Sovereign Spreads and the Political Leaning of Nations*

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Abstract

Nations vary widely in how often they are governed by left-wing governments. Using data from 56 nations over 45 years, we find that the propensity of a nation to elect the left is positively correlated with both the average level and volatility of their sovereign spreads. To explain these facts, we build a quantitative sovereign default model in which two policymakers (left and right) alternate in power. Reelection probabilities are increasing in government spending, with the left having a small advantage (as found in the data). We use variation in the responsiveness of reelection probabilities to government spending in order to create economies that elect the left more or less frequently in equilibrium. We call these the left leaning economy and the right leaning economy. The left leaning economy faces worse borrowing terms due to higher default risk. Moreover, both policymakers have a greater reluctance for fiscal austerity and choose a higher share of government spending as compared to their counterparts in the right leaning economy, which results in lower welfare.

JEL classification: F34, F41.
Keywords: Sovereign default, Interest rate spread, Political turnover, Left-wing, Right-wing, Cyclicality of fiscal policy.

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1 Introduction

Nations vary widely in how often they are governed by left-wing governments – for example, the ruling party in Ecuador is classified as left, 87 percent of the time between 1975 and 2020 by the Database of Political Institutions (DPI) while this occurs only 20 percent of the time in Turkey over the same period. Interestingly, using data from 56 nations over 45 years we find that the propensity of a nation to elect left leaning central governments is positively correlated with both the average level and volatility of their long run sovereign debt yields.

To shed light on the sources of this correlation, we build a quantitative model of a small open economy in which elections determine which of two policymakers (left or right wing) will be in power. Neither of the potential incumbents can commit to repaying the nation's long-term international debt and this default risk causes international lenders to charge a premium over the risk free world interest rate (the spread). The reelection probability of either incumbent policymaker is increasing in popular support, which is itself increasing in the fraction of aggregate output devoted to government spending. Consistent with the political data, left and right governments are modeled as differing in the amount of political support generated by this fiscal choice. Our data indicates that left-wing governments obtain more electoral benefits from increasing public spending than right-wing governments do, and we parametrize the model accordingly.

We use international data on sovereign debt yields, debt-to-GDP ratios, aggregate consumption, government spending, and political variables to calibrate our benchmark model. This benchmark model is also consistent with the stylized facts typically discussed in the quantitative sovereign default literature: private and public consumption are both more volatile than output and positively correlated with it; the trade balance is negatively correlated with GDP; spreads rise with debt levels and fall with output increases, ceteris paribus.

To address the correlation between default risk and the propensity to elect left-wing governments found in the data, we build two variants of the benchmark model which we will call the 'Left leaning' and the 'Right leaning' economies. The Left leaning economy builds in a small equilibrium advantage for left governments in that they win elections slightly more than 50 percent of the time. Conversely, the Right leaning economy has the left winning elections slightly less than 50 percent of the time. These two economies differ only in the value of one

parameter which controls the efficiency with which popular support for an incumbent translates into their reelection probability.

This parameter, which we call election efficiency, is intended to capture the combined influence on reelection probabilities of the myriad institutional differences that exist in the political arena of different nations. For example, due to the presence of political institutions such as an electoral college or a "first-past-the-post" system, changes in popular support may not translate one-for-one into changes in the probability of winning elections. Under both of these institutions, a highly geographically concentrated popular support may be less valuable for reelection prospects than a less concentrated but lower level of support. As such, electoral efficiency might reflect the concentration of certain types of voters in cities versus rural areas, which varies across countries.[1]

We find that a higher election efficiency implies a higher frequency of the left being in power given the built-in political asymmetries discussed above. Moreover, a higher election efficiency incentivizes the incumbent to use government spending to increase popular support. In bad times this makes the incumbent more reluctant to reduce government spending for political reasons, which increases default risk. Thus, election efficiency simultaneously affects the frequency of left-wing incumbents and average spreads, accounting for the observed correlation discussed above. In particular, the mean sovereign spread in the Left leaning economy is slightly more than 100 basis points higher than in the Right leaning economy. It is worth emphasizing that both economies inherit the same popular support parameters for Left and Right incumbents as the benchmark economy and therefore the differences in spread levels come from variation in election efficiency. We also show that the two economies display differing fiscal behavior – the Left leaning economy displays more procyclicality in fiscal policy than the Right leaning economy and this difference is consistent with the data. The differences in election efficiency come with substantial welfare consequences: the representative household in the Left leaning economy would need a permanent increase in consumption of almost 4% to achieve the welfare of the average household in the Right leaning economy. This difference is primarily driven by the higher proportion of public spending relative to private consumption in the Left leaning economy.

[1]We expect the reader can imagine many other features of the political landscape that influence election efficiency. Our aim here is only to provide a general idea of what election efficiency might entail.

We also compare our model with endogenous reelection probabilities with an otherwise identical model in which election probabilities are exogenously fixed. In this latter model, exogenously increasing the probability with which the left policymaker gets reelected (and therefore creating a Left leaning economy) gives the opposite result: Left leaning economies now display lower spreads. The incentives created by making election prospects depend on fiscal choices play a crucial role in affecting default risk, and this relationship is at the heart of our results. We also show that merely introducing differences in the intensity with which left and right policymakers value government spending in this model does not help explain the observed correlation between spreads and frequency with which left policymakers are in power.

Related literature. This paper considers a dynamic stochastic small open economy with incomplete markets, endogenous political turnover, and default risk. It builds on the seminal study on international lending and sovereign default by Eaton and Gersovitz (1981), and on the more recent quantitative models by Aguiar and Gopinath (2006) and Arellano (2008), among others. Like our paper, Cuadra, Sanchez and Sapriza (2010) are interested in the relationship between endogenous fiscal policy and sovereign debt markets but do not make the connection to reelection probabilities that we highlight in this paper.[2]

Our paper is naturally related to the works that merge sovereign default risk with political considerations. Cuadra and Sapriza (2008) introduce exogenous political turnover into sovereign default models and study the role of exogenously varying the reelection probability (which they call political instability) on fiscal policy and default risk. Hatchondo, Martinez and Sapriza (2009) study how the exogenous turnover of politicians with different discount factors (patient vs. impatient) can create default crises (which they call political defaults). D'Erasmo (2011) uses a similar framework but introduces asymmetric information: this gives an incentive to the patient politician to try to separate itself from the impatient one. We build on these three papers and endogenize the reelection probability, making it explicitly dependent on equilibrium fiscal choices. Furthermore, we use our model to explain a novel empirical regularity, the relationship between the propensity of an economy to choose a left government and the average level of its sovereign spread.

[2] Cuadra et al. (2010) show that their model generates procyclical fiscal policy, i.e., government spending increases with output while taxes fall. Our model also generates procyclical fiscal policy.

Like our paper, Scholl (2017) studies the interplay between fiscal policy and endogenous electoral outcomes in a model of sovereign default. Society is polarized between two types of agents who prefer more (L) or less (R) government spending and two parties (L and R) who only govern to maximize the welfare of their supporters. Scholl (2017) focuses on the effects of political instability on debt accumulation and default policies. In contrast, our model does not rely on differences in preferences towards public consumption to generate political heterogeneity between left and right. Instead, we estimate a simple reelection process and our estimates imply that the left has a higher marginal political gain from increasing government spending than the right. As a robustness exercise (see section 5.5), we also show that differences in preferences toward public consumption cannot account for the motivating facts that our paper focuses on. While Scholl (2017) has a fully micro-founded probability of winning elections, this unfortunately leads to the right having a higher probability of winning elections. Unfortunately, this is in contrast with the international data where the left is more likely to be in power. The focus of the two papers is also different. While we highlight the correlation between left propensity of a country and its sovereign spreads, which is driven by differences in electoral efficiency, Scholl (2017) emphasizes differences in debt and default policies of left and right policymakers who disagree on the relative importance of public versus private consumption in one economy. [3]

The sovereign default model of Chatterjee and Eyigungor (2019) also features elections where the outcome depends on the utility of voters. This utility depends on an exogenous process governing the growth regime in place which randomly fluctuates between high and low growth states. In effect the reelection probability of an incumbent is state contingent, but exogenous which is in contrast to our work as well as Scholl (2017). Chatterjee and Eyigungor (2019) also differs from our model because governments in office have the ability to obtain private benefits in the process of providing public goods. The threat of lower private benefits from losing power makes the incumbent behave myopically in bad times relative to good times. This time-varying level of patience leads to increased volatility in the sovereign spread. Reelection probabilities also vary over time in our model as cyclical government spending influences popular support.

[3] In Scholl (2017), the party that prefers higher government spending has an inbuilt economic disadvantage due to the presence of distortionary taxation and this plays a role in reducing their ability to repay debt. We eschew this feature in order to focus on a purely political source of difference between the two policymakers.

In contrast to our model, the two policymakers in Chatterjee and Eyigungor (2019) are not heterogeneous.

Andreasen, Sandleris and Van der Ghote (2019) studies default incentives in a model of sovereign debt with income inequality, heterogeneous taxation and political constraints that limit which fiscal programs are implementable. The model does not feature elections between two policymakers. Other related work includes Herrera, Ordoñez and Trebesch (2020) who focus on the interaction between political booms (i.e., increases in popularity) and financial crises; and Chang (2007) who studies the interaction of political frictions and debt repayment in a stylized model of information asymmetry and conflict between the government and the public. Azzimonti and Mitra (2023) study the role of endogenously varying political constraints in influencing default risk. They show that measures of political constraints are negatively correlated with sovereign spreads and introduce legislative bargaining over fiscal policy following Battaglini and Coate (2008) into a sovereign default framework to explain this feature of the data. Representatives of different regions bargain over taxes, spending on a public good used by all as well as region-specific public goods. The political constraint is captured by the number of votes needed to pass a policy proposal which is a stochastic process. In contrast, in our model government spending increases the reelection probability of the incumbent policymaker and this creates a reluctance to cut spending when output is low for political reasons. While Azzimonti and Mitra (2023) focuses on the variation in default risk over time as political constraints become tight or loose, our work is more focused on international differences in default risk driven by the efficiency of the electoral system in different economies. Acharya, Rajan and Shim (2022) provide a model in which myopic governments incur wasteful spending while taxing output and issuing debt both domestically and to foreign lenders. Their model differs from ours in many ways. First policymakers in our model value government spending using household's preferences. Nonetheless, because re-election probabilities depend on government spending, they inflate public consumption. Second, the presence of domestic bond-holders creates different sources of default costs. Acharya et al. (2022) emphasize that endogenous private saving in their model can create incentives for the government to lower taxes, increase future repayment abilities, and borrow more, thus effectively increasing their time horizon. At the same time, higher taxes increase domestic bond holdings which increases the desire to repay. They show how differences in the propensity to save of its citizens can affect whether foreign

debt is beneficial to the economy or not. Neither of these recent papers have elections where the probability of winning is related to the fiscal choices of the incumbent.

Finally, we also relate to the vast literature on the political economy of government debt. The work of Alesina and Tabellini (1990), Persson and Svensson (1989), and Battaglini and Coate (2008) are key references from this branch of the literature.[4] A closely related paper is the one by Müller, Storesletten and Zilibotti (2016) who study a political-equilibrium model with switches between left and right-wing governments. The main difference with our work is that Müller et al. (2016) abstract from sovereign default.

Layout. Section 2 presents our empirical findings. Section 3 introduces a quantitative model of sovereign borrowing, default and political elections. Section 4 discusses the calibration of the model. Section 5 explains the main results and quantitative implications of the theory. Section 6 concludes. An appendix containing details about our data as well as showing robustness of our results can be found at the end of the manuscript.

2 Motivating evidence

In this section we document a novel stylized fact: there exists a positive correlation between the frequency with which a nation elects a left government and its average sovereign spread.[5]

Data description. We combine information on macroeconomic, financial, and fiscal variables from standard sources (various International Monetary Fund and World Bank databases), information on country sovereign spreads (JP Morgan's EMBI Global and country specific bond yield data), and information on the political affiliation of national governments from the IDB's Database of Political Institutions (DPI, Cruz, Keefer and Scartascini, 2021). The first two sets of data sources are frequently used and well understood, but the last one deserves further description. The IDB's DPI provides us with a harmonized classification of political parties into either Left-wing or Right-wing. The DPI assigns a party's orientation as right (R) if the party is defined as conservative, Christian democratic, or simply 'right-wing.' On the other

[4] Yared (2010) and Ilzetzki (2011) are more recent contributions showing how political distortions can lead to inefficient debt accumulation. See Alesina and Passalacqua (2016) for a recent literature review.

