Engineering Crises: Favoritism and Strategic Fiscal Indiscipline

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Abstract

We develop a political economy theory of the endogenous emergence of fiscal crises based on the idea that the adjustment mechanism to a crisis favors some social groups, that may be induced ex-ante to vote for fiscal policies that are more likely to lead to a crisis. Greater levels of favoritism lead to a higher public debt and more frequent crises, as well as to higher public expenditure, if the favored group is large enough. We provide conditions under which the favored group strategically favors a weaker state's fiscal capacity and when constitutional limits on debt raise the utility of all poor.

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1 Introduction

Crises that follow a period of protracted macroeconomic imbalances are a well-documented phenomenon. In many cases, such crises arise from unsustainable fiscal and monetary policies, which are themselves associated with generous electoral promises. This scenario has been dubbed "Macroeconomic populism" by Dornbusch and Edwards (1991), who analyze a number of episodes, particularly in the context of Latin American countries. Yet an obvious question remains: if people understand that some macroeconomic policies are unsustainable, why would they vote for them in the first place?

This paper addresses this issue. We develop a rational political theory of endogenous fiscal crises, broadly defined as situations where the government is unable to finance its overall expenditures, including both the cost of a publicly provided good, and the cost of servicing the public debt.

We use a simple three period model where, in the first period, society votes on the level of a publicly provided good, defined as an entitlement, i.e. by the amount that each citizen is entitled to consume. In the second period, society votes on how to finance the level of expenditure which was decided in the first period: taxes versus debt. The government can borrow on the international financial market, and debt has to be repaid in the last period of the game. In the third period the economy is subject to a random shock. A fiscal crisis occurs when a negative aggregate income shock makes maximum potential government revenues fall short of government expenditures, calling for some correcting action.

We assume that in the event of a fiscal crisis, the government is forced to cut down on its provision of the entitlement good promised *ex ante*, which is reduced through some rationing scheme.

A key assumption of our theory is that people differ in two dimensions: their pre-tax income, which implies the usual redistributive conflict between rich and poor, and their degree of "*connection*."[1] That is, some people are better connected than others to the public sector broadly defined, i.e. including politicians as well bureaucrats responsible for the implementation of some public policies.[2] Better connected people are better treated than others in case of

[1] We generalize Meltzer and Richard's (1981) positive theory of purely redistributive public spending in two key respects. First, our dynamic framework allows for the accumulation of public debt. Second, heterogeneity is now bidimensional: people differ by income as well as connections.

[2] This notion of connection stands several different interpretations. People may be favored for (i) being public sector employees (e.g. Robinson and Verdier, 2013), (ii) living in a particular region, e.g. the capital city (Bates, 1981; Ades and Glaeser, 1995), (iii) belonging to a particular religious (e.g. Grim and Finke, 2006) or ethno-linguistic group (e.g. Padro-i-Miquel, 2007; Franck and Rainer, 2012), and (iv) more generally sharing

a fiscal crisis, in the sense that they are less exposed to rationing, which makes them naturally less worried by fiscal crises. In our framework, connections become valuable only in times of crisis, but are irrelevant in normal times, when all people can equally access their entitlement. As a consequence, better connected people are more likely to vote for a high level of public spending, and, given that level, they are also more likely to favor debt financing over tax financing. This, in spite of the fact that both policies raise the likelihood of a costly fiscal crisis and that agents correctly internalize that effect.[3]

Specifically, by voting for higher debt, better connected people trade a tax cut now in exchange for a lower probability of getting one's entitlement in the case of a crisis, but this lower probability disproportionately affects less connected people. Hence, better favored people gain from debt financing of public expenditure, implying in particular a failure of Ricardian Equivalence, which would hold absent crises.[4]

For this reason, when voting on the entitlement level in the first period, a voter will also favor a higher expenditure level, the better he is connected, and the more important connections are in the crisis rationing scheme. This is because in equilibrium part of this expenditure will be financed by debt, which shifts the burden of financing to the less connected.

Another implication of our model is that, depending on parameter values, *different coalitions* may arise when society votes on the level of expenditure as opposed to its financing. The connected poor favor both a high level of public debt and a high entitlement level. The rich, on the other hand, favor debt financing over tax financing even more than the connected poor, since they do not benefit from the public good and hence are not harmed by rationing during crises. For the same reason they also favor a low expenditure level in the first stage of the game. The unconnected poor want less debt than the connected poor, because they are less likely to get their entitlement during a crisis, whose likelihood is raised by public debt. For the same reason they benefit less from having a higher entitlement than the connected, although more than the rich. Therefore, the unconnected poor may be the pivotal group when society votes

a particular collective identity. In our model, the social cost of favoritism is the higher probability of a fiscal crisis, an outcome essentially ignored by those papers.

[3] The assumption that connections matter only during crises is extreme; it is made for simplicity and can be relaxed to some extent. What is essential is that the connected poor retain a sufficiently strong advantage with respect to the poor with no connections in the provision of the entitlement good, in times of crisis relative to normal times.

