Transparency, Political Conflict, and Debt*

Roberto Pancrazi † — University of Warwick
Lorenzo Prosperi‡ — Prometeia

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Abstract

In this paper we argue that an important and not-yet analyzed determinant of the observed heterogeneity of government debt across countries is the interaction between political conflicts and transparency of institutions. In the empirical part of the paper we show that whereas these two variables, *per-se*, are not significant determinants of observed debt levels across countries, their interaction is a key factor to explain debt-levels heterogeneity. Specifically, political conflicts imply higher borrowing only in non-transparent economies. In the theoretical model we propose a rationale for this effect. When the incumbent has preferences over distribution of resources across different groups, in a transparent economy political uncertainty leads to precautionary savings. Nevertheless, assuming that in more non-transparent economies the probability of an incumbent to be re-elected is more strongly a function of current economic conditions, then political uncertainty leads to borrowing incentives. We structurally estimate the two frictions in our model (political conflict and lack of transparency) by using their macroeconomic implications. Then, we compare the estimated frictions with the proxies for political conflict and lack of transparency in the data and we find a significant relationship, which supports our theory.

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†University of Warwick: R.Pancrazi@warwick.ac.uk

‡Prometeia: lorenzo.prosperi@prometeia.com

1 Introduction

The macroeconomic literature has largely investigated the cross-country heterogeneity of macroeconomic variables, especially considering business cycle statistics, namely the variability of output, consumption, investment, and interest rates; however, the heterogeneity and the determinants of debt dynamics across countries is a much less examined issue.[1] In this paper we argue that an important and not-yet analyzed determinant of debt incentives is the interaction between political conflicts and transparency of institutions. The rationale behind this effect stems from how these two variables affect strategical political incentives to borrow.

Our contribution is both empirical and theoretical. First, from an empirical point of view, we analyze how our two institutional variables of interest, namely *political conflicts* and *lack of transparency*, affect observed public debt for a comprehensive set of economies. We focus on these two variables for the following reasons. Political conflicts aim to capture the degree of disagreement within a country, which affects the opportunity cost of not-being elected. We proxy political conflicts with measures of fractionalization within a country, as supported by a large body of research.[2] In a nutshell, in our paper political conflict captures how much at stake there is in an election. Our second variable of interest is *lack of transparency*, which aims to capture the difficulties for voters to recognize the true ability of policy makers, and, therefore, their propensity to base their electoral preferences on recent economic performance. This effect could arise for several reasons: for example, governments might lack of transparency in communicating their policies; also, corruption might affect policy makers' credibility; especially in emerging and developing countries governments might restrict the freedom and independence of the media and, more generally, freedom of expression is not guaranteed.[3]

Our main empirical result shows that, whereas *political conflict* and *lack of transparency*, *per-se*, are not significant determinants of observed debt levels across countries, their interaction is a key factor to explain debt-levels heterogeneity. To test this hypothesis we perform cross-country regressions of debt-to-GDP data using our proxies of *political conflict* and *lack of transparency*. Our sample includes 66 countries that are heterogeneous in terms of eco-

[1]See Semlali (1997) and Uribe (2013) for a review.

[2]According to Easterly and Levine (1997) ethnic diversity tends to slow growth by making more difficult to agree on the provision of public goods and policies. Alesina et al. (2001) argue that fractionalization is relevant in explaining the diversity of public policies in the US and in Europe. They argue that European countries are more generous to the poor relative to the US as a result of racial heterogeneity in the US and American political institution.

[3]As suggested by Rogoff and Sibert (1988), the existence of information frictions on the ability of the policy maker implies voters will make decisions according to the state of the economy (c.d. retrospective voting behaviour), as a result of a signal extraction game between voters and politicians.

nomic development: we have included OECD economies, emerging economies, and developing economies. Our findings can be summarized as follows. First, the simple regression of debt levels on political conflict and lack of transparency yields non-significant (but positive) coefficients: this means that political conflict, per-se, does not contribute significantly to increasing debt. Second, and more importantly, when we add an interaction term between the two variables, the interaction term is positive and significant, while the coefficient associated to political conflict changes the sign and become negative. This implies that if political conflict increases in a transparent economy (low lack of transparency values), its effect on debt is negative (which means it incentivizes saving); on the contrary, in a non-transparent economy (high lack of transparency values) large political conflicts induce borrowing (more debt). This result is robust to adding additional control variables and to a more complete second order regression.

The rationale behind these findings stems from the following intuition. As pointed out in Alt and Lassen (2006) and Shi and Svensson (2006), when governments might have unobservable characteristics, in non-transparent economies voters must rely simply on economic conditions as a possible signal about the quality of the government. The incentives to bust economic condition by using of public debt is a function of the opportunity cost of losing elections, which relates to the degree of political conflict. In a transparent economy, inflating economic performances via debt is not beneficial since voters can disentangle this effect from the true ability of the government. On the contrary, when the economy is non-transparent, voters might be more likely to show support to the current government if the country enjoys larger amount of resources, thus increasing incentives to borrow for the incumbent.

In our theoretical contribution, we propose a rather simple model that can explain our empirical findings. The starting point is a conventional open-economy real business cycle model similar to Uribe and Yue (2006): an economy is endowed with an exogenous and persistent stream of output and the incumbent makes intertemporal decision on debt to smooth consumption over time. We add political uncertainty into this model: in each period the incumbent has a certain probability to be re-elected. In addition, we include also political conflict and transparency. Regarding political conflict, similarly to Alesina and Tabellini (1990b), parties have preferences over distribution across different groups and decide the allocation of consumption according to these preferences. A single parameter, which we refer to as the degree of political conflict, determines how unequally the incumbent would like to split aggregate resources. The higher is the degree of political conflict, the larger are the benefits from being in power.[4]

[4]We believe that the assumption on political frictions operating through redistribution of resources is

We emphasize that when political uncertainty is characterized by a constant probability to be reelected, political conflicts *per-se* are not necessarily able to produce borrowing incentives. For example, when the incumbent has Constant Relative Risk Aversion (CRRA) preferences with risk aversion coefficient greater than one, political uncertainty and political frictions alone, i.e. in a transparent economy, induce precautionary savings. In fact, with these preferences, the incumbent would like to transfer resources from her incumbent-state to a possible future opposition-state, thus leading to incentives to postpone consumption. This feature is consistent with our empirical result that political conflict, in a transparent economy, has a negative sign on its relationship with debt.

Then, we introduce the feature of *lack of transparency*. We assume that in non-transparent economies, the probability of an incumbent to be re-elected is more strongly a function of current economic conditions.[5] Empirical studies, such as Pacek and Radcliff (1995), Lewis-Beck and Stegmaier (2000), and Bartels (2013), support the notion that economic performance is a crucial determinant of electoral outcomes and political approval. In our model we show that political conflict *together with* retrospective voting induces borrowing incentives for the incumbent. Intuitively, when the electorate is particularly sensitive to economic conditions, an incumbent is willing to borrow in order to increase current consumption to gain political advantage against the opposition.

Finally, we bring the model to the data. We use the theoretical predictions of our model on a set of observable macroeconomic and political variables to estimate both the degree of transparency and political conflict that are able to match these moments. Recall the two main theoretical findings: first, without lack of transparency, stronger political conflict lead to larger *saving* incentives; second, when lack of transparency is instead high, stronger political conflict leads to larger *borrowing* incentives. These predictions have effects on average debt, average length of government spells, consumption variance, and trade-balance variance. Therefore, we make use of these predictions to structurally estimate the degree of transparency and political conflict for each country that it is able to make these model predictions as close as possible to their observed counterpart. This strategy yields a cross section set of estimates for our two parameters of interest, the degree of political conflict and lack of transparency. Notice that we use only observed macroeconomic moments to estimate these frictions, without using

realistic. There is broad evidence that economic inequality is also related to conflicting preferences over redistribution especially in countries where ethnical heterogeneity is large (see Horowitz (1985)).

[5] Our reduced-form way to model lack of transparency can be justified by the concept of retrospective voting, as introduced by Nordhaus (1975), in which voters myopically reappoint the incumbent conditionally on current economic conditions, and then extended in Rogoff and Sibert (1988) and Rogoff (1990), which rationalize this behaviour in a rational expectation model by means of a multidimensional signaling game, where parties have time-persistent preferences and voters try to extract the competence of the incumbent by observing economic conditions.

any information about the observed degree of these frictions. Hence, the second natural step is to investigate how our estimates correlate, in the cross-section, with observed proxies of political conflict and lack of transparency. Our finding can be summarized as follows. First, the model strongly support the existence of these frictions. Second, the estimated frictions positively and significantly relate to their data counterparts. Third, once one takes into account possible sources of bias, coming from observing imperfect measures of the frictions and from estimating the frictions with a stylized model that might ignore important effects, the positive relationship becomes even stronger. Hence, we are confident that the mechanism proposed in our model can rationalize the empirical importance of the interaction between political conflict and lack of transparency as observed in the data.

The structure of the paper is as follows. In Section 2 we validate the main theoretical results on the cross section of debt to output ratios across countries. In Section 3 we present our model and the political economy environment, In Section 4 we describe the estimation strategy and we test the relevance of our model. In Section 5 we present the final remarks.

2 Transparency, Political Conflict, and Debt

There are two key variables in our analysis: *lack of transparency* and *political conflict*. The goal of this paper is to show how these two variables interact with public debt in the data, and then to provide a theoretical explanation for that interaction using a model.

2.1 Lack of Transparency

In our empirical analysis we measure *lack of transparency*, henceforth simply *transparency*, in a given country using the average of two different proxies. The first proxy is the variable *Functioning of Government (FOG)*, which examines to what extent the freely elected head of government and a national legislative representative determine the policies of the government; if the government is free from pervasive corruption; and if the government is accountable to the electorate between elections and operates with openness and transparency. The second one is the variable *Freedom of Expression and Belief (FEB)*, which measures the freedom and independence of the media and other cultural expressions; the freedom of religious groups to practice their faith and express themselves; the academic freedom and freedom from extensive political indoctrination in the educational system; and the ability of the people to engage in private (political) discussions without fear of harassment or arrest by the authorities. Countries are graded from the worst to the best. Both proxies have been rescaled to belong in the interval $[0, 1]$. See Appendix A for a description of the data sources. Our benchmark measure of *transparency* for country i is the equally weighted average of the inverse of the two proxies: $Transp_i = \frac{1}{2}\frac{1}{FOG_i} + \frac{1}{2}\frac{1}{FEB_i}$, where FOG_i and FEB_i are the value observed in the first year available, i.e. 2005.[6] Therefore, the higher is the value of this variable, the worst is the transparency in that country (Swaziland, value equal to 0.91), and the lower is its value, the highest is the transparency in that country (Australia, value equal to 0).

2.2 Political Conflict

The second variable of interest is *political conflict*, henceforth simply *conflict*. The existence of a conflict between individuals or groups in a given country generates different distribution of aggregate resources benefiting the group in power. Measuring this type of conflict is not straightforward from the data. Following Easterly and Levine (1997), we define the variable political conflict for country i, $Conflict_i$, with ethnic, linguistic and religious fractionalization, by using the one-time measure as computed by Alesina et al. (2003).[7] Fractionalization expresses the probability that two randomly selected individuals from the population will not belong to the same ethnic/linguistic/religious group. The existence of different groups per-se does not imply that a conflict in the economy exists, but it is strongly correlated with it.[8]

2.3 Transparency, Political Conflict, and Debt

In this section we investigate whether *political conflict* and *lack of transparency* are important determinants of the level of debt observed in a country. We show a novel finding, not yet highlighted in the literature: whereas these two measures do not have a significant impact, *per-se*, their interaction is an important driver of debt accumulation. In fact, we find that countries in which both political conflict and lack of transparency are high tend to accumulate larger levels of debt. However, in more transparent economies, the larger degree of political conflicts leads to more savings.

To test this hypothesis formally, and in order to control for additional country characteristics, we perform cross-country regressions of debt-to-GDP data using our proxies of political

[6] As the two variables do not vary much in the sample available, the results of this section hold if we instead consider their average value in the sample period, as shown below in one of the robustness exercise.

[7] Time series variation is not available for this variable, but this should not be a crucial limitation of our analysis, as ethnic, linguistic and religious fractionalization is likely to move very slowly over time.

[8] Alesina and Drazen (1991) argue that a war of attrition between interest groups can postpone macroeconomic stabilization. In Alesina and Spolaore (1997) a public good like a school brings less satisfaction to everyone in an ethnically diverse situation because of the different preferences for language of instruction, curriculum, location, etc. So less of the public good is chosen by society, lowering the level of output or growth.

Table 1: Summary Statistics of benchmark variables

	Debt/GDP	Conflict	Lack of Transp.	Interaction
mean	0.53	0.17	0.28	0.05
0%	0.12	0.01	0.0	0.00
25%	0.32	0.09	0.04	0.00
50%	0.51	0.15	0.20	0.03
75%	0.70	0.22	0.45	0.07
100%	1.36	0.42	0.91	0.34

Note: In this Table we present the summary statistics of the benchmark measures of Debt-to-GDP ratio, Conflict, Lack of Transparency, and interaction among the latter two variables. $Debt/GDP_i$ is calculated as the sample average in country i (see Appendix 8). Lack of transparency is the first observation available in the sample period available, i.e. 2005-2008, while the measure of political conflict is the only observation available, as it is a one-time measure as computed by Alesina et al. (2003).

conflict and transparency. Specifically, we estimate the following cross-section regression:

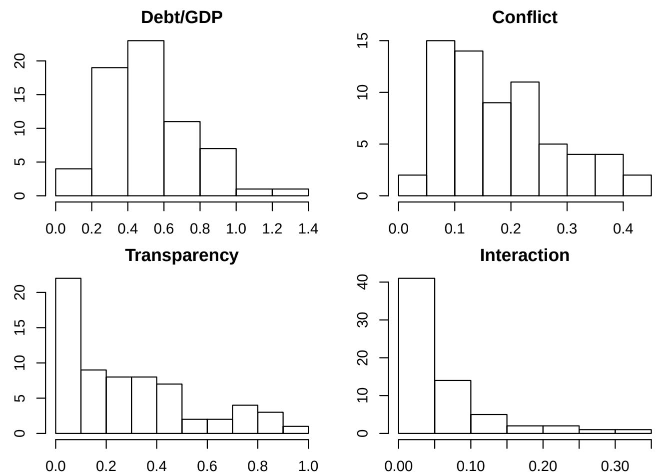
$$D_i = \kappa_0 + \kappa_1 Conflict_i + \kappa_2 (Conflict_i * Transp_i) + \kappa_3 Transp_i + \kappa_J X_{J,i} + \epsilon_i, \qquad (1)$$

where D_i denotes the average level of debt-to-GDP level of country i in the samples available, measured as a fraction; $Conflict_i$ and $Transp_i$ are the proxy for political conflict and lack of transparency, as discussed in the previous section; $X_{J,i}$ denotes possible additional regressors; and ϵ_i are regression errors that are assumed to be independent and identically distributed.[9] As for the dependent variable, debt-to-GDP, we use the sample average over the period for each country, reported in the first column of Table 8 in Appendix A.7. Regarding explanatory variables, our benchmark approach is to take the first observation available for each country to reduce the potential endogeneity among variables in the regression. However, we also check the robustness of our results to include explanatory variable as sample averages, in one of the different specifications. Summary statistics of debt, political conflict and transparency are provided in Table 1, while a plot of the distribution of debt-to-GDP ratio, transparency, conflict, and their interaction is displayed in Figure 1. A detailed description of data sources can be found in Appendix A.

We first provide a taxonomy of the relationship between debt, transparency, and conflict, by showing statistics about average debt-to-GDP for four classes of countries, identified by having lower or higher conflict/lack of transparency than the median values. As Table 2 displays, conditional on having low conflicts, less and more transparent countries have similar levels of debt to output ratios. On the contrary, higher lack of transparency is related to higher level of debt for countries with high level of political conflict. Finally, a higher degree of conflicts implies less debt for more transparent countries, but more debt in less transparent

[9] The limitation of the dataset and the slow-moving nature of lack of transparency does not allow to explore the time variation of that variable; in fact, among all the years and all the countries available we observe only 63 instances of changes of transparency.

Figure 1: Distribution of Benchmark variables



Note: In this Figure we plot the cross-section distribution of the benchmark measures of Debt-to-GDP ratio, Conflict, Lack of Transparency, and interaction among the latter two variables. $Debt/GDP_i$ is calculated as the sample average in country i (see Appendix 8). Lack of transparency is the first observation available in the sample period available, i.e. 2005-2008, while the measure of political conflict is the only observation available, as it is a one-time measure as computed by Alesina et al. (2003).

ones.

Table 2: Transparency, Political Conflicts, and Debt: Data

		Lack of Transparency	
		Below median (*more transparent*)	Above median (*less transparent*)
Conflict	Below median	Avg. Debt/GDP = 0.52 # Countries = 19 (Chile, Finland, Japan)	Avg. Debt/GDP = 0.51 # Countries = 14 (Romania, Honduras, Bangladesh)
	Above median	Avg. Debt/GDP = 0.45 # Countries = 14 (USA, Belgium, Philippines)	Avg. Debt/GDP = 0.63 # Countries = 19 (Thailand, Kenya, Guatemala)

Note: In this table we report average debt-to-output ratio, the number of countries and the names of three countries that belong to one of the four group identified by having higher or lower political conflict (by rows) and lack of transparency (by columns). The thresholds that identify the four groups are the median of the two variables. $Debt/GDP_i$ is calculated as the sample average in country i (see Appendix 8). Lack of transparency is the first observation available in the sample period available, i.e. 2005-2008, while the measure of political conflict is the only observation available, as it is a one-time measure as computed by Alesina et al. (2003).