[5] Our work builds on a vast empirical literature relating political factors to default risk. See Hatchondo and Martinez, 2010 for an extensive review of this literature.

hand, a party's orientation is assigned as left (L) if the party is defined as communist, socialist, social democratic, or simply 'left-wing.' We also use DPI's data on election dates to infer, from changes in the incumbent, the results of the electoral process.

We start with a large number countries and restrict our sample to keep only countries for which we have data on the political stance (L versus R), the sovereign spread, the debt level, government spending, private consumption, and the trade balance. This process leaves us with a dataset of 56 countries over the period 1975–2020. We are interested in uncovering the long run correlation between the propensity of a nation to elect a left government (left-propensity henceforth) and its average sovereign spread. As a result we average the data over the sample period for each country. We define left-propensity as the fraction of time (over the sample period) that a given country spent under a left wing central government. Appendix A provides further details about all our data sources.

Sovereign spreads and left-propensity. We use the aforementioned dataset to document two primary motivating stylized facts: a higher left-propensity of a nation goes together with a higher *(i)* level and *(ii)* volatility of its sovereign spreads.

Since spreads have been shown to be correlated with a number of other factors, we uncover the correlations of interest by conditioning on these factors using cross-country regressions of the following form:

$$\text{DV}_i = \xi_0 + \xi_1 \,\text{Left.Prop}_i + \xi_2' \,\mathbf{X}_i + \xi_3' \,\mathbf{M}_i + \epsilon_i, \tag{1}$$

where DV_i is either the average level or volatility (in standard deviations) of the sovereign spread for country i (measured in basis points) and Left.Prop_i is the left-propensity measure discussed above. $\mathbf{X}_i$ is a vector of the most theoretically relevant control variables in this context of studying average spreads: the average debt-to-GDP ratio and the volatility of real GDP as measured by its standard deviation over the sample period. In addition, instability in the political process of some countries may cause spreads to increase so we include the average value of another political variable called the government stability index obtained from the International Country Risk Guide (ICRG) database. This captures the long-term ability of governments in country i to stay in power and pursue their agenda. Vector $\mathbf{M}_i$ includes additional controls such as the level of the fiscal surplus, and the fraction of time the country

Table 1: Spread regressions

Dep. variable:	Spread level			Spread volatility		
	(1)	(2)	(3)	(4)	(5)	(6)
Left.Prop	235.64**	235.07**	184.15**	288.08**	313.73**	281.30*
	(100.52)	(96.09)	(85.03)	(127.06)	(145.75)	(157.87)
Debt/GDP		6.44**	3.31		4.66	1.98
		(2.70)	(2.99)		(4.39)	(5.47)
GDP volatility		57.94	53.10*		106.26	97.95
		(35.06)	(31.17)		(71.22)	(66.60)
Gov. stability		-118.14	-121.78*		-116.50	-126.93
		(74.03)	(70.39)		(106.43)	(109.88)
(Intercept)	142.72***	795.50	792.54	98.96*	631.63	658.52
	(45.98)	(566.40)	(538.29)	(50.49)	(788.90)	(795.98)
Num.Obs.	56	53	53	56	53	53
R2	0.044	0.323	0.400	0.019	0.122	0.143
Other controls?	No	No	Yes	No	No	Yes

Note: Robust standard errors are reported in parentheses. The volatilities of spreads and GDP are their respective standard deviations. The other covariates included in columns (3) and (6) control for the fiscal surplus, the exchange rate regime, and the history of default crises. *p<0.1; **p<0.05; ***p<0.01.

spent in a fixed exchange rate regime. In addition, we create a variable that captures the number of default crises events occurring in a country, based on information from Catão and Mano (2017), and also include this in the vector $\mathbf{M}_i$. Finally, ϵ_i is a random error term.[6]

The left panel of Table 1 displays the results for the spread level and the right panel for the spread volatility regressions, each considering three different specifications. We begin with the spread level regressions. The main conditional correlation of interest is the coefficient of 'Left.Prop' which lies between 235 and 184 basis points and is significant in all specifications. Consistent with economic theory and previous studies, the spread level is higher when a nation carries a higher average ratio of debt-to-GDP and displays a more volatile GDP. Finally, more stable governments display lower average spreads (these latter coefficients do not always meet conventional significance levels as specifications change but display the expected signs). Inclusion of additional controls in specification (3) lowers the relationship between the spread level

[6]Naturally, there exist a vast and well-known empirical literature that explores the cyclical determinants of sovereign spreads. Instead, our focus is on long-term differences in spread levels and volatility's among nations, in which the time variation is averaged out. As such many variables capturing short-term domestic and global conditions (whose effect on the spread is well understood) are absent from our specifications.

and left-propensity below 200 basis points. In Appendix B, we provide further robustness by including other variables that capture the institutional quality and socio-economic conditions of nations.[7] Turning to the spread volatility regressions, the left-propensity coefficient is also positive and significant in all specifications (4)–(6).[8]

Having established the positive correlation between left-propensity of a nation and the level and volatility of its sovereign spreads, we turn to a quantitative theory of political turnover, fiscal policy and default incentives that is able to rationalize these empirical findings.

3 The Model

We consider a small open economy populated by a continuum of households. There are also two policymakers (L and R) who alternate in power.[9] The economy trades long-duration non-state-contingent bonds with a mass of competitive foreign lenders and has no commitment to repaying its debts. We use recursive notation, where *un-primed* variables (e.g. x) represent current values, while *primed* variables (e.g. x') represent next-period values. Time is discrete and goes on forever.

3.1 Households

The representative household derives utility from the consumption of both private (c) and public (g) goods according to the following per-period utility function:

$$U(c, g) = \alpha\, u(c) + (1 - \alpha)\, u(g), \tag{2}$$

where the function $u(\cdot)$ is of the CRRA type:

$$u(x) = \frac{x^{1-\gamma} - 1}{1 - \gamma}, \qquad \text{for } x = \{c, g\}, \tag{3}$$

[7] We also show that the inclusion or exclusion of centrist governments from the data leaves our findings intact. Appendix A provides details on the data.

[8] In related and contemporaneous work, Brooks, Cunha and Mosley (2022) find that elections won by left wing parties are associated with higher spread volatility.

[9] These policymakers are office-motivated (i.e. they prefer to be in power than not) and when in power they have per-period utility functions that are identical to the households' preferences. Past work has modeled political differences through variation in the preference for public consumption over private consumption. We eschew this approach in the main model in order to focus on one source of political difference between left and right that obtains from the impact of fiscal choices on reelection probabilities as discussed earlier. In the robustness section, we show that differences in preferences on their own cannot explain our empirical regularities.

where parameter γ controls the degree of relative risk aversion (common across goods).

Households receive a stochastic stream of tradable income y which is assumed to have compact support $\mathcal{Y} \subset \mathbb{R}_{++}$ and to follow a Markov process. They also face a proportional income tax (transfer) rate, τ, which is decided by the government and may be time-varying.[10] As it is typical in the models following Eaton and Gersovitz (1981), the households are hand-to-mouth agents: the government does all the intertemporal smoothing for them and implements the desired allocation via changes in the tax rate. Therefore the budget constraint of the households is just given by

$$c = (1 - \tau)y \,.$$

In case of a government default the households suffer an income loss ($\Phi(y) \geq 0$), and hence their budget constraint is

$$c = (1 - \tau) \left[y - \Phi(y)\right] \,.$$

3.2 Political Turnover

An election may occur in any period with an exogenous probability π. If an election occurs, the incumbent policymaker may be replaced by the other policymaker. This is similar to the way elections are modeled in Chatterjee and Eyigungor (2019) and Scholl (2017).

Since our goal is to understand the implications of electoral differences between Left and Right on sovereign debt markets rather than to explain why these political differences exist, we choose not to embed a full-blown model of electoral competition. Instead, we endogenize political turnover through a technology that governs the probability of winning elections. In this, we are guided by evidence (discussed later) illustrating that the reelection probability of incumbents depends on fiscal choices (in particular, higher fiscal spending is associated with higher reelection probabilities). We model this reelection technology with an eye on the available political data and it consists of two functions.

First, we let ps_i denote 'popular support' of a given policymaker and we model it as an

[10] We model income as an exogenous process in order to switch off well-understood links between tax distortions and default risk. See, for example, Cuadra et al. (2010) and Sosa-Padilla (2018).

increasing function of the government spending-to-income ratio:[11]

$$ps_i = ps_i(g/y), \quad \text{with} \quad ps_i'(g/y) > 0 \quad \text{and} \quad i \in \{L, R\}\,. \tag{4}$$

One possible way to understand this relationship is an environment with under-provision of public goods to swing voters. Imagine an economy with two political parties, L and R, with their respective bases. If there exist some swing voters in these bases (i.e., voters who are loosely attached to the party that they ideologically identify with), then incumbents can use fiscal policy to attract their support. Differences in the prevalence of swing voters across L and R bases can lead to differences in the slope of $ps(g/y)$. A simple political-economy model of popular support with two parties and their respective bases can be found in Appendix D. We show that in such a framework, popular support is increasing in government spending despite the voters understanding the tax implications of this higher spending.

Second, we assume a mapping between popular support and reelection probability, $P_i(ps)$, with $P_i'(ps) > 0$ for $i \in \{L, R\}$. Looking ahead, we note that our modelling of the political process implies an equilibrium relationship between reelection probabilities and the debt and default decisions of the incumbent. In section 4, we present supporting evidence for both these relationships.[12]

3.3 Government finances

The government borrows from a large pool of international investors by issuing long-duration bonds. As in Hatchondo and Martinez (2009), a bond issued in period t promises an infinite stream of coupons, which decrease at a constant rate δ.[13] In particular, a bond issued in period t promises to pay $\kappa(1-\delta)^{j-1}$ units of the tradable good in period $t+j$, for all $j \geq 1$. Hence, debt dynamics can be represented as follows:

$$b' = (1-\delta)b + \nu,$$

[11] Equation (4) implies that voters understand that recessions reduce fiscal room for the government and do not punish proportional reductions in government spending.

[12] Moreover, Appendix C shows that the model results are robust to a richer specification in which popular support is also increasing in output growth.

[13] Arellano and Ramanarayanan (2012) and Hatchondo, Martinez and Sosa-Padilla (2016) allow the government to issue both short-term and long-term debt, and study optimal maturity.

where b refers to the number of coupons due at the beginning of the current period, ν to the number of long-term bonds issued in the current period, and b' to the number of coupons due at the beginning of next period. The advantage of this payment structure is that it enables us to condense all future payment obligations derived from past debt issuances into a one-dimensional state variable: the payment obligations that mature in the current period.

If the government decides to repay its debt obligations, it also needs to choose a combination of taxes and debt issuance in order to finance its expenditures (coupon payments plus public consumption). Therefore, the government budget constraint under repayment is

$$g + \kappa b = \tau y + [b' - (1 - \delta)b]\, q(b', g, y)\,, \tag{5}$$

where $q(b', g, y)$ is the per-bond price of the long-duration non-state-contingent government debt and κ is a parameter that controls the size of the per-bond coupon payment. Given that there is lack of commitment to financial obligations, the government may choose to default on its debt. If so, it will face financial exclusion for a random number of periods, and its budget constraint while in autarky is

$$g = \tau\,[y - \Phi(y)]\ . \tag{6}$$

3.4 Determination of government policies

Each period, conditional on being in good financial standing, incumbent $i \in \{L, R\}$ chooses whether to honor its outstanding foreign debt or default. Let d denote the current-period default decision. We assume that d is equal to 1 if the government defaulted in the current period and is equal to 0 if it did not. Let V_i denote the policymaker's value function at the beginning of a period, that is, before the default decision is made. Let V_i^0 denote the value function of a sovereign not in default. Let V_i^1 denote the value function of a sovereign in default.

