Why do some countries default more often than others?  
The role of institutions*

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Abstract

We study the role of institutions and government polarization in shaping sovereign default risk. Using a data set of 90 countries, we show that strong institutions are associated with fewer sovereign default crises. In addition, when institutions are weak, a more polarized government tends to default more often. To explain these findings, we develop a model showing the dynamics between the quality of institutions, the level of government polarization and sovereign default risk. Countries default more often when they lack rules and strong institutions to curb the influence of powerful groups on government policies. In a polarized government, each powerful group makes decisions without considering the impact on the borrowing cost of other groups. Simulations of the model show that more than half of the cross-country variation in sovereign default frequencies can be explained by institutional quality and the degree of government polarization observed in the data.


Keywords  Sovereign debt, default risk, interest rate spread, polarization, institutions.

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1 Introduction

Several studies have documented that business cycles in small emerging economies differ from those in advanced economies, and suggested that these differences relate to the presence of default risk in the former but not the latter. Indeed, the average default probability on sovereign external debt in the data is 7% for advanced economies relative to 17% for developing economies and, within the latter, 34% for Latin American countries. Standard theoretical models à la Eaton and Gersovitz (1981) do not offer explanations about why Latin America countries defaulted more often than other developing countries, who presumably face similar external shocks and are in a similar stage of development.

This paper fills this gap and sheds light on the role of institutions and government polarization in shaping borrowing and default incentives, both empirically and theoretically. While the idea that political factors and institutions affect the likelihood of debt distress is not new (Reinhart et al., 2003; Kraay and Nehru, 2006), our contribution is to propose a particular mechanism through which they matter for countries’ default risk: countries default more often when they lack rules and strong institutions to curb the influence of powerful groups on government policies. Such powerful groups can be political leaders, provincial governments, labor unions, parastatal enterprises and/or financial backers of the ruling government. The idea is that government polarization only matters when a country features weak institutions. In this case, the more polarized the government is, the harder it becomes for the groups to coordinate and/or to agree upon policies that benefit them collectively, which results in suboptimal debt policies and higher default risk.

At the empirical level, we establish two stylized facts by assembling a comprehensive dataset that includes measures of government polarization and institutional quality, the sovereign default history and economic indicators from 1960 to 2008 for more than 90 countries. We measure gov-

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1 See Neumeyer and Perri (2005), Uribe and Yue (2006), Aguiar and Gopinath (2006) and Garcia-Cicco et al. (2010), among others.
2 Default probability is defined as number of episodes over number of years. For the majority of the countries, the period of analysis is 1960 to 2008. For some recent independent countries, the analysis starts at the year of its independence. It can be interpreted as incidence of default crisis as well (see Qian et al., 2010).
ernment polarization as the weighted standard deviation of ideologies of the three largest parties in the government, where the weight given to each party equals its voting share in the legislature. The quality of institutions is proxied by two measures: (i) a market based index which reflects how investors evaluate several aspects of the government structure (e.g., rule of law, corruption, bureaucratic quality), and (ii), a regulation of participation index intended to capture the degree of influence that interest groups have over the government.

To gauge the significance of the interplay between polarization, institutions and default risk, we estimate a cross section regression that allows us to control directly for the usual indicators discussed in the sovereign debt literature (countries’ default history, real GDP per capita and public external debt levels). Our estimation results indicate that the probability of a government to default on its external debt obligations is negatively correlated with its institutional quality. We also find that, conditional on having weak institutions, a polarized government is more likely to default. However, in countries with good institutions, the effect of polarization is not significant. Thus, our results show that government polarization matters for default probability only in countries with weak institutions. Moreover, in those countries, the default probability increases with the degree of polarization. These results are robust across the two proxies for institutional quality in our dataset.

Motivated by these facts, we embed political polarization in an otherwise standard quantitative sovereign default model à la Eaton and Gersovitz (1981) with long-term debt. Since the seminal contributions of Aguiar and Gopinath (2006) and Arellano (2008), the Eaton-Gersovitz framework has been commonly used for quantitative studies of sovereign debt and has been shown to generate a plausible behavior of sovereign debt and spreads.

Formally, we analyze a small open economy that receives stochastic endowments of a single tradable good and features an exogenously given level of institutional quality. At the beginning of each period, the central government observes the endowment shock and decides whether to default on its debt. While not in default, the government issues debt which is purchased and priced by competitive foreign lenders. A defaulting government is excluded from international debt markets.
for a stochastic number of periods and suffers an output loss while excluded.

The borrowing and default decisions of the central government are the outcome of an administration composed of several powerful groups. These groups receive a fraction of the endowment, and polarization in the model is captured by the distribution of income. Countries with good institutions are those that have either powerful groups coordinating and acting as one agent, or a well-developed legal and institutional structure limiting the influence of powerful groups on the central government. In terms of our model, either case imply that the equilibrium would coincide with that in a standard default model without polarization (e.g., Hatchondo and Martinez, 2009).

In countries with weak institutions, these powerful groups have direct influence on the borrowing and default decisions of the central government. At the beginning of each period, each group observes the endowment shock, aggregate bond holdings, and decides whether to default or not on its own outstanding debt. When at least one group chooses to default, the central government then defaults. The country can issue sovereign bonds only if all groups decide not to default. In this context, powerful groups acting in non-cooperative ways generate an inefficient allocation as they do not internalize the effects of their actions on other groups. In particular, an individual group does not internalize how its borrowing decision affects the borrowing costs for the rest of the groups. The resulting equilibrium features suboptimal borrowing and default decisions from the point of view of the country overall. The more polarized the groups are (i.e., when groups’ ideological distance is large and/or their relative power is uneven), the larger the size of this inefficiency.

For tractability, we first develop a simple two-period model to characterize analytically how the degree of polarization affects a country’s default probability. We show that regardless of the degree of polarization in the government, default probabilities are lower in countries with good institutions than in countries with weak institutions. In addition, we show that for an economy with weak institutions, the likelihood of default increases with the degree of polarization. These insights are preserved in the quantitative version of our model and we are able to explain more than half of the

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3 Argentina during the seventies and eighties is a clear example of uncoordinated behavior among several public agencies, particularly, between the Provinces and the Federal government (see Sanguinetti, 1994).
cross-country difference in sovereign default frequencies observed in the data.

**Discussion of the Literature** Our analysis builds on and extends two branches of the literature: sovereign default and politico-institutional. First, our study is related to the recent literature on quantitative models of sovereign default that extended the approach developed by Eaton and Gersovitz (1981), starting with Aguiar and Gopinath (2006) and Arellano (2008). Different aspects of sovereign debt dynamics and default have been analyzed in these quantitative studies. Excellent surveys of the literature on sustainable public debt and sovereign default can be found in handbook chapters by Aguiar and Amador (2014), Aguiar, Chatterjee, Cole, and Stangebye (2016), D’Erasmo, Mendoza, and Zhang (2016), and Martinez, Roch, Roldán, and Zettelmeyer (2023).

Within the sovereign default literature, Hatchondo et al. (2009) and D’Erasmo (2011) take a political economy approach. In their models, policymakers of the borrowing country that have different degrees of impatience alternate in power. Lenders cannot directly observe a borrower’s type, and hence, have to infer from the borrower’s actions. Our paper differs from these in two ways. First, in our model default risk does not depend only on the policymaker in power. What is essential in our model is the institutional environment in which these powerful groups take actions. Second, since we focus on explaining the cross-country difference in terms of sovereign default frequencies, we do not try to match with a particular country’s data, as these papers do.

In the politico-institutional literature, there is a vast set of papers that studies the role of institutions and polarization on shaping macroeconomic policies that ultimately explain the cross-country differences in growth, output volatilities and vulnerability to crisis. Acemoglu et al. (2003) argue that countries pursuing poor macroeconomic policies also have weak institutions. Kraay and Nehru (2006) found the quality of policies and institutions are an important determinant of debt distress. Hagen (1992) and Stein et al. (1998) find that countries with better budgetary institutions display relatively smaller fiscal deficit and public debt. Their findings are confirmed in this paper, and we build a model to show the mechanism through which institutions affect macroeconomic outcomes.
Aizenman (1993), Hagen and Harden (1995) and Velasco (1999) study the role of interest groups in shaping fiscal policy. In their models, a negative externality arises and interest groups are tempted to overspend and overborrow. In our model, the negative externality comes from the fact that each group underestimates the cost of borrowing more, and when a single group chooses to default, it forces the country (all groups) to default. Tornell and Lane (1999) explain theoretically how powerful groups interact and expropriate national resources in a society with weak legal-political infrastructure. Our paper follows this line of analysis, and shows the importance of limiting powerful groups’ influence on policy decisions regarding spending and borrowing. Furthermore, we demonstrate empirically and theoretically how the interplay of having weak institutions and a government with polarized interests results in suboptimal debt policies.

Alesina and Tabellini (1990) argue that polarization leads to over-accumulation of public debt because the current government has different preference on spending than their opponent. Alesina and Drazen (1991) show that polarization leads to higher deficit and high debt because it delays stabilization. Eslava and Nupia (2010) find that party fragmentation has no effect on government spending in the absence of ideological polarization, and a positive effect when polarization is high enough. In these papers they focus on deficit/spending, but not the financing cost of the deficit. In our paper, we model the financing side and allow for defaults, which might depend on government polarization. Conditional on having weak institutions, more polarization leads to higher default risk.