Estimation results for the model in (1) are reported in Table 3. In regression (1) we display the estimates of the coefficients of the univariate relationship between debt and political conflict. Without any other explanatory variable, the sign is positive but not significant. This means that political conflict, *per-se*, does not contribute significantly to increasing debt. In regression (2) we add lack of transparency: the coefficient associated to this variable is positive and significant, but notice that even when adding this regressor political conflict is still positive and not significant. In regression (3) we first test the mechanism proposed in this paper: compared with regression (2) we have included an interaction term between political conflict and transparency. The interaction is positive and significant, while the coefficient associated to political conflict changes the sign and becomes negative. This implies that as political conflict increases the effect on debt is negative (which means it incentivizes saving) in a transparent economy (low lack of transparency values), while large political conflicts induce borrowing (more debt) in a non-transparent economy (high lack of transparency values). To give an example, if a country had a lack of transparency equal to zero (very transparent), the *marginal* effect of conflict on debt would be negative (thus, inducing savings) and equal to $\kappa_1 = -0.53$. If that country instead had the maximum observed level of lack of transparency equal to 0.916 (non-transparent), the effect of conflict on debt would be positive (thus, inducing borrowing) and equal to $\kappa_1 + 0.916\kappa_2 = 1.55$.[10]

The results are robust to using different specifications and adding controls. In regression (4) we also include additional regressors that have been shown in the literature to be important determinant of debt levels. Variable *Credit* is domestic credit provided by the financial sector and measures the soundness of the financial system: when this proxy increases, the government can borrow more easily from national and foreign investors. *Energy* is measured as energy production per capita: countries that produce energy do not need to rely on international energy markets to satisfy energy demand. The coefficient associated to *GDP per capita* tells that governments of richer countries have lower incentive to borrow. The variable *Growth*, which measures annual growth rate of GDP per capita, tells whether fast growing countries have borrowing or saving incentives. *Majoritarian* is a dummy variable that takes value one if the country had a majoritarian system in the first period available. According to Milesi-Ferretti et al. (2002) the existence of a majoritarian electoral system has an impact on fiscal policy. *Openness* is computed as export plus imports over GDP. Its positive coefficient signals that more open countries are also more financially integrated. *Pop>65* measures the percentage of the population over 65 years old and it proxies public spending in social security. In regressions (3^{cl}) and (4^{cl}) we cluster the standard errors at economic area levels for the two main benchmark models: here the standard errors are more conservative, but the interaction term remains significant at 10%.[11] In regression (5) we included additional squared terms to control for additional non linearities. Given the quadratic terms it is not immediate to observe the change in sign of the effect of transparency. Doing a similar example as before, a country like Brazil (with a conflict level similar to the average and equal to 0.2) would experience a

[10]We can compute the economic magnitude of these estimate by computing the *change* in debt to output ratio, measured as a fraction, from moving from the minimum to the median level of conflict observed in the data (that is from 0.01 to 0.15) both for the most and least transparent economy, as an example. In the first case the *change* in debt to output ratio would be equal to -0.07, while in the second case it would be 0.22. These numbers should be taken only as an indicative measure as political conflict, which is a fractionalization measure, is unlikely to vary that much in a given country.

[11]We split the countries in the following areas: North Africa & Middle East, Latin & Central America, Asia, Eastern Europe, Africa and Developed countries.

negative *marginal* effect of political conflict on debt, equal to -0.59, if its transparency value were zero, and a positive *marginal* effect, equal to 1.32, with the highest transparency value.[12]

In regression (6) we add squared terms of Conflict and Transparency to the specification in (4). In regression (7) we include area dummies to control for latitude effects. Regression (8) only differs from (7) in the way the regressors are calculated. While in all the other cases each variable enters as the first available observation for each country, here the variable is calculated as an average in the available period. In this way average GDP growth becomes more significant in the regression, but the interaction term is still strongly significant. Regression (9) has the same specification of model (6), but we restrict the analysis to developing countries: our results appear stronger in this case, as the size (in absolute value) of the coefficients associated to political conflict, transparency and their interaction is larger. Furthermore political conflict becomes now more significant. Model (10) differs from (7) just for the dependent variable: debt-to-GDP ratios are calculated from 1990 onward to focus on the period when emerging markets started integrating in the global economy. Also in this case the coefficients associated to our variables of interests are robust in size and sign. Models (11) to (13) differ from (7) for the proxy of lack of transparency used in the analysis. The results seem to be robust to the choice of the transparency index: in regression (11) transparency is defined from *Functioning of Government* described above, while in regression (12) we used *Freedom of Expression and Belief*. In model (13) we define transparency as the average of 7 different proxies. In addition to the proxies included in the benchmark definition of transparency we have added: proxies of freedom of the press and pressures over media content exerted by politics, state laws or more generally influence coming from the economic environment of the media; a measure of political participation (that measures the right of people to freely organize in political parties); and a measure of rule of law (as a measure of reliability of the judiciary system). Finally, in model (14) we exclude countries that have been through a major regime switch from dictatorship to multi-partisan election.[13] The five countries with such a regime change are: Burundi, Hungary, Jordan, Nepal, and Romania.

[12]As the regression contains second order terms, the marginal effect for political conflict is a function of the conflict level. That is why for the example with picked a country with a value of political conflict equal to the average.

[13]We identify the regime switcher using the variable *No Parties Allowed, (NPA)* computed by Institutions and Elections Project, and that in any year takes value of 1 if no parties are allowed and 0 otherwise. The criterion we use to isolate the regime switcher is that a country that starts in a dictatorship (NPA=1) experiences a one-time shift to multi-partisan election (NPA=0).

Table 3: Transparency, Political Conflicts, and Debt: Regressions

	Model 1	Model 2	Model 3	Model 3^d	Model 4	Model 4^d	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14
Constant	0.47***	0.42***	0.54***	0.54***	0.25	0.25	0.68***	0.30	1.24**	2.30***	1.07**	1.09*	1.23**	1.26**	1.25**	0.13
	(7.16)	(6.10)	(7.79)	(12.01)	(0.48)	(0.25)	(5.95)	(0.57)	(2.14)	(4.47)	(2.45)	(1.84)	(2.25)	(2.01)	(2.03)	(0.24)
Interaction			2.27***	2.27*	2.14**	2.14*	2.10***	1.91**	2.43***	2.48***	3.37***	2.00**	2.23**	2.25**	2.42**	2.08**
			(2.99)	(1.82)	(2.21)	(1.70)	(2.92)	(2.05)	(2.66)	(3.90)	(4.01)	(2.00)	(2.55)	(2.53)	(2.25)	(2.10)
Political Conflict	0.35	0.25	-0.53	-0.53*	-0.39	-0.39	-2.32*	-2.21	-1.61	-2.00*	-4.80***	-0.95	-1.36	-1.53	-1.40	-2.52*
	(0.91)	(0.73)	(-1.45)	(-1.72)	(-0.69)	(-0.49)	(-1.74)	(-1.60)	(-1.11)	(-1.70)	(-3.47)	(-0.57)	(-0.98)	(-1.04)	(-0.99)	(-1.78)
Lack-of-Transp.		0.26**	-0.13	-0.13	-0.24	-0.24	0.002	-0.12	0.08	-0.32	0.39	0.58	0.46	-0.28	-0.77	-0.13
		(2.37)	(-0.76)	(-0.49)	(-1.00)	(-0.61)	(0.005)	(-0.28)	(0.18)	(-0.74)	(0.84)	(1.28)	(1.08)	(-0.57)	(-1.41)	(-0.27)
Political Conflict^2							4.32	4.50	3.03	2.76	7.61**	1.52	1.98	3.38	2.39	5.36*
							(1.43)	(1.50)	(0.89)	(0.96)	(2.40)	(0.36)	(0.62)	(0.94)	(0.72)	(1.67)
Lack-of-Transp.^{2}							-0.16	-0.13	-0.52	-0.18	-1.05**	-0.97**	-0.86**	-0.09	0.40	-0.15
							(-0.34)	(-0.32)	(-1.21)	(-0.47)	(-2.07)	(-2.15)	(-2.24)	(-0.21)	(0.72)	(-0.32)
Credit					0.34***	0.34**		0.32***	0.31***	0.31***	0.61***	0.42***	0.31***	0.31***	0.31***	0.28***
					(3.54)	(2.16)		(3.32)	(3.17)	(4.16)	(5.44)	(4.22)	(3.16)	(2.95)	(3.20)	(2.90)
Energy					-0.17	-0.17		-0.16	-0.07	-0.02	-0.29**	-0.12	-0.05	-0.10	-0.12	-0.18
					(-1.15)	(-1.13)		(-1.03)	(-0.53)	(-0.79)	(-2.39)	(-0.76)	(-0.37)	(-0.75)	(-0.96)	(-1.21)
Business					0.24***	0.24***		0.27***	0.21***	0.10	0.32***	0.34***	0.20***	0.22***	0.25***	0.24***
					(3.39)	(6.26)		(4.24)	(2.97)	(1.56)	(5.04)	(4.27)	(2.83)	(3.18)	(3.69)	(3.99)
GDP per capita					-0.02	-0.02		-0.01	-0.11**	-0.19***	-0.08*	-0.11*	-0.11**	-0.10*	-0.09	0.01
					(-0.33)	(-0.17)		(-0.25)	(-2.11)	(-4.22)	(-1.70)	(-1.93)	(-2.40)	(-1.84)	(-1.64)	(0.26)
GDP growth					0.06	0.06		0.18	-0.34	-5.40**	-0.30	-0.01	-0.31	-0.28	-0.23	0.10
					(0.11)	(0.13)		(0.32)	(-0.59)	(-2.48)	(-0.66)	(-0.02)	(-0.55)	(-0.49)	(-0.38)	(0.19)
Majoritarian					0.04	0.04		0.06	0.05	0.04	-0.08	0.01	0.03	0.05	0.05	0.08
					(0.66)	(0.59)		(1.03)	(0.68)	(0.65)	(-1.02)	(0.12)	(0.51)	(0.71)	(0.71)	(1.38)
Openness					0.001	0.001		0.001	0.001*	0.002***	0.001	0.001	0.001**	0.001	0.001	0.001
					(1.43)	(0.82)		(1.39)	(1.77)	(2.83)	(1.64)	(0.98)	(2.19)	(1.38)	(1.04)	(1.37)
Pop>65					1.17	1.17		1.45	1.56	1.45	0.46	2.26	1.79	1.19	0.69	1.04
					(1.01)	(0.67)		(1.23)	(0.94)	(1.06)	(0.48)	(1.25)	(1.05)	(0.77)	(0.46)	(0.92)
Area Dummies	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	0
Expl. Average	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Only Developing	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Short Sample Debt	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Transparency alt.	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	0
Clustered Std.Err	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
No Regime Switch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
N	66	66	66	66	66	66	66	66	66	66	47	66	66	66	66	61
R^2	0.02	0.09	0.16	0.16	0.36	0.36	0.19	0.40	0.48	0.58	0.63	0.56	0.48	0.48	0.46	0.40
$\bar{R}^2$	0.003	0.06	0.12	0.12	0.24	0.24	0.12	0.25	0.28	0.42	0.48	0.39	0.29	0.29	0.25	0.24

Note: In this table we report the estimates of the cross-section regression in (1). The dependent variables is the debt-to-GDP ratio for the 66 countries reported in Appendix B. Different specification accounts for several controls. t-statistics are reported in parenthesis. (*) indicates significance at 10%; (**) indicates significance at 5%; (***) indicates significance at 1%. Standard errors are calculated using heteroskedasticity consistency estimator White (1980).

2.4 Transparency of institutions or unsophisticated voters?

One might wonder whether the effect we found for our measure of lack of transparency, which aims to capture institutional frictions that create difficulties for voters to recognize the true ability of policy makers, can be instead interpreted as voters' lack of sophistication, which in contrast should be interpreted as voters' inability to evaluate the political and electoral process, regardless the degree of transparency of the institutions. In order to shed lights on these two interpretations, we first create a *Lack of Sophistication* index, as an average of two different proxies.

The first proxy is the variable *Social Globalization*, and it is measured by three categories of indicators; (i) personal contacts, such as telephone traffic and tourism; (ii) information flows, e.g. number of Internet users; and (iii) cultural proximity, e.g. trade in books and number of Ikea warehouses per capita. The second proxy is the variable *Education*, and it is measured as number of students at universities or other higher education institutions per 100,000 inhabitants of the country.

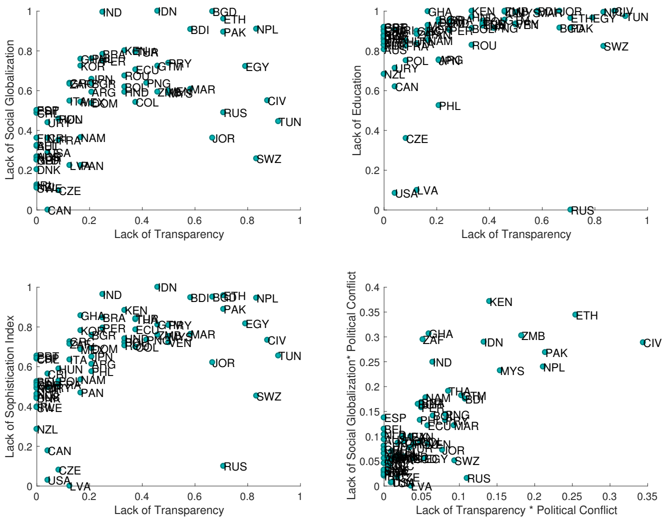
The measure of lack of sophistication is the average of the two proxies and it is rescaled to belong in the interval [0,1]. Hence, a country with value of lack of sophistication equal to zero is the most sophisticated (Latvia), whereas a country with value equal to one is the least sophisticated (Indonesia). See Appendix A.4 for a description of the data sources. Figure 2 displays the relationship between our benchmark measure of lack of transparency and lack of social globalization, lack of education, the overall lack of sophistication index, as well as the relationship between the interaction between lack of transparency and political conflict and lack of sophistication and political conflict. Although obviously positively correlated the transparency and sophistication are far from perfectly correlated.[14]

If we were to estimate the same empirical regression in equation (1) with *Lack of Sophistication* instead of with *Lack of Transparency*, would we obtain the same results? And if we, instead, were to add sophistication as a control, would the results in the previous section change? Table 4 helps answering these questions. Model 1 reports, for reference, the relation between debt and political conflict. Model 2s adds lack of sophistication: the results are very similar to Model 2 of Table 3, both in terms of sign and magnitude. However, as Model 3s displays, the interaction between political conflict and lack of sophistication is insignificant. This confirms that our results in the previous section are related to transparency of institutions rather than unsophisticated voters. Model 4s and Model 5s support this finding, as our parameter of interest, that is the the interaction between political conflict and transparency

[14] The correlation between the two indexes is 0.46, while the correlation between the interactions with political conflict is 0.74.

remains large and positive when controlling for lack of sophistication and its interaction with conflict, while the interaction between political conflict and lack of sophistication is very close to zero.[15]

Figure 2: Sophistication and Transparency



Note: In this Figure we display the relationship between our benchmark measure of lack of transparency (x-axis) and lack of social globalization, lack of education, the overall lack of sophistication index (y-axis, panel north-west, north-east, and south-west), as well as the relationship between the interaction between lack of transparency and political conflict (x-axis) and lack of sophistication and political conflict (y-axis, panel south-east).

Table 4: Sophistication, Transparency, Political Conflicts, and Debt

	Model 1	Model 2s	Model 3s	Model 4s	Model 5s
Constant	0.47***	0.30***	0.50***	0.46***	0.46**
	(7.16)	(3.17)	(2.79)	(5.18)	(2.32)
Lack-of-Transp*Pol.Confl				2.23***	2.10***
				(3.03)	(2.79)
Political Conflict	0.35	0.27	-0.62	-0.48	-0.45
	(0.91)	(0.74)	(-0.73)	(-1.34)	(-0.50)
Lack-of-Transp.				-0.14	-0.14
				(-0.86)	(-0.79)
Lack-of-Sophist		0.29**	-0.01	0.12	0.13
		(2.45)	(-0.04)	(0.95)	(-0.39)
Lack-of-Sophist*Pol.Confl			1.34		-0.04
			(1.00)		(-0.03)
N	66	66	66	66	66
R^2	0.01	0.08	0.09	0.16	0.16
$\bar{R}^2$	0.00	0.05	0.04	0.11	0.09

Note: In this table we report the estimates of the regression in (1) when including lack of sophistication. The dependent variables is the debt-to-GDP ratio for the 66 countries reported in Appendix B. t-statistics are reported in parenthesis. (*) indicates significance at 10%; (**) indicates significance at 5%; (***) indicates significance at 1%. Standard errors are calculated using heteroskedasticity consistency estimator White (1980).

[15]These results are robust to including the additional regressors as in Table 3, including a full second order specification in conflict, transparency, and sophistication.

3 The Model

In this section we describe our economy of interest. There are two key features of the model. First, we consider *political conflict*: as in Alesina and Tabellini (1990a), the economy is populated by several groups of domestic agents that are represented by political parties. The incentive of an incumbent to favour her group constitutes a political conflict. Second, in our more general framework we introduce the concept of *transparency*. We assume that lack of transparency induces inability of voters to judge and assess politicians. Therefore, a non-transparent environment leads voters to base their support to an incumbent only when her mandate was characterized by good economic performance, which in our model means higher aggregate consumption level and utility. In this sense, we generalize Aguiar and Amador (2011) by assuming that the probability of reelection is constant only in an economy characterized by transparency, and that it is instead a function of previous aggregate consumption levels in an economy where transparency is absent. We will show that these two features jointly are able to replicate the empirical facts displayed in the previous section.