[4] In our model, as long as crises occur, Ricardian equivalence fails for two reasons. First, reneging on the state's pre-agreed provision of public goods has, by assumption, a resource cost. Second, the adjustment following a fiscal crisis is made through a reduction in public spending, so that expenditures are not independent of the way they are financed, which affects the probability of the occurrence of a crisis in the first place.

on entitlements, while the connected poor are pivotal when society votes on debt.[5] In such a configuration, a reduction in spending would be blocked by a coalition of all the poor, while a reduction in debt would be blocked by a coalition of rich and connected poor.[6] We also show that institutional debt ceilings may act as a commitment device that helps foster cooperation between the unconnected and the connected poor by curbing the latter's propensity to issue debt in second period. This in turn makes it valuable for the unconnected to raise expenditure in the first period in a way that benefits both groups.

Another interesting result of our model is that it can explain situations where governments choose a low level of (or do not improve the) state's fiscal capacity, namely the ability of the state to raise taxes and provide public goods. Indeed, we show that if the connected poor were the decisive voters in the first stage of the game, they would tend to support a reduction in the fiscal capacity of the state in order to strategically engineer more frequent crises.

In addition to the literature on the politics of income redistribution spurred by Meltzer and Richard (1981), our paper is related to Alesina and Drazen's (1991) influential work on the role of attrition wars between interest groups in delaying stabilizations. We depart from their analysis essentially by addressing the question of why a fiscal crisis emerges endogenously as a result of uneven connections, a question which has been neglected by the literature to the best of our knowledge. Our setup does not allow for wars of attrition. However, it may be interpreted in a way consistent with Alesina and Drazen: the connected group may be viewed as the one which rationally expects to win a war of attrition in case of a crisis.

Our paper is also related to the literature on the political economy of budget deficits, including Persson and Svensson (1989), Aghion and Bolton (1990), Alesina and Tabellini (1990), Fabrizio and Mody (2010), Tabellini and Alesina (1990), Milesi-Ferretti and Spolaore (1994), and Lizzeri (1999).[7] As in this literature, in our model heterogeneity leads to strategic fiscal indiscipline. Unlike this literature, we study heterogeneity in the distribution of the burden of the crisis, not in preferences for different public goods.

Our model is an attempt to formalize some of the key insights offered by Dornbusch and Edwards in their work on macroeconomic populism. The pivotal voter, being relatively insulated from fiscal crises, supports a "*macroeconomic populist*," i.e. a leader who *rationally*

[5] This is a case of "ends against the middle", as in Epple and Romano (1996).

[6] Here political connections do *not* affect directly the political process as this works through the standard one man-one vote principle unlike, for instance, in Bénabou (2000). Connections only play a role in the rationing process that may be implemented during a crisis.

[7] See also Alesina and Perotti (1995), and Alesina and Passalacqua (2016) for some comprehensive discussion of this literature.

implements policies characterized by fiscal indiscipline. Consistent with our result that the high debt policy is supported by the rich and the connected poor, this literature has also shown that populist regimes are often supported by a cross-cutting coalition, often involving part of the economic elite and part of the lower classes (e.g. Drake, 1982; Kaufman and Stallings, 1991).

This paper sheds light on recent empirical findings relating weak institutions to weak macroeconomic performance. In particular, Rodrik (1999) and Acemoglu et al. (2003) have highlighted the role of weak institutions as a cause for bad macroeconomic policies including high inflation, large budget deficits, and misaligned exchange rates. Our model provides foundations for these findings by eliciting the role of one dimension of institutional weakness, i.e. unequal treatment in terms of crisis; also, Saint-Paul (2020) provides evidence linking direct institutional measures of unequal treatment to aggregate fiscal performance, consistent with our model.[8]

Finally, we provide a contribution to the literature on fiscal capacity by showing that microeconomic features of the adjustment mechanism to fiscal crises may also affect governments' investments in the ability of the state to raise taxes (see Besley and Persson, 2009; Acemoglu et al., 2011; and Besley and Persson, 2013, for a review).

The paper is organized as follows. Section 2 describes the basic setup. Section 3 characterizes the equilibrium choice of public debt conditional on the predetermined entitlement level of the public good. Section 4 studies the determination of the public good level in the first stage of our game. Section 5 discusses two extensions: the strategic endogenous choice of fiscal capacity and the consequences of a debt ceiling on the welfare of the poor. Section 6 concludes. Appendix A contains the proofs omitted from the main text.

2 The Model: Basic Environment

We consider an economy with three periods, $t = 0, 1, 2$, populated by a continuum of agents of measure one. This endowment economy has a single final good produced and consumed at dates 1 and 2.