Layout  The remainder of the paper is structured as follows. First, Section 2 motivates the mechanism proposed in the paper, provides details of the data used in our cross-country empirical analysis and shows the findings. Second, Section 3 presents a two-period model with default option in period two with a closed-form solution. In Section 4, we embed the two-period model into an infinite horizon framework and compare simulation results to the data. Finally, Section 5 concludes.
2 Motivating evidence, data and empirical findings

In this section, we document the cross-country differences in terms of institutional quality and sovereign default frequencies, and establish the facts we aim to explain using the models that we will develop in sections 3 and 4. The data set covers more than 90 countries. It includes measures of quality of institutions, sovereign default history and economic indicators from 1960 to 2008. Subsection 2.1 discusses the cases of Argentina and Brazil that motivate why the mechanism proposed in this paper is relevant. Subsection 2.2 describes the data used to measure institutional quality, government polarization and default probability. We then conduct the empirical analysis on the effect of institutions and government polarization on default probability in Subsection 2.3.

2.1 Anecdotal evidence

Our insight is that many countries are plagued by weak institutional environment and that fiscal policies are often the result of negotiation within politico-business elite. Unless these groups perfectly cooperate, this interaction is unlikely to result in collective efficient outcomes.

An example of a country with these characteristics is Argentina during the 1980s: one of the most decentralized countries in Latin America, with approximately 50% of total public spending occurring at the subnational level. Argentina defaulted on its external default two times during this period (1982 and 1989). Argentina established a “revenue sharing scheme” in 1935, under which the central government administrates national taxes and then distributes these revenues between the federal government and provincial jurisdictions. This scheme is complemented by a regime of Extraordinary Treasury Transfers (ETT) with the objective to transfer funds to local governments in case of unusual events. The legal framework has changed since 1935 many times. Two events that took place in the 1980s illustrate well the type of problems this regime had. First, the tax reform of 1980 eliminated the employer’s social security contribution and determined that the associated

\footnote{Our main data set spans from 1960 to 2008. However we use sovereign default crisis data from 1800 to 1959 to construct a measure of default history.}
deficit of the social security system should be partly met using the tax revenues that were subject to the revenue sharing rule. Therefore, since that year, the actual amount of funds received by the provinces became dependent on another public agency: the social security system.

The second event is the complete absence of a legal rule for the tax-sharing between 1985 and 1987, when the regime established by the 1973 law expired in 1984. It took three years to approve a new one. During that period the transfers to the provinces were subject to the arbitrariness of the bilateral negotiations between the federal government and local governments. On the whole, changes in regulation made the amount of resources that the provinces could obtain from the tax sharing system very unpredictable and unstable. Hence, whatever the difference between what provincial governments considered a normal or historical level for the transfers and the actual ones, it was covered using the ETT.

As result, the participation of the provinces and state owned enterprises in the aggregate level of deficit increased during 1981-1983 which pused the consolidated public deficit above 15% of GDP. Local governments contributed with 5.2% and public enterprises 5.9% of GDP. Sanguinetti (1994) concludes that in cases where the fiscal regime that regulates the financial relationship between different government jurisdictions is not properly designed, a non-cooperative behavior among these agents can develop.

Another interesting case is Brazil that experienced three major state-level debt crises since the late 1980s in which one ended up in sovereign crisis (1983). In each case the federal government assumed state debts. The constitution and the basic structure of intergovernmental relations have sabotaged the most important mechanisms that enforce subnational fiscal discipline. The credit market did not discipline states because they believed that state debt was backed by the federal government. The central government, despite of its proclamations, could not credibly commit to abstain from bailing out the troubled states in case of crisis. This is because the states have influence on relevant central government decisions regarding subnational finance due to their strong representation in the legislature.
Constitutional revenue sharing provision ensures massive revenue flows from the center to the states but subnational governments have substantial budgetary autonomy. In spite of numerous federal attempts to restrict their borrowing, they had access to credit through a wide range of sources and instruments through the 1980s. While the constitution stipulates that the senate can regulate all state borrowing, the senate granted exceptions on several occasions. Given that the senate is dominated by the interests of the states, it was a very poor overseer of state borrowing.

States were unable to roll over external debt and failed to service their debt in 1983. The federal government honored the states’ debt by issuing federally guaranteed obligations to their respective creditors. In 1989, after extended period of negotiations, the federal government agreed to transform the accumulated states’ arrears and remain principal into a single debt to the federal treasury.

### 2.2 Data description

The first key variable in our study is the measure of government polarization, which captures how different are the preferences of the governing parties on certain issues, as well as their relative bargaining powers.

The term “polarization” has been used in the literature with different meanings, and has also been operationalized in different ways. In theoretical papers, polarized government means that governing parties have different preferences over an issue that voters care about, for example public goods. The difference could be between governing parties or between altering governments (Alesina and Tabellini, 1990). Polarization can also mean degree of political cohesiveness. In Alesina and Drazen (1991) a government with high degree of polarization is the one with uneven distribution of the expected cost of stabilization. The high degree of polarization is intended to capture low degree of political cohesiveness, hence an agreement that is optimal for the aggregate would be harder to achieve.

In the empirical literature, polarization has been measured as ideological distance, in a left-center-right scale, between the chief executive’s party and other parties in the governing coalition (Keefer...
and Stasavage, 2003). Fragmentation has also been used to refer to ideological distance among agents that participate in policy-making. For example Volkerink and Haan (2001) refer distance as political fragmentation. However, the majority of the literature started by Weingast et al. (1981) that studies the role of political fragmentation on government spending refers to the number of different interests or parties whose demands are reflected in the budget. The most commonly used measure of fragmentation is number of legislative parties in the governing coalition, either raw or effective.\(^5\)

Considering that both the preference differences and the number of governing parties, as well as their relative bargaining power, are important in the process of determining aggregate spending and debt, we measure government polarization as the weighted standard deviation of ideologies of the three largest parties in the government, where the weight given to each party is its voting share in the legislature. A higher number implies higher polarization. This method of measuring polarization has been used by Franzese (2008) and Eslava and Nupia (2010). The data used to calculate government polarization is from the Database of Political Institutions (2010).\(^6\)

The second important variable of our interest is the quality of institutions. Ideally we would need to have a measure that captures how the interests of these powerful groups are translated into central government policies. Such powerful groups can be political leaders, provincial governments, labor unions, parastatal enterprise and financial backers of the ruling government. This measure at its lowest would describe the case of a central government that is weak and surrenders all the demands of the interest groups. At its highest value, it would capture the case when the central government is strong and makes optimal decisions for the aggregate economy. Unfortunately, we are not aware of the existence of such a measure, and then we use two proxies. First, we use the standard market assessment measures of institutional quality: the International County Risk Guide (ICRG) institutional index. This index from the PRS Group is based on investors’ evaluation regarding

\(^5\)The effective number of parties, proposed by Laakso and Taagepera (1979), adjusts the number of parties by taking into account the weight of each party in terms of number of seats in Congress; it is effectively equal to the inverse of a Herfindal-type concentration index.

\(^6\)A broader concept of polarization is social polarization. We can think of different interest groups of the society represented in the government by governing parties. If we use income inequality (Gini coefficient) as a proxy for social polarization as it has been suggested by Woo (2003), results are similar to those using polar.
the rule of law, bureaucratic quality, corruption, expropriation risk, and government repudiation of contracts. It ranges from 0 and 1, with high values representing better institutions. While this measure of institutional quality includes several aspects of the government structure, it has two potential disadvantages: (1) ICRG as any market assessment measure of institutions tend to improve with income level rather than reflect durable institutional constraints in the government; and, (2) ICRG might already contain information about past defaults, hence we would have an endogeneity problem.\footnote{Reinhart et al. (2003) show that history of non-repayment is an important driver of the market perceptions of default risk.}

The second proxy that we use is regulation of participation (\( \text{parreg} \)) from POLITY IV. It measures the degree of institutionalization or “regulation” applied regarding how political preferences are expressed by subordinates.\footnote{Marshall and Jaggers (2000), p. 23.} It captures the extent to which the political system enables non-elites to influence political elites in regular ways. A five-category scale is used: 1- Unregulated, 2- Multiple identity, 3- Sectarian, 4- Restricted, 5- Regulated. Details of each category can be found in the data appendix. A high value for \( \text{parreg} \) implies that the influence of interest groups on government policies is better regulated. The disadvantage of using this measure is that it is not as widely used as ICRG and, therefore, it becomes harder to compare with other studies in the literature. Nonetheless, it captures better the degree of influence that powerful groups have over the government, which will be a key feature in our theoretical model. Although we cannot rule out the potential endogeneity problem of using regulation of participation (i.e., a default could generate changes in government structure and rules), we argue that institutions are very persistent and thus evolve slowly (Acemoglu et al., 2005).

Reinhart and Rogoff (2009) is our main data source to calculate default probabilities.\footnote{The definition of sovereign default crisis can be found in the appendix.} We also supplement it with the datasets constructed by Laeven and Valencia (2008), Paoli et al. (2009), and Levy-Yeyati and Panizza (2011). The default probability for each country is calculated as the number of sovereign default episodes that occurred between 1960 and 2008 divided by number of years.
since 1960 (or year of independence). As proxy for countries’ default history, we follow Reinhart et al. (2003) and use the percent of years in a state of default or restructuring from 1800 (or year of independence) to 1959.10

Finally, as control variables, we include the log of average real GDP per capita in constant 2000 dollars from WDI database and debt as percent of Gross National Income (GNI), 1970 to 2008 average from Global Development Finance database.

Table 1 provides some basic descriptive statistics of our data set and Table 2 reports the pairwise correlation among our determinants of default risk.