For any bond price function q_i, the function V_i satisfies the following functional equation:

$$V_i(b, y) = \max_{d \in \{0,1\}} \Big\{ d\, V_i^1(y) + (1 - d)\, V_i^0(b, y) \Big\}. \tag{7}$$

When incumbent i has access to financial markets it chooses public spending, the tax rate

and foreign debt in order to solve the following problem:

$$V_i^0(b,y) = \max_{\tau,g,b'} \left\{ U\big((1-\tau)y, g\big) + \beta \mathcal{P}_i \, \mathbb{E}_{y'|y} V_i(b',y') + \beta \left(1-\mathcal{P}_i\right) \, \mathbb{E}_{y'|y} \overline{V}_i(b',y') \right\} \tag{8}$$

subject to

$$g + \kappa b = \tau y + q_i(b',g,y)\left[b' - (1-\delta)b\right] \,,$$

$$\mathcal{P}_i \equiv 1 - \pi + \pi P_i(ps) \,, \text{ and} \tag{9}$$

$$ps = ps_i(g/y) \tag{10}$$

where $\beta \in (0,1)$ is a discount factor common across agents and $\mathcal{P}_i$ can be understood as the probability that incumbent i will be in office in the next period (and it is a function of both exogenous and endogenous variables). The value function of policymaker i when it is not in power and the country is in good financial standing is $\overline{V}_i(b,y)$, and will be defined shortly (and similarly for when in autarky). When the government defaults the country gets excluded from international financial markets and the economy suffers an income loss. The problem is:

$$V_i^1(y) = \max_{\tau,g} \Bigg\{ U\big((1-\tau)\left(y - \phi(y)\right), g\big) + \beta \mathcal{P}_i \mathbb{E}_{y'|y} \Big[\theta V_i(0,y') + (1-\theta) V_i^1(y') \Big] \\ + \beta \big(1-\mathcal{P}_i\big) \mathbb{E}_{y'|y} \Big[\theta \overline{V}_i(0,y') + (1-\theta) \overline{V}_i^1(y') \Big] \Bigg\} \tag{11}$$

subject to

$$g = \tau\left(y - \Phi(y)\right), \text{ (9), and (10).}$$

The economy gets excluded from international credit markets in the default period, but it could regain access in any future period with probability θ. When the economy returns to credit markets, it does so without a debt burden (a feature captured by the zero in the value functions $V_i(0,y')$ and $\overline{V}_i(0,y')$). Alternatively, the economy remains in autarky with probability $1-\theta$.

Value while not in power. If policymaker i is not in power, then $\overline{V}_i(b,y)$ depends on the decisions of the opponent policymaker (who is now the incumbent). Let $\overline{V}_i^0(b,y)$ represent the value function of policymaker i when not in power and the country repays the debt, and $\overline{V}_i^1(y)$ when the country defaults. Optimal decisions of the opponent are denoted by $-i$. Hence, the

value functions of policymaker i while not in office are given by

$$\overline{V}_i^0(b,y) = \chi\, U(c_{-i}, g_{-i}) + \beta \mathcal{P}_{-i} \mathbb{E}_{y'|y} \overline{V}_i(b'_{-i}, y') + \beta\,(1-\mathcal{P}_{-i})\,\mathbb{E}_{y'|y} V_i(b'_{-i}, y') \tag{12}$$

$$\overline{V}_i^1(y) = \chi\, U(c_{-i}, g_{-i}) + \beta \mathcal{P}_{-i} \mathbb{E}_{y'|y} \Big[\theta \overline{V}_i(0,y') + (1-\theta)\overline{V}_i^1(y')\Big] + \beta\big(1-\mathcal{P}_{-i}\big)\mathbb{E}_{y'|y}\Big[\theta V_i(0,y') + (1-\theta)V_i^1(y')\Big] \tag{13}$$

where

$$\overline{V}_i(b_{-i}, y) \equiv \big(1 - d_{-i}(b_{-i}, y)\big)\overline{V}_i^0(b_{-i}, y) + d_{-i}(b_{-i}, y)\overline{V}_i^1(,y)\,, \tag{14}$$

with $\mathcal{P}_{-i}$ defined analogously to $\mathcal{P}_i$. Therefore, the value of being outside of office is the sum of (i) a potentially reduced flow utility (with parameter $\chi \in (0,1]$ controlling the relative disutility of not being in power), and (ii) a continuation value that takes into account the possibility of winning future elections and coming back into office.[14]

3.5 Foreign Lenders

Foreign lenders are risk neutral and discount time at rate r, which is the international risk-free interest rate. Lenders have perfect information about the income process of the small open economy and each policymaker's reelection function. Bonds are priced in a competitive market inhabited by a large number of identical lenders, which implies that bond prices are pinned down by a zero expected profit condition. The risk of default (of both types of government) and the reelection probability of the current incumbent i are both taken into consideration by foreign lenders when pricing the sovereign bond:

$$\begin{aligned} q_i(b',g,y) \;=\; & \frac{\mathcal{P}_i}{1+r}\,\mathbb{E}_{y'|y}\left[1-\hat{d}_i\left(b',y'\right)\right]\left[\kappa + (1-\delta)\,q_i\left(\hat{b}_i(b',y'),\hat{g}_i(b',y'),y'\right)\right] \;+ \\ & \frac{1-\mathcal{P}_i}{1+r}\,\mathbb{E}_{y'|y}\left[1-\hat{d}_{-i}\left(b',y'\right)\right]\left[\kappa + (1-\delta)\,q_{-i}\left(\hat{b}_{-i}(b',y'),\hat{g}_{-i}(b',y'),y'\right)\right] \end{aligned} \tag{15}$$

with $\{\hat{d}, \hat{b}, \hat{g}\}$ denoting future policy rules that lenders expect the two governments will follow.

Equation (15) indicates that if the country defaults, the lenders get nothing. However, if

[14] Note that in the quantitative implementation we scale mean income to guarantee that flow utility is always positive and therefore $\chi \in (0,1]$ actually implies that flow utility while out of office is not larger than while in office.

the country repays the lenders get the coupon payment (κ) and the bond still has a residual market value ($(1-\delta)q'$). Since there is uncertainty regarding who will be in office next period, the equilibrium price is a weighted average over the two possible future incumbents.

Our pricing function is a natural extension of the ones found in standard models of sovereign debt with long-duration debt (e.g., Hatchondo and Martinez, 2009). The main difference is that government spending choices matter for the bond price since they affect reelection probabilities.

3.6 Recursive equilibrium definition

Definition 1 (Markov perfect equilibrium)**.** *A Markov perfect equilibrium is defined by value functions* $\left\{V_i(b,y), V_i^0(b,y), V_i^1(y), \overline{V}_i(b,y), \overline{V}_i^0(b,y), \overline{V}_i^1(y)\right\}_{i\in\{L,\,R\}}$ *, associated policy functions* $\left\{d_i(b,y), g_i^0(b,y), g_1^1(y), \tau_i^0(b,y), \tau_i^1(y)\right\}_{i\in\{L,\,R\}}$*, reelection probability functions* $\{P_i(ps), ps_i(g/y)\}_{i\in\{L,\,R\}}$*, and a set bond price schedules* $q_i(b',g,y)$ *for* $i \in \{L,\ R\}$ *such that*

1. *given policy functions, the bond price function* q_i *is given by equation* (15)*; and*
2. *the policy functions solve the dynamic programming problem defined by equations* (7) – (14)*, when the government can trade bonds at* q*.*

4 Quantitative Analysis

We solve the model using value function iteration and interpolation (Hatchondo, Martinez and Sapriza, 2010). In our benchmark paramaterization we are guided by our data on 56 countries. A period in the model refers to a year.

We split the parameters of the model into two groups. The first group of parameters (those in the top part of Table 4) can either be directly estimated from the data or follow the values that are typically used in the literature. The second group of parameter values (those in the bottom part of Table 4) are set by simultaneously matching key moments from the data.

We assume a coefficient of relative risk aversion of 2 and a discount factor of 0.96, which are both standard values. Regarding the financial market parameters, the risk-free rate is set to 4% annually, also a standard value in literature. The probability of reentry into international financial markets is chosen to be 15.4%, so that the government remains excluded for a period of six and a half years after a default episode, on average (Chatterjee and Eyigungor, 2012).

We set $\delta = 0.142$. With this value and our target for the average spread, bonds have an average duration of 5 years in the simulations, which is roughly the average debt duration found in previous literature.[15]

We assume that y follows a log-normal AR(1) process:

$$\log(y_t) = (1-\rho)\mu + \rho \log(y_{t-1}) + \epsilon_t,$$

with $|\rho| < 1$, and $\epsilon_t \sim N(0, \sigma^2)$. The persistence and volatility parameters are estimated for each country in our dataset. We then use the median of these values.[16] As in Chatterjee and Eyigungor (2012), we assume a quadratic loss function for income during a default episode $\Phi(y) = \max\{y[\lambda_0 + \lambda_1[y - \mathbb{E}(y)]], 0\}$.

Estimation of the reelection technology. As explained in section 3, we postulate a re-election technology in two steps, taking advantage of available political data. First, we propose a simple linear model for the relationship between popular support and government spending. Namely, we estimate

$$ps_{jt} = \psi_1 \text{ Gov.Spending-to-GDP}_{jt} + \psi_2 \text{ Left}_{jt} \times \text{Gov.Spending-to-GDP}_{jt} + \psi_{0,t} + \epsilon_{jt} \qquad (16)$$

where j indexes the countries, t the years, 'Left_{jt}' is an indicator variable taking a value of one if the country j is under a left wing government in year t (and zero otherwise), and ϵ_{jt} is an error term. It is important to include time effects in order to account for international 'waves' of support for incumbents. For example, a global recession could lower the level of support for all incumbent governments, holding other things constant. To estimate (16) we use the 'Popular support' sub-index from the International Country Risk Guide (ICRG) database (ICRG Researchers, 2013).[17] Table 2 presents the estimates of ψ_1, ψ_2 and the (mean of the)

[15] Using a sample of 27 countries, Cruces, Buscaglia and Alonso (2002) find an average duration of 4.77 years, with a standard deviation of 1.52 years. Bai, Kim and Mihalache (2017) report an average debt duration of 6.7 years in a panel of 11 economies. We use the Macaulay definition of duration which, with our coupon structure, is given by $D = (1+i^*)/(\delta + i^*)$, where i^* denotes the constant per-period yield delivered by the bond.

[16] As in Arellano (2008), we scale income so that it has a mean value of 10. This guarantees that flow utility is always positive in our simulations, and hence $\chi < 1$ indeed captures a utility penalty of being out of office.

[17] The 'Popular support' sub-index from ICRG is normalized relative to its highest value of 4.

ψ_0's which are then used as parameters in our model.[18] We explore the robustness of our specification for (16) in Table C.3 of Appendix C. We add a number of explanatory variables to account for other economic factors that may affect the popularity of an incumbent government such as output growth and inflation. We find that the main features seen in Table 2 (i.e., that popularity is increasing in the share of government spending and that this effect is stronger for left-wing governments) are robust to these additions.[19]

Table 2: Popular support estimation

Dep. variable:	Popular support
Gov.Spending/GDP	0.481***
	(0.149)
Left × Gov.Spending/GDP	0.243***
	(0.081)
Mean of Time Effects	0.48
Num.Obs.	492
Num.Countries	45
Num.Years	15
R2	0.084

Note: standard errors are clustered at the year level and are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

In the second step, we use election data to obtain estimates of the elasticities of the reelection probabilities with respect to popular support, for both L and R incumbents. In particular, we estimate the following simple linear probability model

$$\text{Prob. of reelection}_\ell = \phi_0 + \phi_1 \, \text{ps}_\ell + \phi_2 \, \text{Left}_\ell \times \text{ps}_\ell + \mathbf{e}_\ell \,, \tag{17}$$

where ℓ indexes the election events in our dataset, 'ps' stands for popular support (as above), and $\mathbf{e}$ is an error term.[20] Table 3 presents the estimation results. We then use the estimated ϕ's and convert them into elasticities by dividing them with the observed ratio of reelection probabilities to popular support for left (1.18) and right (1.08) in our dataset. The estimated

[18] That is to say, in solving our model we use the prediction coming out of (16):

$$\hat{ps} = \mathbb{E}(\hat{\psi}_0) + \hat{\psi}_1 \, g/y + \hat{\psi}_2 \, \text{Left} \times g/y.$$

[19] Appendix C shows that the results of our quantitative model (discussed in the next section) are also robust using an extended version of equation (16).