A fraction $\theta < 1/2$ of the people are rich and the remaining are poor. For any realization of aggregate income y, a poor person's income is equal to βy, while the income of the rich is

[8] Direct empirical evidence that political connections are especially valuable in abnormal times is provided by Acemoglu et al. (2016), who show that firms connected with Timothy Geithner experienced unusually high returns after he was appointed Secretary of the Treasury by President-elect Obama, in the midst of the 2007-2008 financial crisis, and impute this to their connections.

equal to γy. We assume that $\beta < 1$ and that

$$\gamma = \frac{1-(1-\theta)\beta}{\theta} > 1,$$

which guarantees that average income is equal to y. Clearly, β is a measure of income equality.

All the poor have the same utility function given by

$$U_P(c_1, c_2, \mu_1, \mu_2, \tilde{G}_1, \tilde{G}_2) = -\alpha + \sum_{t=1}^{2} \left(c_t + \tilde{G}_t - \mu_t \right),$$

where c_t is consumption of the final good at date t, $\tilde{G}_t$ is the *actual* consumption of a publicly provided good, α is the administrative setup cost of the *entitlement* level of the public good, itself denoted by G,[9] and μ_t denotes the utility cost of rationing in the allocation of $\tilde{G}$ that will take place in some states of the world such that $\tilde{G} < G$, as explained below.

When the publicly provided good is rationed some agents are *favored* in the allocation process in the sense that they are allowed to consume the entitlement G before other citizens who, as a consequence, have a lower probability of being served. Specifically, a fraction λ of the poor are served first; the size of this group is therefore equal to $\lambda(1-\theta)$, and we will often refer to such citizens as the *connected poor* (or the *preferred* group, or type H). The remaining poor, whose size is equal to $(1-\lambda)(1-\theta)$, will be served only after all citizens of group H have consumed G; we will then refer to these citizens as the *unconnected poor* (or *unfavored* group, or type L). As will be clear later, the parameter λ can be interpreted as an inverse measure of favoritism: a lower λ implies a lower size of the connected poor group and, therefore, a higher probability that they are served under rationing; this, in turn, allows them to obtain more rents by exploiting the unconnected citizens during crises, hence the existence of a higher favoritism.[10]

For simplicity, we assume that the rich (type R) consume their entitlement of the publicly provided good G whenever they can, despite that this does not provide them any utility.[11] Therefore, their utility will be given by

$$U_R(c_1, c_2, \mu_1, \mu_2) = -\alpha + \sum_{t=1}^{2} (c_t - \mu_t).$$

[9] For simplicity, the setup cost is in utility terms. Nothing would be changed if it were in resource terms and people also had an endowment and consumed at $t = 0$, as long as utility remained separable.

[10] A countervailing effect is that a lower λ reduces the connected group's political power. However it will remain pivotal as long as the conditions spelled out in Footnote 12 continue to hold.

[11] This would be the case, for example, if the publicly provided good is health or education, for which the rich can get higher quality suppliers on the private market. It is also clear that the distinction between connected and unconnected is irrelevant for such citizens. However, all our results are not affected by the assumption that the utility of the rich is not affected by G.

Throughout most of our analysis, we assume that none of the three groups (connected poor, unconnected poor, and rich) has an absolute majority and, therefore, two groups are necessary to form a majority (the exception being our analysis of comparative statics and of the strategic choice of fiscal capacity – Propositions 3 and 4 – where to get unambiguous predictions we need to assume that the connected poor are the absolute majority).[12] There are at least two reasons that justify such assumptions. First, for simplicity, we consider only two groups of poor, with one of them having zero favoritism. In the real world, favoritism would be a continuous variable and the decisive voter would have *some* degree of favoritism.[13] Second, in practice, it is plausible that the pivotal group enjoys some degree of favoritism since connected poor and rich citizens may be able to gain additional influence through methods such as lobbying, vote buying, or because of the lower turnout rates of relatively poor and unconnected individuals that may further limit their political influence (Bénabou, 2000).[14]

The entitlement level of the publicly provided good is decided by majority voting at the beginning of period 0. Setting G involves an administrative setup cost that, for simplicity, we assume being quadratic in G and equal to

$$\alpha = \frac{k}{2} G^2,$$

where k is a positive parameter.

There is a fiscal crisis when the government has to renege on its commitments and to deny some citizens their entitlement. In such cases the adjustment process is non convex: some citizens get their full entitlement G, i.e. $\tilde{G} = G$, and others don't get it at all, i.e. $\tilde{G} = 0$, although this occurs with some probability. Such rationing involves a utility cost to each citizen equal to

$$\mu = \varepsilon \left(1 - \phi\right) G, \tag{1}$$

where $\varepsilon \in (0, \beta)$ is a parameter and ϕ is the proportion of citizens that get their entitlement. This cost may be interpreted as an administrative cost or, in the tradition of the rent-seeking

[12] The assumption that the size of groups H and L is lower than $1/2$, i.e. $\max\{\lambda(1-\theta), (1-\lambda)(1-\theta)\} < 1/2$, implies the degree of favoritism λ is constrained within the following bounds: $(1-2\theta)/2(1-\theta) < \lambda < 1/2(1-\theta)$.