**Table 1: Summary Statistics.**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
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<tbody>
<tr>
<td>Default probability</td>
<td>95</td>
<td>3.51</td>
<td>3.13</td>
<td>0.00</td>
<td>12.24</td>
</tr>
<tr>
<td>Default history (years in default or restructuring)</td>
<td>95</td>
<td>11.32</td>
<td>18.16</td>
<td>0.00</td>
<td>70.00</td>
</tr>
<tr>
<td>Total external debt / GNI</td>
<td>95</td>
<td>51.08</td>
<td>45.02</td>
<td>0.00</td>
<td>255.78</td>
</tr>
<tr>
<td>Log of real GDP per capita</td>
<td>95</td>
<td>7.54</td>
<td>1.47</td>
<td>4.94</td>
<td>10.31</td>
</tr>
<tr>
<td>ICRG</td>
<td>90</td>
<td>0.55</td>
<td>0.21</td>
<td>0.12</td>
<td>1.00</td>
</tr>
<tr>
<td>Regulation of participation</td>
<td>93</td>
<td>3.60</td>
<td>0.88</td>
<td>2.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Government polarization index</td>
<td>94</td>
<td>0.09</td>
<td>0.15</td>
<td>0.00</td>
<td>0.62</td>
</tr>
</tbody>
</table>

**Table 2: Correlation among explanatory variables.**

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<thead>
<tr>
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<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<tbody>
<tr>
<td>Default history (1)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Debt/GNI (2)</td>
<td>-0.03</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>log GDP per capita (3)</td>
<td>0.14</td>
<td>-0.52***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICRG (4)</td>
<td>-0.09</td>
<td>-0.57***</td>
<td>0.81***</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulation of participation (5)</td>
<td>-0.23**</td>
<td>-0.24**</td>
<td>0.46***</td>
<td>0.61***</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Polarization Index (6)</td>
<td>0.09</td>
<td>-0.24***</td>
<td>0.20**</td>
<td>0.29**</td>
<td>0.08</td>
<td>1</td>
</tr>
</tbody>
</table>

2.3 Stylized Facts

The main objective of this paper is to explain why some countries default on its sovereign debt more often than other countries, even those at similar stages of development. The key findings

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10Results are similar if we use number of default episodes over years (1800-1959) as proxy for default history, or exclude countries that are independent after 1959 since they have no default history by construction.
from our empirical analysis are: (i) countries with weaker institutions tend to default more; and, (ii) conditional on weak institutions, higher government polarization is associated with higher default probability. We discuss these results in the rest of this subsection.

**Fact 1: Institutional quality and sovereign default probability are negatively correlated.**

Countries with good institutions rarely default. Figures 1 shows the negative relationship between our two measures of institutional quality and sovereign default probability. The correlation of sovereign default probability with ICRG institutional index and regulation of participation is -0.53 and -0.44, respectively. They are significant at 1%. Columns 1 and 2 of Table 3 report the summary statistics of institutional quality and government polarization for non-defaulters (countries that have not defaulted during the timeframe covered in our sample), one-time defaulters and serial defaulters. Non-defaulters have a substantially higher index in both measures of institutions than defaulters, and the difference is statistically significant at 1%. However there is no statistical difference between one-time defaulters and serial defaulters.

Column 3 of Table 3 shows the average government polarization. On average, non-defaulters have higher polarization than defaulters; and among defaulters, one time defaulters are less polarized than serial defaulters. However, these differences are not statistically significant. This is also
Table 3: Summary Statistics of Institutions, Polarization and Default Probability.

<table>
<thead>
<tr>
<th></th>
<th>ICRG index</th>
<th>Ref of Participation</th>
<th>Gov Polarization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-defaulters</td>
<td>0.79</td>
<td>4.34</td>
<td>0.12</td>
</tr>
<tr>
<td>Defaulter</td>
<td>0.44</td>
<td>3.28</td>
<td>0.08</td>
</tr>
<tr>
<td>One-time Defaulters</td>
<td>0.46</td>
<td>3.16</td>
<td>0.03</td>
</tr>
<tr>
<td>Serial Defaulters*</td>
<td>0.44</td>
<td>3.30</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Note: * Countries that had two or more default episodes. Samples size: 90 countries, 27 non-defaulters, 14 one-time defaulter and 49 serial defaulters. Source: POLITY IV, The PRS Group, DPI Database and Reinhart & Rogoff (2009).

It seems that default probability is not positively correlated with government polarization. In fact, the pair wise correlation between default probability and government polarization is 0.01 and not significant. We will argue that polarization does not matter when a country features good institutions that prevent powerful groups to influence the central government, regardless of how polarized they are. Therefore, countries with higher polarization do not necessarily default more times. To show this, we perform an OLS analysis where the dependent variable is the default probability. We first show that institutional quality is an important determinant. Second, we show that, conditional on having weak institutions, default probability is higher in countries with higher degree of government polarization.

Figure 2: Default Probability versus Polarization.

One can argue that there might be omitted variables that can explain cross-country differences in both institutional quality and default frequencies (e.g., the stage of development). This is a valid
argument since most advanced economies enjoy better institutions and rarely default. The correlation between real GDP per capita and default probability is -0.46 and significant at 1%. Another issue is that if a country does not have external debt, either because it does not need to borrow abroad or it has no access to foreign funding, its sovereign default probability will be zero by definition. In fact, countries with higher debt as percent of Gross National Income (GNI) are also those that default more often. The average debt as percent of GNI of non-defaulters is 0.11 while the average of defaulters is 0.60. Finally, countries that have defaulted in the past are more likely to default again in the future. Reinhart and Rogoff (2005) argue that history matters and one possible explanation is the inertia of institutions. Adopting this interpretation, past defaults should be seen as symptoms of deeper institutional failures and not just contemporaneous policies or external shocks. The market penalizes countries with default records by charging them a higher risk premium, which will in turn exacerbate the vulnerabilities of these countries.

Taking into account these issues, we include real GDP per capita, debt as percent of GNI and default history as explanatory variables (in addition to ICRG, regulation of participation and government polarization). Table 4 reports the OLS cross-country regression results. Column 1 includes as explanatory variable log of real GDP per capita, debt as percent of GNI and default history. All three of them have the expected signs, although only GDP is significant. Countries with higher incomes have lower default probability; countries with higher debt as percent of GNI and that have been more years in default state are likely to default more often. Column 2 uses the ICRG measure of countries’ institutional quality. Not surprisingly, the coefficient is negative and highly significant, indicating that countries with better overall institutions are less likely to default. As we argued before, these institutional quality measures tend to improve with income level. Note that real GDP per capita is not significant in this case. When we use regulation of participation (parreg) in column 3, real GDP per capita becomes significant and with the correct sign. Rich countries are associated with lower default probability. Countries with better regulation of participation, capturing how much limits are set to control the influence of powerful groups in government decisions, are less likely to default.
Table 4: Cross-country regression of sovereign default risk and institutions. Dependent Variable: Default Probability.

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<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>lGDPpc</td>
<td>-0.963***</td>
<td>-0.282</td>
<td>-0.671**</td>
<td>-1.002***</td>
<td>-0.308</td>
<td>-0.326</td>
<td>-0.722**</td>
<td>-0.709**</td>
</tr>
<tr>
<td></td>
<td>(0.254)</td>
<td>(0.395)</td>
<td>(0.312)</td>
<td>(0.256)</td>
<td>(0.389)</td>
<td>(0.387)</td>
<td>(0.313)</td>
<td>(0.308)</td>
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<tr>
<td>ICRG*polarization</td>
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<tr>
<td>R-squared</td>
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<td>0.271</td>
<td>0.254</td>
<td>0.323</td>
<td>0.339</td>
<td>0.286</td>
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</table>

Note: * significant at 10%, ** significant at 5%, *** significant at 1% Source: Worldwide Governance Indicators (WGI) project, Political Institutions Database DPI (2009) and Reinhart & Rogoff (2009).
In column 4 government polarization is entered alone. Although the coefficient is positive, it is not significant, consistent with Figure 2.

Fact 2: High government polarization is associated with high default probabilities conditional on weak institutions.

In column 5, we include both ICRG and polarization to assess whether polarization is associated with default probability once we control for the overall quality of institutions. We find that indeed, government polarization is a relevant determinant of default probability. Given a certain level of institutional quality, a higher degree of government polarization is associated with higher default probabilities. In column 7, we use regulation of polarization and government polarization, and the results are similar to column 5.

In column 6 and 8, we try to show the interplay between institutions and government polarization. The idea is that government polarization only matters when there are weak institutions (in particular, when powerful groups can influence government’s policies). In this case, the higher the degree of polarization, the harder it is for the groups to coordinate and/or agree on policies that benefit them all together, generating more defaults. Thus, government polarization affects default probability conditional on the level of institutional quality. To capture that, we introduce the interaction term \( \text{ICRG} \times \text{polarization} \) in column 6, and \( \text{parreg} \times \text{polarization} \) in column 8. We find that \( \text{ICRG} \times \text{polarization} \) has the expected negative sign but it is not significant. However, the interaction of polarization with \( \text{parreg} \) (our preferred measure of institutions) shows the intuition we described above (the coefficient on \( \text{parreg} \times \text{polarization} \) is -3.77). To interpret this, we do the following exercise. Assume that \( \text{parreg} \) equals 2, the lowest level of regulation of participation in our sample: the marginal effect of government polarization in default probability is then 17.24-3.774*2 (= 9.692). Now, assume that \( \text{parreg} \) equals 5, the highest level of regulation of participation: the marginal effect of government polarization in default probability is then 17.24-3.774*5 (= -1.63). This implies that polarization contributes to default probability positively only when the degree of regulation of participation is low. Furthermore, the magnitude of the impact of having polarized
government is much higher when the interaction term is included \((\text{parreg} \times \text{polarization})\) relative to only controlling for \(\text{parreg}\) (column 7).