3.1 Preferences

Consider a neoclassical small open economy model with $N+1$ equally sized groups of domestic agents, each represented by a political party. Each period, one of the $N+1$ parties is in office and the incumbent party remains in power with a given probability $p(\cdot)$. Conditional on the incumbent losing the elections, each opponent party has equal probability $\frac{1-p(\cdot)}{N}$ of being elected. In a non-transparent economy the probability of being reelected is a positive function of aggregate consumption, whereas in a transparent economy, that probability is constant and fixed, as in Aguiar and Amador (2011). We model political conflict by using the partisan approach; the party in power decides borrowing and consumption allocation to the different groups. We define the utility at time t of party i when that same party i is in power as:

$$\mathcal{U}^{i,i}(c_t^i) = \theta_{i,i} u(c_t^{i,i}) + \sum_{q \neq i} \theta_{i,q} u(c_t^{i,q}), \tag{2}$$

where $\theta_{i,j} \geq 0$, $\forall i,j$ s.t $\sum_{j=1}^{N+1} \theta_{i,j} = 1$, is the weight that party i associates to the utility of party j, and $c_t^i = \left\{ c_t^{i,1}, \ldots, c_t^{i,N+1} \right\}$ is the consumption allocation decided by party i. A political party i cares about all the agents in the economy, but gives higher weight to agents of its group i, meaning that $\theta_{i,i} \geq \theta_{i,j}$. The instantaneous utility function $u(\cdot)$ is uniformly continuous, twice continuously differentiable, strictly increasing in c, and satisfies the Inada conditions. Similarly, the utility of an opposition party r when party i is in power, is defined as:

$$\mathcal{U}^{i,r}(c_t^i) = \theta_{r,r} u(c_t^{i,r}) + \sum_{q \neq r} \theta_{r,q} u(c_t^{i,q}).$$

Moreover, we assume no discrimination, i.e. each party weights equally the utility of other types of agents and likes to be in power as the other parties do. In this way we have simplified the problem by imposing symmetry, meaning that we are also going to restrict our attention to equilibria that are symmetric. The symmetry assumption imposes that $\theta_{i,i} = \theta \, \forall i$ and $\theta_{i,q} = \frac{1-\theta}{N} \forall i, q$ such that $\frac{1}{N} \leq \theta < 1$; hence, we can simply ignore the identity of the party in power and at the opposition. Therefore, for the rest of the paper and for simplicity we denote the utility of the incumbent i as $U^I(c_t) \equiv \mathcal{U}^{i,i}(c_t^i)$ and the utility of any opposition party, r, as $U^O(c_t) \equiv \mathcal{U}^{i,r}(c_t^i)$. We exclude the case with $\theta = 1$ in order to avoid corner solutions.[16] Each party is born at 0 and lives for T periods and discounts future utility at rate β.

3.2 International Financial Market and Output

The party in power (incumbent) has the ability to borrow or lend using an internationally traded one-period risk-free non-contingent real bond. Borrowing and saving allow the government to diverge the amount of aggregate consumption from the exogenous aggregate income and to distribute it intertemporally. Similarly to a small-open economy setting, the evolution of the debt position of the government is:

$$d_{t+1} - d_t = r_t d_t + c_t - y_t, \tag{3}$$

where d_{t+1} denotes the debt position at the beginning of period $t+1$, chosen in period t, r_t denotes the country interest rate, and y_t is an exogenous stochastic endowment. We assume that each party cannot renege the debt contract in each period even if it was stipulated by another party.[17] We implicitly assume that the country is a small-open economy, which we believe is a reasonable assumption given the set of countries considered in the empirical section; the domestic interest rate is assumed to be the sum of a constant world interest rate $r^* > 0$ and a country-premium that is increasing in a detrended measure of aggregate debt,

[16] See Alesina and Tabellini (1990b) for a model where each party cares only about her personal consumption, in such a case the borrowing implications are very different.

[17] See Cuadra and Sapriza (2008) and Prosperi (2016) for a discussion of the case when the government can actually default.

as in Garcia-Cicco et al. (2010), i.e.:

$$r_t = r^* + \xi \left(e^{\tilde{d}_{t+1} - \bar{d}} - 1 \right). \tag{4}$$

The variable $\tilde{d}_t$ denotes the aggregate level of debt, which is taken as given, ξ measures the sensitivity of the interest rate to the debt position, and $\bar{d}$ is a reference point. In equilibrium $\tilde{d}_t = d_t$. Also, since the economy ends at T it must be that $d_{T+1} = 0$.

Remark. As discussed in Schmitt-Grohé and Uribe (2003), standard small open economy model, in which domestic residents have only access to a risk-free bond whose rate of return is exogenously determined abroad, have the undesired property that the steady-state of the model depends on initial conditions, more specifically upon the country's initial net foreign asset position. In other words, the equilibrium dynamics of the model follow a random walk component and the distribution of debt is unbounded. In their seminal paper, Schmitt-Grohé and Uribe (2003) present several ways to *close* small open economy models, that is to slightly modify the model specifications so that the model is stationary, i.e. does not depend on initial condition; assuming a debt-elastic interest rate is one of this approach, which we adopt as it is particularly convenient in our framework.

Output is assumed to follow a first-order autoregressive process, i.e.:

$$\log(y_t) = \rho_y \log(y_{t-1}) + \sigma_y \epsilon_t, \tag{5}$$

where $\epsilon_t \sim N(0, 1)$. In each period, the party in power (incumbent) decides the amount of borrowing (lending) in the one-period bond (d_{t+1}) and the allocations of consumption across the different type of agents, such that $\sum_{i=1}^{N+1} c_t^i = c_t$.

3.3 Political Economy

We consider a political environment where political power fluctuates between the $N + 1$ parties. Hence, we introduce political uncertainty in the model as an additional stochastic process. Also, as in Acemoglu et al. (2011), the incumbent decides consumption allocation between groups, but in our case the incumbent decides the amount of debt next period.[18] As in Acemoglu et al. (2011) the timing is as follows:

1. In each period t, we start with one party, i, in power.

2. Exogenous output y_t realizes.

[18] Acemoglu et al. (2011) considers a closed economy with zero external borrowing.

3. Party i chooses the level of aggregate consumption c_t by choosing the quantity of debt to carry to the next period, d_{t+1}.

4. Given the level of aggregate consumption c_t, party i chooses consumption allocations for each type of agents, c_t^i, subject to the feasibility constraint $\sum_{j=1}^{N+1} c_t^j = c_t$.

5. Political uncertainty resolves. In an economy with transparency, the re-election probability parameter p, which determines the likelihood that an incumbent will be in power also in the next period, is constant. Instead, with lack of transparency p follows a first order Markov process. In this case, then, the probability of party j to retain office in $t+1$ depends on the level of aggregate consumption c_t, and it is equal to $p(c_t)$, where $p(\cdot)$ is a continuously differentiable and increasing function. If the incumbent j is not reappointed (event with probability $1-p(c_t)$), then the opposition parties have equal probability of being in power. Hence, each opposition party will be in office in period $t+1$ with probability $\frac{1-p(c_t)}{N}$.

In Appendix C we describe in detail the Symmetric Markov Perfect Equilibrium that arises from this political environment.

Remark. In the rest of the paper we assume that the function $p(c)$ is given and exogenous. This approach allows us to clearly analyze the difference between the standard case in which the reelection probability is constant to the one in which it depends on economic conditions. Although certainly interesting, micro-funding that function is outside the scopes of this paper, which, in contrast, focuses on the effects of that function, more than on its genesis.

In our framework the political setup induces two kinds of frictions:

1. The uncertainty from political elections together with the political conflict creating disagreement about redistribution (as in Alesina and Tabellini (1990a));

2. The strategic behaviour of the incumbent to increase her probability of re-election by increasing aggregate consumption via borrowing in a non-transparent economy. (see Rogoff (1990) and Rogoff and Sibert (1988))

In the next sections we show that, with commonly used utility function, political uncertainty [1] is not in general sufficient to create incentives for the incumbent to borrow. In contrast, the strategic behaviour induced by lack of transparency [2] is able generate significant amount of borrowing in the economy. This result implies that heterogeneity in the degree of transparency and political conflict can produce large heterogeneity in borrowing decisions that is observable in the data.

3.4 The Benchmark: Transparent Economy with No Political Conflict

In order to study the role of political conflict and lack of transparency in consumption-saving decisions, we use the following strategy. First, we shut down both channels to consider a benchmark model without frictions. Then, we add first political conflicts alone, and we compare the resulting borrowing incentives with the frictionless model. Finally, we include also lack of transparency and we investigate how borrowing incentives are driven by the interaction of these two frictions. To obtain useful analytical results, we first simplify the model assuming that the economy lasts only two periods, $t = 1, 2$, and that output, y, and the interest rate, r, are constant. Since the economy lasts only two periods, no borrowing is allowed in the last period and it will be not optimal to save in the last period; hence $d_3 = 0$. We also assume that the discount factor is $\beta^{-1} = 1 + r$, so that there is no other borrowing or lending incentive in the model other than the one resulting from political frictions.

As a benchmark for comparison we consider a model in which all frictions are eliminated, which happens when a party weights equally the instantaneous utility of each group, i.e. when $\theta_{q,i} = \frac{1}{N+1}$ $\forall q, i \in 1, ..., N+1$. In this case each party is indifferent to be in power or in opposition as that would imply an identical consumption distribution; hence, we have that: $U^I(c_t) = U^O(c_t) = u\left(\frac{c_t}{N+1}\right)$. As evident, in this case the political economy component of the model is shut down, since any incumbent will equally distribute aggregate consumption across agents, and, as a result, the political uncertainty does not play any role. Hence, the solution of the borrowing problem is determined by maximizing the intertemporal utility as:

$$\max_{\{c_1,c_2,d_2\}} u\left(\frac{c_1}{N+1}\right) + \beta u\left(\frac{c_2}{N+1}\right)$$
$$\text{s.t. } d_{t+1} = (1+r)\, d_t + c_t - y, \text{ for } t = 1, 2 \quad \text{and } d_3 = 0,$$

with d_1 given. The equilibrium of the frictionless model is given by:

$$u'\left(\frac{y + d_2 - (1+r)\, d_1}{N+1}\right) = u'\left(\frac{y - (1+r)\, d_2}{N+1}\right). \tag{6}$$

This condition implicitly characterizes the optimal debt in the frictionless economy, which we denote as d_2^*, as a function of the parameters d_1, r, N, y. Importantly, note that in this benchmark economy, the optimal level of debt d_2^* is such that consumption is equalized in the two periods, i.e. $c_1 = c_2$.

3.5 The Transparent Economy With Political Conflict

Let us now consider an economy with political conflicts, in which the incumbent i values the utility of his party $\theta_{i,i} = \theta > \frac{1}{N+1}$. We still consider a transparent economy by assuming that the probability of an incumbent to be reelected is a constant and equal to p.

Given a level of aggregate consumption, the incumbent's utility is:

$$U^I(c) = \theta u\left(c^I\right) + (1-\theta)\, u\left(\frac{c-c^I}{N}\right), \tag{7}$$

where c^I is the value of consumption held by the incumbent party. Similarly, each opposition party's utility is:

$$U^O(c) = \frac{(1-\theta)}{N} u\left(c^I\right) + \left(1 - \frac{(1-\theta)}{N}\right) u\left(\frac{c-c^I}{N}\right),$$

since the opposition values θ his own instantaneous utility and $\frac{(1-\theta)}{N}$ the utility of the incumbent and of the other N opposition parties. When there are political conflicts, for a given level of aggregate consumption, c, the incumbent follows the optimal sharing rule that is given by maximizing the incumbent's utility in equation (7), which gives:

$$\theta u'\left(c^I\right) = \frac{(1-\theta)}{N} u'\left(\frac{c-c^I}{N}\right). \tag{8}$$

Therefore, in case of political conflicts, the incumbent maximizes the intertemporal utility with respect to $\{c_1, c_2, d_2\}$, anticipating that the incumbent at period 2 will repay the public debt, and will implement the optimal sharing rule.[19] Hence, the problem for the incumbent is then, given d_1:

$$\begin{aligned}
&\max_{\{c_1,c_2,d_2\}} U^I(c_1) + \beta\left[pU^I(c_2) + (1-p)\,U^O(c_2)\right] \\
&\text{s.t. } d_{t+1} = (1+r)\,d_t + c_t - y, \text{ for } t = 1,2 \quad \text{and } d_3 = 0, \\
&\theta u'\left(c_t^I\right) = \frac{(1-\theta)}{N} u'\left(\frac{c_t - c_t^I}{N}\right), \text{for } t = 1,2.
\end{aligned}$$

The equilibrium condition of this problem is:

$$U^{I'}(y-(1+r)\,d_1 + d_2) = \left[pU^{I'}(y-(1+r)d_2) + (1-p)\,U^{O'}(y-(1+r)d_2)\right], \tag{9}$$

[19] Suppose, instead, that the incumbent does not apply the optimal sharing rule. Then, the incumbent at period 2 could threaten the incumbent at period 1 by applying a more severe sharing to induce him not to overborrow. Such an equilibrium would not be sub-game perfect, since in the stage game the incumbent will never implement a different sharing rule. This kind of reasoning always applies with finite games.

where

$$
\begin{aligned}
U^{I'}(c) &= \theta u'\left(c^I\right)\frac{\partial c^I}{\partial c} + \frac{(1-\theta)}{N}u'\left(c^O\right)\left(1-\frac{\partial c^I}{\partial c}\right), \quad (10)\\
U^{O'}(c) &= \frac{(1-\theta)}{N}u'\left(c^I\right)\frac{\partial c^I}{\partial c} + \frac{1}{N}\left(1-\frac{(1-\theta)}{N}\right)u'\left(c^O\right)\left(1-\frac{\partial c^I}{\partial c}\right), \quad (11)
\end{aligned}
$$

where $c^O = \frac{c-c^I}{N}$ is the amount of consumption of each opposition party. The equilibrium condition (9) defines the equilibrium level of debt in case of political conflict, $\tilde{d}_2^*$. Political conflicts affect the intertemporal decision of the incumbent. When the incumbent is deciding the optimal level of debt, she takes into account that the marginal cost of an extra unit of debt in period-1 is the weighted average of the period-2 marginal utility of being incumbent and opponent. Depending on the relative size of these two marginal utilities, political conflicts can generate more saving or more borrowing with respect to the frictionless case. Proposition (1) states the conditions for having more saving in a partisan economy with respect to the frictionless economy.

Proposition 1. ***Political Conflicts and Savings.*** *Consider the political economy model as specified above; then the following statements are equivalent:*

(a) $\tilde{d}_2^* \leq d_2^*$, *i.e. political conflicts generate saving incentives*

(b) $U^{I'}(c) \leq U^{O'}(c)$

(c) $\theta \geq \frac{\partial c^I}{\partial c}$

(d) $\frac{u''(c^O)}{u''(c^I)} \leq \left(\frac{u'(c^O)}{u'(c^I)}\right)^2$

See Appendix D.1 for the proof. This result is in contrast with Aguiar and Amador (2011), which showed that political frictions generate incentive for borrowing. The reason for their result is that they modeled political frictions using the opportunistic approach were the incumbent has *per-se* larger marginal utility than the opponent. In our setting that is not generally the case. In fact, Proposition 1 states that when the marginal utility of the incumbent is lower then the marginal utility of the opponent then political conflicts induce saving incentives. This is an intuitive result: if that condition is satisfied, a unit of consumption is more valuable for the opposition than for the incumbent. Hence, a party is willing to move resources from the incumbent state to the opposition state. Given that in time $t = 1$ the decision maker is the incumbent and that there is some positive probability that at time $t = 2$ that agent will be at the opposition, she is then willing to move resources intertemporallty from $t = 1$ to $t = 2$. Notice that, as equations (10) and (11) show, the marginal utilities of the incumbent and opposition depend on the property of the utility function not only through its first derivative u', but also from its second derivative through the sharing rule $\frac{\partial c^i}{\partial c}$. In fact, by using the implicit function theorem on equation (8), it is trivial to show that:

$$\frac{\partial c^I}{\partial c} = \frac{\frac{1-\theta}{N^2} u''\left(\frac{c-c^I}{N}\right)}{\theta u''(c^I) + \frac{1-\theta}{N^2} u''\left(\frac{c-c^I}{N}\right)}. \tag{12}$$

The shape of the utility function is then a crucial determinant on the role of political frictions. We now define a general class of utility functions that have the useful property of implying a proportional optimal sharing rule.

Definition 1. **Proportional Sharing Rule.** An utility function satisfies the Proportional Sharing Rule (henceforth, PSR) property if the derivative $\frac{\partial c^I}{\partial c}$ solution of the optimal sharing rule in equation (8) is constant, i.e. if there exists a $\psi \in \Re$, s.t. :

$$\frac{\partial c^I}{\partial c} = \psi.$$

The following corollary defines the condition for a utility function to satisfy the PSR.

Corollary 2. *Consider an utility function $u(c)$ and denote with $g(\cdot)$ the inverse of its marginal utility. If for any two real positive numbers, a and x, $g(\cdot)$ satisfies the following property:*

$$g(ax) = h(a)g(x) + l(a), \tag{13}$$

where $h(\cdot)$ and $l(\cdot)$ are real-valued functions, then the utility function $u(c)$ also satisfies the PSR property.

See Appendix D.2 for the proof.

Condition (13) is quite general. In fact, it is satisfied for any utility function that belongs to the hyperbolic absolute risk aversion (HARA) utilities, as proved in the following Corollary.

Corollary 3. ***HARA utility function and PSR.*** *An utility function that belongs to the class of Hyperbolic Absolute Risk Aversion (HARA) utility functions, i.e. such that:*

$$u(c) = \frac{\sigma}{1-\sigma}\left(\frac{ac}{\sigma} + b\right)^{1-\sigma}$$

with $a > 0$ and $\frac{ac}{\sigma} + b > 0$, satisfies the PSR property.

See Appendix D.3 for the proof. As a consequence, the most common utility functions

(CRRA, logarithm, linear, quadratic, exponential) satisfy the PSR property. An interesting consequence of proposition 1 arises when considering the CRRA utility function.

Corollary 4. ***CRRA and Savings****. Consider the political economy model as specified above: if $u(c) = \frac{c^{1-\sigma}}{1-\sigma}$, then:*

(a) $\frac{\partial c^I}{\partial c} = \psi = \frac{\left(\frac{\theta}{1-\theta}\right)^{\frac{1}{\sigma}} N^{\frac{1-\sigma}{\sigma}}}{1+\left(\frac{\theta}{1-\theta}\right)^{\frac{1}{\sigma}} N^{\frac{1-\sigma}{\sigma}}}$.

(b) $\theta \geq \psi \iff \sigma \geq 1$.

(c) $\tilde{d}_2^* \leq d_2^* \iff \sigma \geq 1$, *with* $\tilde{d}_2^* = d_2^* \iff \sigma = 1$.

See Appendix D.4 for the proof. In the case of the CRRA utility function the saving condition is always satisfied whenever $\sigma \geq 1$. When $\sigma \to 1$ (log utility case) the marginal utility of the incumbent is equal to the marginal utility of the opposition party, and by Proposition 1 the equilibrium under political uncertainty is identical to the one in the frictionless economy, for any value of p or θ. Hence, when considering logarithm instantaneous utility, political uncertainty does not affect the consumption-saving decision.

As pointed out, the incentive for an incumbent to save relies on the willingness to bring resources from its incumbent state to a possible opposition states. When the latter is less likely, the saving incentive is reduced. The next corollary formally states this feature.