[13] As we will see, when no one group is an absolute majority group H is pivotal in choosing the level of debt D and group L is decisive in the choice of the entitlement G. Obviously, group H is decisive in the equilibrium outcome of both choices, G and D, if it is an absolute majority.

[14] Moreover, as it will be clear in the next section, the assumption that both connected and unconnected people are equally poor is not crucial for our results, in the sense that the connected may be somewhat richer than the unconnected as perhaps representing a middle class. Indeed, a higher income of the connected poor would not change the second round voting equilibrium since, if richer, they would have an even stronger reason to support a higher level of the public debt at the margin, so reinforcing our argument.

literature, as the resources spent by individuals in competing to get their entitlement. The existence of such utility loss implies that fiscal crises are an inefficient outcome.

It is useful to define the following quantity

$$z = \beta - \varepsilon > 0$$

that represents the net gain to a poor citizen of financing one unit of his entitlement by rationing another citizen as compared to paying taxes for it. Note that both z and β are inverse measures of income inequality given that a higher β implies a higher income of the poor.

The entitlement good G is provided at dates 1 and 2, and may be financed by two means. First, the government may levy proportional income taxes at dates $t \in \{1, 2\}$ at rate τ_t. Second, at date $t = 1$ the government may issue a stock of public debt, denoted by D, to be paid back at $t = 2$. Taxation generates no distortion but has an upper bound, i.e. $\tau_t \leq \overline{\tau}$ with $\overline{\tau} \in (0, 1)$, reflecting the state's fiscal capability.

For simplicity, there is no private saving or borrowing. Consequently, consumption of the final good at date t is given by

$$c_{Pt} = \beta y_t(1 - \tau_t)$$

for the poor, and by

$$c_{Rt} = \gamma y_t(1 - \tau_t)$$

for the rich.

If the government issues debt at time 1 it borrows from the international financial market, in terms of the final good, at a fixed gross interest rate which is normalized to 1. We assume for simplicity that debt is always paid back, implying it is senior relative to the citizens' entitlements, that may be defaulted upon in a fiscal crisis.[15] The equilibrium level of borrowing D is decided by majority voting at $t = 1$. That is, people first vote on an entitlement level G of the publicly provided good, and then on how it should be financed (taxes τ versus public debt D). It is intuitive that choosing greater entitlements and/or financing them by borrowing raises the probability of a fiscal crisis at a later date.

[15] This no default assumption is consistent with our assumption of an exogenous interest rate, since the risk premium is always equal to zero. In a richer setting, a fiscal crisis would lead the government to default on sovereign debt as well as on its commitments to citizens. The breakdown between the two would reflect the relative level of seniority between the two commitments. There is no a priori reason to believe that in such a situation our results would not hold, as long as greater debt financing raises the probability of crisis and the latter is associated with greater rationing in accessing one's entitlement.

Clearly, by making each collective choice one-dimensional, sequential voting greatly enhances the likelihood that a majority winner exists at each stage of the political process.[16] More fundamentally, though, this sequencing of events captures the real world feature that many items of public policy, especially the welfare state, are specified in terms of present entitlements (such as a right to a certain level of education, to a certain pension at a certain age, to subsidized housing or child care, to unemployment benefit at a defined replacement ratio, etc.) while their financing is set ex-post in a more discretionary fashion.

Income changes across periods and the timing of income shocks realizations is as follows: no income is produced at time 0; aggregate income at time 1, y_1, is fixed and known at time 0; aggregate income at time 2, y_2, is random and drawn from a uniform distribution with support $\left[\underline{y}, \overline{y}\right]$. Its realization is publicly known at the beginning of time 2 only. We denote by $\sigma = \overline{y} - \underline{y}$ an index of macroeconomic volatility. We also assume that y_1 is in the same range as y_2, i.e. $\underline{y} \leq y_1 \leq \overline{y}$.

We make the following technical assumptions for the sake of tractability and of limiting the number of regimes to be discussed.

Assumption 1 *The level of public debt D has the following bounds*

$$\bar{\tau}\underline{y} \geq D \geq G - \bar{\tau} y_1. \tag{2}$$

Assumption 1 guarantees that (i) creditors can always be repaid in full,[17] leaving the burden of adjustment to citizens, regardless of the realization of the shock at date 2, and (ii) there never is a fiscal crisis in period 1, since public debt has to be large enough for G to be financed by taxing at capacity or less.[18] Therefore, $\mu_1 = 0$ and the tax rate at date 1 is given by

$$\tau_1 = \frac{G - D}{y_1}. \tag{3}$$

The following assumption guarantees that the range of admissible values of D defined by Assumption 1 is nonempty.[19]

[16] Under simultaneous voting, to get around Condorcet cycles, one would presumably have to impose restrictions upon the specification of preferences and/or their distribution, as in Grandmont (1978), change the required majority size as in Caplin and Nalebuff (1991), or use a set equilibrium concept as suggested by Tullock (1967) or McKelvey (1986).