### Table 5: Cross-country regression of sovereign default risk and institutions excluding Latin America

Dependent Variable: Default Probability.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
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<th>(5)</th>
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<td>(\text{LGDPpc})</td>
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<td>-0.774***</td>
<td>-1.192***</td>
<td>-0.568*</td>
<td>-0.602*</td>
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<td></td>
<td>(0.225)</td>
<td>(0.349)</td>
<td>(0.273)</td>
<td>(0.226)</td>
<td>(0.332)</td>
<td>(0.317)</td>
<td>(0.269)</td>
<td>(0.256)</td>
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<td>(\text{Debt} / \text{GNI})</td>
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<td>-0.00623</td>
<td>0.00268</td>
<td>0.00299</td>
<td>-0.00467</td>
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<td>-0.996**</td>
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<td>-4.553***</td>
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<tr>
<td>(\text{ICRG}\times\text{polarization})</td>
<td>-20.64***</td>
<td>-20.64***</td>
<td>-20.64***</td>
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<tr>
<td>R-squared</td>
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<td>0.495</td>
<td>0.458</td>
<td>0.552</td>
<td>0.599</td>
<td>0.522</td>
<td>0.573</td>
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</table>

*Note:* * significant at 10%, ** significant at 5%, *** significant at 1%  

Since Latin America countries have the highest default probability, we want to assess whether they are driving the results.\(^{11}\) Table 5 reports the results excluding Latin America. The results are similar to the ones we discussed above. Furthermore, the magnitude of the effects of \(\text{parreg}\) and polarization are larger in this case. We repeat the previous exercise: assuming the highest level of \(\text{parreg}\), the marginal effect of government polarization is -0.84; and assuming the lowest level of \(\text{parreg}\), the marginal effect of government polarization is 12.81. Note that in this case the coefficient of the interacting term \(\text{ICRG} \times \text{polarization}\) is significant. This suggests that the marginal effect of

\(^{11}\)We could have added Latin America as a dummy variable into the analysis. But since the dummy variable is highly correlated with the two institutional variables, the results could be misleading. Thus we decided to exclude them instead.
government polarization on default risk is decreasing in the quality of institutions. This mechanism works only not for Latin America countries.\textsuperscript{12}

\textbf{Figure 3:} Default Probability versus Polarization.

To further demonstrate that government polarization matters for default probability only in countries with weak institutions (i.e., low $\text{parreg}$), we regress default probability for countries with $\text{parreg}$ smaller than 3.55 (sample median), and countries with $\text{parreg}$ higher than 3.55. Columns 1 and 2 of Table 6 show that polarization is positively correlated with default probability only when $\text{parreg}$ is below the median. When $\text{parreg}$ is above the median, polarization has a negative coefficient and it is not significant. Figure 3 shows the default probability against polarization when dividing the sample into countries with $\text{parreg}$ below and above 3.55. For countries with weak institutions ($\text{parreg} < 3.55$), default probability and polarization are positively correlated. For countries with good institutions ($\text{parreg} > 3.55$), the correlation is negative but not significant.

In columns 3 and 4 of Table 6, we divide the sample into countries with $\text{parreg}$ smaller than 2.72 (mean minus one standard deviation) and countries with $\text{parreg}$ larger than 4.48 (mean plus one standard deviation). In this case the effect of polarization is even stronger at the lower level of

\textsuperscript{12}The results are qualitatively similar if we exclude countries that are independent after 1959 (Table 8).
Table 6: Cross-country regression of sovereign default risk and institutions. High vs. Low Regulation of participation.

<table>
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<td>Y=Default probability</td>
<td><strong>parreg&lt;3.55</strong></td>
<td><strong>parreg&gt;3.55</strong></td>
<td><strong>parreg&lt;2.72</strong></td>
<td><strong>parreg&gt;4.48</strong></td>
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<td>(0.303)</td>
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<td>(1.790)</td>
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<tr>
<td>debt / gni</td>
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<tr>
<td>R-squared</td>
<td>0.097</td>
<td>0.429</td>
<td>0.510</td>
<td>0.734</td>
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Note: * significant at 10%, ** significant at 5%, *** significant at 1% Source: Worldwide Governance Indicators (WGI) project, Political Institutions Database DPI (2009) and Reinhart & Rogoff (2009).

*parreg*. In Tables 9 and 10 we exclude Latin America and countries that are independent after 1959, respectively. We find that the effect of government polarization is even stronger.\(^ {13}\)

Based on these results, we conclude that institutional quality, in particular, the degree of influence pressure groups have on government decisions, is an important factor determining countries’ likelihood to default. Moreover, in countries that have weak institutions, the more polarized the government is, the higher the default risk.

### 3 A Simple Theory of Government Polarization and Default Risk

We build a model where powerful groups and lenders choose their actions optimally, taking the institutional quality of the country as given. We demonstrate that the default probability depends both on the institutional quality and the degree of polarization. Polarization in the model is captured by the distribution of shares of government resource allocated to the groups.\(^ {14}\) In countries with good insti-
tutions, this is when there is well defined government structure that limits the influence of powerful groups on government policies, even if there are many powerful groups, social optimal allocation for aggregate consumption and borrowing is achieved. On the other hand, in countries with weak institutions, powerful groups have direct influence on government policies. Furthermore, when they are polarized, they do not coordinate with each other; instead each group optimally chooses independently how much to spend and to borrow at a level that is suboptimal from the point of view of the country overall. This is because each group internalizes only its own cost of borrowing an additional unit of debt, which is lower than the aggregate cost when it takes into account the effect of its action on other group’s financing cost. We want to emphasize that government polarization by itself is not a problem; it causes inefficiency only when institutions are weak.

To study the relationship between the frequency of sovereign default, institutions and government polarization, we first build a two-period model in which a closed form solution can be derived. There are four assumptions in our model: 1) there are n powerful groups that want to influence government’s spending and borrowing decisions. Powerful groups’ source of income comes from government transfers. These groups can only save and borrow through the central government. 2) We take the institutional quality of the country as exogenous. Countries with good institutions are those that either have powerful groups coordinating and acting as one agent or when a well-developed legal and institutional structure exists to limit the influence of powerful groups on central government fiscal and debt decisions. In both cases a central planner’s solution that maximizes collective welfare is achieved. We will call this the unified government case. In countries with weak institutions, the central government is weak, powerful groups have direct influence on central government decisions. Furthermore, groups act in a non-cooperative manner, each group maximizes its individual welfare and ignores the effect of its action on other groups. We will call this the polarized government case. 3) We assume that failure to repay the full amount of the debt constitutes default, and borrowers are excluded from the capital market as part of the default penalty. 4) International lenders know
the quality of institutions of the country, they observe the number of powerful groups, the degree of polarization and how much debt the country (as a whole) demands, but they cannot match the group with the part of debt that is allocated to it. When a default decision is made, lenders cannot discern whether the decision is made by all the groups or one group, and which group. Hence when one group defaults, all groups are shut down from the international capital market. A less extreme case is when one group (for example a state) defaults, investors perceive a higher risk of default in other states too, and therefore risk premium increases to all groups. This means the behavior of one group has effect beyond its own.\(^\text{16}\)

The model structure is based on Vegh (2013) Chapter 2. We have a small open economy that takes the international price as given. The saving or borrowing decision is made in period one; the repayment or default decision is made in period two. Since this is a finite horizon model, debt is sustainable if and only if default does not occur with probability one. For this reason, we assume a default cost in period two. For simplicity, we assume \(n = 2\). The two groups share the tax revenue \(Y\) collected by the central government. Let's denote \(\eta\) group 1’s and \(1 - \eta\) group 2’s share of government debt and revenue that they receive as transfer, as well as the weights their welfare enters into planner’ problem. Let \(\eta \in (0, 0.5]\), hence group 1 has less power than group 2. The unequal power distribution between groups indicates how polarized the government is. Similar to Alesina and Drazen (1991), we use \(\eta\) to measure the degree of government polarization. That is, the more unequal are the shares of resources that correspond to groups, the larger is the degree of polarization.\(^\text{17}\) Revenue in period 2 (\(Y_2\)) is the only source of uncertainty in this economy. It is a random variable drawn from a uniform distribution with support \([0, Y_2^H]\).

\(^\text{16}\)The case of the Brazilian state Minas Gerais constitutes a clear example. The declaration of liquidation of its debt at the end of 1998 caused not only doubts about the ability of repayment of other states, but also produced a national crisis the following year.

\(^\text{17}\)Alesina and Drazen (1991) use the fraction of tax burden borne by groups as measure of the degree of polarization.
3.1 Optimization Problem of the Unified Government

In this section, we solve the unified government case, which is the central planner solution. The objective of the planner is to maximize the sum of the two groups’ lifetime utility weighted by their relative power \( \eta^i \) subject to the economy-wide resource constraint, where \( \sum_{i=1}^{2} \eta^i = 1 \). In period one, the planner chooses the aggregate spending, aggregate debt given the revenue shock and the schedule of interest rate.\(^{18}\) In period two, the planner decides to repay or default the debt; when it chooses to default, there is a cost associated that is proportional to revenue. The objective function of the planner is given by

\[
\max_B U^U = \sum_{i=1}^{2} \eta^i g^i_1 + \beta \mathbb{E} \left[ \eta^i g^i_2 \right]
\]

where superscripts denote groups and subscripts denote periods. \( 0 < \beta < 1 \) denotes the discounting factor. The aggregate budget constraint in each period is given by

\[
t=1, \quad \sum_{i=1}^{2} g^i_1 = Y_1 + B^U
\]

\[
t=2 \text{ (default)}, \quad \sum_{i=1}^{2} g^i_D = Y_2 (1 - \phi)
\]

\[
t=2 \text{ (repay)}, \quad \sum_{i=1}^{2} g^i_R = Y_2 - (1 + r^U) B^U
\]

Where \( g^i_1 \) denotes group \( i \)'s consumption in period one; \( g^i_D \) and \( g^i_R \) denote consumptions of group \( i \) in period two in the event of default and repayment, respectively. \( B^U \) denotes the level of debt engaged by the planner in period 1 to be repaid in period 2 in case that it chooses to. \( Y_1 \) denotes period 1’s revenue, \( Y_2 \) denotes period 2’s revenue, not known in period 1. \( \phi \) denotes share of the revenue that is lost if default is chosen; and \( r^U \) denotes the real interest rate charged by lenders to countries with a unified government.