Corollary 5. ***Political uncertainty and Savings****. Assuming that the utility function satisfies the PSR property and it is such that* $U^{I'}(c) \leq U^{O'}(c)$, *then* $\frac{\partial \tilde{d}_2^*}{\partial p} > 0$ *and* $\lim_{p \to 1} \tilde{d}_2^* = d_2^*$.

See Appendix D.5 for the proof.

The 2-period case that we have discussed in this section, had been already studied in Alesina and Tabellini (1990b). The authors studied the case with $\frac{1}{2} < \theta < 1$ and derived the same condition for borrowing that is presented in proposition 1 in terms of ratios of the *concavity index* defined by Debreu and Koopmans (1982). As it is stated in our Proposition 4 they argue that for the CRRA case, the borrowing condition is satisfied whenever $0 < \sigma < 1$. The problem is that this assumption makes it difficult to reconcile model predictions with data.[20] Since our final goal is to use a model that has realistic implications in the quantitative analysis, in what follows we assume that $\sigma \geq 1$. In this case, then, without any other friction, political uncertainty and political conflict do not generate borrowing incentives.

[20]The responsiveness of consumption growth to a variation of the interest rate is completely determined by $1/\sigma$ as in standard intertemporal model with CRRA utility functions. This means that with $\sigma < 1$ consumption growth is highly responsive to interest rate, an implication that the literature has found irreconcilable with the data. Furthermore, in macro finance literature $\sigma < 1$ does not provide any good result in explaining how agents face risky decisions.

Finally, the last implication of Corollary 5 states that when political uncertainty disappears, i.e. $p = 1$, the precautionary saving motives for an incumbent disappears, since it will certainly stay in power forever. In this case, political conflict does not alter the optimal decision of debt with respect to the benchmark frictionless economy.

3.6 The Non-Transparent Economy With Political Conflict

In the previous section we have pointed out that, under the commonly used parameterization of utility functions, political uncertainty alone does not generate borrowing incentives. In this section we now introduce an important feature of our model, i.e. lack of transparency, which we assume induces retrospective voting. We show that this feature is able to provide borrowing incentives and, most importantly, it interacts with political conflicts in the similar way as empirically estimated in Section 2. In what follows we modify the model presented above by assuming that the probability of being reelected is an increasing function of the aggregate consumption, $p(c)$, and we assume that that the instantaneous utility function $u(\cdot)$ satisfies the PSR property, i.e. $\frac{\partial c^I}{\partial c} = \psi$. The problem for the incumbent is, then, given d_1:

$$\max_{\{c_1,c_2,d_1\}} U^I(c_1) + \beta\left[p(c_1)\,U^I(c_2) + (1-p(c_1))\,U^O(c_2)\right] \tag{14}$$

$$\text{s.t. } d_{t+1} = (1+r)\,d_t + c_t - y, \forall t = 1,2 \quad \text{and } d_3 = 0, \tag{15}$$

$$\text{and } \theta u'\left(c_t^I\right) = \frac{(1-\theta)}{N} u'\left(\frac{c_t - c_t^I}{N}\right) \ \forall t = 1,2, \tag{16}$$

The first order condition of this problem reads:

$$U^{I'}(c_1) + \beta p'(c_1)\left[U^I(c_2) - U^O(c_2)\right] = p(c_1)\,U^{I'}(c_2) + (1-p(c_1))U^{O'}(c_2) \ . \tag{17}$$

The solution of this equilibrium condition delivers the optimal level of debt in a non-transparent economy, $\hat{d}_2^*$.

Comparing the equilibrium condition above with the equilibrium condition of the economy with constant probability of re-election (equation (9)), lack of transparency adds an additional term to the marginal benefit of borrowing, since increasing debt, and therefore aggregate consumption, now increases the probability of being re-elected by $p'(c)$. A higher probability of being re-elected has a value equal to the difference in utility between the incumbent state and the opposition state at period 2. Since this difference is always positive, and since $p'(c) > 0$, this additional term increases the marginal utility of borrowing. Notice that the first order condition in (17) could not be a sufficient condition for the equilibrium. In Appendix D.6, Lemma 8, we display the sufficient condition on $p(c)$ to guarantee that the equilibrium condition (17) characterizes a global maximum.

Under those conditions, we can prove the following proposition.

Proposition 6. ***Lack of Transparency and Borrowing****. Assume conditions* (26)*-*(27) *are satisfied. Define as* $\hat{d}_2^*$ *the solution of the two period model with lack of transparency that solves equation* (17)*; define as* $\tilde{d}_2^*$ *the solution of the model with transparency that solves* (9)*; then, given a degree of political conflict* $\theta > \frac{1}{N+1}$*, a non-transparent economy has higher borrowing incentives than a transparent economy, i.e.* $\tilde{d}_2^* < \hat{d}_2^*$*;*

See Appendix D.7 for the proof.

With additional conditions on the shape of the probability function, we can prove an additional result.

Corollary 7. *Assume conditions* (26)*-*(27) *are satisfied. Define as* d_2^* *the solution of the frictionless benchmark model that solves equation* (6)*. Also, consider a linear probability function, i.e.:*

$$p(c) = \gamma + \alpha(c - \bar{c}); \tag{18}$$

then, if α *is large enough, i.e. larger than a threshold level* $\tilde{\alpha}$*, a non-transparent economy with political conflict has higher borrowing incentives than the benchmark frictionless economy, i.e.* $d_2^* < \hat{d}_2^*$*.*

See Appendix D.8 for the proof.

Notice that the parameter α in equation (18) incorporates the degree of lack of transparency: if $\alpha = 0$, then the reelection probability is constant and equal to γ; instead, the larger α, the strongest the reelection probability is linked to economic performances.[21] Proposition 6 and Corollary 7 are crucial results to link political friction to borrowing incentives. In fact, when local maxima of problem (14)-(16) are ruled out, we can formally prove that lack of transparency reduces saving incentives generated by political uncertainty and can create borrowing incentive, if the sensitivity of the probability of being reelected is sensitive enough to aggregate consumption.[22]

In the specific case of linear probability as defined in (18), we can easily check that: *(i)* borrowing solutions always exist;*(ii)* we can always characterize a threshold level for $\tilde{\alpha}$ s.t. if $\alpha > \tilde{\alpha}$ we have positive level of debt; *(iii)* we can show that $\tilde{\alpha}$ is independent of θ; *(iv)* when

[21] Although potentially this function could obtain values outside the $[0, 1]$ interval, in the following exercise we make sure that the realizations of the election probability lie in that interval.

[22] The results of Corollary 7 can be extended to a general probability function $p(c)$, which is required to have a large enough derivative at the optimal level consumption level.

utility is logarithmic then $\partial d_2/\partial\theta > 0$ when $\alpha > \tilde{\alpha} = 0$. In Appendix D.9 we investigate analytically these properties considering a log utility function.

Remark. This reduced form for the reelection probability can be rationalized with a background model as in Alt and Lassen (2006), in which government debt cannot always be observed instantaneously and from the government budget constraint, this implies that the incumbent can raise debt in order to appear more able in providing public or consumption goods. In this context one could interpret transparency as fiscal/budget transparency, which affects voters' ability to monitor government budgetary policies, or to observe and accurately assess government debt before the election.

Remark. Our assumption that in less transparent economies election outcomes depends more on macroeconomic performance is supported by the finding in the literature on political business cycles (henceforth, PBC). Several works have addressed the empirical plausibility of the existence of PBC; although at first evidence appeared to be weak, more recent studies have pointed out the importance of controlling for the quality of institutions. For example, Brender and Drazen (2008) analyze 350 election campaigns in 74 democracies and find that strong macroeconomic performance is associated with a higher probability of reelection only in the less developed countries and in younger democracies. Similarly, while Western European high-income countries pooled studies are contradictory (see Lewis-Beck and Stegmaier (2000) for a review), economic conditions are important determinants of the vote in lower-income countries in Eastern Europe (see Pacek (1994)), Latin America (Remmer (1991)), and a broader set of developing countries (Pacek and Radcliff (1995)). In addition, Alt and Lassen (2006) highlight the difference between strength of democracy and transparency; they find that even among advanced democracies, which therefore do not vary much in terms of strength of democracy, significant opportunistic electoral cycles are conditional on the transparency of budget institutions and that in countries with less transparent institutions the political business cycle appears, whereas that is not the case in higher-transparency countries.

3.7 Debt Incentives in a T-period model

Here we generalize the model by considering an economy with T large. This generalization is important since one of our goal is to study the impact of political frictions on the level of debt of the economy.

Remark. Once we move to a model with more than two periods, political uncertainty and lack of transparency create computational challenges for solving the model. In fact, while the problem could be rewritten in a recursive way by constructing a value function for the

Table 5: Equilibrium Level of Debt in a T-period model

		Lack of Transparency		
		No: $\alpha = 0$	Medium: $\alpha = 1$	High: $\alpha = 1.5$
Conflict	No: θ=0.5	0	0	0
	Medium: θ=0.7	-12.4	0.2	10.4
	High: θ=0.9	-35.7	7.7	58.1

Note: In this table we report the average level of debt (in percentage) in a T-period economy, with T = 1000, when assuming CRRA utility function and linear probability, for different values of degree of lack of transparency (α, x-axis) and degree of political friction, θ. Negative values denote savings.

incumbent and one for the opposition, as a function of the endogenous state (current debt) and the exogenous states (an indicator for being or not the incumbent in the current period, and the current level of output, when we assume it follows an AR(1) process as in equation (5)), we were not able to prove the existence of an invariant policy, as in a non-transparent economy the probability density for the evolution of the exogenous state depends on an endogenous variable. Therefore, as an alternative, we follow Azzimonti et al. (2014) by allowing for an arbitrarily large number of periods and solving the problem of the incumbent by backward induction by assuming that each party plays Symmetric Markov Strategy.

In this section we assume that the election probability is linear, as defined in (18).[23] To show that the analytical results we have derived for a 2-period model hold even in a large-T economy, we numerically solve the model and compute the average level of debt as a function of the two main parameters of interest: the degree of political friction, θ, and the degree of transparency, α. For illustrative purpose, in this exercise we shut down fluctuations in output, so that political shocks are the only source of uncertainty. The rest of the parameters are calibrated as discussed in Section 4.1.

Table 5 shows how the average equilibrium level of debt (measured in percentage of the GDP) varies with the degree of political friction, θ, and the degree of lack of transparency, α, when considering an economy that lasts for $T = 1000$ periods. Several results are worth noting. First, not surprisingly, when political frictions are absent (i.e. $\theta = 0.5$, since we assume that there are only two parties, $N = 1$) the economy experiences no borrowing or saving, since in this case there is no incentive for the incumbent to distort voting; in other words the only uncertainty in the economy, which is political uncertainty, is irrelevant and, as a consequence, there are no incentive to save or borrow. In contrast, when political frictions arise (i.e. $\theta > 0.5$) Table 5 highlights two important features of the model.

1. Consistently with the analytical results derived for the two period model, for a given

[23] In Appendix E we show the robustness of the results when assuming a non-linear utility function that is always bounded in the interval $[0, 1]$.

level of θ, the economy on average accumulates savings when voters live in a transparent economy, i.e. for low values of α, and the economy in average accumulate debt when lack of transparency arises (i.e. for large values of α).

2. Consistently with the analytical results derived for the two period model, the effect described above are more pronounced when political conflicts are stronger. In fact, when θ increases, precautionary saving are even larger in a transparent economy, and borrowing incentives are stronger in a non-transparent economy.

3. Qualitatively the relation between θ, α, and debt in the model resembles the one observed in the data as described in Table 2.

4 Bringing the Model to the Data

In this section we investigate whether political conflicts and transparency are able to capture the different level of debts across countries as well as other important political economy and macroeconomics features. Specifically, our strategy is as follows. First, we select observable moments in the model that have a clear counterpart in the data. We will show that these moments are affected by the degree of transparency, α, and political conflicts θ. Then, for each country we use the prediction of our model to estimate these two parameters. We then show that these two channels are able to replicate the observed heterogeneity in debt levels and other macroeconomic fundamentals, and, importantly, that the estimated degree of transparency and political conflict are indeed highly correlated with their proxies we have used in the empirical section. We consider the same economies considered in the empirical section and listed in Appendix B.

4.1 Strategy and Calibration

First, we calibrate some parameters that remain constant across the different economies. Our goal is to investigate whether heterogeneity in transparency and political frictions alone can explain the heterogeneity in debt levels and other macroeconomic variables. Hence, we shut down possible heterogeneity in preference and on financial markets, but we allow for heterogeneity in the output process. We fixed the word interest rate $r^* = 0.07$, which correspond at an annual rate of 7%, as reported in Uribe and Yue (2006). The subjective discount rate is then pinned down such that $\beta = (1+r^*)^{-1} = 0.9346$. The coefficient of relative risk aversion, σ, is assumed to be 2. The debt elasticity of the interest rate, ξ is fixed at 0.1.[24] The reference level of debt in the interest rate equation is assumed to be zero, which is $\bar{d} = 0$.[25] We consider a linear probability function as in equation (18), i.e. $p(c) = \gamma + \alpha(c - \bar{c})$, and we fixed the reference parameter $\bar{c}$ to be equal to 1; this value is identical to the unconditional mean of the exogenous endowment, in level, received by the agents in each period. Hence, if consumption in a given period is greater than the unconditional mean, the electorate is more likely to vote for the incumbent in a non-transparent economy ($\alpha > 0$).

The remaining parameters are assumed to be country-specific. The parameters that define the stochastic process for output are directly estimated from output data, by fitting an $AR(1)$ process on the deviation of the logarithm of GDP from its cubic trend, as in Garcia-Cicco et al. (2010). Hence, the deviation from the trend, in log, for country i follows: $y_t^i = \rho_i^y y_{t-1}^i + \sigma_i^y \epsilon_t^i$, where ϵ_t^i are iid, in the time dimension and cross-section dimension, disturbances. Hence, for each country, we will estimate directly from detrended GDP data the persistence of the income process, ρ_i^y, and the standard deviation of the error term, σ_i^y. Given that the utility function features risk aversion, different degrees of uncertainty in output realization imply different strength of precautionary saving motive.

Finally, there are three parameters to be estimated that are related to the two main channels introduced in our model; α_i, which measure the degree of retrospective voting, which we interpret as the degree of lack of transparency; γ_i, which is the probability of reelection of an incumbent in a transparent economy; and θ_i, which measures the degree of political conflict. We estimate these parameters by asking the model to replicate some features of the data, using a GMM-approach.

Specifically, for each country i, we estimated $\Theta_i = \{\alpha_i; \gamma_i; \theta_i\}$ as:

$$\Theta_i = \arg\min \left[E(Y_i) - E(Y(\Theta_i; \tilde{\Theta}_i))\right]' W_i \left[E(Y_i) - E(Y(\Theta_i; \tilde{\Theta}_i))\right], \tag{19}$$

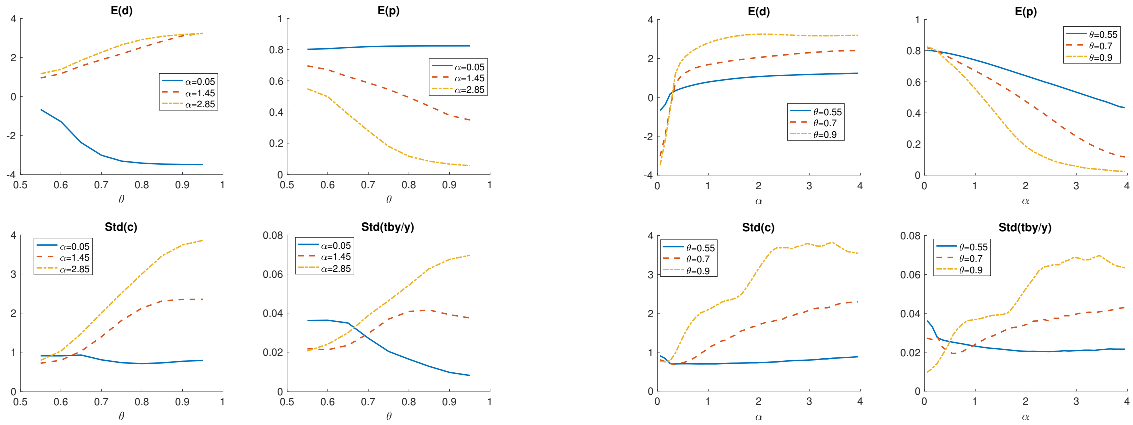
where $E(Y_i)$ is a set of data moments, $E(Y(\Theta_i; \tilde{\Theta}_i))$ is their model counterpart, which are

[24] The assumption of a positive debt elasticity of the interest rate is supported by the work of Kumar and Baldacci (2010), who find that higher deficits and public debt lead to a significant increase in long-term interest rates in a sample of 31 countries over the period 1980-2007, and of Grande et al. (2013), who find that each percentage point increase in the ratio of public debt to GDP raises 10 year rates by about 3 basis points focusing on 18 advanced economies over the period 1995-2011. If we were to set $\xi = 0$, the model would generate too high level of debts and, as a consequence, the model fit would be not ideal. Even in that case, however, the results of this paper would be qualitatively similar to the one described below.

[25] An alternative approach would be to assume that either preferences and/or financial markets are also country specific, which would imply cross sectional variation on β, σ, ξ and $\bar{d}$. As the goal of this quantitative section is to investigate whether heterogeneity in transparency and political frictions *alone* can explain the heterogeneity in debt levels and other macroeconomic variables, we have taken the stand to assume that preferences and the supply equation of loans from international investor in equation (4) is not country specific.

a function of the parameters to be estimated, Θ_i, and of the other calibrated parameters, gathered in the vector $\tilde{\Theta}_i = \left\{\rho_i^y, \sigma_i^y, \beta, \sigma, \bar{d}, r^*, \xi, \bar{c}, N\right\}$, and W_i is a weighting function. The weighting function is computed through a conventional two-step GMM procedure. The model moments are computed simulating the economy with $T = 1000$ periods, and eliminating the first and last 100 observations in order to clear the results from initial and end conditions. We include the following four moments, which are well defined in the model and that are directly observed in the data (see Appendix A for a complete description of the data source). The first moment is the average probability of reelection. This moment aims to make the model able to match the country-specific political turnover. The second moment is the average level of debt to output ratio, which aims to make the model to match the borrowing/saving outlook of a country. The third moment is the standard deviation of consumption, which is partly due to the variation in income that are taken into account by the calibrated parameters ρ_i^y and σ_i^y and to the country borrowing/saving dynamics. The fourth moment is the standard deviation of the trade-balance-to-output ratio, which is driven mainly by the borrowing/saving dynamics. To show that these four moments are able to identify the three parameters of interest, in Figure 3 we simulate the model and display how these moments vary with θ_i (left panel) and α_i (right panel), for a given level of $\gamma_i = 0.75$, and assuming that $\rho^y = 0.75$ and $\sigma^y = 0.02$. We can observe that variations in the two parameters imply a large heterogeneity in the level of debt, as explained in the previous sections, in the reelection probability, and in the variance of consumption and trade-balance, which are not equivalent even qualitatively especially for low level of α_i. Also, our model predicts that high reelection probability can coexist with high levels of political conflict in very transparent economies; nevertheless, political instability emerges in non transparent economies: large debt accumulation reduces consumption in the long run and consequently reduces reelection probability. This result reconciles with the findings in Easterly and Levine (1997), which shows that the univariate relationship between political instability and ethnical conflict is rather ambiguous.