[17] Absent Assumption 1, and under the maintained assumption that debt is senior relative to the citizens' entitlements, no citizen would get his entitlement and creditors would get a haircut for low enough realizations of the income shock y. And, as a consequence, the interest rate would endogenously adjust to reflect those potential haircuts. Preliminary calculations suggest that these effects would greatly complicate our algebraic derivations without providing additional insights for our theory.

[18] Assumption 1 greatly simplifies the model by forcing the timing of a fiscal crisis to be exogenous. None of the main results of the paper would change if we allowed for fiscal crises to take place in both periods 1 and 2.

[19] Also note that a fiscal crisis at date 1 could not be avoided if G were too high for any given level of fiscal capacity $\bar{\tau}$.

Assumption 2 *The level of entitlement of the publicly provided good G has the following upper bound*

$$G \leq G_{\max} = \bar{\tau}\left(y_1 + \underline{y}\right). \tag{4}$$

We also assume the upper bound of the distribution of shocks is large enough for a no crisis situation to always occur with positive probability:

Assumption 3 $\bar{y} > y_1 + 2\underline{y}$.

Finally, to guarantee the concavity of the poor's preferences in G in the first stage of the game, we assume that the administrative setup cost for the publicly provided good G is sufficiently convex.

Assumption 4 *The parameter k has the following lower bound*

$$k > \frac{z(1-\lambda)^2}{\sigma\bar{\tau}(1-\lambda z)}.$$

3 Choice of Public Debt Conditional on Entitlement

We solve the dynamic political game described in the previous section by backward-induction. This implies analyzing the equilibrium of the game starting from the last period. Specifically, we characterize fiscal policy at $t = 2$ as a function of the aggregate income shock y_2.

A fiscal crisis occurs at time $t = 2$ when the maximum level of tax revenues the government can collect falls short of "notional" government spending, defined as the level obtained if all citizens get their entitlement. This will be the case if $\overline{\tau} y_2 < G + D \Leftrightarrow y_2 < (G + D)/\overline{\tau}$. In a crisis, taxes are set at their maximum value and a fraction ϕ of the people get their entitlement, where ϕ is the highest possible level consistent with government receipts, i.e.

$$\overline{\tau} y_2 = \phi G + D. \tag{5}$$

We denote the fraction of unconnected citizens (type L) and of connected ones (type H) that get their entitlement with ϕ_L and ϕ_H respectively, and recall that group H is always served before group L; that is, no member of the L group can access the publicly provided good unless all H people are served. Consequently, we distinguish between a *mild crisis*, where only the unconnected poor are rationed (i.e., $\phi_L < 1$ but $\phi_H = 1$), and a *supercrisis*, where the connected poor are rationed and all members of group L have no access to the public good (i.e., $\phi_L = 0$ and $\phi_H < 1$). It is immediate that a mild crisis obtains whenever $\lambda \leq \phi < 1$.

The following table summarizes the properties of each regime and their likelihood of arising.

Regime	*Normal*	*Mild crisis*	*Supercrisis*
Range of y_2	$\left[\frac{G+D}{\bar{\tau}}, \bar{y}\right]$	$\left[\frac{\lambda G+D}{\bar{\tau}}, \frac{G+D}{\bar{\tau}}\right)$	$\left[\underline{y}, \frac{\lambda G+D}{\bar{\tau}}\right)$
Probability	$\min\left(1, \frac{1}{\sigma}\left[\bar{y} - \frac{G+D}{\bar{\tau}}\right]\right)$	$\max\left(\min\left(\frac{1}{\sigma}\frac{(1-\lambda)G}{\bar{\tau}}, \frac{1}{\sigma}\left[\frac{G+D}{\bar{\tau}} - \underline{y}\right]\right), 0\right)$	$\max\left(0, \frac{1}{\sigma}\left(\frac{\lambda G+D}{\bar{\tau}} - \underline{y}\right)\right)$
Tax rate τ_2	$\frac{D+G}{y_2}$	$\bar{\tau}$	$\bar{\tau}$
ϕ	1	$\frac{\bar{\tau}y_2-D}{G}$	$\frac{\bar{\tau}y_2-D}{G}$
ϕ_H	1	1	ϕ/λ
ϕ_L	1	$\frac{\phi-\lambda}{1-\lambda}$	0

Table 1 – *Fiscal regimes in period $t = 2$.*

We now move to the characterization of the equilibrium of the game at $t = 1$ that is conditional on the choice about the entitlement of the publicly provided good G made at date $t = 0$.

The following proposition reports our first key result: greater favoritism, represented by a lower λ, makes debt financing more likely, which in turn raises the likelihood of crisis.

Proposition 1 1. *For $G \leq G_{\max}$ there exists a unique equilibrium at $t = 1$. The equilibrium value of the public debt D is*

$$D^*(G) = \arg \max_{D \in [G - \bar{\tau}y_1, \bar{\tau}\underline{y}].} V_H(D, G),$$

where $V_i(D, G)$ denotes group i's indirect expected utility.