In the second period the planner will repay the debt only if the cost of repaying it, given by

\(^{18}\)We focus on the case of borrowing in period 1 to be optimal by assuming \( 1 - \beta (1 + r) > 0 \).
(1 + r^U)B^U$, is smaller than the cost of default $Y_2\phi$. Therefore, default is optimal for low realizations of the revenue shock in period 2, that is, if $Y_2 \leq Y_2^{U*}$; and repayment is optimal otherwise. $Y_2^{U*}$ is the threshold by which if the revenue shock is smaller than it, default will be optimal.

$$Y_2^{U*} = \frac{(1 + r^U)B^U}{\phi}$$  \hspace{1cm} (3)

Let $\pi^U$ denote the probability of default in the case of unified government

$$\pi^U = Pr \left[ Y_2 \leq Y_2^{U*} \right]$$  \hspace{1cm} (4)

### 3.2 Optimization Problem of the Polarized Government

In the case of polarized government, in addition to having weak institutions, they do not coordinate giving rise to negative externalities that harm the collective welfare. Unlike the unified government case each group makes spending, borrowing and default decisions independently.

The objective of each is to maximize its lifetime utility given by

$$\max_{b_i} U^i = g^i_1 + \beta \mathbb{E} \left[ g^i_2 \right]$$  \hspace{1cm} (5)

subject to the budget constraints

$$t=1 , \quad g^i_1 = \eta^i Y_1 + b^i$$

$$t=2 \text{ (default)} , \quad g^i_D = \eta^i Y_2 (1 - \phi)$$

$$t=2 \text{ (repay)} , \quad g^i_R = \eta^i Y_2 - (1 + r^P)b^i$$  \hspace{1cm} (6)

Where $b^i$ denotes the level of debt engaged by group $i$, $r^P$ denotes the interest rate charged by lenders to countries with a polarized government.

In the second period group $i$ will repay its debt only if the cost of repaying, given by $(1 + r^P)b^i$, is smaller than the cost of default $\eta^i Y_2\phi$. Default is optimal for low realizations of the revenue shock, that is, if $Y_2 \leq Y_2^{P*}$, and repayment is optimal otherwise. $Y_2^{P*}$ is the threshold by which if the
revenue shock is smaller than it, default will be optimal for group $i$.

$$Y^{i,P*}_{2} = \frac{(1 + r^{P})b^{i}}{\eta^{i} \phi}$$ (7)

Let $\pi^{i}$ denote the default probability of group $i$.

$$\pi^{i} = Pr \left[ Y_{2} \leq Y^{i,P*}_{2} \right]$$ (8)

### 3.3 Foreign Lenders

Lenders are international investors with a funding cost of $r$, the risk-free interest rate. They are competitive and risk neutral. They know whether the country has a unified government or a polarized government. They also know the degree of polarization, captured by $\eta$, and the distribution of revenue shock in period two. However, investors cannot identify which portion of the total debt lent to the country corresponds to each group. Whenever investors do not collect the full amount of the contracted debt; that is, if at least one group fails to repay or both groups fail to repay; it constitutes a default. Similarly, when the country demands one unit more of debt, lenders will charge the same interest rate regardless of which group is actually receiving that unit.

When facing a country with a unified government, lenders know the default probability in period two is given by $\pi^{U}$. Using the zero profit condition we can pin down the equilibrium real interest rate charged by lenders to a unified government

$$(1 + r^{U})(1 - \pi^{U}) = 1 + r$$ (9)

where $\pi^{U}$ is given by 4 and $r$ is the risk free interest rate.

When the borrowing country has a polarized government with $\eta$ degree of polarization, the equilibrium real interest rate charged by lenders is given by

$$(1 + r^{P})(1 - \pi^{P}) = 1 + r$$ (10)
where

$$\pi^P = \max \pi_{i=1}^{i2}$$  \hspace{1cm} (11)

Equation 11 means that the probability of default used by lenders to determine the interest rate they charge to the country with a polarized government is that of the group with the highest default probability. This is because failure to repay the full amount constitutes default in our model.\(^{19}\) As long as one group decides not to repay its portion of the debt, the country will not be able to repay the full amount even if the other group chooses to repay.\(^{20}\) Hence, the relevant default probability for investors is the highest probability of the two groups. This is a negative externality in the case of countries with a polarized government. Assume that group \(i\) has the highest default probability, when it chooses to increase the amount of debt it borrows, it does not take into account the effect of its action on the other group, which is to increase the borrowing cost, and in the case it chooses to default it forces the other group to default as well. The cost of not repaying for group \(i\) is simply \(\eta^i Y_2 \phi\) but the aggregate cost to the country is \(Y_2 \phi\). For all values of \(\eta^i\), the individual cost of default is strictly lower than the aggregate cost.

### 3.4 Timing of the Events

**Unified government** \(t = 0:\)

- Planner chooses \(B^U\).

- Interest rate is determined satisfying investors zero profit condition.

- Planner transfers to each group debt and revenue according to its share.

\(t = 1:\)

\(^{19}\)Reinhart and Rogoff (2005) define as external default crisis the failure of a government to meet a principal or interest payment on the due date. These episodes include instances in which rescheduled debt is ultimately extinguished in terms less favorable than the original obligation.

\(^{20}\)In equilibrium, if one group chooses to default, the other group will find optimal to default as well. This is because it has to incur the default cost regardless it repays or not. Hence, the other group is better off defaulting too.
• Revenue shock is realized.

• If $Y_2 < Y_2^U$, it chooses to default. If $Y_2 \geq Y_2^U$ it chooses to repay.

  - If it defaults, each group receives its share of the revenue net of default cost: $\eta Y_2 (1 - \phi)$ and $(1 - \eta) Y_2 (1 - \phi)$, for group 1 and 2 respectively.

  - If it repays, each group receives its share of revenue net of repayment: $\eta [Y_2 - (1 + U^r) B]$ and $(1 - \eta) [Y_2 - (1 + U^r) B]$, for group 1 and 2 respectively.

**Polarized government**  \( t = 0: \)

• Group \( i \) receives its share of revenue and chooses \( b^i \).

• Total debt is the sum of \( b^i \)s, \( B^P = \sum_{i=1}^{2} b^i \).

• The central government goes to the international capital market and demands \( B^P \).

• Interest rate is determined satisfying investors zero profit condition.

\( t = 1: \)

• Revenue shock is realized.

• If $Y_2 < Y_2^P$, groups choose to default. If $Y_2 \geq Y_2^P$ groups choose to repay.

  - If they default, each group receives its share of the revenue net of default cost according to its power: $\eta^i Y_2 (1 - \phi)$, for \( i = 1, 2 \).

  - If they repay, each group receives its share of revenue net of repayment according to its power and its debt: $\eta^i [\eta^i Y_2 - (1 + r^P) b^i]$, for \( i = 1, 2 \).
3.5 Equilibrium

In this section we solve the equilibrium default probabilities for the case of unified government and polarized government. Note that, conditional on the country having defaulted $Y_2^*$ varies uniformly between 0 and $Y_2^U$ in the case of unified government, and between 0 and $Y_2^P$ in the case of polarized government. Similarly, conditional on the country having repaid, revenue varies uniformly between $Y_2^P$ and $Y_2^H$, and between $Y_2^P$ and $Y_2^H$.

Unified government  The expected revenue in period 2 is given by

$$ E[Y_2] = E[Y_2|D] + E[Y_2|R] $$

where $D$ denotes default and $R$ denotes repayment. Given that revenue when default is chosen varies between 0 and $Y_2^U$, the expected revenue conditional on default is given by

$$ E[Y_2|D] = \frac{Y_2^U}{2} = \frac{Y_2^H \pi^U}{2} $$

(12)

Similarly, conditional on the country having repaid, revenue varies uniformly between $Y_2^U$ and $Y_2^H$, the expected revenue conditional in repayment is given by

$$ E[Y_2|R] = \frac{Y_2^U + Y_2^H}{2} = \frac{Y_2^H(1 + \pi^U)}{2} $$

(13)

We can rewrite 1 as

$$ \max_B U^U = \sum_{i=1}^{2} g_i + \beta E[g_2] $$

(14)

The maximization problem 14 subject to 2 is equivalent to maximize 1 subject to 2 because as planner, he can always maximize the total resource first and then distribute to the two groups according to their weights.

Using 2, 9, 12 and 13, 14 can be written as

$$ \max_B U^U = Y_1 + \beta E[Y_2] + B^U [1 - \beta(1 + r)] - \frac{\phi \beta \pi^U Y_2^H}{2} $$

(15)
The first order condition is given by:

$$1 = \beta (1 + r) + \phi \beta \pi^U Y^H_2 \frac{d\pi^U}{dB^U}$$

(16)

The above marginal condition has a straightforward economic interpretation. In choosing the optimal amount of debt, the marginal benefit of increasing an additional unit of debt in period 1 equals to the marginal cost of increasing one unit of debt in period 2 discounted. The marginal cost is composed by the sum of $1 + r$, the risk free interest rate, and the marginal increase in the default probability times the revenue loss in case of default.