Figure 3: Model Moments as function of Political Frictions and Transparency



(a) Moments and θ (b) Moments and α

Note: In this Figure we plot the model-implied value of average debt (top-left panel), average reelection probability (top-right panel), standard deviation of consumption (bottom-left panel), and standard deviation of trade-to-output ratio (bottom-right panel), as a function of the degree of lack of transparency, θ_i(left panel) and political conflicts α_i (right panel), keeping fixed the other parameter. The other country-specific parameters are fixed as follows: $\gamma_i = 0.75$, $\rho_i^y = 0.75$, and $\sigma_i^y = 0.02$. The moments are average of simulation with length $T = 1000$.

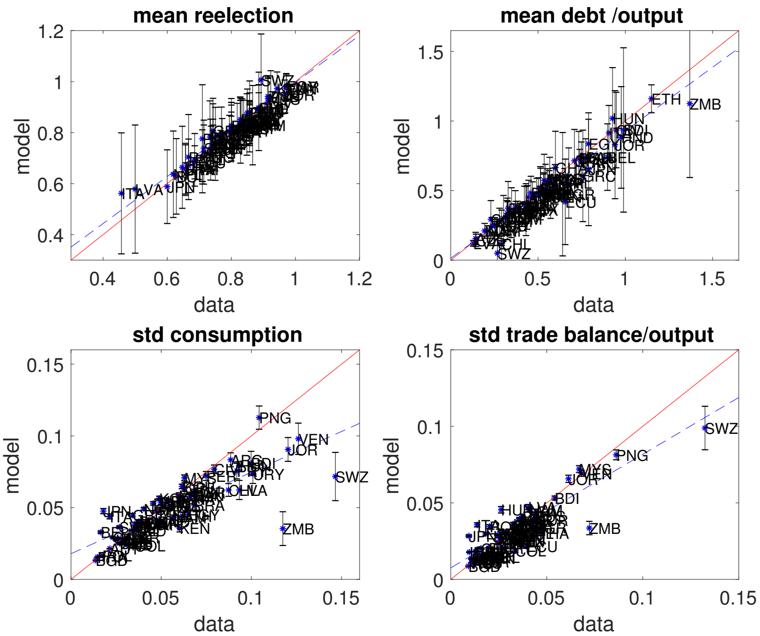
4.2 Fit

The first question to address is whether the three estimated parameters are able to provide a reasonable match for the four target moments.

In Figure 4 we display the cross-sectional fit of the four moments. Specifically for each of the four moments (average mean reelection probability, top-left panel; mean debt-to-gdp ratio, top-right panel; standard deviation of consumption, bottom-left panel; standard deviation of trade-balance to output ratio, bottom-right panel), we plot the data value for each country in the y-axis and its model counterpart computed at the estimated parameters value. If the model was able to perfectly match the data the scatter plots would lie in the 45 degree line (displayed with a continuous blue line). The fit is extremely good for the two first moments (slope of the regression line equal to 0.92 and 0.98, and R^2 equal to 0.97 and 0.98, respectively), while the fit of the two second moments is slightly less impressive, but still satisfactory (slope of the regression line equal to 0.55 and 0.51, and R^2 equal to 0.69 and 0.72, respectively). Since the fit is overall good, we claim that variations in three parameters α_i, γ_i, and θ_i, together with the variations in the income process, are able to capture the cross-section heterogeneity in the four targeted models. Notice, that our estimation procedure attempts to match four moments with only three parameters.[26]

[26]One might wonder whether the four moments are collinear. This is not the case, as the cross correlation

Figure 4: Fit



Note: This figure plots the model-implied moments of interest, i.e. average debt (top-left panel), average reelection probability (top-right panel), standard deviation of consumption (bottom-left panel), and standard deviation of trade-to-output ratio (bottom-right panel), at the estimated parameter values the y-axis, with standard error bands, and their data counterpart in the x-axis, for each country in our sample. The red solid line is the 45 degree line. The dashed blue line is the regression line.

4.3 Hypothesis testing on the mechanism

Our empirical strategy estimates the degree of transparency, $\hat{\alpha}_i$, and of political conflicts, $\hat{\theta}_i$ for a country i, only by using data on macroeconomic moments. We now investigate whether the main mechanism in our model, which is the interaction between lack of transparency and political conflict as a driver of debt incentives, is supported by the data. The GMM approach in equation (19) allows us to test the following joint hypothesis, for each country i, by computing the asymptotic distribution of the estimators:

$$\begin{aligned} H_0 &: \ \theta_i = \frac{1}{2}, \ \ \alpha_i = 0 \\ H_1 &: \ \theta_i > \frac{1}{2}, \ \ \alpha_i > 0 \end{aligned} \tag{20}$$

For all the country, the resulting F-statistic is very high and the test strongly rejects the null hypothesis.[27] Next, we investigate whether, for each country, $\theta_i = \frac{1}{2}$ and $\alpha_i = 0$, indepen-

among the four moments is:

$$\Sigma = \begin{bmatrix} 1 & 0.15 & 0.22 & 0.23 \\ 0.15 & 1 & 0.14 & 0.02 \\ 0.22 & 0.14 & 1 & 0.81 \\ 0.23 & 0.02 & 0.81 & 1 \end{bmatrix}.$$

[27] Results of the F-statistic are available upon request from the authors.

dently. These tests clarify whether the political conflict channel or the transparency channels are detected. In Table 6 we report the estimated parameters $\hat{\theta}_i$, $\hat{\alpha}_i$, and, for completeness, also $\hat{\gamma}_i$, and the associated standard error, in brackets.[28] For 44 out of 66 countries, we reject the null hypothesis of no political frictions, while for 42 countries we reject the null hypothesis of no lack of transparency. We conclude that: *(i)* no country exhibit absence of both frictions; and *(ii)* at least in two third of our sample a country displays either political conflict or lack of transparency.

4.4 Do the estimates capture transparency and political conflict?

We now investigate whether the estimated parameters $\hat{\theta}_i$ and $\hat{\alpha}_i$ do actually relate to the observed proxies of *political conflict* and *lack of transparency*, which we have defined and used in Section 2 for the cross-country regressions.

Recall that the estimation procedure in equation (19) that we have implemented does not use any information regarding the degree of transparency and political conflict of a country, but it only employs the relationship between re-election probabilities, levels of debt, and consumption and trade balance variances. Therefore, if we find a positive relationship between the two estimates $\hat{\theta}_i$ and $\hat{\alpha}_i$ and the observed proxies of *political conflict* and *lack of transparency*, we can conclude that our simple model is able to attribute cross-country variations of debt to the interaction between transparency and political conflict.

A first natural step to explore whether the estimated parameters $\hat{\theta}_i$ and $\hat{\alpha}_i$ positive correlate with the observed proxies of *political conflict* and *lack of transparency*, is to draw a scatter plot of the model estimates and their proxies, for any given country. In Figure 5a and 5b we plot, on the x-axis, the empirical counterpart of θ and α defined in Section 2, and on the y-axis we plot the estimated $\hat{\theta}_i$ and $\hat{\alpha}_i$. The correlations between model estimates and proxies are positive and equal to 0.26 and 0.27 for political conflicts and transparency, respectively.

Possible explanation for imperfect fit Although the positive relationship between data and estimates is comforting, nevertheless it is not possible to ignore the evidence that there are disturbances around the linear relationship. The imperfect fitting may arise for two different reasons:

1. **Specification Error:** The model considered in this paper is a rather stylized model of consumption smoothing, in which output is exogenous (i.e. no production), financial markets are competitive, debt contracts are fully enforceable, there are only two possible

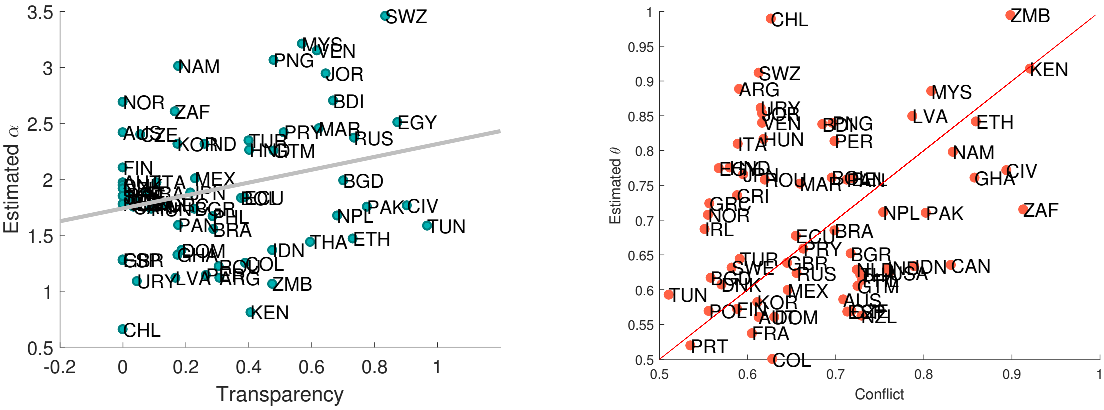
[28] For the intercept of $p(c)$ we tested the null hypothesis of $\gamma = 1$.

Table 6: Estimated parameters

	$\hat{\theta}$	$\hat{\alpha}$	$\hat{\gamma}$		$\hat{\theta}$	$\hat{\alpha}$	$\hat{\gamma}$
ARG	0.89**	1.12***	0.89	KEN	0.92***	0.81***	1.07
	(0.17)	(0.38)	(0.09)		(0.06)	(0.12)	(0.05)
AUS	0.59***	2.42***	0.88**	KOR	0.58*	2.32***	0.8***
	(0.02)	(0.05)	(0.05)		(0.05)	(0.11)	(0.07)
AUT	0.56***	1.98***	0.85***	LVA	0.85***	1.12***	0.64***
	(0.02)	(0.13)	(0.02)		(0.03)	(0.14)	(0.11)
BGD	0.62***	1.99***	0.76***	MYS	0.89***	3.21***	1.68***
	(0.01)	(0.08)	(0.07)		(0.03)	(0.13)	(0.14)
BEL	0.76	1.79	0.92	MEX	0.6***	2.01***	0.86***
	(0.26)	(3.21)	(0.25)		(0.03)	(0.25)	(0.04)
BOL	0.76	1.84	0.76**	MAR	0.75***	2.46***	1.23***
	(0.24)	(2.32)	(0.1)		(0.02)	(0.12)	(0.05)
BRA	0.69	1.55***	0.86***	NAM	0.8***	3.02***	1.3***
	(0.12)	(0.5)	(0.04)		(0.02)	(0.06)	(0.06)
BGR	0.65	1.74	0.86	NPL	0.71***	1.68***	0.72***
	(0.24)	(3.77)	(0.1)		(0.04)	(0.38)	(0.07)
BDI	0.84***	2.7***	1.3***	NLD	0.63***	1.78*	0.9
	(0.04)	(0.12)	(0.08)		(0.02)	(1.03)	(0.07)
CAN	0.64	1.75	0.85***	NZL	0.56	1.92***	0.82***
	(0.11)	(2.18)	(0.05)		(0.04)	(0.15)	(0.03)
CHL	0.99***	0.66***	1.01	NOR	0.71***	2.69***	0.96
	(0.07)	(0.14)	(0.06)		(0.04)	(0.12)	(0.1)
COL	0.5	1.25***	0.73***	PAK	0.71	1.75	0.86***
	(0.03)	(0.08)	(0.02)		(0.22)	(2.51)	(0.02)
CRI	0.74	1.8	0.85	PAN	0.76	1.59**	0.89***
	(0.36)	(3.6)	(0.14)		(0.17)	(0.78)	(0.03)
CZE	0.57**	2.4***	0.79***	PNG	0.84***	3.07***	1.26
	(0.03)	(0.08)	(0.05)		(0.03)	(0.17)	(0.17)
DNK	0.61***	1.95***	0.87**	PRY	0.66***	2.42***	0.95
	(0.02)	(0.22)	(0.06)		(0.06)	(0.25)	(0.16)
DOM	0.56	1.37***	0.79***	PER	0.81**	1.15***	0.91
	(0.04)	(0.16)	(0.04)		(0.15)	(0.3)	(0.08)
ECU	0.68	1.84	0.74	PHL	0.61	1.67	0.89***
	(0.58)	(8.12)	(0.25)		(0.33)	(4.69)	(0.04)
EGY	0.77***	2.51***	1.28***	POL	0.57***	1.78***	0.84***
	(0.02)	(0.13)	(0.07)		(0.01)	(0.39)	(0.04)
ETH	0.84	1.47	1.11	PRT	0.52	1.87***	0.64***
	(0.24)	(1.21)	(0.07)		(0.04)	(0.19)	(0.05)
FIN	0.57***	2.11***	0.75***	ROU	0.76***	1.22***	0.74***
	(0.03)	(0.16)	(0.06)		(0.08)	(0.18)	(0.1)
FRA	0.54	1.88***	0.63***	RUS	0.62***	2.37***	0.88***
	(0.03)	(0.16)	(0.05)		(0.03)	(0.08)	(0.03)
GHA	0.76***	1.33***	0.94	ZAF	0.72***	2.61***	1.02
	(0.09)	(0.26)	(0.05)		(0.03)	(0.12)	(0.09)
GRC	0.72	1.77	0.89	ESP	0.57*	1.28***	0.83***
	(3.42)	(37.78)	(1.58)		(0.04)	(0.09)	(0.03)
GTM	0.61***	2.26***	0.68***	SWZ	0.91***	3.46***	1.83***
	(0.03)	(0.13)	(0.05)		(0.09)	(0.31)	(0.32)
HND	0.78***	2.26***	1.02	SWE	0.63***	1.85***	0.76***
	(0.02)	(0.34)	(0.1)		(0.03)	(0.53)	(0.07)
HUN	0.82	1.74	0.94	THA	0.62*	1.44***	0.64***
	(3.65)	(27.12)	(0.85)		(0.07)	(0.09)	(0.07)
IND	0.63***	2.32***	0.83**	TUN	0.59	1.58	0.95**
	(0.02)	(0.07)	(0.07)		(0.1)	(1.22)	(0.02)
IDN	0.63	1.37***	0.88***	TUR	0.64***	2.35***	0.75***
	(0.09)	(0.12)	(0.04)		(0.03)	(0.05)	(0.08)
IRL	0.69	1.81	0.81	GBR	0.64***	1.28***	0.85**
	(0.48)	(6.01)	(0.21)		(0.04)	(0.12)	(0.06)
ITA	0.81**	1.98	0.73	USA	0.62***	1.78**	0.84***
	(0.13)	(1.61)	(0.24)		(0.03)	(0.82)	(0.04)
CIV	0.77	1.77	1.04	URY	0.86*	1.09**	0.92
	(0.22)	(2.32)	(0.17)		(0.21)	(0.44)	(0.1)
JPN	0.77*	1.88	0.73*	VEN	0.84***	3.15***	1.46***
	(0.15)	(1.81)	(0.15)		(0.02)	(0.09)	(0.1)
JOR	0.85***	2.95***	1.53***	ZMB	1***	1.07***	1.16**
	(0.03)	(0.2)	(0.14)		(0.11)	(0.39)	(0.07)

Note: In this table we report estimated parameter values of $\hat{\theta}_i$, $\hat{\alpha}_i$, and $\hat{\gamma}_i$. Standard errors are reported in brackets. We denote with *** significance at 1%, with ** significance at 5%, and with * significance at 10%. Specifically, we tested the following null hypothesis $\theta = 0.5$, $\alpha = 0$, $\gamma = 1$.

Figure 5: Scatterplot of estimated parameters and proxies of transparency and conflict



(a) Estimated α vs Trasparency

(b) Estimated θ vs Conflict

Note: In this Figure we plot the relationship between our estimates of political frictions (y-axis) and their data proxies (x-axis). In the left panel we plot the estimated degree of transparency ($\hat{\alpha}_i$) and the proxy $Transp_i$ as defined in section 2. In the right panel we plot the estimated degree of political conflict ($\hat{\theta}$) and the proxy $Confl_i$ as defined in section 2. The solid lines are regression lines.

shocks (to domestic output and to reelection probability) so other relevant internal or external sources of risk are ignored. Whenever these missing features are actually relevant in determining the empirical moments that we have employed in our estimation strategy (i.e. re-election probability, level of debt, and consumption and trade balance variances), then the estimated parameters $\{\hat{\Theta}_i\}$ may differ from their real value. For example, suppose that debt to GDP is larger in country i than in country j because of different demographic structures that result in different costs of the pension system. Since this element is not present in our model, country i would result as more politically frictioned compared to country j.

2. **Measurement Error:** Another potential source of error comes from the unobservability of the real structural parameters. The proxies for lack of transparency and political conflicts proposed in Section 2 are only imperfect measures of the real institutional frictions. For example, to proxy political conflict we averaged different measures of fractionalization following the literature. As explained in Section 2, the existence of fractionalization might not necessarily imply that a conflict between parties exists. Observing more accurate measures of conflict would reduce the measurement error arising from comparing the structural parameter θ implied and its data proxies. Similarly, we do not observe the degree of lack of transparency, which relates to the degree of retrospective voting in our model, in each country but only possible determinants of the existence of this phenomenon.