2. *Let*

$$G_{\min} = \frac{1 - \lambda z}{1 + \lambda - 2\lambda z}\bar{\tau}(y_1 + \underline{y}), \tag{6}$$

then for $G < G_{\min}$ the equilibrium debt level is

$$D^*(G) = \bar{\tau}\underline{y} - \frac{\lambda(1 - z)}{1 - \lambda z}G. \tag{7}$$

3. *Consequently, in this regime, denoting by P the probability of a crisis, we have that:*

$$\frac{\partial P}{\partial G} > 0, \ \frac{\partial D}{\partial G} < 0; \ \frac{\partial P}{\partial z} > 0, \ \frac{\partial D}{\partial z} > 0; \ \frac{\partial P}{\partial \lambda} < 0, \ \frac{\partial D}{\partial \lambda} < 0, \ \frac{\partial P}{\partial \bar{\tau}} < 0, \ \frac{\partial D}{\partial \bar{\tau}} > 0.$$

Proof. See Appendix A for details. First, one computes the marginal utility of debt for each group, which allows us to prove a single crossing property and to rank those preferences. From there, show that group H is pivotal. Next, compute the value of D that maximizes the welfare of this group. It depends on whether constraint (1) is binding. Here we focus on the case of interest where it is not, i.e. $G < G_{\min}$.[20] ■

A reduction in inequality, that can be represented by an increase in z, raises indebtedness ($\partial D/\partial z > 0$) and makes crises more likely ($\partial P/\partial z > 0$). Intuitively, if the poor of group H are richer, they value the publicly provided good less, given that they have to contribute more to it, and therefore they are more willing to trade a reduction in taxes at date 1 against a lower probability of being served at date 2.

A reduction in λ, i.e. an increase in favoritism, also raises the level of debt and the probability of a crisis. A lower λ makes it less likely that the favored group has to bear the burden of adjustment in a crisis, making it more valuable for these pivotal voters to reduce taxes at $t = 1$.

An increase in fiscal capacity $\bar{\tau}$ lowers the probability of a crisis, all else equal. This reduces the marginal cost of debt for the favored group, which then selects a higher level of debt.

It is interesting to discuss these results in light of the marginal utility of debt for the pivotal H group:

$$\frac{\partial V_H}{\partial D} = \; - A\left(\frac{1}{\lambda} + \varepsilon\right) - B\varepsilon - C\beta + \beta. \tag{8}$$

Here A, B, and $C = 1 - A - B$ denote the probability of supercrisis, mild crisis and normal times respectively (see Table A.2 in Appendix A). Absent a crisis, an increase in debt by one dollar reduces the poor's utility at $t = 2$ by β dollars, since average taxes have to increase by one dollar, and the poor pay β of taxes per dollar of average tax. This cost of debt is captured in Equation (8) by the $-C\beta$ term, while the benefit to the poor of issuing debt at $t = 1$ is, by the same token, equal to β—hence the last term on the RHS of (8). In a mild crisis, group H is served its entitlement of the publicly provided good anyway, and the only cost to them of raising debt is that the level of rationing in society goes up, and so does its distortionary cost. This effect is captured by the term $-B\varepsilon$ on the RHS of (8). Finally, in a supercrisis, the marginal cost of debt is twofold: first, the distortionary cost of rationing still applies; second, contrary to the mild crisis regime, the preferred group have a lower probability of being served, the lower the proportion ϕ of individuals who are served, i.e. the greater the level of debt. These two effects are summarized by the term $-A\left(\frac{1}{\lambda} + \varepsilon\right)$ in (8). This formula captures a *multiplier effect*: since the preferred group only accounts for a fraction λ of society

[20] If $G > G_{\min}$, debt is constrained by (2), and therefore $D = G - \bar{\tau} y_1$. As a result debt mechanically goes up with G, and is independent of z and λ.

and since the L group is not served in a supercrisis, a unit reduction in ϕ has to be matched by a reduction in ϕ_H by $1/\lambda > 1$ units.

We note that as long as $C = 1$, $\frac{\partial V_H}{\partial D} = 0$; that is, Ricardian Equivalence holds locally as long as there is no crisis, since the distortions associated with public debt only materialize in a fiscal crisis. When debt grows beyond some point, $C < 1$, and Ricardian equivalence fails. As long as that is feasible, the poor of group H always prefer a level of D such that there is a positive probability of both a mild crisis and a supercrisis. Supercrisis is the only regime where this group loses on net from raising D. In a mild crisis their only cost is the distortion ε, which is smaller than the benefit β of paying lower taxes at date 1 while shifting the burden of adjustment upon group L. Consequently, as long as $A = 0$, group H gains from raising D.