[20] Including year dummies produces almost identical results.

elasticities are 0.95 for the left and 0.72 for the right. This result that the left government gains more political support from increasing public spending is consistent with a simple model of popular support that we present in Appendix D and with a large empirical political science literature.[21]

We specify a decreasing returns to scale function with invariant elasticities for $P_i(ps)$

$$P_i(ps) = A\, ps^{\omega_i} \quad \text{for } i \in \{L, R\}\,, \tag{18}$$

and calibrate ω_L and ω_R using the estimated elasticities above. The parameter A, which we call 'election efficiency,' is common across policymakers. As we explain below, we calibrate A, along with four other parameters, to match certain moments from our data. We will later vary A around its calibrated value in order to generate different economies with varying propensities to elect L governments (see section 5 below for details).

Table 3: Probability of reelection estimation

Dep. variable:	Prob. of reelection
Popular support	0.780***
	(0.293)
Left × Popular support	0.339**
	(0.152)
(Intercept)	0.077
	(0.163)
Num.Obs.	109
R2	0.145

Note: *p<0.1; **p<0.05; ***p<0.01.

Targeted moments. The calibration strategy described so far leaves us with five parameters to assign values to: the parameters of the income cost of default (λ_0, λ_1), the utility weight on public consumption ($1-\alpha$), the out-of-office scale parameter (χ), and the election efficiency (A). We jointly target the following five moments from the data: (i) a mean external debt-to-

[21] Levitt and Snyder (1997) find that federal spending benefits congressional incumbents in the US. Evidence of strategic government spending has also been found in Canada (Landon and Ryan, 1997), Chile (Cerda and Vergara, 2008), India (Arulampalam, Dasgupta, Dhillon and Dutta, 2009), Mexico (De La and Ana, 2013), and Sweden (Dahlberg and Johansson, 2002; Johansson, 2003). Shin (2016) finds that the effect of welfare spending on the incumbent's vote share is stronger for the left.

GDP ratio of 41%, (ii) a mean sovereign spread of 3.1%, (iii) a mean government spending-to-consumption ratio of 30%, (iv) an ex-ante probability of incumbents winning elections of 67%, and (v) a mean popular support of 61%.[22] Table 4 presents all parameter values.[23]

Table 4: Parameter values.

Parameter	Description	Value
r	Risk-free rate	0.04
β	Discount factor	0.96
γ	Coefficient of relative risk aversion	2.00
δ	Coupon decay rate	0.142
κ	Bond coupon	$(r+\delta)/(1+r)$
θ	Probability of re-entry	0.154
π	Probability of elections	0.25
ρ	Autocorrelation of $\log(y)$	0.90
σ	Std. dev. of innovation to $\log(y)$	0.03
μ	Mean log income	$(-1/2)\sigma^2$
ω_L	Elasticity of P for L	0.95
ω_R	Elasticity of P for R	0.72
$\hat{\psi}_1$	Popularity slope	0.481
$\hat{\psi}_2$	Popularity slope	0.243
$\mathbb{E}\left(\hat{\psi}_0\right)$	Popularity intercept	0.483
	Parameters set by simulation	
λ_0	Default cost parameter	0.125
λ_1	Default cost parameter	1.15
$1-\alpha$	Utility weight on g	0.035
χ	Out-of-office scale parameter	0.830
A	Election efficiency	0.98

Model fit. Table 5 shows statistics from the data and the model. As is clear from the top panel of this table, our benchmark calibration gives a very close fit to the targeted moments.

[22] We calculate the probability of an incumbent winning an election in two steps. First, we identify all election dates using data from the DPI. Second, we check whether the political label of the incumbent party changes with the election. Conditional on an election, 67% of the time we see no change in the political leaning of the ruling party. See Appendix A for further details.

[23] It may be worth noting that the calibrated utility weight on government spending is 3.5% ($1-\alpha = 0.035$) which is lower than the values typically used in the business cycle literature. To understand this value, note that in a model in which government spending does not affect the incumbent's reelection prospects, the optimality condition reads as

$$\frac{g}{c} = \left(\frac{1-\alpha}{\alpha}\right)^{1/\gamma},$$

where γ is the coefficient of relative risk aversion. In order to calibrate $1-\alpha$ to the observed ratio of $g/c = 0.3$, and using the typical value of $\gamma = 2$, this condition requires that $1-\alpha = 0.08$. In our model, where incumbents have a political incentive to expand government spending, the utility weight on g needs to be somewhat lower to match the observed ratio g/c.

Table 5: Data and model statistics.

	Data	Model
Targeted moments		
Mean s (in %)	3.1	3.1
Mean Debt/GDP	.41	.41
Mean G/C	.30	.30
Mean prob. winning elec.	.67	.66
Mean popular support	.61	.62
Non-targeted moments		
$\sigma(s)$ (in %)	2.6	1.9
$\sigma(G/GDP)$ (in %)	2.0	2.0
$\sigma(C)/\sigma(GDP)$	1.1	1.3
$\rho(GDP, s)$	-.32	-.71
$\rho(GDP, G)$	.47	.77
$\rho(GDP, C)$	.79	.84
$\rho(GDP, TB/GDP)$	-.22	-.80

Note: $\sigma(x)$ and $\rho(x, z)$ denote the standard deviation of variable x and the correlation coefficient between variables x and z, respectively. C is private consumption, G is government spending, TB is the trade balance, and s is the sovereign spread. For GDP, private consumption, and government spending we report statistics for the deviations from a log-quadratic trend; for the trade balance we use a quadratic trend, and for the spread, we use its level.

Table 5 also shows that our model produces business cycle statistics that are consistent with the data for non-targeted moments. In particular, the model delivers (i) spread volatility that is slightly lower than seen in the data, (ii) volatility of the government spending share that is close to the data, and (iii) relative consumption volatility that is above 1. Turning to the cyclical behavior of the model time series we obtain (i) countercyclical spreads, (ii) procyclical government spending, (iii) procyclical consumption, and (iv) a countercyclical trade balance. All of these are empirical regularities typically accounted for in the open economy business cycle literature.

Having established that the benchmark calibration of the model does a good job accounting for the usual empirical features discussed in the literature, we now use it to help shed light on the relationship between Left-propensity of a nation and its sovereign spread.

5 Left-propensity, fiscal policy and spreads

We begin this section with an explanation of how we use our framework to create model economies that display different levels of Left propensity. We then use these model economies to generate data that can shed light on the economic forces that underlie the main empirical regularities documented earlier – countries with a higher Left-propensity tend to pay higher and more volatile spreads. Next, we explore two testable implications of our theory: (i) that a higher election efficiency (A) is associated with higher spreads, and (ii) that economies with higher Left-propensity run more procyclical fiscal policies. We find both to be consistent with our international data. We then study the welfare implications of different levels of Left propensity and find substantial gains of moving to an economy with a lower Left propensity (due to a lower A).[24] Finally, to highlight the importance of endogenous turnover for our results, we show how an otherwise identical model with exogenous turnover is at odds with the data.

5.1 Generating variation in 'Left-propensity'.

In order to use our framework to generate model economies that vary in left-propensity we vary the election efficiency parameter A symmetrically around its calibrated benchmark value (0.98) according to the following steps. First, we subset our panel data into left leaning and right leaning groups of countries. We then compare the relative increase in average reelection probability between the two groups and we find that $P_{\text{left\_leaning}}/P_{\text{right\_leaning}} = 1.2$. Next, we find the two values of A around the benchmark value of 0.98 such that the high A economy generates a reelection probability that is 20% higher than the low A economy (while also generating a left-leaning economy at the high value of A and a right-leaning economy at the lower value of A).[25] These values are $A = 0.90$ and $A = 1.06$.[26]

Variation in A (across economies) implies that the same level of popular support for the

[24] It may be worth emphasizing that voters take the political landscape in their country (captured by A) as given when voting. While the higher welfare associated with the Right leaning economy creates an incentive for institutional change, this is beyond the scope of the present model.

[25] Model economies that vary only on these values of A may be interpreted as representing the average of each type of country in our data with the caveat that by construction, we are only changing one parameter relative to the benchmark as opposed to creating two full calibrations in order to clarify the pure role of election efficiency.

[26] In previous versions (see Cotoc, Johri and Sosa-Padilla, 2023) we explored the impact of larger differences in A between the left leaning and right leaning economies. As expected, this resulted in larger differences in outcomes: more variation in reelection probabilities and in left propensity, wider gaps in spreads, government spending ratios and therefore welfare.

incumbent can lead to higher or lower reelection probabilities. As discussed in the Introduction, A succinctly captures the combined influence on reelection probabilities of the myriad institutional differences that exist in the political arena of different nations. In addition to institutions such as electoral colleges or "first-past-the-post" systems discussed in the Introduction, cross-country variation in A could reflect variation in the willingness to vote or the difficulty in getting to polling stations due to voter suppression methods or other electoral manipulations. We expect readers can imagine many other features of the political landscape that influence A beyond the examples above, however, our aim here is only to provide a general idea of what election efficiency might entail.

Why does variation in A generate variation in left propensity? In order to understand this note that as election efficiency increases, policymakers realize that a unit increase in popular support translates into larger gains in reelection prospects. This, in turn, incentivizes them to increase the share of government spending which is the only way they can influence popular support in the model. In other words, a higher A translates into "more political bang for their fiscal buck." As a result, changing the election efficiency of an economy has a direct effect on reelection probabilities, but also an indirect effect through the endogenous impact on the fiscal choices of the government. Moreover, since the two policymakers differ in the overall transmission of government spending to popular support and onto reelection probabilities, there is a differential impact of changing A on the left as compared to the right. Therefore, an increase in A improves the incumbent left policymaker's reelection probabilities more than the incumbent right policymaker. Over a long period of time, this increase in reelection probability implies that left policymakers are more often in power compared to an economy with lower A.

5.2 Politics and spreads

In this section we will use the Left leaning and Right leaning economies to shed light on the economics underlying the main empirical regularities documented earlier, namely that countries with a higher Left-propensity tend to pay higher and more volatile spreads.

Figure 1 shows that indeed our theory produces spread-debt menus that are higher (i.e. less favorable borrowing terms) the higher is the Left propensity of the economy. The simulations show that the Left leaning displas an average spread of 3.7 percent while the Right leaning

economy displays a spread of 2.5 percent.

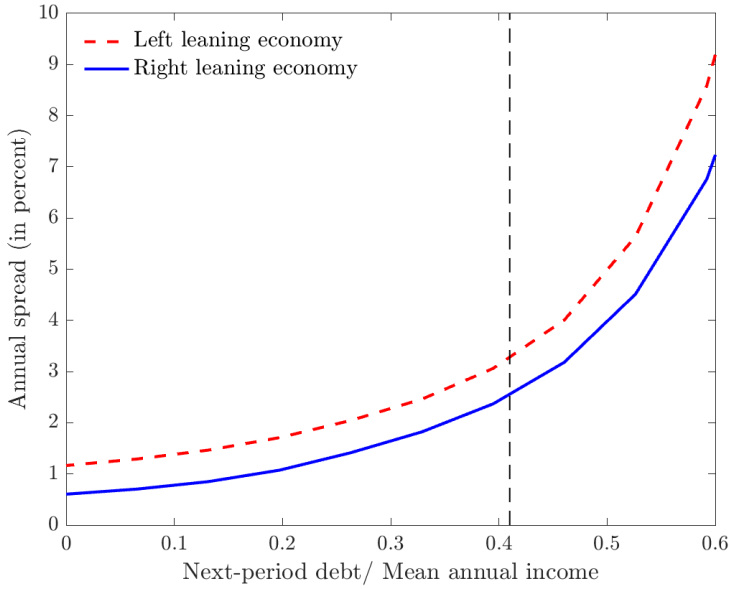

Figure 1: Spread-debt menus. The dashed red line is for the Left leaning economy and the solid blue line is for the Right leaning economy. The vertical line marks the mean debt level (41%). The plot assumes the income level is at its mean.