Given the argument above, the imperfect fitting resulting in the scatters of Figure 5a and 5b may result from estimating a too stylized model and from comparing the estimates to imprecise proxies. Removing these sources of the errors is not an easy task and it would ideally require developing a richer model or observing different data. Nevertheless, in what follows we try to correct for these possible errors and to investigate whether, when addressing them, the relationship between the data and the estimates becomes stronger or weaker. To address this point we proceed by adding potential omitted factors in the regression of $\hat{\Theta}$, i.e. the structurally estimated parameters of interest, on their proxies from the data, and then testing whether Specification errors and Measurement errors alter the positive relationship between estimated parameters and data proxies. To address the Specification error, we include the same control variables that have used to test the cross section of debt in equation (1). To address the Measurement error we included alternative proxies of conflict and transparency that could help in reaching a more accurate measure of the proxies. Hence, we run the following regressions:

$$\hat{\alpha}_i = \gamma_0 + \gamma_1 Transp_i + \gamma_s X_i^s + \gamma_m Z_i^{m,\alpha} + \eta_i; \tag{21}$$

$$\hat{\theta}_i = \psi_0 + \psi_1 Conflict_i + \psi_s X_i^s + \psi_m Z_i^{m,\theta} + \nu_i; \tag{22}$$

where $Conflict_i$ and $Transp_i$ are the proxies defined in Section 2, X_i^s are the control variables used in the regression (1) and that aim to capture the Specification error, $Z^{m,\alpha}$ and $Z^{m,\theta}$ are control variables that aim to capture the Measurement errors for α and θ, respectively, and η_i and ν_i are *iid* disturbances. Explanatory variables are included in the model as averages in the period available.

In Table 7 we present the results for the two regressions. Regarding transparency, left panel, the first column displays the results for the univariate regression corresponding to the solid regression line in Figure 5a: as expected the coefficient is positive and strongly significant, although the fit is not excellent, since the R^2 is below 0.1. In column 2 (Spec.) we address the Specification error by including a selection of most significant control variables among the one used in regression (1). Recall that these control variables aim to capture possible determinants of debt levels that are not included in our model. Accounting for the Specification error improves quite substantially the fit, since the R^2 increases to 0.35, but, importantly, it does not alter the significant and strong positive relationship between the estimated degree of lack of transparency, and its data counterpart. In column 3 (Meas.) we analyze the role of an alternative interpretation of lack of transparency, that is lack of sophistication, to reduce potential measurement error. We have included the two different variables that capture lack of sophistication, as described in section 2: *Lack of Education* and *Lack of Social Globalization*. Only the second variable is significant and the fit increases only marginally, but the significance disappear when we include all the controls as displayed in column 4 (Complete). Notice, that even when addressing the Measurement error and in the complete regression, the statistically significant positive relationship between $\hat{\alpha}$, and the proxy of lack of transparency still holds.

The right panel displays the results for the regression for political friction in equation (22). As before, in the first column (Univariate) we present univariate regression of $\hat{\theta}$ on $Conflict$. As expected the slope is positive and significant. In the second column (Spec.) we present multivariate regression with the same controls included in Table 7. In contrast with the α case, the majority of controls that account for the the Specification error are not significant; furthermore, the relation between the estimate $\hat{\theta}$ and the proxy of political conflict becomes not significant, albeit still positive. In column 3 (Meas.) we add only controls for the measurement error, i.e. a measure of dictatorship (No Party allowed) aimed to capture a degree of political friction that is not embodied in fractionalization, the Gini index,[29] as a measure of economic inequality, and political killings, which is a measure of realized conflict. We find that measurement controls are strongly significant and improve substantially the fit. Importantly, the significant positive relationship between estimated parameters and our benchmark proxies holds. The same conclusion applies when estimating the complete regression.

To summarize, we found that the estimated institutional parameters in our model, i.e. political conflict and lack of transparency, are positively correlated with the proxies that have been found to explain the cross section of debt-to-gdp across countries. The positive relationship holds when controlling for possible specification errors of the model and measurement errors in the proxy. Our preliminary analysis supports the idea that a less stylized model would probably help in improving the link, but we nevertheless found support that indeed lack of transparency and political conflict can be an important determinant of observed heterogeneity of debt levels across countries.

[29] Remember that, in our model, larger θ implies larger distribution of consumption to the incumbent's party, which results in greater inequality.

Table 7: Estimated parameters, Transparency and Political Conflict

	Dependent var: $\hat{\alpha}$				Dependent var: $\hat{\theta}$			
	Univariate	Spec.	Meas.	Complete	Univariate	Spec.	Meas.	Complete
Constant	1.74**	-1.21	2.01***	-2.05	0.49***	0.67**	0.26**	0.10
	(16.39)	(-1.18)	(17.13)	(-1.41)	(5.37)	(2.66)	(2.22)	(0.26)
Lack-of-Transp.	0.58**	0.79**	1.11**	0.68*				
	(2.14)	(2.09)	(2.59)	(1.70)				
Political Conflict					0.30**	0.20	0.30**	0.33***
					(2.29)	(1.50)	(2.05)	(2.71)
Energy		0.38***		0.38***		0.01		0.03**
		(4.46)		(4.45)		(0.79)		(2.04)
Business		0.39**		0.38*		0.04		0.05
		(2.22)		(1.80)		(1.08)		(1.40)
GDP per capita		0.23**		0.31**		-0.02		-0.01
		(2.34)		(2.11)		(-1.09)		(-0.20)
Majoritarian		0.32*		0.37**		-0.01		-0.00
		(1.89)		(2.13)		(-0.23)		(-0.11)
Openness		0.60***		0.64***		0.07*		0.02
		(3.15)		(2.76)		(1.96)		(0.41)
Lack of Social Glob			-0.98**	0.10				0.17
			(-2.47)	(0.21)				(1.59)
Lack of Educ			0.08	0.22				-0.09
			(0.25)	(0.45)				(-1.60)
No Parties Allow.				0.15			0.23**	0.20***
				(0.43)			(2.22)	(3.02)
Gini index				0.12			0.37***	0.45***
				(0.09)			(3.47)	(3.43)
Political killings				-0.07			0.04*	0.10***
				(-0.47)			(1.79)	(3.43)
R^2	0.07	0.35	0.17	0.37	0.06	0.22	0.31	0.43
$\bar{R}^2$	0.06	0.28	0.13	0.24	0.05	0.15	0.26	0.31
N	66	66	66	66	66	66	66	66

Note: This table presents the results of regression (21) (left panel) and for (22) (right panel). The univariate regression displays the link between estimated degree of lack-of transparency, $\hat{\alpha}_i$ and its proxy observed in the data, $Transp_i$ (left panel) and $\hat{\theta}_i$ and its proxy observed in the data, $Confl_i$ (right panel). The regression labeled Spec includes control variables X_i^s that capture the Specification error. The regression labeled Meas. includes control variables $Z_i^{m,\theta}$ that capture the Measurement error. The final regression is the complete regression. For each country, all variables are calculated as sample average.

5 Conclusion

In this paper we study the relationship between cross-country sovereign debt, lack of transparency and political conflicts. Our first set of results is empirical. Whereas these two variables, *per-se*, are not significant determinants of observed debt levels across countries, their interaction is a key factor to explain debt-levels heterogeneity. In fact, whereas the simple regression of debt levels on political conflict and lack of transparency yields insignificant coefficients, their interaction term is positive and significant. This implies that if political conflict increases in a transparent economy (low lack of transparency values), its effect on debt is negative (which means it incentivizes saving); on the contrary, in a non-transparent economy (high lack of transparency values) large political conflicts induce borrowing (more debt).

Then, we propose a model that rationalizes these findings. We incorporate political conflicts and transparency into a conventional open-economy real business cycle model. Regarding political conflict, similarly to Alesina and Tabellini (1990b), parties have preferences over distribution across different groups and decide the allocation of consumption according to these preferences. Regarding lack of transparency, we assume that in more non-transparent economies, the probability of an incumbent to be re-elected is more strongly a function of current economic conditions. This model can generate the empirical finding that in a transparent economy, political conflict generates savings, since an incumbent has a precautionary saving motive driven by political uncertainty, while with lack of transparency it incentivizes borrowing, since a higher amount of resources in the economy increases re-election probability.

We then use the theoretical prediction of our model about macroeconomic aggregates to estimate the two frictions. Using a GMM approach, our strategy yields a cross section set of estimates for the two parameters of interest, the degree of political conflict and lack of transparency. Notice that we use only observed macroeconomic moments to estimate these frictions, without using any information about the actual degree of these frictions. Hence, the second natural step is to investigate how our estimates correlate, in the cross-section, with observed proxies of political conflict and lack of transparency. Our finding can be summarized as follows. First, the model strongly supports the existence of these frictions and the estimated frictions positively and significantly relate to their data counterparts. Third, once one takes into account possible sources of bias, the positive relationship becomes even stronger. Hence, we are confident that the mechanism proposed in our model can rationalize the empirical importance of the interaction between political conflict and lack of transparency as observed in the data.

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A Appendix: Data Source

Institutional variables come from different sources that are collected in the Quality of Government dataset Teorell et al. (2011).

A.1 Debt-to-GDP

Debt to GDP data has been collected from Reinhart and Rogoff (2010) and Jaimovich and Panizza (2010). From Reinhart and Rogoff (2010) we took debt to GDP measured as the share of total gross general public debt (domestic and external) over gross domestic product, last year available 2009.[30] Country coverage has been extended by using the dataset of Jaimovich and Panizza (2010) at the cost of fewer observation in the time-dimension (until 2005), where the debt data refers to gross central (as opposite to general) government debt and for this reason it is not fully comparable with the data in Reinhart and Rogoff (2010). Gross domestic product is extracted from the World Bank dataset, is calculated at constant local currency prices. In fact, from this dataset we can also include the following countries: Bangladesh, Burundi, Czech Republic, Ethiopia, Jordan, Latvia, Namibia, Nepal, Pakistan, Papua New Guinea, Swaziland.

A.2 Transparency proxies

- *Functioning of Government (FOG)*: This variable examines to what extent the freely elected head of government and a national legislative representative determine the policies of the government; if the government is free from pervasive corruption; and if the government is accountable to the electorate between elections and operates with openness and transparency. Countries are graded from the worst to the best.

- *Freedom of Expression and Belief (FEB)*: This variable measures the freedom and independence of the media and other cultural expressions; the freedom of religious groups to practice their faith and express themselves; the academic freedom and freedom from extensive political indoctrination in the educational system; and the ability of the people to engage in private (political) discussions without fear of harassment or arrest by the authorities. Countries are graded from the worst to the best.

The source for the two variables is Freedom House. https://freedomhouse.org. Other proxies from this source have been used to define an alternative transparency index that has been used in regression (12) of Table 3. The available sample for these variables is 2005-2008, see Table A.7.

A.3 Political conflict proxies

- *Ethnic, linguistic and religious fractionalization*: Fractionalization expresses the probability that two randomly selected individuals from the population will not belong to the same ethnic/linguistic/religious group. Time coverage differs across countries. Source Alesina et al. (2003).

[30] We made few exceptions due to data availability. In Tunisia we choose total non-financial public sector debt over GDP, while for UK we choose net central public debt over GDP.

A.4 Control Variables used in Section 2

- *Credit*: domestic credit provided by the banking sector. Source World Development Indicators (WDI)
- *GPDpc*: GDP per capita (PPP, constant 2005 international $) . Source WDI
- *GDP growth*: annual growth rate of GDP per capita. Source WDI
- *Openness*: sum of export and imports over GDP. Source Penn world tables
- *Majoritarian*: fraction of years in which the country had majoritarian system. Source Norris (2009)
- *Energy*: per-capita energy production (kt of oil equivalent). Source WDI
- *Business*: variable easiness of doing business. Source WDI
- *Pop>65*: share of the population over 65 years old. Source WDI

Lack of sophistication is the average of two different proxies:

- *Lack of Education*: (inverse of) number of students at universities or other higher education institutions per 100000 inhabitants. Source: Index of Power resources Vanhanen (2004)
- *Lack of Social Globalization*: it is measured by three categories of indicators; (i) personal contacts, such as telephone traffic and tourism; (ii) information flows, e.g. number of Internet users; and (iii) cultural proximity, e.g. trade in books and number of Ikea warehouses per capita. Source: KOF Globalisation Index, Dreher (2006)

A.5 Data used for GMM estimation

Output is GDP per capita in costant local currency. Consumption is calculated by multiplying GDP per capita and final consumption expenditure in percentage of GDP. Trade balance is calculated as the difference between output and consumption. Consumption and output are detrended using cubic polynomial. The source of macroeconomic data is WDI. Mean re-election probability is calculated as the average number of years in office of the chief executive, from the Database of Political Institutions (Beck et al. (2001) and Keefer (2009)).

A.6 Data for the Measurement Error regression

- *No Parties Allowed*: For a single year the index takes value 1 if parties are not allowed. Source: Institutions and Elections Project Regan and Clark (2010).
- *Gini Index*: Source WDI
- *Political Killings and Imprisonment*: These proxies measure the frequency of political killings and imprisonment. Source Human Rights Dataset Cingranelli and Richards (2010)

A.7 Sample Available for the Analysis

Table 8: Sample available for each country and each variable

country	Debt/GDP	Lack Transp.	Pol. Conflict	Credit	Energy	Business	GDP p.c. (PPP)	GDP growth	Majoritarian
ARG	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
AUS	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
AUT	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
BDI	75-05	05-08	75-05	75-05	75-05	08-09	80-05	75-05	75-04
BEL	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
BGD	90-05	05-08	90-05	90-05	90-05	08-09	90-05	90-05	90-04
BGR	81-09	05-08	81-09	91-09	81-09	08-09	81-09	81-09	81-04
BOL	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
BRA	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
CAN	75-09	05-08	75-09	75-08	75-09	08-09	80-09	75-09	75-04
CHL	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
CIV	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
COL	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
CRI	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
CZE	93-05	05-08	93-05	93-05	93-05	08-09	93-05	93-05	93-04
DNK	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
DOM	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
ECU	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
EGY	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
ESP	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
ETH	93-05	05-08	93-05	93-05	93-05	08-09	93-05	93-05	93-04
FIN	76-09	05-08	76-09	76-09	76-09	08-09	80-09	76-09	76-04
FRA	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
GBR	75-07	05-08	75-07	75-07	75-07	08-09	80-07	75-07	75-04
GHA	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
GRC	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
GTM	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
HND	80-09	05-08	80-09	80-09	80-09	08-09	80-09	80-09	80-04
HUN	91-09	05-08	91-09	91-09	91-09	08-09	91-09	91-09	91-04
IDN	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
IND	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
IRL	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
ITA	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
JOR	76-05	05-08	76-05	76-05	76-05	08-09	80-05	76-05	76-04
JPN	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
KEN	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
KOR	76-09	05-08	76-09	76-09	76-09	08-09	80-09	76-09	76-04
LVA	94-05	05-08	94-05	94-05	94-05	08-09	94-05	94-05	94-04
MAR	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
MEX	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
MYS	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
NAM	91-05	05-08	91-05	91-05	91-05	08-09	91-05	91-05	91-04
NLD	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
NOR	75-09	05-08	75-09	75-06	75-09	08-09	80-09	75-09	75-04
NPL	85-05	05-08	85-05	85-05	85-05	08-09	85-05	85-05	85-04
NZL	77-09	05-08	77-09	77-09	77-09	08-09	80-09	78-09	77-04
PAK	75-05	05-08	75-05	75-05	75-05	08-09	80-05	75-05	75-04
PAN	80-09	05-08	80-09	80-09	80-09	08-09	80-09	80-09	80-04
PER	80-09	05-08	80-09	80-09	80-09	08-09	80-09	80-09	80-04
PHL	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
PNG	75-05	05-08	75-05	75-05	75-05	08-09	80-05	75-05	75-04
POL	90-09	05-08	90-09	90-09	90-09	08-09	90-09	91-09	90-04
PRT	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
PRY	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
ROU	92-09	05-08	92-09	92-09	92-09	08-09	92-09	92-09	92-04
RUS	92-09	05-08	92-09	93-09	92-09	08-09	92-09	92-09	92-04
SWE	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
SWZ	78-05	05-08	78-05	78-05	78-05	08-09	80-05	78-05	78-04
THA	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
TUN	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
TUR	77-09	05-08	77-09	77-09	77-09	08-09	80-09	77-09	77-04
URY	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
USA	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
VEN	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
ZAF	75-09	05-08	75-09	75-09	75-09	08-09	80-09	75-09	75-04
ZMB	75-09	05-08	75-09	75-09	80-09	08-09	80-09	75-09	75-04