Combining 3, 4, 9 and 16, we obtain:

$$\pi^U = \frac{1 - \beta (1 + r)}{2 - \beta (1 + r)}$$

(17)

Note that the default probability is independent of the degree of polarization $\eta_i$. This is because in planner’s solution, there is no negative externality, all default costs are internalized.

The equilibrium debt and interest rate are the following:

$$B^U = \frac{[1 - \beta (1 + r)] \phi Y^H_2}{(1 + r)[2 - \beta (1 + r)]^2}$$

(18)

$$1 + r^U = (1 + r)[2 - \beta (1 + r)]$$

(19)

**Polarized government** In a polarized government each group maximizes its lifetime utility subject to its budget constraint taking as given the interest rate schedule the country faces. In equilibrium, the total debt that the central government borrows at the international capital market will be the sum of the chosen levels of debt by the two groups, each group contributing accordingly. That is,

$$B^P = \sum_{i=1}^{2} b^i, b^i = \eta^i B^P$$

(20)
In this case, the expected revenue in period 2 is given by

\[ \mathbb{E} [Y_2 | D] = \frac{Y_2^P^*}{2} = \frac{Y_2^H \pi^P}{2} \]  

(21)

\[ \mathbb{E} [Y_2 | R] = \frac{Y_2^P^* + Y_2^H}{2} = \frac{Y_2^H (1 + \pi^P)}{2} \]

(22)

Combining 5, 6, 10, 20 and 21, we can express group i’s problem as the following

\[
\max_{b^i} U^i = \eta^i Y_1 + \beta \mathbb{E} \left[ \eta^i Y_2 \right] + b^i [1 - \beta (1 + r)] - \frac{\eta^i \phi \beta (\pi^P)^2 Y_2^H}{2}
\]

(23)

The first order condition is given by:

\[ 1 = \beta (1 + r) + \eta^i \phi \beta \pi^P Y_2^H \frac{d\pi^P}{db^i} \]

(24)

The economic interpretation of 24 is similar to the one given in the case of the unified government. However, a key difference should be noted: the second component of the marginal cost of increasing one unit of debt is only a portion of \( \eta \) of the total cost. This shows that group \( i \) when deciding the optimal level of debt overlooks the additional effect that it imposes on the other group, a negative externality. Consequently, a lower \( \eta \), higher polarization, is associated with greater externality, increasing the resultant debt level and default probability.

Given that lenders charge the same interest rate to all groups, the marginal increase in interest rate is the same for an additional unit of the total debt or an additional unit of a group’s debt. That is

\[ \frac{dr^P}{db^i} = \frac{dr^P}{dB^P}, i = 1, 2 \]

(25)

10 and 25 imply

\[ \frac{d\pi^P}{db^i} = \frac{d\pi^P}{dB^P}, i = 1, 2 \]

(26)
Combining 7, 8, 10, 20, 24 and 26, we obtain group \(i\)'s default probability,

\[
\pi^{i,P} = \frac{1 - \beta(1 + r)}{2 + \beta(1 + r)(\eta^i - 2)}
\]  

(27)

Taking into account 11 and the fact that \(0 < \eta \leq 0.5\), the default probability of a polarized government is

\[
\pi^P = \frac{1 - \beta(1 + r)}{2 - \beta(1 + r)(2 - \eta)}
\]  

(28)

The equilibrium debt and interest rate are the following:

\[
b^i = \phi Y^H_i \eta^i \Omega, i = 1, 2
\]  

(29)

\[
B^P = \phi Y^H \Omega
\]  

(30)

\[
1 + r^P = \frac{(1 + r)[2 - \beta(1 + r)(2 - \eta)]}{1 - \beta(1 + r)(1 - \eta)}
\]  

(31)

where

\[
\Omega = \frac{[1 - \beta(1 + r)][1 - \beta(1 + r)(1 + \eta)]}{(1 + r)[2 - \beta(1 + r)(2 - \eta)]^2}
\]

Proposition 1. \(\forall \eta\), i) the default probability, ii) the level of total debt, and iii) the equilibrium interest rate are strictly higher in the polarized government case than the unified government case, that is, \(\pi^P > \pi^U\), \(r^P > r^U\), \(B^P > B^U\).

Proof. See appendix.

Proposition 2. If the government is polarized, \(\forall \eta\), i) the default probability, ii) the level of total debt, and iii) the equilibrium interest rate are increasing in the degree of polarization, that is, \(\frac{d\pi^P}{d\eta} < 0\), \(\frac{dr^P}{d\eta} < 0\), \(\frac{dB^P}{d\eta} < 0\).

Proof. See appendix.

Proposition 1 is an intensive result. The quality of institution determines the likelihood of default independent of the distribution of powers. Given that the default probability is higher with a po-
larized government, the equilibrium interest rate is higher to satisfy investors’ zero profit condition. The lack of coordination leads to overborrowing because groups do not internalize the aggregate cost of a marginal increase in the debt. Proposition 2 is an extensive result; the higher the degree of polarization; the higher the default probability; the higher the total level of debt and the higher is the equilibrium interest rate. They are due to the fact that the size of the negative externality is increasing in the degree of polarization.

4 Quantitative Model

In this section, we extend the two-period model into an infinite horizon framework of Eaton and Gersovitz (1981). We adopt the quantitative analysis technique developed by Aguiar and Gopinath (2006) and Arellano (2008).

There is an additional default cost in the infinite horizon setup that is the risk of being excluded by the international capital market for certain periods, also known as the reputation cost.21 This cost will dampen the incentive for the countries to default because while the country is excluded from the capital market, it lives in autarky and consumption smoothing is not possible.

4.1 Model Setup

Preference of the group $i$ in period $t$ is given by

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

where $u$ is strictly concave and differentiable, $\beta \in (0, 1)$ is the discount factor and $g_i^t$ is the consumption of group $i$ in period $t$. The central government receives a stochastic stream of revenue $Y$. We assume that $Y$ follows a Markov process with transition function $f(Y', Y)$. The country has access to the international capital markets, where it can buy one period discount bonds $B'$ at price $q(B', Y)$. The bond price is function of the amount of bond $B'$ and the current revenue shock $Y$. When $B'$ is a

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21For discussion on cost of the exclusion, read Arellano (2008).
negative number, it means the country borrows \(-q(B', Y)B'\) units of goods and promises to repay, conditional on not defaulting, \(B'\) units of goods the following period. The timing of events can be summarized as follows: at the beginning of the period, the country starts with a level of debt \(B'\). The revenue \(Y\) is realized and it is revealed to lenders. In the unified government case, the planner decides to repay or default on the previous period debt. If it chooses to repay, it also chooses how much to borrow. The equilibrium bond price is determined satisfying lenders zero profit condition. After receiving \(-q(B', Y)B', Y + B - q(B', Y)B'\) is split between the two groups according to their shares \(\eta^i\). If it chooses to default, from that period onward the country will be in financial autarky until re-access. In the case of polarized government, each group decides to repay or to default on its previous period debt simultaneously. If both groups repay, then each group also chooses how much to borrow. The central government then goes to the international capital market and sells sovereign bonds for the amount that is the sum of two groups chosen debt. The equilibrium bond price is determined. If at least one group decides to default, lenders shut down the capital market to the country since failure of full repayment constitutes default. The country will remain in financial autarky until re-access.

4.2 Default Decision in a Unified Government

Like the two-period model, the planner’s problem is to maximize the aggregate welfare of the two groups weighted by their relative power \(\eta^i\):

\[
E_0 \sum_{t=0}^{\infty} \beta^t \sum_{i=1}^{2} \eta^i u(g_t^i) \tag{33}
\]

The planner solves the following problem: if the country is active in the international capital market (i.e., it has not defaulted in the previous period) and has debt, it chooses to default or to repay; and in the case of repayment, how much new bond to issue \(B'\).

We define the optimization as a recursive problem. The state variables are the level of debt inher-

---

\(^{22}\)As in the two-period model, we will assume parameter values that make the agent always want to consume more in the current period relatively to next period; hence, we will only analyze the case of borrowing.
ited from the previous period $B$ and current revenue realization $Y$. We denote the value function for the unified government being active at state $(B, Y)$ as $V_U(B, Y)$. With option to default, $V_U(B, Y)$ satisfies

$$V_U(B, Y) = \max \left\{ V^D_U(Y), V^R_U(B, Y) \right\}$$

(34)

where $V^D_U(Y)$ is the value associated with default and $V^R_U(B, Y)$ is the value associated with repayment. If the planner chooses to default, the country is in temporary financial autarky, total consumption equals to revenue net of default loss. The value of default is given by:

$$V^D_U(Y) = \sum_{i=1}^{2} \eta^i u(g^i_t) + \beta \mathbb{E} \left[ \mu V_U(0, Y') + (1 - \mu) V^D_U(Y') \right]$$

subject to $\sum_{i=1}^{2} g^i_t = Y^{def}$

(35)

where $\mu$ is the probability that the country will regain access to international credit market. Following Arellano (2008), $Y^{def} = h(Y) \leq Y$, $h(.)$ an increasing function.