The differences in the spread-debt menus offered to the two economies by international lenders reflect different expected default policies across economies: recall the bond price equation (15), which essentially prices the repayment probability in all future periods adjusting for the likelihood of changes in the policymaker in power (and, as explained above, this last likelihood depends on the election efficiency A). Figure 2 shows the equilibrium default regions for both policymakers in the Left and Right leaning economies. Here we can see that for both policymakers it is true that default incentives increase with the debt level and decrease with the income level (exactly as in the Eaton and Gersovitz, 1981 tradition). We can also notice that the Left policymaker defaults "before" the right policymaker does, by which we mean the following: fix a debt level (say 30% of mean income) then as income decreases we hit the boundary of L's default set before we hit the corresponding boundary for R. This means that default incentives are stronger for L, which translates into higher spreads. The Left leaning economy has the left in power more often, which explains its higher spreads (as already seen in Figure 1).[27]

[27]Even though the differences in the default regions in Figure 2 seem small, recall that our model has long-

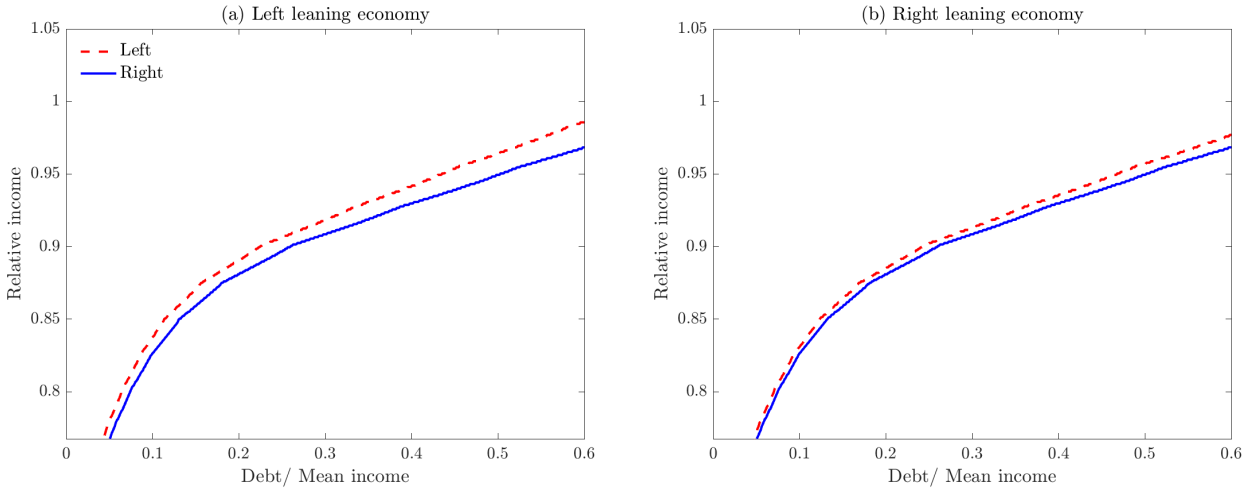

Figure 2: Default sets. The red dashed line corresponds to the Left wing policymaker and the solid blue line corresponds to the Right wing one. Each line is the respective default set contour: the government defaults south of the line. "Relative income" refers to the income level as a fraction of mean income. We trim the region of the state space where relative income is above 1.05, as no government ever defaults in those states. Panels (a) and (b) are Left and Right leaning economies, respectively.

Since our model only introduces political differences through the reelection technology, then it must be the case that differences in the default policies between the two policymakers in one economy (and across the two economies) come from the differences in the political process parameters. To confirm this intuition, and to understand why default incentives are stronger for L, we plot the equilibrium level of government spending in Figure 3. In this figure we plot not only the equilibrium government spending of each policymaker in the two economies, but we also plot (in dashed lines) the level of government spending chosen *under repayment*. If the two lines coincide, then the incumbent is choosing to repay the debt for that particular state; if they differ, then the solid line is the choice under default and the dashed line shows what the incumbent would have chosen had it repaid instead. When the lines diverge, the policymaker in power sees a political benefit from defaulting due to the fiscal space that opens up. Recall that popular support is increasing in the share of government spending, so there is a political cost to be paid if the policy maker chooses to repay the debt rather than defaulting and keeping government spending at a higher level (avoiding fiscal austerity). The vertical distance between the dashed and solid lines captures the additional spending made possible by default.

term debt and therefore lenders price in not only the one-period-ahead default probability, but all future default probabilities. Since the default region of L is *everywhere* larger than the one for R, this translates into significant differences in equilibrium spreads.

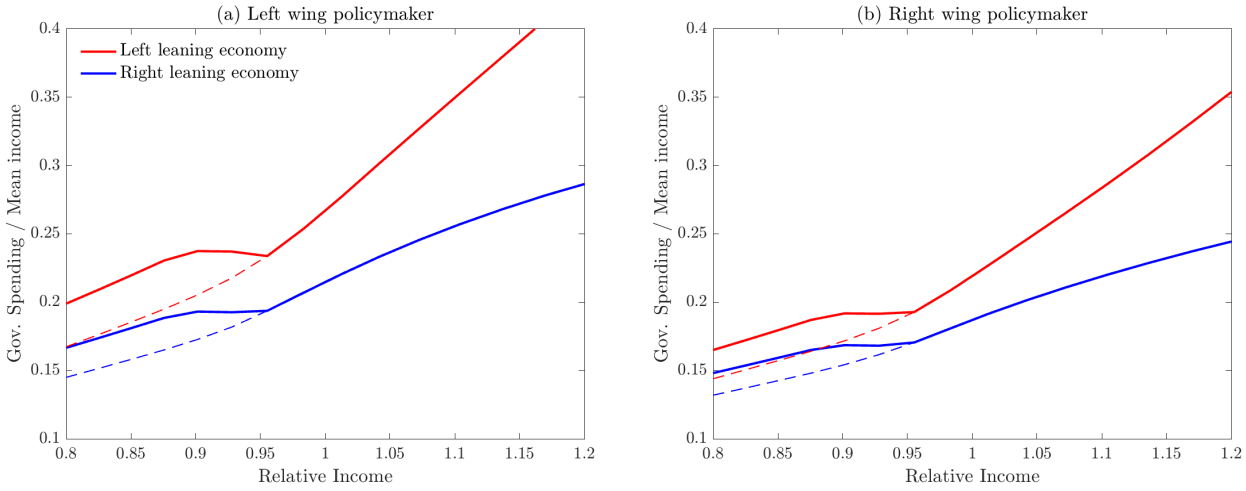

Figure 3: Government spending as a function of income. The red and blue lines are for the Left and Right leaning economies, respectively. The solid lines are the equilibrium functions and the dashed lines are assuming repayment. Panels (a) and (b) are for the Left and Right wing policymakers, respectively.

Focusing for a moment on the left panel of Figure 3, we see that the left policymaker has a greater political gain from defaulting in the Left leaning economy (red lines) than in the Right leaning economy (blue lines). This is captured by the larger vertical distance between the solid and dashed lines for the Left leaning economy. A similar, but more muted pattern can be discerned in the right panel of the figure which displays the fiscal behavior of the right policymaker as income varies. This fiscal/political difference between the two policymakers is primarily responsible for the left being assigned a higher default probability. As the Left Propensity increases, this divergence between left and right becomes more pronounced.

In order to understand why the Left leaning economy involves higher default risk, we need to understand the role that a higher A plays in creating a stronger distaste for fiscal austerity. Recall that a higher A creates a stronger "political bang for the fiscal buck." This effect works to reduce reelection prospects when income is very low, causing the government to tighten its belt and reduce spending if it wants to meet its outstanding obligations. This choice of fiscal austerity reduces popular support, which in turn, reduces the probability of winning elections. The higher the A, the higher the political cost of austerity, the higher the default incentives. These dynamics are more exacerbated for the left-wing policymaker because of the estimated political parameters, as discussed above.

Effects on the volatility of the spread. The dynamics described above also affect the volatility of the spread. Our Right leaning economy features a mean standard deviation of the sovereign spread that is 172 bps, while in the Left leaning economy this statistic is 212 bps (roughly 40 bps higher). We corroborate the statistical significance of this difference by simulating 100 samples of 200 periods each for both economies and then performing a test for the equality of means of the respective volatility distributions. This hypothesis is rejected (p-value of $9.81E^{-4}$).[28]

5.3 Testable Implications

Next, we explore two testable implications of our theory. Namely, that a higher election efficiency (A) is associated with higher spreads, and that economies that are more left leaning display government spending that is more procyclical (as shown in Figure 3).

5.3.1 Election efficiency and spreads

We show above that variation in election efficiency leads to variation in default risk and spreads. We use estimates of (18) to generate a distribution of election efficiency parameters for the nations in our dataset.[29] We now test the theory by checking to see if our uncovered election efficiency data is indeed positively correlated with sovereign spreads. To do this, we regress the average country spread on the calculated A's and the usual controls, and we find that the coefficient of interest is indeed positive and significant. Table 6 shows the estimation results.

5.3.2 Left-propensity and the cyclicality of government spending

Another feature of our model is that government spending is procyclical. This property, which is found in the data (see Table 5 for our dataset, and Kaminsky, Reinhart and Végh, 2004 and Frankel, Vegh and Vuletin, 2013 more generally), is shared by other papers in this literature (e.g. Cuadra et al., 2010). The typical intuition for this result hinges on the tension between

[28] A Kolmogorov-Smirnov test also rejects the hypothesis that the two samples (of spread volatilities) are coming from the same continuous distribution (p-value of 0.0018).

[29] Recall that the model implies that A is constant while ω switches for each country. In any given year, only one of two ω's is relevant, depending on which party is in power. Since we know whether the incumbent was left or right, we can calculate P/ps^{ω_i} for every election year in the dataset. The average value of this ratio is the country specific A.

Table 6: Election efficiency and spreads

Dep. variable:	Spread level
Election efficiency	118.059*
	(57.624)
Debt/GDP	3.791
	(4.777)
GDP volatility	52.068
	(51.277)
(Intercept)	-1.193
	(209.632)
Num.Obs.	23
R2	0.180
Other controls?	Yes

Note: Robust standard errors are reported in parentheses. Other controls include the fiscal surplus and the exchange rate regime. *p<0.1; **p<0.05; ***p<0.01.

a consumption-smoothing desire and the risk of default. The government wants to deliver a smooth path of public consumption but market incompleteness comes in the way.[30] In good times, borrowing is cheap and the government can afford more public spending (and lower taxes); in bad times the reverse is true. So, the countercyclicality of borrowing costs drives the procyclicality of fiscal policies.

A more novel testable implication of our model is that government spending is more pro-cyclical for economies with higher left-propensity. This is clear from inspecting the slopes of the equilibrium functions for $g(b, y)$ in Figure 3. Once again, the underlying intuition follows from the previously discussed impact of a higher A. When the election efficiency A is high, default risk rises more sharply as income drops. As a result, borrowing costs are more counter-cyclical, leading to more pro-cyclical government spending.

We then use our international dataset to test if this is found in the data and confirm it is. Table 7 shows that a higher left-propensity is associated with more procyclical government spending and that this is true, as well, after controlling for other variables. In particular, consistent with the workings of the model, a higher countercylicality of the spread (i.e. a more negative value for 'Cyclicality of spread') comes with higher procyclicality of government

[30] See Riascos and Vegh (2003) and Fernández, Guzman, Lama and Vegh (2021).

spending but it does not undo the significance of 'Left.Prop.'

Table 7: Cyclicality of government spending and left propensity

Dep. variable:	Cyclicality of gov. spending		
Left.Prop	0.293***	0.261***	0.259***
	(0.090)	(0.090)	(0.086)
Cyclicality of spread		-0.253**	-0.240*
		(0.124)	(0.125)
(Intercept)	0.310***	0.246***	0.146
	(0.058)	(0.070)	(0.137)
Num.Obs.	56	56	56
R2	0.106	0.165	0.174
Add. controls?	No	No	Yes

Note: *p<0.1; **p<0.05; ***p<0.01. Additional controls include the debt-to-GDP ratio and the level of government spending. The cyclicality of government spending is computed as the correlation between the cyclical components of government spending and GDP after removing the log-quadratic trend. The cyclicality of the spread is computed using its level and the cyclical component of GDP.

5.4 Implications for Welfare

In this subsection we compare the welfare of the representative household in the left and right leaning economies. We follow standard practice and measure this in units of permanent consumption (of both private and public goods) that must be given to equalize the welfare of the representative household in the two economies, starting at the same initial levels of debt and income.

Figure 4 displays the results of this exercise. The left panel shows that the representative household's value function is uniformly higher (as income varies) in the right leaning economy. The right panel shows the welfare gains associated with the right leaning economy. These gains are uniformly positive and increasing in the level of income. They average 3.9% of permanent (private and public) consumption. We note that both left and right policymakers choose more public consumption in the left leaning than in the right leaning economy, at all income levels.[31] Decomposing the sources of the welfare gains reveals that the higher level of g/c chosen by both incumbents in the left leaning economy accounts for most of the welfare differences. Different

[31] On average, g/c is 8 percentage points higher in the left leaning economy compared to the right leaning economy, and this difference is more pronounced in high income states.