4 Equilibrium determination of the entitlement level G

In this section we first determine the equilibrium level of the entitlement G at $t = 0$. In particular, we show that preferences are single-crossed so that the marginal utility of public spending is highest for the connected poor (group H) and lowest for the rich (group R). This implies that the unconnected poor (group L) is the decisive group is when no one group is an absolute majority. Moreover, since we are able to establish unambiguous comparative statics results only for the case where the favored group H is pivotal, we present some comparative statics results for the case where the connected poor are an absolute majority in the population and, therefore, they are pivotal in both periods of the game.

The following proposition describes the equilibrium level of the entitlement G depending on which group is pivotal at date $t = 0$.

Proposition 2 (i) [*Single crossing*] *For any* $G \in [0, G_{\max}] - \{G_{\min}\}$, $\frac{dV_L}{dG} < \frac{dV_H}{dG}$ *and* $\frac{dV_R}{dG} < 0$.

(ii) [*Existence*] *There exists a unique voting equilibrium at date* $t = 0$.

(iii) [*Group H is pivotal if it has an absolute majority*] *If* $\lambda(1-\theta) > 1/2$, *then*

$$G = \arg\max_G \quad V_H(D^*(G), G) = G_H^*.$$

(iv) [*Otherwise Group L is pivotal*] *If* $\lambda(1-\theta) < 1/2$, *then*

$$G = \arg\max_G \quad V_L(D^*(G), G) = G_L^*.$$

Proof. The properties of the value functions are directly established using the relevant expressions (see Appendix A for details). We show that they are concave except perhaps for the rich and C^1 for $G \neq G_{\min}$, and prove the inequalities in (i) by straight computations; (ii) and (iii) are then straightforward if $\lambda(1-\theta) > 1/2$. When $\lambda(1-\theta) < 1/2$ we can replace V_R by $\tilde{V}_R = AV_R$, for any $A > 0$. Since $dV_R/dG < 0$, we can pick A large enough so that $\frac{d\tilde{V}_R}{dG} < \frac{dV_L}{dG}$ for any $G \in [0, G_{\max}] - \{G_{\min}\}$. With this new cardinal representation of the preferences, single-crossing holds and standard results apply, implying that (ii) and (iv) hold. ■

When no one group is an absolute majority, the level of entitlement G corresponds to that one preferred by the unconnected poor (group L, see Proposition 2) while the level of public debt D to finance it is chosen by the connected poor (group H, see Proposition 1). This result comes from a reversal of coalitions between date 1 and date 2 that occurs because the rich favor the highest possible level of debt when voting on how to finance the entitlement G at $t = 1$ while preferring the lowest possible level of G at $t = 0$. That is, the rich side with the connected poor (group H) in opposing higher taxes at date 1, but side with the unfavored group L against higher expenditures at date 0. Consequently, the determinants of public expenditure will differ depending on which of the poor, the L group or the H group, is pivotal at date $t = 0$.

When the unconnected poor are pivotal in determining the equilibrium level of entitlement G, it is not possible to establish unambiguous results in the comparative statics analysis. Hence, we have focused our attention on the case where the connected poor are pivotal in determining G at time 0, i.e. when group H is an absolute majority. The comparative statics results for such case are summarized in the following proposition.

Proposition 3 *Assume that $\lambda(1-\theta) > 1/2$ so that group H is pivotal at time 0. Then, there exists $\hat{k}$ such that:*

(1) $G^*_H \leq G_{\min}$, *if and only if $k > \hat{k}$.*

(2) *If $k > \hat{k}$ then:*

(i) $\partial G^*_H/\partial\overline{\tau} < 0$, $\partial G^*_H/\partial\lambda < 0$, *and* $\partial G^*_H/\partial\beta < 0$.

(ii) $\partial B/\partial\overline{\tau} < 0$, $\partial B/\partial\lambda < 0$, *and* $\partial B/\partial\beta < 0$, *where B is the probability of a mild crisis.*

(iii) $\partial A/\partial\overline{\tau} < 0$, *where A is the probability of a supercrisis.*

(iv) *The probability of a crisis, $P = A + B$, is such that $\partial P/\partial\beta < 0$ and $\partial P/\partial\lambda < 0$.*

(v) *Total government commitments $D + G$ always fall with β, i.e. $\partial(D + G)/\partial\beta < 0$.*

Proof. Straightforward algebra (see Appendix A). ■

The main novelties contained in Proposition 3 are represented by the effects of favoritism and fiscal capacity:

• A reduction in favoritism, i.e. an increase in λ, makes it more likely that the favored group H is rationed in a fiscal crisis. In particular, it reduces the probability of a mild crisis B, for any given G; this raises the marginal cost of G to the poor of group H, thus reducing the level of the equilibrium entitlement.

• An increase in fiscal capacity $\bar{\tau}$ reduces the probability of a crisis and makes it more likely that G is financed by taxation as opposed to a reduction of the probability of being served for group L. Again, the cost of G goes up for group H, which favors a lower level of expenditures. This effect stands in contrast to the standard one, by which greater fiscal capacity, i.e. lower distortions from taxation, raises public spending. Here greater fiscal capacity reduces public spending because, by making crises less frequent, it raises the average contribution of the decisive group H to financing entitlements.