If central planner chooses to repay, the value of remaining in credit relation is given by:

$$V^R_U(B, Y) = \max_{B'} \left\{ \sum_{i=1}^{2} \eta^i u(g^i_t) + \beta \mathbb{E} \left[ V_U(B', Y') \right] \right\}$$

subject to $\sum_{i=1}^{2} g^i_t = Y + B - q(B', Y') B'$

(36)

The decision of to default or to repay is a period-by-period decision. The default probability in the unified government case is

$$\pi_U(B, Y) = Pr \left[ V^D_U(Y) > V^R_U(B, Y) \right]$$

(37)

4.3 Default Decision in the Polarized Government

Powerful groups maximize their lifetime utility given by

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u(g^i_t), i = 1, 2$$

(38)
Each group solves the following problem simultaneously: if the country is active in the international credit market and the group $i$ has debt $b^i$, it chooses to default or to repay; and in the case of repayment, how much new bond to issue $b'^i$. The state variables for each group are the level of debt inherited from the previous period $b^i$, the revenue realization $Y$ and the aggregate bond $B'$. We denote the value function of interest group $i$ of a country with polarized government being active at state $(b^i, B, Y)$ as $V_{P_i}(b^i, B, Y)$. Group $i$ decides whether to default or repay its debt to maximize its individual utility function. With option to default, $V_{P_i}(b^i, B, Y)$ satisfies

$$V_{P_i}(b^i, B, Y) = \max \{V_{D_i}(Y), V_{R_i}(b^i, B, Y)\}$$  \(39\)

When at least one group decides to default, the country is in temporary financial autarky; total expenditure equals to revenue net of default loss. The value of default is given by:

$$V_{D_i}(Y) = u(g^i) + \beta \mathbb{E}[V_{P_i}(0, 0, Y') + (1 - \mu)V_{D_i}(Y')]$$  \(40\)

subject to $g^i = \eta^i Y^{def}$

When both groups decide to repay, the value of remaining in credit relation is given by:

$$V_{R_i}(b^i, B, Y) = \max_{b'^i} \{u(g^i) + \beta \mathbb{E}[V_{P_i}(b'^i, B', Y')]\}$$  \(41\)

subject to $g^i = \eta^i Y + b^i - q(B', Y)b'^i$

The default probability of group $i$ is given by

$$\pi_{P_i}(b^i, B, Y) = Pr[V_{D_i}(Y) > V_{R_i}(b^i, B, Y)]$$  \(42\)

Whenever the country fails to repay the full amount (i.e., at least one group decides to default on its debt) lenders exclude the country (i.e., all groups) from the capital market. Therefore the default risk that is relevant to determine the equilibrium bond price is the maximum default probability of the two groups.

$$\pi_P(B, Y) = \max \{\pi_{P_i}\}_{i=1}^2$$  \(43\)
4.4 Equilibrium Bond Price

Foreign investors are risk neutral and competitive. Given $B'$, the country’s total amount of debt, the revenue $Y$ and the default risk, the bond price for both unified and polarized government satisfies

$$q(B', Y) = \frac{1 - \pi(B', Y)}{1 + r}$$

(44)

where $\pi(B', Y)$ equals $\pi_U$ or $\pi_P$, for unified or polarized government respectively and $r$ for risk free interest rate.

4.5 Calibration

The model is solved numerically using value function iteration. A CRRA utility function is used:

$$u(g) = \frac{g^{1-\sigma}}{1-\sigma}$$

The revenue process is assumed to be a log-normal AR(1)

$$\log(Y_t) = \rho \log(Y_{t-1}) + \epsilon_t, \mathbb{E}(\epsilon) = 0, \mathbb{E}(\epsilon^2) = \sigma_y$$

We use Arellano (2008) output cost structure that takes the following form$^{23}$

$$Y^{def} = \begin{cases} 
(1 - \phi) & \text{if } Y > \hat{Y} \\
Y & \text{if } Y \leq \hat{Y} 
\end{cases}$$

(45)

Each period refers to a quarter. The discount factor $\beta$ is set to 0.95; the risk free interest rate 2%; the coefficient of relative risk aversion 2; the probability of re-access to the capital market after default $\mu = 0.1$ which implies an average duration of 2.5 years of staying in autarky, similar to the estimate by Gelos et al. (2011) and the output loss when staying in autarky 2%. Values for parameters of the revenue process are: $\rho = 0.9$ and $\sigma_y = 3.4\%$, which is the value used in Aguiar and Gopinath (2006), also similar to many business cycle models.

$^{23}$Arellano (2008) discusses the advantage of using this asymmetric default cost structure.
4.6 Simulation Results

We simulate the model for the unified government and polarized government cases. In the polarized government case, simulation is conducted for three degrees of polarization: high ($\eta = 0.1$), medium ($\eta = 0.3$) and low ($\eta = 0.5$). The computational algorithm used to solve the model can be found in Appendix 3.

Figure 4: Bond price schedule: Unified government.

Figure 5: Default rule: Unified government.

Figure 4 shows the bond price schedule faced by countries with a unified government as a function of assets $B'$ for two revenue shocks that are one standard deviation above and below the trend. Bond prices are an increasing function of the asset, making larger levels of debt to be associated with lower price. Booms are associated with higher bond price, which implies lower interest rate. This is because revenue is persistent; higher revenue in the current period predicts higher revenue in the next period, therefore less likely to default. This endogenous countercyclical interest rate is
consistent with the data. Figure 5 shows the default decision rule as function of revenue at a given level of debt: 1 denotes default, 0 denotes repayment. Default is optimal when revenue shock is low. This is also consistent with the data since most defaults occur in recessions. The fact that the central planner maximizes the collective welfare, the relative power of the groups, i.e., \( \eta \), does not affect the optimal decision, therefore the price schedule and default decision rule are the same using different \( \eta \)'s.

![Figure 6: Bond price schedule: Polarized government (\( \eta = 0.5 \)).](image)

Figure 6: Bond price schedule: Polarized government (\( \eta = 0.5 \)).

![Figure 7: Default rule: Polarized government (\( \eta = 0.5 \)).](image)

Figure 7: Default rule: Polarized government (\( \eta = 0.5 \)).

Figures 6 and 7 correspond to the case of countries with a low degree of polarization, that is \( \eta = 0.5 \). Compared to the unified government case, bond price is lower for any given \( Y \) and \( B' \). This is because default probability is higher for countries with a polarized government; to compensate for the higher default risk, interest rate is higher (bond price lower). Price zero means there is no market for bonds at that level because at that level of debt, default probability is one. This is
known as the default set. Comparing figure 4 to figure 6, the default set is larger in the case of the polarized government than the unified government. Comparing figure 5 to figure 7, countries with a polarized government default in more states of the revenue realization than the countries with a unified government. Figures 8 and 9 show the case of countries with high degree of polarization, $\eta = 0.1$. The default set becomes even larger and there are more states of revenue in which default is optimal.

![Figure 8: Bond price schedule: Polarized government ($\eta = 0.1$).](image)

![Figure 9: Default rule: Polarized government ($\eta = 0.1$).](image)

In order to study the long run default probabilities, we simulate the model 10000 periods 100 times for the unified government case and for the polarized government cases. We compare simulation results with the data. The median polarization in the data given that there is some degree of polarization ($\eta \neq 0$) and that there is weak institutions (parreg<4.48) is 0.12; 75% of the sample has polarization below 0.23. We divide the sample into four groups: i) countries without polarization
\( (\eta = 0) \) and have good institutions (parreg>4.48); ii) countries with low polarization \( (\eta < 0.12) \) and weak institutions (parreg<4.48); iii) countries with medium polarization \( (0.12 \leq \eta < 0.23) \) and weak institutions (parreg<4.48), and iv) countries with high polarization \( (\eta \geq 0.23) \) and weak institutions (parreg<4.48). We then take the average default probability of each group and compare it to the simulation result in Table 7. For the simulation, default probability is calculated as number of periods that the country defaults divided to total number of periods that the country has access to the capital market. Autarky periods are excluded.

Table 7: Summary Statistics of Default Probabilities: Simulations Results.

<table>
<thead>
<tr>
<th></th>
<th>Default Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Data (average)</td>
</tr>
<tr>
<td>Unified government</td>
<td>3.01</td>
</tr>
<tr>
<td>Polarized government</td>
<td></td>
</tr>
<tr>
<td>Low ( (\eta = 0.5) )</td>
<td>3.71</td>
</tr>
<tr>
<td>Medium ( (\eta = 0.3) )</td>
<td>4.37</td>
</tr>
<tr>
<td>High ( (\eta = 0.1) )</td>
<td>6.24</td>
</tr>
</tbody>
</table>

Note: in the data, unified governments are countries with zero polarization or having parreg>=4.48 (62); polarized governments with low degree of polarization are countries with polarization below 0.12 (18); polarized governments with medium polarized are countries with polarization between 0.12 and 0.23 (7) and polarized governments with high polarization are countries with polarization above 0.23 (8).

Results of the two-period model are confirmed in this infinite horizon setting. Default probability is higher for countries with a polarized government. Furthermore, it is increasing in the degree of polarization. Compared to the data, our model explains more than 50% of the observed default frequencies for each group. Note that for the simulations we use the same set of parameters values for all countries; the only differences among countries are the degree of polarization and institutions.

In the data, there is heterogeneity among countries other than the degree of polarization, which in principle accounts for the remaining 50%.
5 Conclusions

We have provided an explanation for the cross-country difference in sovereign default frequencies and institutions. The key factor that determines the likelihood of default in this paper is the institutional setting. If institutions set clear rules to limit the influence of powerful groups in central government’s spending and borrowing decisions, central planner solution that maximizes collective welfare can be achieved. If such institutions do not work properly, individual behaviors of powerful groups lead to an inefficient equilibrium in which default occurs more often. Furthermore, given that powerful groups do not coordinate in the polarized government case, more polarization results in higher default probabilities.

In a two-period model, we show that a country with a unified government is less likely to default than a country with a polarized government. This is because in the unified government case, there are either good institutions that limit the influence of powerful groups in central government’s decisions or that groups can coordinate; thus, the central planner’s solution that maximizes the collective welfare can be achieved. In contrast, in a polarized government, each powerful group makes decisions ignoring the effect of its action on other groups As a result, suboptimal choices are made and default is more likely at any given level of debt.