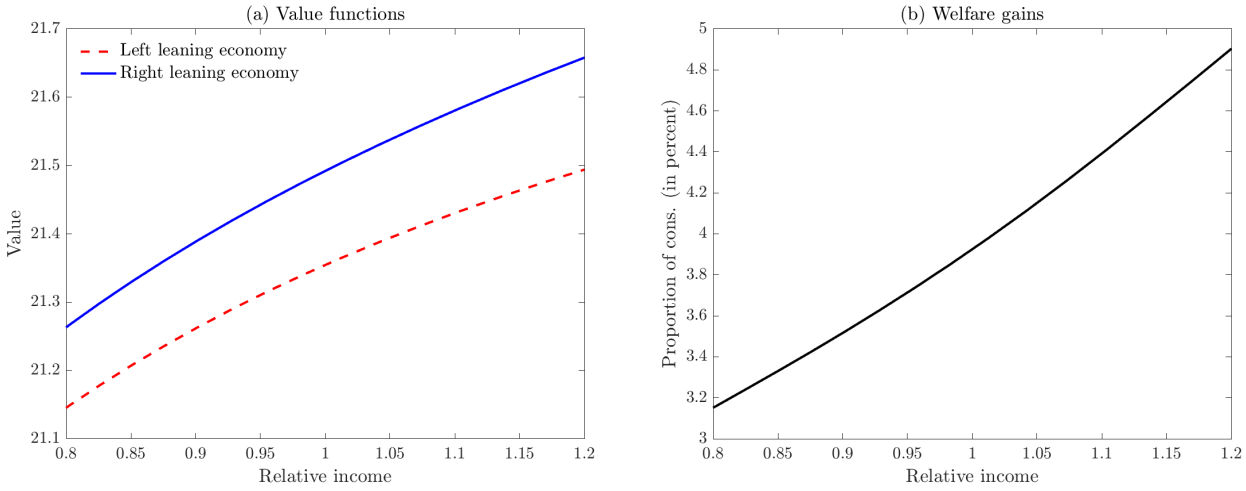

Figure 4: Value functions and welfare gains. Panel (a) shows the value functions for the representative household in the Left and Right leaning economies. Panel (b) shows the welfare gain of moving from the Left leaning economy to the Right leaning one, expressed in proportional (public and private) consumption increases.

frequencies of left and right incumbents, as well as differences in debt policies have a smaller impact on welfare.[32]

In economies with higher A, such as the left leaning economy, the temptation to use fiscal policy to improve reelection prospects is stronger. This leads incumbents to choose higher levels of public spending, distorting g/c further away from the level that maximizes the households' welfare. Essentially we see that higher A increases the divergence in the interests of households and policy makers due to the presence of political considerations in fiscal policy.

5.5 Exogenous Turnover

In order to highlight the importance of endogenous turnover for our results, we study an otherwise identical model in which turnover is exogenous. In this model, left frequency can be changed by exogenously varying the reelection probability of the incumbents. Table 8 compares two economies: the first one takes the fixed reelection probabilities from the means observed in the benchmark economy (roughly 66% for both policymakers) while the second one, increases P_L to take the same value it takes in the Left leaning economy from section 5.2, which is 0.74, holding P_R at 0.66. While doing this exercise we keep all other parameters unchanged.

[32] In an environment where incumbents underprovide public goods to same fraction of the electorate, the lower welfare of the left leaning economy may be atenuated.

As can be seen in column 1 of Table 8, the economy with the higher P_L has a higher Left-propensity but moderately lower spread level and volatility. The lower default risk arises from the higher reelection probability which is exogenously held constant while the endowment rises and falls. As a result, the likelihood of remaining in power stays constant and since this higher probability raises the incumbent's relative valuation of future utility, it works similarly to increasing their discount factor. In other words, making the P_L higher is equivalent to making the left-wing policymaker more patient, and a more patient government defaults less frequently and pays lower and less volatile spreads.[33] Since the left is more often in power in this economy, the average spread falls.

The cyclical nature of endogenous reelection probabilities in our model, undo the above-mentioned impact of higher reelection probability levels. In the left leaning economy, the higher level of A implies higher reelection probabilities but as government spending is reduced in bad times, this has a knock-on effect on P_i, which also falls. As such, the incumbent is less patient when endowment levels are low and more patient when they are high. This effect intensifies the cyclical nature of default risk already present in standard sovereign default models. Moreover, since the incumbent can actually influence their reelection chances, they may choose to default in regions of the state space, where they would not otherwise do so in the absence of the political feedback.

Table 8: Exogenous turnover

	(1)	(2)
Preferences for g		
$1-\alpha_L$	0.035	0.07
$1-\alpha_R$	0.035	0.035
Statistics of interest		
Δ in Left.Prop (in pp)	6.2	6.2
$\%\Delta$ in Spread	-6.7	-8.8
$\%\Delta$ in Vol. of Spread	-6.0	-8.4

Note: each entry is a comparison between the Left leaning economy and the (appropriately modified) benchmark economy.

[33]This result is reminiscent of Figure 5 in Hatchondo et al. (2009) where they show that holding the patience of the policymaker constant, it can be seen that the bond price is highest for no turnover and falling (in the interesting region) as turnover rises. Comparing columns 3 and 4 in Table 2 of their paper also isolates the effect of patience on the average spread. The more patient policymaker pays lower spreads than the less patient one when there is no turnover. This allows a comparison of the impact of political turnover to the impact of patience and informs our discussion above.

It is often thought that differences between left and right can be encapsulated by different preference weights on public goods, $1-\alpha$. We explore the impact of this in the exogenous turnover economy. The second column in Table 8 makes it transparent that the previous result does not hinge on policymaker differences in the preference for government spending. In this column, we keep $(1-\alpha)$ at the baseline value for R (3.5%) and increase it to 7% for L. We then repeat the exercise of increasing the exogenous probability of reelection of the left in order to generate an economy with more left propensity. Once again, we find that this differential preference for public spending of the left does not contribute to generating higher nor more volatile spreads for the economy with higher left propensity. While the greater desire for government spending on the part of the left translates into a higher share of government spending on average, it does not generate additional default risk.[34]

Overall, the results in this subsection highlight that making reelection probabilities of left and right policymakers differentially responsive to fiscal choices is a key element of our theory. It allows for the strategic use of government spending to improve the chance of retaining office. This leads governments to avoid fiscal austerity measures through default. Variation in election efficiency across economies causes variation in austerity reluctance (and therefore default risk) while also changing the reelection probabilities of both policymakers. As a result, both left frequency and average spreads increase with election efficiency thus generating positive comovement between them.

6 Conclusions

We combine international data on sovereign bond yields with macroeconomic indicators and political variables to show that nations that have a higher propensity to elect left wing governments pay higher spreads on their government debt when averaged over more than four decades. These nations also face more volatile sovereign spreads.

We build a quantitative sovereign default model with long-term debt and elections that lead

[34]Yet another variant of the models discussed above allows for differences in preferences while keeping endogenous reelection probabilities. We solve this model allowing for reelection probabilities to depend on fiscal policies, but in an identical manner for both parties: in this way, we only impose differences across policymakers in the utility weight they assign to government spending, $1-\alpha$. Being consistent with the data (i.e., calibrating to the observed levels of g/y), this modeling approach does not generate meaningful variation in left-propensity and therefore it cannot account for our motivating facts. For brevity, we omit a fuller presentation of these results.

to political turnover between two policymakers. These two policymakers differ in the political support gained from public expenditure: consistent with the data, the left policymaker gains more from public spending than the right. We calibrate this model to our international data and then use it to generate simulated economies that differ in their election efficiency, i.e., their ability to convert popular support into reelection probabilities. The model delivers the key regularities found in the data – the economy with a higher propensity to elect the left faces higher and more volatile spreads. In line with the data, the economy with a higher left-propensity also displays a more procyclical fiscal policy. A higher left-propensity occurs when the probability of winning reelection is more responsive to changes in the share of public spending. This increased responsiveness imposes a large political cost on governments that wish to repay debt in bad times by engaging in fiscal austerity measures. In turn, this cost encourages default and discourages fiscal austerity while increasing the likelihood of electing left policymakers. We show that the high level and volatility of sovereign spreads faced by the economy with a higher left-propensity lead to substantial welfare losses.

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A Empirical appendix

A.1 Data Sources and Variable definitions

1. **Political data – DPI**

   (a) Source: Cruz, Cesi, Philip Keefer, and Carlos Scartascini. 2021. "Database of Political Institutions 2020." Washington, DC: Inter-American Development Bank Research Department. Download link: https://publications.iadb.org/en/database-political-institutions-2020-dpi2020

   (b) Variables used:

      i. `EXECRLC`. It codes as "Right" parties which are defined as conservative, Christian democratic, or simply 'right-wing,' and as "Left" those parties defined as communist, socialist, social democratic, or simply 'left-wing.' There are some instances in which the government is coded as 'centrist" – we pool these observations together with "Left."

      ii. `DATELEG` and `DATEEXEC`. These code elections dates (month/year). We use them to identify elections and then we check if there was a change in the political leaning of the incumbent. If there was, we code that election as a loss for the previous incumbent; otherwise it is coded as a victory. Electoral victories and losses are assigned ones and zeros (respectively) and used in the estimation of the reelection probability.

2. **Political data - ICRG**

   (a) Source: International Country Risk Guide (ICRG) Researchers, 2013, "International Country Risk Guide (ICRG) Researchers Dataset." DOI: 10.7910/DVN/4YHTPU

   (b) Variable used:

      i. `POLITICAL SUPPORT` sub-index. This index ranges from 0 to 4, with higher values indicating a higher level of support for the government. We take the monthly observations and compute year medians. We then divide all observations by the highest possible value, 4. Therefore our normalized annual variable ranges from 0 to 1.

      ii. `GOVERNMENT STABILITY` sub-index. The index ranges from 0 to 12, with higher values indicating a higher level of stability. The monthly observations are converted into average annual observations.

3. **Macroeconomic, financial and fiscal data**

   As is common in studies of emerging economies, we exclude crisis years. Whenever possible, we take the data from the online appendix of Catão and Mano (2017). We also follow them in terms of variable definitions for debt, spreads, crisis years, fiscal surplus and exchange rate regime classification. Here, we provide a brief description of these variables:[35]

   (a) Gross Domestic Product (GDP): as reported by the World Bank's World Development Indicators database.

   (b) Debt: we focus on external debt. The source is the World Bank's Global Development Finance database.

[35] See Catão and Mano (2017)'s data appendix for further details.

(c) Spreads: the main source for emerging market spreads is JP Morgan's EMBI spreads. For countries not included in the EMBI, the spread is computed as the difference between the country 10-year bond yield and a reference rate (typically the US 10-year yield or, for Euro area countries, the German 10-year Bund yield).

(d) Exchange rate regime: this is a dummy variable taking a value of 1 for countries deemed to be under a "Fix" regime and 0 otherwise. This dummy was constructed based on the IMF classification (categories "1" and "2").

(e) Crisis years: these are defined as years in which a given country experienced a "credit event." These events are defined as all the years in between the initial default and full (or near full) settlement of arrears as per the Standard and Poor's definition.

(f) Fiscal surplus: General government balance, as reported in Catão and Mano (2017). Their sources include IMF's International Financial Statistics, World Economic Outlook, and the World Bank's Global Development Finance databases.

(g) Government spending/GDP: as reported by the World Bank's World Development Indicators database.

A.2 Country coverage

Table A.1: Countries in the dataset and their left propensity

	Country	Left.Prop		Country	Left.Prop
1	Argentina	0.59	29	Latvia	0.48
2	Australia	0.43	30	Lebanon	0.12
3	Austria	0.78	31	Lithuania	0.71
4	Belgium	0.07	32	Mexico	0.74
5	Brazil	0.52	33	Netherlands	0.26
6	Bulgaria	0.52	34	New Zealand	0.41
7	Canada	0.59	35	Norway	0.54
8	Chile	0.62	36	Pakistan	0.83
9	Colombia	0.67	37	Panama	0.00
10	Costa Rica	0.65	38	Peru	0.60
11	Croatia	0.27	39	Philippines	1.00
12	Cyprus	0.13	40	Poland	0.76
13	Czech Rep.	0.82	41	Portugal	0.61
14	Denmark	0.43	42	Romania	0.84
15	Dominican Republic	0.70	43	Russia	1.00
16	Ecuador	0.89	44	Slovakia	1.00
17	El Salvador	0.37	45	Slovenia	0.96
18	Estonia	0.00	46	South Africa	0.57
19	Finland	0.85	47	South Korea	0.28
20	France	0.52	48	Spain	0.65
21	Greece	0.54	49	Sweden	0.76
22	Guatemala	0.13	50	Thailand	0.00
23	Hungary	0.70	51	Tunisia	1.00
24	Iceland	0.31	52	Turk Cyprus	0.13
25	India	0.74	53	Turkey	0.36
26	Israel	0.20	54	Ukraine	1.00
27	Italy	0.73	55	Uruguay	0.39
28	Jamaica	0.63	56	Venezuela	0.64

These are all the countries for which we have data on, at least, GDP per capita, debt, consumption, spread, government spending, and political orientation. Exercises in section 2 use data from these countries.