country	Openness	Pop>65	Lack Educ.	Lack Soc.Glob.	Gini	No Parties Allow.	Pol. Killings	Re-election	GDP p.c.(LC)
ARG	75-07	75-09	68-98	70-06	86-06	72-05	81-08	75-09	75-09
AUS	75-07	75-09	68-98	70-06	94-94	72-05	81-08	75-09	75-09
AUT	75-07	75-09	68-98	70-06	00-00	72-05	81-08	75-09	75-09
BDI	75-05	75-05	68-98	70-06	92-06	72-05	81-08	75-05	75-05
BEL	75-07	75-09	68-98	70-06	00-00	72-05	81-08	75-09	75-09
BGD	90-05	90-05	78-98	70-06	86-05	72-05	81-08	90-05	90-05
BGR	81-07	81-09	68-98	70-06	89-03	72-05	81-08	81-09	81-09
BOL	75-07	75-09	68-98	70-06	91-07	72-05	81-08	75-09	75-09
BRA	75-07	75-09	68-98	70-06	81-07	72-05	81-08	75-09	75-09
CAN	75-07	75-09	68-98	70-06	00-00	72-05	81-08	75-09	75-09
CHL	75-07	75-09	68-98	70-06	87-06	72-05	81-08	75-09	75-09
CIV	75-07	75-09	68-98	70-06	85-02	72-05	81-08	75-09	75-09
COL	75-07	75-09	68-98	70-06	88-06	72-05	81-08	75-09	75-09
CRI	75-07	75-09	68-98	70-06	81-07	72-05	81-08	75-09	75-09
CZE	93-05	93-05	98-98	93-06	88-96	93-05	93-08	93-05	93-05
DNK	75-07	75-09	68-98	70-06	97-97	72-05	81-08	75-09	75-09
DOM	75-07	75-09	68-98	70-06	86-07	72-05	81-08	75-09	75-09
ECU	75-07	75-09	68-98	70-06	87-07	72-05	81-08	75-09	75-09
EGY	75-07	75-09	68-98	70-06	91-05	72-05	81-08	75-09	75-09
ESP	75-07	75-09	68-98	70-06	00-00	72-05	81-08	75-09	75-09
ETH	93-05	93-05	98-98	70-06	82-05	93-05	93-08	93-05	93-05
FIN	76-07	76-09	68-98	70-06	00-00	72-05	81-08	76-09	76-09
FRA	75-07	75-09	68-98	70-06	95-95	72-05	81-08	75-09	75-09
GBR	75-07	75-07	68-98	70-06	99-99	72-05	81-08	75-07	75-07
GHA	75-07	75-09	68-98	70-06	88-06	72-05	82-08	75-09	75-09
GRC	75-07	75-09	68-98	70-06	00-00	72-05	81-08	75-09	75-09
GTM	75-07	75-09	68-98	70-06	87-06	72-05	81-08	75-09	75-09
HND	80-07	80-09	68-98	70-06	86-06	72-05	81-08	80-09	80-09
HUN	91-07	91-09	68-98	70-06	87-04	72-05	81-08	91-09	91-09
IDN	75-07	75-09	68-98	70-06	05-07	72-05	81-08	75-09	75-09
IND	75-07	75-09	68-98	70-06	05-05	72-05	81-08	75-09	75-09
IRL	75-07	75-09	68-98	70-06	00-00	72-05	81-08	75-09	75-09
ITA	75-07	75-09	68-98	70-06	00-00	72-05	81-08	75-09	75-09
JOR	76-05	76-05	68-98	70-06	87-06	72-05	81-08	76-05	76-05
JPN	75-07	75-09	68-98	70-06	93-93	72-05	81-08	75-09	75-09
KEN	75-07	75-09	68-98	70-06	92-05	72-05	81-08	75-09	75-09
KOR	76-07	76-09	68-98	70-06	98-98	72-05	81-08	76-09	76-09
LVA	94-05	94-05	98-98	91-06	88-07	92-05	92-08	94-05	94-05
MAR	75-07	75-09	68-98	70-06	85-07	72-05	81-08	75-09	75-09
MEX	75-07	75-09	68-98	70-06	84-08	72-05	81-08	75-09	75-09
MYS	75-07	75-09	68-98	70-06	84-04	72-05	81-08	75-09	75-09
NAM	91-05	91-05	98-98	70-06	93-93	91-05	81-08	91-05	91-05
NLD	75-07	75-09	68-98	70-06	99-99	72-05	81-08	75-09	75-09
NOR	75-07	75-09	68-98	70-06	00-00	72-05	81-08	75-09	75-09
NPL	85-05	85-05	68-98	70-06	96-04	72-05	81-08	85-05	85-05
NZL	77-07	77-09	68-98	70-06	97-97	72-05	81-08	77-09	77-09
PAK	75-05	75-05	78-98	70-06	87-05	72-05	81-08	75-05	75-05
PAN	80-07	80-09	68-98	70-06	79-06	72-05	81-08	80-09	80-09
PER	80-07	80-09	68-98	70-06	86-07	72-05	81-08	80-09	80-09
PHL	75-07	75-09	68-98	70-06	85-06	72-05	81-08	75-09	75-09
PNG	75-05	75-05	88-98	70-06	96-96	76-05	81-08	75-05	75-05
POL	90-07	90-09	68-98	70-06	85-05	72-05	81-08	90-09	90-09
PRT	75-07	75-09	68-98	70-06	97-97	72-05	81-08	75-09	75-09
PRY	75-07	75-09	68-98	70-06	90-07	72-05	81-08	75-09	75-09
ROU	92-07	92-09	68-98	70-06	89-07	72-05	81-08	92-09	92-09
RUS	92-07	92-09	98-98	90-06	88-07	92-05	92-08	92-09	92-09
SWE	75-07	75-09	68-98	70-06	00-00	72-05	81-08	75-09	75-09
SWZ	78-05	78-05	88-98	70-06	95-01	72-05	81-08	78-05	78-05
THA	75-07	75-09	68-98	70-06	81-04	72-05	81-08	75-09	75-09
TUN	75-07	75-09	68-98	70-06	85-00	72-05	81-08	75-09	75-09
TUR	77-07	77-09	68-98	70-06	87-06	72-05	81-08	77-09	77-09
URY	75-07	75-09	68-98	70-06	89-07	72-05	81-08	75-09	75-09
USA	75-07	75-09	68-98	70-06	00-00	72-05	81-08	75-09	75-09
VEN	75-07	75-09	68-98	70-06	81-06	72-05	81-08	75-09	75-09
ZAF	75-07	75-09	68-98	70-06	93-00	72-05	81-08	75-09	75-09
ZMB	75-07	75-09	68-98	70-06	91-04	72-05	81-08	75-09	75-09

Note: GDP per capita LC (local currency) is used for GMM estimation together with Trade balance and Consumption, whose sample size coincides with GDP.

B Appendix: List of Countries

We collect public data from different sources of 66 economies listed in Table 9. Selected countries are strongly heterogenous in terms of economic development: we have included OECD economies, emerging economies and developing economies. The choice of which country to include in the analysis that follows has been driven mainly by the existence of data on government debt over GDP.

Table 9: List of Countries

Argentina	Greece	Pakistan
Australia	Guatemala	Panama
Austria	Honduras	Papa New Guinea
Bangladesh	Hungary	Paraguay
Belgium	India	Peru
Bolivia	Indonesia	Philippines
Brazil	Ireland	Poland
Bulgaria	Italy	Portugal
Burundi	Ivory Coast	Romania
Canada	Japan	Russia
Chile	Jordan	South Africa
Colombia	Kenya	Spain
Costa Rica	Korea	Swaziland
Czech Republic	Latvia	Sweden
Denmark	Malaysia	Thailand
Dominican Republic	Mexico	Tunisia
Ecuador	Morocco	Turkey
Egypt	Namibia	United Kingdom
Ethiopia	Nepal	United States
Finland	Netherland	Uruguay
France	New Zealand	Venezuela
Ghana	Norway	Zambia

C Appendix: Equilibrium

We describe the game as follows. We define the state vector $k \in K \in \mathbb{R}^4$ where $k_t = (t, d_t, y_t, \omega_t)$,[31] and $\omega_t \in \Re^{N+1}$ is a vector of indices s.t. $w_{i,t} = 1$ if i is the incumbent at period t and 0 otherwise $\forall i = 1, .., N+1$. Output y_t evolves exogenously, d_t is the level of debt inherited from past period, and ω_t is determined by the endogenous political markov process.

In this dynamic game, at each stage t of the game, the incumbent decides an action $a_{it} \in A^i(k_t)$ where $a_{it} = \left(d_{t+1}, c_t^{i,i}, \left\{c_t^{i,j}\right\}_{i \neq j}\right)$ if $\omega_{it} = 1$ and subject to the budget constraint in (3); instead the action profile of the opponents at t is empty: $a_{j,t} = A^j(k_t) = \emptyset$. Define an history $h^t \in \mathcal{H}^t$ as $h^t = (a_0, k_0, \ldots, a_{t-1}, k_{t-1})$. A pure strategy for party i as incumbent I at time t is a function

$$\sigma_{i,t} : \quad \mathcal{H}^t \times K \to A_t$$

[31] The time index t enters in the state representation because we are focusing on finite horizon

i.e. a mapping from the entire history and the current state space to each party actions at time t. We define as $\sigma_i = (\sigma_{i,1}, \dots, \sigma_{i,T})$ the strategy profile of party i in the finite game, and $\sigma_i[t] = (\sigma_{i,t}, \dots, \sigma_{i,T})$ the continuation strategy at time t. To be general let's define the intertemporal utility of party i in t as a function of the continuation strategy $W(\sigma_i[t], \sigma_{-i}[t])$. Defining S_i the set of all feasible σ_i, the strategy space of the infinite game is $S = \prod_{i=1}^{N+1} S_i$. We define the best response correspondence as:

$$BR(\sigma_i[t]|h^{t-1}, k_t) = \{\sigma_i[t] \in S_i[t]\},$$

such that

$$\sigma_i[t] \, \text{maximizes} \, W(\sigma_i[t], \sigma_{-i}[t]),$$

given $\sigma_{-i}[t] \in S_{-i}[t]$.

A Sub-game Perfect Equilibrium of this game is defined as follows:

Definition 2. A **Sub-game Perfect Equilibrium** is a strategy profile $\sigma^* = (\sigma_1^*, \dots, \sigma_{N+1}^*) \in S$ s.t. $\sigma_i^*[t] \in BR(\sigma_i[t]|h^{t-1}, k_t)$ for all (k_t, h^{t-1}), for all t and i.

In the rest of the paper we consider the more specific class of Markov Perfect Equilibria (MPE), where we restrict the strategies to be based only on *payoff-relevant* state, and not on the entire history of the game. In particular a Markov strategy is a mapping $\sigma \in \hat{S} \subset S$ s.t. $\sigma_i(k, h^{t-1}) = \sigma_i(k) \quad \forall h^{t-1} \in \mathcal{H}^{t-1}$.

Given the assumption of no discrimination and given that borrowing is completely independent from consumption allocation, it is natural to restrict our attention to the class of Symmetric MPE. In such a case the consumption level decided by the incumbent doesn't change with her identity, furthermore there is no discrimination between different groups at the opposition. As discussed in section 3.1, in such a case we can then define the instantaneous utility evaluated in $c^*(c)$ as $U^I(c_t) = \mathcal{U}^{i,i}(c_t^*)$ and $U^O(c_t) = \mathcal{U}^{i,r}(c_t^*)$. Defining as $\bar{p}_{t,s}$ the conditional probability for the party being in power at t to be in power also in s, the discounted utility is defined as

$$W(\sigma[t]) = \mathbb{E}_t \left[\sum_{s=t}^{T} \beta^t \left\{ \bar{p}_{t,s} U^I(c_t) + (1 - \bar{p}_{t,s}) U^O(c_t) \right\} \right] \tag{23}$$

Definition 3. A **Symmetric Markov Perfect Equilibrium** of this game is a strategy profile $\sigma^* = (\sigma_1^*, \dots, \sigma_{N+1}^*) \in \hat{S}$ s.t.

1. $\sigma_i^*[t] \in BR(\sigma_i[t]|k_t)$ for all k_t, for all t and i,
2. $\forall k, \tilde{k} \in K$ s.t. $k = (t, d, y, \omega)$ and $\tilde{k} = (t, d, y, \tilde{\omega})$, where $\omega \neq \tilde{\omega}$, $\Rightarrow \sigma_{i,t}(k) = \sigma_{j,t}(\tilde{k}) \in \hat{S}$ where $\omega_i = \tilde{\omega}_j = 1$.

D Appendix: Proofs

D.1 Proof of Proposition 1

Proof. • Part 1: $(a \Leftrightarrow c)$. Using equations (10) and (11), the RHS of the Euler equation in (9), can be written as:

$$\left[\begin{array}{c} pU^{I'}(y-(1+r)d_2)+ \\ +(1-p)\,U^{O'}(y-(1+r)d_2) \end{array}\right] = \left\{\begin{array}{c} p\left(\theta u'\left(c_2^I\right)\frac{\partial c^I(c_2)}{\partial c}+\frac{(1-\theta)}{N}u'\left(c_2^O\right)\left(1-\frac{\partial c^I(c_2)}{\partial c}\right)\right)+ \\ (1-p)\left(\frac{1}{N}\left(1-\frac{1-\theta}{N}\right)u'\left(c_2^O\right)\left(1-\frac{\partial c^I(c_2)}{\partial c}\right)+\frac{(1-\theta)}{N}u'\left(c_2^I\right)\frac{\partial c^I(c_2)}{\partial c}\right) \end{array}\right\}$$

$$= \frac{\partial c^I(c_2)}{\partial c}\gamma u'\left(c_2^I\right)+\left(1-\frac{\partial c^I(c_2)}{\partial c}\right)\left(\frac{1-\gamma}{N}\right)u'\left(c_2^O\right),$$

where we have defined $\gamma = \left(p\theta + (1-p)\frac{1-\theta}{N}\right)$. Since, $\theta \geq (N+1)^{-1}$, then $\gamma \leq \theta$.

Similarly, the LHS of the Euler equation in (9) is:

$$U^{I'}(y-(1+r)\,d_1+d_2) = \frac{\partial c^I(c_1)}{\partial c}\theta u'\left(c_1^I\right)+\left(1-\frac{\partial c^I(c_1)}{\partial c}\right)\frac{(1-\theta)}{N}u'\left(c_1^O\right).$$

Notice that $\frac{\partial c^I(c)}{\partial c}$ can be derived by applying the implicit function theorem on the optimal sharing rule in equation (8), which gives:

$$\psi(c) = \frac{\partial c^I(c)}{\partial c} = \frac{\frac{1-\theta}{N^2}u''\left(\frac{c-c^I}{N}\right)}{\theta u''(c^I)+\frac{1-\theta}{N^2}u''\left(\frac{c-c^I}{N}\right)}. \tag{24}$$

From this expression it is clear that $0 \leq \frac{\partial c^I}{\partial c} \leq 1$. In the following, we omit to make explicit the dependency of ψ from aggregate consumption. Let's now evaluate the Euler Equation above at d_2^*, which is the solution of the benchmark (transparent and no-conflict) economy, i.e.

$$U^{I'}(y-(1+r)\,d_1+d_2^*) = \left[\begin{array}{c} pU^{I'}(y-(1+r)d_2^*)+ \\ +(1-p)\,U^{O'}(y-(1+r)d_2^*) \end{array}\right]$$

Recall that d_2^* implies that $c_1 = c_2$, and, therefore, $\psi(c_1) = \psi(c_2)$, $c_1^I = c_2^I$, and $c_1^O = c_2^O$. Therefore, we can use the expressions for the LHS and RHS derived above and we can then eliminate the time subscripts. Since the utility function is concave, then we have that political conflict implies incentive to save (i.e. $\tilde{d}_2^* \leq d_2^*$), if and only if:

$$\psi\gamma u'\left(c^I\right)+(1-\psi)\frac{(1-\gamma)}{N}u'\left(c^O\right) \geq \psi\theta u'\left(c^I\right)+(1-\psi)\frac{(1-\theta)}{N}u'\left(c^O\right),$$

which can be rearranged as:

$$\underbrace{(\theta-\gamma)}_{\geq 0}\left((1-\psi)u'\left(c^O\right)-N\psi u'\left(c^I\right)\right) \geq 0. \tag{25}$$

By the optimal sharing rule in (8), we also have that: $u'\left(c^O\right) = \frac{N\theta}{1-\theta} u'\left(c^I\right)$. Hence, :

$$\left(\theta - \gamma\right) u'\left(c^I\right) N \left((1-\psi) \frac{\theta}{1-\theta} - \psi \right) \geq 0.$$

This inequality is satisfied if and only if $\theta > \psi$.

- Part 2: ($c \Leftrightarrow b$). Statement b is:

$$U^{I'}(c) \leq U^{O'}(c)$$

Using the definition of ψ and equations (10) and (11), it becomes:

$$\theta u'(c^I)\psi + \frac{1-\theta}{N} u'\left(c^O\right)(1-\psi) - \left(\frac{1-\theta}{N} u'(c^I)\psi + \frac{1}{N}\left(1 - \frac{1-\theta}{N}\right) u'\left(c^O\right)(1-\psi) \right) \leq 0$$

$$\frac{N\theta - 1 + \theta}{N} \left[N\psi u'(c^I) - (1-\psi) u'(c^O) \right] \leq 0$$

Since $\theta \geq (N+1)^{-1}$, the condition is satisfied if the term in squared brackets is negative. Notice that this condition is equivalent to the one used in (25). Hence, as before, by using the optimal sharing rule in (8) we have that the condition is satisfied if and only if $\theta \geq \psi$.