Numerical simulation of the infinite horizon model succeeds in showing the cross-country difference in terms of default probability and degree of polarization given the quality of institutions. We were able to match the empirical positive relationship between degrees of polarization and default probabilities using standard parameters in the sovereign default literature.

The policy implication of the paper is that efforts of international organizations in preventing sovereign default crisis must pay attention to the quality of institutions in addition to general fiscal management. With the increasing ideological polarization across countries and heightened exogenous shocks, it is paramount to preserve good institutions to prevent interest groups influencing policy decisions such as fiscal expansion through borrowing.
References


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A Proofs

Proposition 1. \( \forall \eta \), i) the default probability, ii) the level of total debt, and iii) the equilibrium interest rate are strictly higher in the polarized government case than the unified government case, that is, \( \pi^p > \pi^U, r^p > r^U, B^p > B^U \).

Proof. i) Comparing 17 to 28

\[
\pi^p > \pi^U \iff \beta(1 + r)(\eta - 2) + 2 < 2 - \beta(1 + r) \quad \beta(1 + r)(\eta - 1) < 0
\]

ii) Comparing 18 to 30

\[
B^p > B^U \iff \frac{1 - \beta(1 + r)(1 - \eta)}{(2 - \beta(1 + r)(2 - \eta))^2} > \frac{1}{(2 - \beta(1 + r))^2}
\]

First we will show that \( \frac{\partial B^p - B^U}{\partial \eta} < 0 \)

\[
\frac{\partial B^p - B^U}{\partial \eta} < 0 \iff \frac{\partial B^p}{\partial \eta} < 0
\]

\[
\frac{\partial B^p}{\partial \eta} < 0 \iff \left[ \beta(1 + r)(\eta - 2) + 2 \right]^2 - 2\beta(1 + r)(\eta - 1) + 1 \right] \left[ \beta(1 + r)(\eta - 2) + 2 \right] < 0
\]

\[
\Rightarrow \frac{\partial B^p - B^U}{\partial \eta} < 0
\]

Since \( B^p - B^U \) is strictly increasing in \( \eta \), it is sufficient to show that \( B^p - B^U > 0 \ \forall \eta \) if \( B^p - B^U > 0 \) at \( \eta = 0 \) and \( \eta = 0.5 \). At \( \eta = 0 \)

\[
B^p - B^U = 1 - \beta(1 + r) > 0
\]

At \( \eta = 0.5 \)

\[
B^p - B^U = 1.5 - \beta(1 + r) > 0
\]

iii) Given that \( \pi^p > \pi^U \), 9 and 10 imply that \( r^p > r^U \). \( \square \)

Proposition 2. If the government is polarized, \( \forall \eta \), i) the default probability, ii) the level of total debt, and iii) the equilibrium interest rate are increasing in the degree of polarization, that is, \( \frac{\partial \pi^p}{\partial \eta} < 0, \frac{\partial r^p}{\partial \eta} < 0, \frac{\partial B^p}{\partial \eta} < 0 \).

Proof. i)

\[
\frac{\partial \pi^p}{\partial \eta} = \frac{[1 - \beta(1 + r)]\beta(1 + r)}{[2 - \beta(1 + r)(2 - \eta)]^2} < 0
\]

ii) Provided in Proposition 1.

iii)

\[
\frac{\partial r^p}{\partial \eta} = \frac{-\beta(1 + r) - 1}{[1 - \beta(1 + r)(1 - \eta)]^2} < 0
\]
# Additional Empirical Results

Table 8: Cross-country regression of sovereign default risk and institutions excluding countries independent after 1959 Dependent Variable: Default Probability.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
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</thead>
<tbody>
<tr>
<td>lGDPpc</td>
<td>-1.146***</td>
<td>-0.754</td>
<td>-0.863**</td>
<td>-1.224***</td>
<td>-0.703</td>
<td>-0.712*</td>
<td>-0.952**</td>
<td>-1.018***</td>
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<td>(0.286)</td>
<td>(0.483)</td>
<td>(0.379)</td>
<td>(0.276)</td>
<td>(0.458)</td>
<td>(0.422)</td>
<td>(0.365)</td>
<td>(0.320)</td>
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<td>Debt / GNI</td>
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<td>-0.00413</td>
<td>0.000378</td>
<td>0.000804</td>
<td>-0.00276</td>
<td>0.00119</td>
<td>0.00240</td>
<td>0.00130</td>
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<td>(0.0129)</td>
<td>(0.0132)</td>
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<td>(0.0116)</td>
<td>(0.0124)</td>
<td>(0.0109)</td>
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<td>Default history</td>
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<td>0.00351</td>
<td>0.00700</td>
<td>0.00743</td>
<td>-0.000867</td>
<td>-0.00470</td>
<td>0.00507</td>
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<td>(0.0192)</td>
<td>(0.0201)</td>
<td>(0.0192)</td>
<td>(0.0184)</td>
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<td>(0.0176)</td>
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<td>ICRG</td>
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<td>(3.433)</td>
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<td>-0.527</td>
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<td>(0.486)</td>
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<td>(0.458)</td>
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<td>(1.705)</td>
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<td>(1.704)</td>
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<td>(1.700)</td>
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<td>(7.634)</td>
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<td>ICRG*polarization</td>
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<td></td>
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<td>-22.93***</td>
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<tr>
<td>(8.104)</td>
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<tr>
<td>parreg*polarization</td>
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</tr>
<tr>
<td>Constant</td>
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<td>10.54***</td>
<td>11.15***</td>
<td>11.46***</td>
<td>10.47***</td>
<td>8.528***</td>
<td>11.32***</td>
<td>8.881***</td>
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<tr>
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<td>(2.781)</td>
<td>(2.673)</td>
<td>(2.569)</td>
<td>(2.632)</td>
<td>(2.519)</td>
<td>(2.563)</td>
<td>(2.344)</td>
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<td>45</td>
<td>45</td>
<td>45</td>
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<td>45</td>
<td>45</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.475</td>
<td>0.488</td>
<td>0.492</td>
<td>0.530</td>
<td>0.553</td>
<td>0.631</td>
<td>0.545</td>
<td>0.660</td>
</tr>
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</table>

Note: * significant at 10%, ** significant at 5%, *** significant at 1% Source: Worldwide Governance Indicators (WGI) project, Political Institutions Database DPI (2009) and Reinhart & Rogoff (2009).
Table 9: Cross-country regression of sovereign default risk and institutions excluding Latin America. High vs. Low Regulation of participation.

<table>
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<th>(1)</th>
<th>(2)</th>
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<th>(4)</th>
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</thead>
<tbody>
<tr>
<td>Y=Default probability</td>
<td>parreg&lt;3.55</td>
<td>parreg&gt;3.55</td>
<td>parreg&lt;2.72</td>
<td>parreg&gt;4.48</td>
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<tr>
<td>lGDPpc</td>
<td>-1.311*</td>
<td>-0.719***</td>
<td>-1.175</td>
<td>-0.803</td>
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<tr>
<td></td>
<td>(0.649)</td>
<td>(0.196)</td>
<td>(2.070)</td>
<td>(0.787)</td>
</tr>
<tr>
<td>debt / gni</td>
<td>0.00512</td>
<td>0.0121*</td>
<td>0.0374</td>
<td>0.0520**</td>
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<tr>
<td></td>
<td>(0.0195)</td>
<td>(0.00669)</td>
<td>(0.0926)</td>
<td>(0.0242)</td>
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<td>history</td>
<td>0.0612</td>
<td>-0.00463</td>
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<td>(0.0714)</td>
<td>(0.0141)</td>
<td>(0.135)</td>
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<td>polarization</td>
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<td>-0.422</td>
<td>17.72*</td>
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<td>(5.007)</td>
<td>(1.813)</td>
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<td>(7.797)</td>
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<td>R-squared</td>
<td>0.283</td>
<td>0.658</td>
<td>0.679</td>
<td>0.746</td>
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</table>

Note: * significant at 10%, ** significant at 5%, *** significant at 1% Source: Worldwide Governance Indicators (WGI) project, Political Institutions Database DPI (2009) and Reinhart & Rogoff (2009).

Table 10: Cross-country regression of sovereign default risk and institutions excluding countries independent after 1959. High vs. Low Regulation of participation.

<table>
<thead>
<tr>
<th></th>
<th>Parreg &lt; 3.55</th>
<th>Parreg &gt; 3.55</th>
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</thead>
<tbody>
<tr>
<td>lGDPpc</td>
<td>-1.520**</td>
<td>-0.894***</td>
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<td>(0.587)</td>
<td>(0.240)</td>
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<td>Debt / GNI</td>
<td>0.0290</td>
<td>0.00630</td>
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<tr>
<td></td>
<td>(0.0316)</td>
<td>(0.00933)</td>
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<tr>
<td>Default history</td>
<td>0.117**</td>
<td>-0.000984</td>
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<tr>
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<td>(0.0513)</td>
<td>(0.0122)</td>
</tr>
<tr>
<td>polarization</td>
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<td>0.534</td>
</tr>
<tr>
<td></td>
<td>(4.224)</td>
<td>(1.136)</td>
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<tr>
<td>Constant</td>
<td>10.65**</td>
<td>8.738***</td>
</tr>
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<td>(4.525)</td>
<td>(2.287)</td>
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<tr>
<td>Observations</td>
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<tr>
<td>R-squared</td>
<td>0.709</td>
<td>0.718</td>
</tr>
</tbody>
</table>

Note: * significant at 10%, ** significant at 5%, *** significant at 1% Source: Worldwide Governance Indicators (WGI) project, Political Institutions Database DPI (2009) and Reinhart & Rogoff (2009).