B Robustness to the Main Spread Regression

Here we show robustness to the main spread regression, relating the average spread level to Left propensity. We have two goals: first, to show that the main result is robust to defining Left.Prop differently (we exclude the country-year observations in which the party in executive power is labeled as "centrist"; see columns 1b and 2b); and second, to show that adding other country-specific characteristics, like level of GDP per capita, a commonly used measure of income inequality, or the degree of law and order does not overturn our main findings: more left-leaning countries pay higher sovereign spreads, other things equal. Since per capita GDP is correlated with a slew of institutional quality measures and is also correlated with the number of poor citizens in a country, it was included here as a composite variable to avoid collinearity amongst those measures. The law and order measure attempts to capture overall stability in society that could be related to spread levels and finally, the Gini coefficient was included as our measure of inequality.

Table B.2: Spread regressions – Robustness

Dep. variable:	Spread level			
	(1)	(1b)	(2)	(2b)
Left.Prop	235.07**	194.23*	270.21***	305.80**
	(96.09)	(106.59)	(98.89)	(144.87)
Debt/GDP	6.44**	5.99**	3.96	3.24
	(2.70)	(2.62)	(2.73)	(2.60)
GDP volatility	57.94	51.87	81.51*	91.18*
	(35.06)	(36.36)	(41.02)	(52.05)
Gov. stability	-118.14	-145.10**	-54.90	-53.92
	(74.03)	(70.35)	(57.93)	(63.58)
GDP per capita			6.87	7.39
			(5.46)	(6.02)
Law and Order			-185.56**	-192.19**
			(83.88)	(89.70)
Gini			-3.72	-2.25
			(4.12)	(4.09)
(Intercept)	795.50	1046.72*	1055.74**	997.22*
	(566.40)	(547.90)	(517.44)	(519.95)
Num.Obs.	53	52	53	52
Excluding Centrist?	No	Yes	No	Yes
R2	0.323	0.320	0.466	0.474

Note: Robust standard errors are reported in parentheses. GDP per capita is measured in thousands of USD dollars. *p<0.1; **p<0.05; ***p<0.01.

C Extending the Popular Support Estimation

As previewed in Section 4, in this section we begin by documenting the robustness of our specification for (16). In Table C.3 we add a number of explanatory variables to account for other economic factors that may affect the popularity of an incumbent government above and beyond the ratio of government spending to GDP. We control for relevant macroeconomic economic variables (like output growth, inflation, and the level of foreign reserves). We also control for the level of external debt, a key state variable in our quantitative model. We find that the main features of our baseline specification (column 1 in Table C.3) is robust to these additions. In particular, popularity is increasing in the share of government spending and this effect is stronger for left-wing governments. Finally, in column (1b), we show that our results are robust to using the one year lagged value of the government spending to GDP ratio.

Table C.3: Popular support estimation – Robustness I

Dep. variable:	Popular support					
	(1)	(1b)	(2)	(3)	(4)	(5)
Gov.Spending/GDP	0.481***	0.441**	0.614***	0.675***	0.682***	0.476*
	(0.149)	(0.151)	(0.143)	(0.142)	(0.138)	(0.228)
Left × Gov.Spending/GDP	0.243***	0.310***	0.193**	0.176*	0.184*	0.176*
	(0.081)	(0.072)	(0.085)	(0.090)	(0.091)	(0.092)
Output growth			0.717***	0.845***	0.858***	0.903***
			(0.168)	(0.202)	(0.210)	(0.201)
Inflation				-0.161*	-0.175**	-0.217**
				(0.075)	(0.076)	(0.089)
FX Reserves					-0.045	-0.031
					(0.045)	(0.052)
Debt/GDP						0.101***
						(0.023)
Mean of Time Effects	0.483	0.476	0.439	0.438	0.443	0.442
Num.Obs.	492	450	492	458	458	370
Gov.Spending/GDP lagged?	No	Yes	No	No	No	No
R2	0.084	0.073	0.104	0.108	0.109	0.108

Note: standard errors are clustered at the year level and are reported in parentheses. Column (1) is the specification used in the main body of the text and is presented here to ease comparison. *p<0.1; **p<0.05; ***p<0.01.

To further test the robustness of our results for this crucial set of parameters, we add variables that capture the political climate. We use country risk estimates from the International Country Risk Guide (ICRG) dataset. The variables are political risk taken as a composite in column (2) or as individual components individually or together in column (5). These components are socioeconomic conditions, internal conflict, and religious tensions. Noting that a higher score on the index means lower risk, we find that popular support is increasing in political risk. Despite the inclusion of these political variables, our main results remain intact.

Table C.4: Popular support estimation – Robustness II

Dep. variable:	Popular support				
	(1)	(2)	(3)	(4)	(5)
Gov.Spending/GDP	0.481***	0.261*	0.455***	0.300*	0.297*
	(0.149)	(0.135)	(0.140)	(0.143)	(0.141)
Left × Gov.Spending/GDP	0.243***	0.223**	0.213**	0.200**	0.236**
	(0.081)	(0.083)	(0.079)	(0.086)	(0.082)
Political Risk		0.300***			
		(0.044)			
Socioeconomic Conditions			0.052*	-0.004	0.031
			(0.029)	(0.033)	(0.036)
Internal Conflict				0.247***	0.344***
				(0.044)	(0.048)
Religious Tensions					-0.126***
					(0.024)
Mean of Time Effects	0.483	0.318	0.464	0.324	0.334
Num.Obs.	492	479	479	479	479
R2	0.084	0.105	0.084	0.111	0.135

Note: standard errors are clustered at the year level and are reported in parentheses. Column (1) is the specification used in the main body of the text and is presented here to ease comparison. *p<0.1; **p<0.05; ***p<0.01.

D A Simple Model of Popular Support and Government Spending

In this Appendix, we provide a model that helps to understand some of the economic and political factors that lie behind our empirical results on popular support. Recall, we find that both left and right incumbents gain support when they increase government spending as a fraction of GDP. We also find left incumbents gain more support than right incumbents. We have in mind that increases in popular support come from what is commonly known as 'swing voters.' In what follows, we will hold aggregate output in the economy constant so that any changes in government spending will be equivalent to changes in the ratio of government spending to output.

D.1 Environment

This is a model of an endowment economy with two parties L and R, competing to be in government with the authority to use taxes to fund public goods. To fully capture the fiscal implications of any public expenditure in a simple one-period model, we assume a balanced budget. There are two types of consumer-voters with labels L and R, each indexed by j_L and j_R respectively, of potentially different measures. In our benchmark parameterization, there will be an equal number of voters of measure one each. Later we will show that variation in the number of voters of each type (N^L, N^R) can have large effects on the results.

Voters get economic utility from private and public goods but the model captures a fundamental disagreement between L and R voters through the presence of two types of public goods: L goods and R goods (education expenditure vs. police expenditure, for example). L voters get more utility from L goods than they do from R goods and similarly, R voters derive more utility from R goods than they do from L goods. This differing weight in preferences between the two types of public goods is captured by the parameters (ω_L, ω_R), where the subscript identifies which type of voter it is relevant for. In addition, L and R voters may differ in the overall weight assigned to public goods relative to private goods which is given by (ζ_L, ζ_R).

Voters also get political utility from supporting the party closer to them in (political) ideology and get no political utility from supporting the other party. We refer to this as *attachment* and assume that the attachment of voters to their party is distributed according to the following CDF, with support $[0, 1]$,

$$F_p(j^p) = \text{Proportion}\,(j \leq j^p) = \int_0^{j^p} f_p(j)dj \quad \text{for} \quad p \in \{L, R\}\,, \tag{19}$$

with $F_p(1) = 1, F_p(0) = 0$. Let χ denote this political utility, and let's assume that $\chi'(j) > 0$ and that:

$$\chi^p(j = 0) = 0 \quad \text{and} \quad \chi^p(j = 1) = \overline{\chi} \qquad \text{with} \quad p \in \{L, R\} \tag{20}$$

where $\overline{\chi}$ is sufficiently large that an interior solution (see below) is guaranteed, provided the other model assumptions are satisfied.

Total utility is defined as the sum of economic and political utility. For the R voter indexed by j^R, this is given by

$$V_j^R = U(c^R, G^L, G^R) + \chi^R(j^R)\,, \tag{21}$$

where

$$U(c^R, G^L, G^R) = u(c^R) + \zeta^R \upsilon(\omega_R G^R + (1 - \omega_R)G^L)\,.$$

Similarly for the L voter j^L

$$V_j^L = U(c^L, G^L, G^R) + \chi^L(j^L)\,, \tag{22}$$

where

$$U(c^L, G^L, G^R) = u(c^L) + \zeta^L v(\omega_L G^L + (1-\omega_L)G^R)\,.$$

Both u and v are increasing and concave utility functions for private and public goods, respectively. We assume that $\zeta^L > 0$ and $\zeta^R > 0$ are potentially different from each other.

Each voter is endowed with an income level of y and faces a tax rate of τ, which implies the following budget constraint: $c = y\,(1-\tau)$. There are a total of $N\,(= N^L + N^R)$ voters in the economy who must be taxed equally. The government budget is, therefore, $G = G^L + G^R = N\tau y$.

Fiscal platforms. Starting from a pair of candidate economic utility levels promised by the two parties, and focusing on the case of an L incumbent without loss of generality, we wish to explore the possibility of the incumbent increasing their popular support by increasing total government spending, G. To be consistent with the empirical results presented in section 4, we show the many combinations of parameters in which the L incumbent can increase popularity more than the R incumbent. In other words, the slope of the L incumbent's popularity function should be greater than the R incumbent.

To see how many voters will change the party they support in response to a change in government spending by an incumbent, we need an initial pair of party positions on fiscal policy. Let the pair $\{\overline{U}_{LL}(C, G^L, G^R), \overline{U}_{LR}(C, G^L, G^R)\}$ refer to the economic utility obtained by the L and R voters respectively from the initial L party policies. Similarly $\{\overline{U}_{RL}(\cdot), \overline{U}_{RR}(\cdot)\}$ refer to the economic utility obtained by the L and R voters from the initial R party policies.[36]

Popular support. In general, there will exist a threshold j_s^p such that any voter attached to party p, with index $j^p \leq j_s^p$ will prefer to support the other party $(-p)$ since the total utility is greater than the one coming from their own party's fiscal platform. These voters may be described as 'swing voters.' The threshold values j_s^R and j_s^L are implicitly given by

$$\overline{U}_{RR} + \chi(j_s^R) = \overline{U}_{LR}$$

and

$$\overline{U}_{LL} + \chi(j_s^L) = \overline{U}_{RL}\,.$$

To obtain the popular support for the L incumbent, given the threshold values above, we add up the number of R and L voters that will support the L party:

$$PS^L = F\left(j_s^R\right)\frac{N_R}{N} + \left(1 - F\left(j_s^L\right)\right)\frac{N_L}{N}$$

and similarly for the R incumbent. Having characterized the initial level of popular support for each party, we turn to the impact of any new incumbent policy, holding the other party's position fixed.