- Part 3: ($c \Leftrightarrow d$). Condition c states that: $\theta \geq \frac{\partial c^I}{\partial c}$. Applying the implicit function theorem on the optimal sharing rule in equation (8), that condition is:

$$\theta \geq \frac{\partial c^I}{\partial c} = \frac{\frac{1-\theta}{N^2} u''\left(\frac{c-c^I}{N}\right)}{\theta u''(c^I) + \frac{1-\theta}{N^2} u''\left(\frac{c-c^I}{N}\right)}.$$

Using the definition: $c^O = \frac{c-c^I}{N}$ and the fact that $u''(\circ) < 0$, the condition becomes:

$$u''(c^I) \leq \left(\frac{1-\theta}{N\theta}\right)^2 u''(c^O).$$

The optimal sharing rule in (8) implies that:

$$\frac{1-\theta}{N\theta} = \frac{u'(c^I)}{u'(c^O)}.$$

Substituting into the equation above, and again considering that $u''(\circ) < 0$, then we have:

$$\frac{u''(c^O)}{u''(c^I)} \leq \left(\frac{u'(c^O)}{u'(c^I)}\right)^2$$

□

D.2 Proof of Corollary 2

Proof. Consider the optimal sharing rule in equation (8). Applying the inverse of the marginal utility function to both sides of the equation, we have:

$$u'^{-1}\left(\theta u'\left(c^I\right)\right) = u'^{-1}\left(\frac{(1-\theta)}{N}u'\left(\frac{c-c^I}{N}\right)\right).$$

Assuming that condition (13) is satisfied, we have:

$$h\left(\theta\right)u'^{-1}\left(u'\left(c^I\right)\right) + l\left(\theta\right) = h\left(\frac{(1-\theta)}{N}\right)u'^{-1}\left(u'\left(\frac{c-c^I}{N}\right)\right) + l\left(\frac{(1-\theta)}{N}\right).$$

Labeling some terms for convenience, we obtain:

$$\underbrace{h\left(\theta\right)}_{\kappa_1}c^I + \underbrace{l\left(\theta\right)}_{\iota_1} = \underbrace{h\left(\frac{(1-\theta)}{N}\right)}_{\kappa_2}\frac{c-c^I}{N} + \underbrace{l\left(\frac{(1-\theta)}{N}\right)}_{\iota_2}.$$

Solving for c^I, we have:

$$c^I = \frac{\kappa_2}{N\kappa_1+\kappa_2}c + \frac{N(\iota_2-\iota_1)}{N\kappa_1+\kappa_2}.$$

It follows that:

$$\frac{\partial c^I}{\partial c} = \frac{\kappa_2}{N\kappa_1+\kappa_2} = \psi.$$

Since ψ is only a function of parameters of the model, then the utility function $u(c)$ satisfies the PSR property. □

D.3 Proof of Corollary 3

Proof. According to corollary 2, we only need to test condition 13 on the marginal utility of the HARA utility functions, i.e.

$$u'(c) = a\left(\frac{ac}{\sigma}+b\right)^{-\sigma}.$$

In particular the inverse of the marginal utility of HARA utility can be written as:

$$c = g(\bar{u}) = \bar{u}^{-\frac{1}{\sigma}}\underbrace{\sigma a^{\frac{1-\sigma}{\sigma}}}_{r} - \underbrace{b\sigma a^{-1}}_{s} = \bar{u}^{-\frac{1}{\sigma}}r - s.$$

We can now show that property (13) holds:

$$g(\epsilon\bar{u}) = \epsilon^{-\frac{1}{\sigma}}\bar{u}^{-\frac{1}{\sigma}}r - s = \epsilon^{-\frac{1}{\sigma}}\bar{u}^{-\frac{1}{\sigma}}r - s + \epsilon^{-\frac{1}{\sigma}}s - \epsilon^{-\frac{1}{\sigma}}s = \underbrace{\epsilon^{-\frac{1}{\sigma}}}_{h(\epsilon)}\underbrace{(\bar{u}^{-\frac{1}{\sigma}}r - s)}_{g(\bar{u})} + \underbrace{s\left(\epsilon^{-\frac{1}{\sigma}}-1\right)}_{l(\epsilon)}.$$

Hence, any HARA utility function satisfies the PSR property. □

D.4 Proof of Corollary 4

Proof.
- Part (a). Let us begin with part (a) of the corollary. In case of CRRA utility, it can be easily checked that the sharing rule is the following $c^I = \psi c$. In fact, by using equation (24) considering that $u(c) = \frac{c^{1-\sigma}}{1-\sigma}$ and by using the optimal sharing rule in (8), we have that $c^I = \psi c$, with:

$$\psi = \frac{\left(\frac{\theta}{1-\theta}\right)^{\frac{1}{\sigma}} N^{\frac{1-\sigma}{\sigma}}}{1 + \left(\frac{\theta}{1-\theta}\right)^{\frac{1}{\sigma}} N^{\frac{1-\sigma}{\sigma}}}.$$

- Part (b). The inequality $\theta \geq \psi = \frac{\left(\frac{\theta}{1-\theta}\right)^{\frac{1}{\sigma}} N^{\frac{1-\sigma}{\sigma}}}{1+\left(\frac{\theta}{1-\theta}\right)^{\frac{1}{\sigma}} N^{\frac{1-\sigma}{\sigma}}}$ is satisfied for:

$$1 - \left(\frac{N\theta}{1-\theta}\right)^{\frac{1-\sigma}{\sigma}} \geq 0.$$

  which holds for $\sigma \geq 1$ and is satisfied with strictly inequality for $\sigma > 1$. Notice that in the log case ($\sigma = 1$), we have equality, i.e. $\theta = \psi$.

- Part (c). The result follows from part (b) above and from parts (a) and (c) of Proposition 1.

□

D.5 Proof of Corollary 5

Proof. At the optimal level of debt $\tilde{d}_2^*$, the Euler equation in (9) is satisfied, i.e.:

$$\theta\psi u'\left(c^I(y+\tilde{d}_2^*+d_1)\right) + (1-\psi)\frac{1-\theta}{N}u'\left(c^O(y+\tilde{d}_2^*+d_1)\right) = \psi\gamma u'\left(c^I(y-\tilde{d}_2^*(1+r))\right) + (1-\psi)\frac{(1-\gamma)}{N}u'\left(c^O(y-\tilde{d}_2^*(1+r))\right),$$

where we have used the expression for the Euler equation as derived in the proof D.1, and the definition of $\gamma = \left(p\theta + (1-p)\frac{1-\theta}{N}\right)$. Differentiating both sides for p, considering that by assumption ψ is a constant, we have:

$$\left[\theta\psi u''\left(c_1^I\right) + (1-\psi)\frac{1-\theta}{N}u''\left(c_1^O\right)\right]\frac{\partial\tilde{d}_2}{\partial p} = \frac{\partial\gamma}{\partial p}\left(\psi u'\left(c_2^I\right) - \frac{1-\psi}{N}u'\left(c_2^O\right)\right) - (1+r)\frac{\partial\tilde{d}_2}{\partial p}\left(\psi\gamma u''\left(c_2^I\right) + (1-\psi)\frac{1-\gamma}{N}u''\left(c_2^O\right)\right),$$

which gives:

$$\frac{\partial\tilde{d}_2}{\partial p} = \frac{\frac{\partial\gamma}{\partial p}\left(\psi u'\left(c_2^I\right) - \frac{1-\psi}{N}u'\left(c_2^O\right)\right)}{\left[\theta\psi u''\left(c_1^I\right) + (1-\psi)\frac{1-\theta}{N}u''\left(c_1^O\right)\right] + (1+r)\left(\psi\gamma u''\left(c_2^I\right) + (1-\psi)\frac{1-\gamma}{N}u''\left(c_2^O\right)\right)}$$

The denominator is negative because of the concavity of the utility function. Also, the first term in the numerator is positive, $\frac{\partial\gamma}{\partial p} > 0$, whenever $\theta > (N+1)^{-1}$. The term in brackets at the numerator is negative whenever $\theta > \psi$, as can be easily seen by optimal sharing rule in (8). By assumption, $U^{I'}(c) \leq U^{O'}(c)$, which indeed implies that $\theta > \psi$, by Proposition 1. Hence, $\frac{\partial\tilde{d}_2}{\partial p} < 0$, which means that an increase in p reduces saving incentive. Finally, notice that if $p = 1$, then $\gamma = \theta$, which is independent of p. Therefore $\frac{\partial\tilde{d}_2}{\partial p}|_{p=1} = 0$, and the Euler equation of the problem coincides with the Euler equation of the frictionless economy in 6. □

D.6 Sufficient conditions for the solution of FOC to be a global maximum

In this section we provides the sufficient conditions on the probability function $p(c)$ such that the equilibrium condition in (17) characterizes a unique global maximum.

Lemma 8. Assuming that the utility function satisfies the PSR property and the conditions of Proposition 1. Then, if $\forall d_2$

$$
\begin{aligned}
p'(c_1) &< A_1(c_2) && (26) \\
p''(c_1) &< A_2(c_1, c_2) && (27)
\end{aligned}
$$

then the solution of the Euler Equation in equation (17) is a global solution of the problem (14)-(16). Here, $c_1 = y + d_2 - (1+r)\,d_1$, $c_2 = y - (1+r)\,d_2$, $\tau = (N\theta - 1 + \theta)/N$, *and* $A_1(c_2)$, $A_2(c_1, c_2)$ *are:*

$$
A_1(c_2) = (1+r)\frac{\theta\psi^2 u''(\psi c_2) + (1-\theta)\left(\frac{1-\psi}{N}\right)^2 u''\left(\frac{1-\psi}{N}c_2\right)}{\tau\left[\psi u'(\psi c_2) - \frac{1-\psi}{N}u'\left(\frac{1-\psi}{N}c_2\right)\right]} > 0.
$$

$$
\begin{aligned}
A_2(c_1, c_2) = &-\frac{\theta\psi^2\left[u''(\psi c_1) + (1+r)u''(\psi c_2)\right]}{\beta\tau\left(u(\psi c_2) - u\left(\frac{1-\psi}{N}c_2\right)\right)} - \\
&-\frac{(1-\theta)\left(\frac{1-\psi}{N}\right)^2\left[(1+r)(1-\theta)\left(\frac{1-\psi}{N}\right)^2 u''\left(\frac{1-\psi}{N}c_2\right) + (1-\theta)\left(\frac{1-\psi}{N}\right)^2 u''\left(\frac{1-\psi}{N}c_1\right)\right]}{\beta\tau\left(u(\psi c_2) - u\left(\frac{1-\psi}{N}c_2\right)\right)}
\end{aligned}
$$

Proof. A sufficient condition for the solution of FOC to be a global maximum is that the RHS of the Euler equation in 17 is increasing in d_2 and the LHS decreasing in d_2. Notice that $U^{I'}(c) - U^{O'}(c) = \tau\left(u'(\psi c_1) - u'\left(\frac{1-\psi}{N}c_1\right)\right)$, where $\tau = (N\theta - 1 + \theta)/N$. Differentiating the RHS for d_2:

$$
\frac{\partial RHS}{\partial d_2} = -(1+r)\left[\theta\psi^2 u''(\psi c_2) + (1-\theta)\left(\frac{1-\psi}{N}\right)^2 u''\left(\frac{1-\psi}{N}c_2\right)\right] + \underbrace{\tau p'(c_1)}_{\gamma'(c_1)}\left[\psi u'(\psi c_2) - \frac{1-\psi}{N}u'\left(\frac{1-\psi}{N}c_2\right)\right] > 0
$$

Notice that the first term in squared brackets is negative because of the concavity of the utility function. Also, the second term in squared bracket is negative when $\theta > \psi$, as directly implied by optimal sharing rule in (8). Solving for $p'(c_1)$, we obtain the condition in (26). Differentiating the LHS of the Euler equation for d_2:

$$
\begin{aligned}
\frac{\partial LHS}{\partial d_2} = &\theta\psi^2 u''(\psi c_1) + (1-\theta)\left(\frac{1-\psi}{N}\right)^2 u''\left(\frac{1-\psi}{N}c_1\right) + \\
&+ \tau p'(c_1)\left[\psi u(\psi c_2) - \frac{1-\psi}{N}u\left(\frac{1-\psi}{N}c_2\right)\right] + \beta\tau p''(c_1)\left[u(\psi c_2) - u\left(\frac{1-\psi}{N}c_2\right)\right] < 0
\end{aligned}
$$

Rearranging terms and using (26) to determine an upper bound for $p'(c_1)$, we obtain the condition (27). $\square$

D.7 Proof of Proposition 6

Proof. If conditions (26) and (27) are satisfied, the unique equilibrium $\hat{d}_2^*$ in a non-transparent economy is given by equating the LHS and RHS of the Euler equation in (17). In a transparent economy, the equilibrium $\tilde{d}_2^*$ is given by (9). Comparing the two conditions, notice that the right-hand sides are identical; hence, the marginal utility of savings is unchanged in the two case. Instead, the left-hand side of (17) has an additional term, which is: $\beta p'(c_1)\left[U^I(c_2) - U^O(c_2)\right]$. With a strictly positive degree of political conflict, i.e. $\theta > \frac{1}{N+1}$, that term is strictly positive if $p'(c_1) > 0$. That means that with a positive degree of lack of transparency, the marginal utility of consuming is larger than in a transparent economy. Therefore, it follows that $\tilde{d}_2^* > \hat{d}_2^*$.

□

D.8 Proof of Corollary 7

Proof. Consider the solution d_2^* of the frictionless benchmark model that solves equation (6). Recall that d_2^* implies that $c_1 = c_2$, and, therefore, $\psi(c_1) = \psi(c_2)$, $c_1^I = c_2^I$, and $c_1^O = c_2^O$. Then, defining z the difference between RHS and LHS evaluated at d_2^*. z represents the difference between saving incentives and consuming incentives. Eliminating the time subscripts, we have:

$$z = \left(\theta - \gamma\left(c^I\right)\right) N \left[(1-\psi)\frac{\theta}{(1-\theta)} - \psi\right] u'\left(c^I\right) - p'\left(c\right)\left(\frac{N\theta - 1 + \theta}{N}\right)\left[u\left(c^I\right) - u\left(c^O\right)\right].$$

Using the linear probability function, $p'(c) = \alpha$, and the expression becomes:

$$z = \left(\theta - \gamma\left(c^I\right)\right) N \left[(1-\psi)\frac{\theta}{(1-\theta)} - \psi\right] u'\left(c^I\right) - \alpha\left(\frac{N\theta - 1 + \theta}{N}\right)\left[u\left(c^I\right) - u\left(c^O\right)\right].$$

Differentiating, we have that $\frac{\partial z}{\partial \alpha} < 0$. Since z is monotone, for a large enough α then $z < 0$, which means that the solution in a non-transparent economy with political conflict implies larger borrowing incentives than the one in the frictionless economy.

□

D.9 The log-utility case with linear probability

In the log utility case we have already seen that there is no saving incentive for any level of θ when the probability of being re-elected is exogenous. Indeed in this case $\psi = \theta$ and $U^{I'}(c) = U^{O'}(c) = 1/c$. It is easy to notice also that $U^I(c) - U^O(c) = \tau(2\theta - 1)\left[\log\theta - \log(1-\theta)\right]$. The Euler Equation (17) becomes:

$$(y + d_1)^{-1} + p'(d_1)\beta\tau(2\theta - 1)\left[\log\theta - \log(1-\theta)\right] = (y - d_1(1+r))^{-1}.$$

In the linear probability case, i.e. $p'(d_1) = \alpha$, the optimal level of debt solves:

$$\frac{(y + d_1)}{(y - d_1(1+r))} = 1 + (y + d_1)\alpha\beta\tau\left[\log\theta - \log(1-\theta)\right] \tag{28}$$

In a non-transparent economy, $\alpha > 0$, the RHS of this equation is always greater than 1. Then $\tilde{d}_1$ that satisfies (28) is always positive. This implies that as far as $\alpha > 0$ we have borrowing in this economy. Therefore, the threshold level for α that implies more borrowing incentives than in frictionless case is zero, in the log-utility case. We can also prove a more general statement: with CRRA utility function and with linear reelection probability, the threshold level for α, $\bar{\alpha}$ s.t. when $\alpha > \bar{\alpha}$ we have borrowing incentives with respect to the frictionless economy is independent from θ.

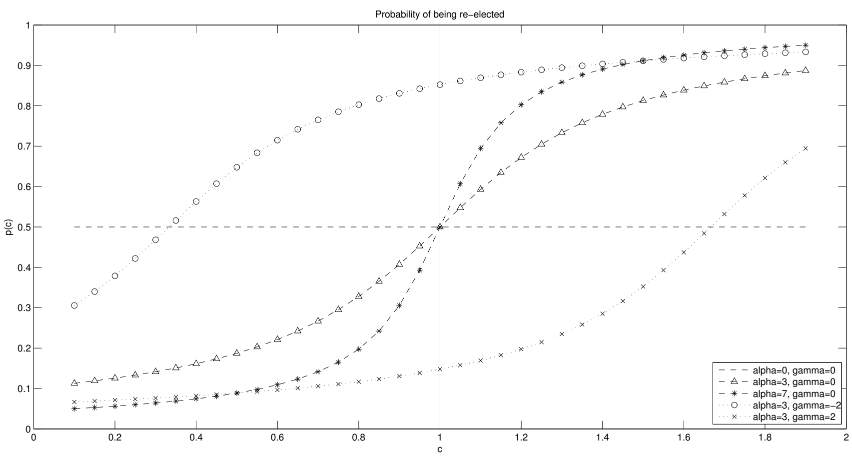
E Appendix: Equilibrium Debt and Non-linear Probability

Here we consider the following non-linear probability function: We assume that the probability of being re-elected is represented by the following functional form:

$$p(c) = \text{atan}\left(\frac{\alpha(c - \bar{c}) + \gamma}{\pi}\right) + \frac{1}{2}. \tag{29}$$

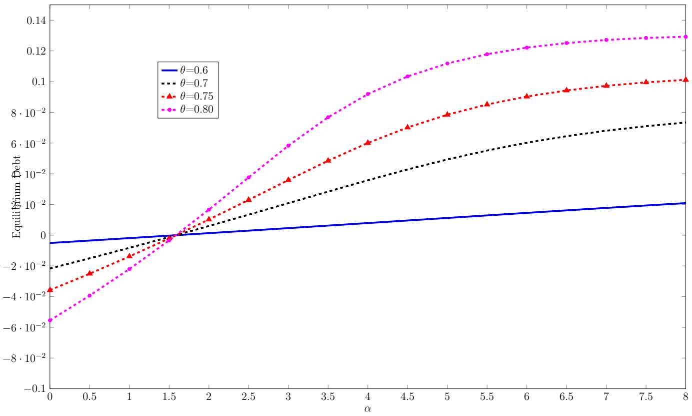
Figure 6 visualizes this probability function for different parameter values. Here, α affects the sensitivity (slope) of the probability function, whereas γ determines its level. By increasing α the probability becomes steeper around the flex. When α is very large the probability function is close to a step function. If γ is zero, the function is centered in $\bar{c}$. Adopting the function in (29) we assume that voters are more sensitive to economic conditions at the flex point. The flex point of the curve is shifted to the left (right) with respect to $\bar{c}$ when $\gamma > 0 (< 0)$. This function is bounded between 0 and 1 for any realization of consumption. The calibration of the model is as presented in section 3.7. In Figure 7 we plot the equilibrium level of debt for different combinations of θ and α in a 2-period model with CRRA utility function. In Table 10 we report the average equilibrium level of debt for different combinations of θ and α in a T-period model (with T=2250).

Figure 6: Non-linear Probability function



Note: In this figure we display of the probability function in equation (29) for different pairs of sensitivity (α) and the level parameter (γ).

Figure 7: EQUILIBRIUM DEBT, RETROSPECTIVE VOTING, AND POLITICAL FRICTION: NON-LINEAR PROBABILITY



Note: This figure plots the equilibrium level of debt in a 2-period economy when assuming CRRA utility function and non-linear probability, for different values of degree of retrospective voting (α, x-axis) and degree of political friction, θ. The blue-solid line is associated to a low degree of political friction (θ=0.6), the black-dotted line and the red-triangle-marked line are associated to moderate degrees of political friction ((θ=0.7 and 0.8, respectively), and the pink-circle-marked line is associated to a high degree of political friction (θ=0.8).

Table 10: Equilibrium Level of Debt in a T-period economy: Non-linear Probability

		Lack of Transparency		
		No: $\alpha = 0$	Medium: $\alpha = 1$	High: $\alpha = 5$
Conflict	No: θ=0.5	0	0	0
	Medium: θ=0.7	-4.3	-0.2	23.3
	High: θ=0.9	-4.8	-1.2	256.7

Note: In this table we report the average level of debt (in percentage) in a T-period economy, with $T = 2250$, when assuming CRRA utility function and non-linear probability, for different values of degree of retrospective voting (α, x-axis) and degree of political friction, θ. Negative values denote savings.