Consider a new policy of increasing G (from an initial level G_0) proposed by the incumbent L party and funded by an increase in taxes. This higher public spending will be divided between the L and R public goods according to a sharing rule, where a fraction s goes to the L good and $1-s$ to the R good. Noting that $dG = d\tau \times Ny > 0$, since all voters are equally taxed, this proposal lowers consumption below its initial level, C_0. Therefore, the expected change in economic utility from this policy for the R voter, holding constant the economic utility obtained from the policies proposed by

[36] For example, a natural symmetric candidate starting pair of policies by both parties are $\tau = 0, G = 0$ in which case $\overline{U}_{LL}(y, 0, 0) = u(y)$ and so on. Since both candidate policies offer identical economic utility in this case, voters align with L and R parties according to their attachment.

the non-incumbent party $\overline{U}_{RR}$, is

$$dU_{LR} = U\Big(C_0 - dG/(Ny),\, G_0^L + sdG,\, G_0^R + (1-s)dG\Big) - \overline{U}_{RR}\,. \tag{23}$$

This change in utility can similarly be defined for the L voter (dU_{LL}), and for both voters if R is the incumbent (dU_{RL} and dU_{RR}). For low enough initial government spending, $dU_{LR} > 0$, and this increase will cause the R voter's threshold to shift to the right and increase the popularity of the L incumbent. The extent of the shift in thresholds and popular support depends on the CDF of political attachment to either party, the number of L and R voters as well as the specification of preferences. Below we provide numerical examples of this shift and their impact on popular support for the incumbent.

D.2 Parameterization

Voters preferences are governed by

$$V_j^p = \sqrt{C} + \zeta^p \sqrt{\omega_p G^L + (1-\omega^p) G^R} + \chi_j^p$$

where

$$\chi^p(j) = \chi_0^p \left(e^j - 1\right)$$

captures political attachment for party p, with $\chi_0^p \geq 0$. Note that at $j^p = 0$ (the lower bound of the support) the attachment value is zero. We use a flexible functional form to specify the CDF over j for both types of voters using the "Sigmoid-Logit" probability function in the (0,1) domain:

$$F(j^p; \mu_p, \nu_p) = \left[1 + \left(\frac{j^p\,(1-\mu_p)}{\mu_p\,(1-j^p)}\right)^{-\nu_p}\right]^{-1}.$$

This CDF behaves like the logistic function in the (0,1) domain. Notice that if $\mu = .5$ and $\nu = 1$, then this becomes a uniform CDF. $\{\mu, \nu\}$ control the median and steepness of the distribution F, respectively.

D.3 Numerical exercises

In what follows we will depict the slope of the popular support of both a L incumbent and a R incumbent for different increases in government spending, $\frac{dPS^p}{dG/Y}$. This increase in the share of government spending is funded by an increase in taxes paid equally by all voters. To help fix ideas, we perform numerical exercises starting from a symmetric initial fiscal platform in which incumbents set government spending to zero (and therefore set taxes to zero as well). Therefore, these starting platforms are characterized by an under-provision of public goods. We will consider increases in government spending that go up to 50% of national income, which covers the empirically relevant values for most countries. In order to generate asymmetric slopes for L and R each of the exercises below assumes symmetry between L and R in all but one parameter. Unless otherwise specified, we assume that: (i) any tax collection is equally split between the L and R goods ($s = 0.5$), (ii) voters like their own type of public good ($\omega_L = \omega_R = 1$) but get no utility from the other public good, (iii) voters weight the utility value of public goods equally relative to private consumption ($\zeta_p = 1$), (iv) the baseline value for χ_0 is 1 in for L and R, (v) there are equal numbers of L and R voters ($N_L = N_R = 1$) all endowed with a unit of income ($y = 1$), and (vi) the parameters governing F are $\mu = .5$ and $\nu = 1.2$.

Figure D.1, shows the slopes of the popular support function when L voters are 30 percent more

attached than their R counterparts ($\chi_0^L = 1.3 > 1 = \chi_0^R$). This figure illustrates that the slope is positive for both the L and R incumbents. Moreover, in keeping with the empirical results from our popular support regressions, the L incumbent displays a higher slope.

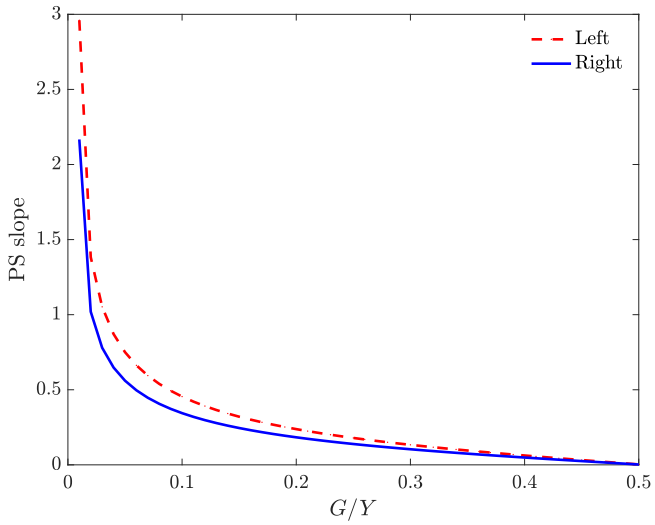

Figure D.1: Asymmetry in χ_0^p . The dashed red line is for the Left incumbent and the solid blue line is for the Right incumbent.

In the next exercise shown in Figure D.2, we restore symmetry in χ_0 but we introduce asymmetry in the curvature of F by lowering $\nu^R = 1$ (and therefore making F_R uniform) while leaving $\nu^L = 1.2$ (which implies there is a greater mass of L voters at the median j). Since there is now a greater mass of R voters at low levels of j compared to the mass of L voters at similar j's, the slope of popular support is higher for the L incumbent for small increases in government spending. As the incumbent attempts to attract R-voters with higher j, the opposite effect dominates.

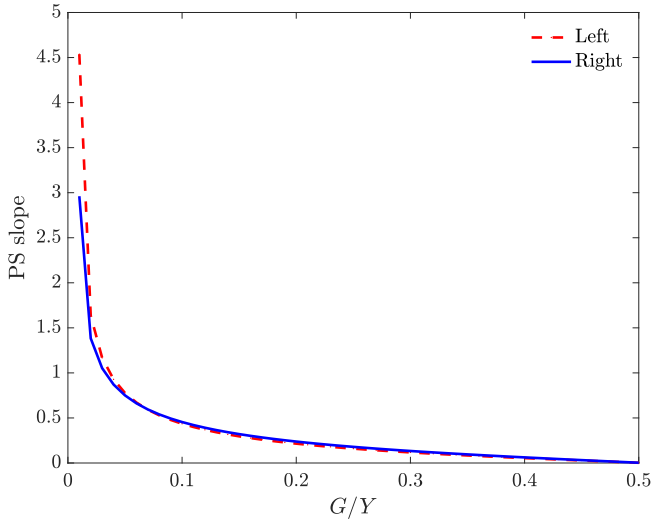

Figure D.2: Asymmetry in ν^p . The dashed red line is for the Left incumbent and the solid blue line is for the Right incumbent.

Similarly, the density of attachment can be influenced by varying the median location by changing μ. In Figure D.3, we lower μ^R to 0.4 from 0.5 while increasing μ^L to 0.6. This has a more substantial impact on the difference in slopes of the L and R incumbents with the L incumbent showing much higher values than the R incumbent.

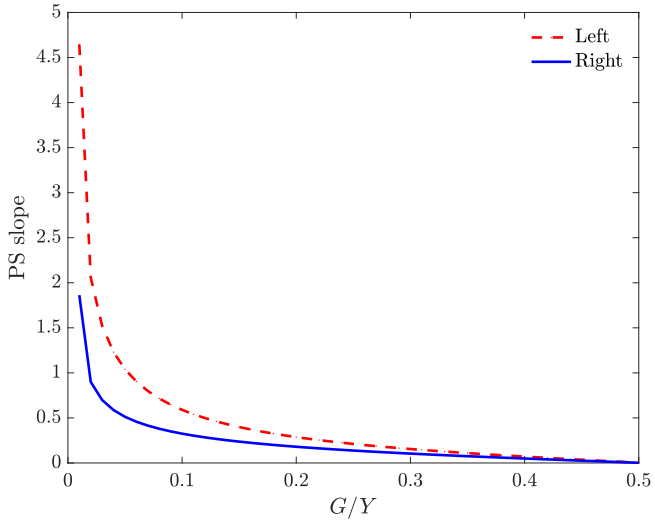

Figure D.3: Asymmetry in μ^p . The dashed red line is for the Left incumbent and the solid blue line is for the Right incumbent.

These first three exercises highlight the potential role of asymmetries in the distribution of political attachment in explaining our empirical results on popular support.[37]

In the next exercise, we consider asymmetries in the preferences of voters while restoring symmetry in the political attachment parameters. We first explore the role of ζ^R relative to ζ^L since they govern the relative weight assigned to utility from public versus private consumption. If $\zeta^R > \zeta^L$ then the L incumbent displays a higher slope than the R incumbent as shown in Figure D.4. In order to understand this result, recall that the incumbent is proposing to fund additional expenditure on public goods (evenly split between L and R goods) by increasing taxes. The initial set of policies proposed by the other party provides zero public goods. As a result, given curvature in preferences, both types of voters gain economic utility from the new policy as long as tax increases are not too large. If $\zeta^R > \zeta^L$, R voters gain more than L voters from the policy change so their threshold will move by a larger amount. As a result, the L incumbent will gain more popular support than the R incumbent.

In our model, changes in ω's by themselves (whether symmetric or asymmetric) have little effect on the slope of the popular support. As a result, we do not report them.

In a final exercise, we retain all symmetry in the parameters of the model but increase the number of R votes while reducing L voters, leaving the total population the same. As expected, since there are more R voters available to be attracted through economic policy, identical shifts in thresholds will create a greater increase in popular support for the L incumbent than the R incumbent. This is displayed in Figure D.5, where we use the values $N^R = 1.2$ and $N^L = 0.8$.

[37]Clearly, reversing any of these asymmetries to favor the R incumbent will also reverse the results.

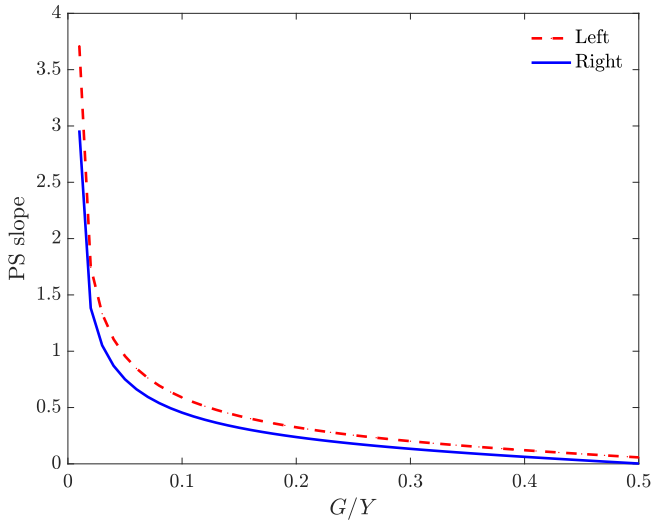

Figure D.4: Asymmetry in ζ^p . The dashed red line is for the Left incumbent and the solid blue line is for the Right incumbent.

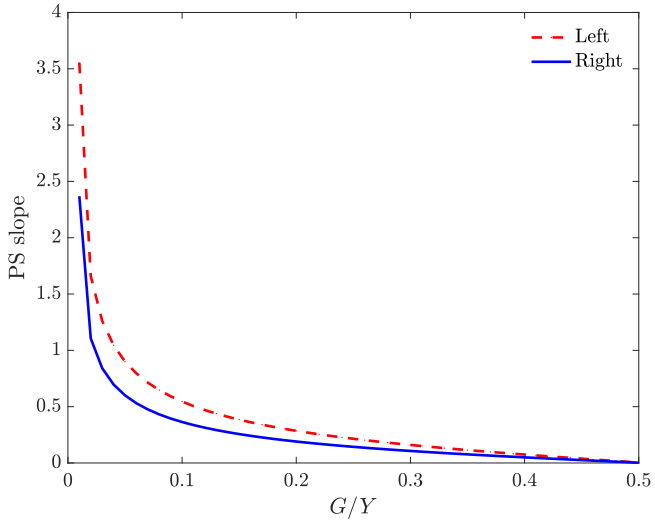

Figure D.5: Asymmetry in N^p . The dashed red line is for the Left incumbent and the solid blue line is for the Right incumbent.

To conclude, our goal was to use a simple political model as a tool to discuss some possible economic, political, and demographic influences behind our empirical finding that an increase in government spending can lead to increases in popular support with the L party gaining more support than the R party, for the same increase in spending. While our discussion has proceeded by making one change at a time in order to make clear each mechanism, we would expect that different combinations of these factors may lie behind the behavior seen in different countries and time periods.