The comparative statics result with respect to income inequality is in accordance with the standard Meltzer–Richard model: total government commitments, $D + G$, always fall as the income the poor increase (higher β) and, therefore, redistributive forces overall dominate.[21]

5 Extensions

5.1 Strategic Choice of Endogenous Fiscal Capacity

As noted in the Introduction, it is often observed that stabilization programs are made difficult for lack of fiscal capacity. Yet one may wonder why fiscal capacity is low in some countries but not in others. As stated in the following proposition, our model predicts that under favoritism the preferred group will favor a reduction in fiscal capacity as long as it is in power.

Proposition 4 *Assume that (i) $\lambda(1-\theta) > 1/2$, and (ii) $k > \hat{k}$, where $\hat{k}$ is defined in Proposition 3. Then $\frac{d}{d\bar{\tau}} V_H(D^*(G^*), G^*) < 0$.*

Proof. See Appendix A. ■

Intuitively, the probability of a crisis increases as the state's fiscal capacity becomes weaker (see Proposition 3), but a situation of crisis is precisely the state of the world where the group of connected poor benefits from favoritism. Therefore, a low fiscal capacity tends to induce some selective redistribution in favor of the connected poor (group H) through the channel of making a fiscal crisis more likely to occur.[22]

[21] On the other hand, higher β also leads to higher debt D and a lower entitlement G.

[22] Also note that if group H can choose $\bar{\tau}$ freely, it will lower it down to a point where the no fiscal crisis constraint at $t = 1$, $D \geq G - \bar{\tau} y_1$ is binding.

5.2 Consequences of a Debt Ceiling

We have seen that when no one group has the majority, i.e. $\lambda(1-\theta) < 1/2$, group L (unconnected poor) is pivotal at date 0 and the equilibrium level of the entitlement G corresponds to its preferred level. This group favors lower spending than group H (the connected poor) because, from its viewpoint, the latter sets debt at a level that is too high, since it benefits from a fiscal crisis. This opens up the scope for coordination between these two groups: group L could set G at a higher level while group H would commit to a lower level of public debt at the next date, relative to the no commitment equilibrium outcome. In this section, we show that a constitutional debt ceiling contingent on G can provide such a commitment device and deliver Pareto-improving outcomes, from the viewpoint of the poor, compared to the equilibrium ones that we have characterized so far.

Proposition 5 *Assume (i) $\lambda(1-\theta) < 1/2$, so that group L is pivotal at $t = 0$, and (ii) k is large enough so that $G_L^* < G_{\min}$.*

Consider the debt ceiling

$$D_{\max}(G) = D^*(G_L^*) - \omega(G - G_L^*).$$

Then, there exists $\omega > \frac{\lambda(1-z)}{1-\lambda z}$ such that the equilibrium (G_C, D_C) if the constraint $D \leq D_{\max}(G)$ is imposed, is such that $V_H(D_C, G_C) > V_H(D^*(G_L^*), G_L^*)$ and $V_L(D_C, G_C) > V_L(D^*(G_L^*), G_L^*)$.

Proof. The idea is as follows (see Appendix A for formal details). Since group L is pivotal for choosing the level of expenditure and group H is pivotal for choosing debt, it must be that

$$\frac{\partial V_L}{\partial G} + D'(G)\frac{\partial V_L}{\partial D} = 0, \tag{9}$$

and

$$\frac{\partial V_H}{\partial D} = 0.$$

At the margin, H wants more spending than L, i.e. $\frac{dV_H}{dG} = \frac{\partial V_H}{\partial G} + \frac{\partial V_H}{\partial D} D'(G) = \frac{\partial V_H}{\partial G} > dV_L/dG = 0$, while L wants less debt than H, i.e. $\frac{\partial V_L}{\partial D} < 0$. Suppose the debt ceiling defined above is binding when spending goes up at the margin of our political equilibrium. Then, an increase in G benefits group H since $\frac{\partial V_H}{\partial G} > 0$ and $\frac{\partial V_H}{\partial D} = 0$. Furthermore, group L gains if $\frac{\partial V_L}{\partial G} - \omega \frac{\partial V_L}{\partial D} > 0$, which is true as long as $\omega > -D'(G) = \frac{\lambda(1-z)}{1-\lambda z}$. ■

The ceiling on debt considered here forces group H to reduce debt by a larger amount in response to an increase in G decided by group L. As a result, the probability of a crisis, where group L does not get its full entitlement, *goes up by less* for any increase in G, which induces group L to choose a larger G while at the same time making it better-off. As for group H, its loss from being able to issue less debt is only of *second order* as long as the new equilibrium is not too different from the original one, while its gain from a higher level of entitlement is *first order*. Therefore, the poor of group H are better-off too.

While this constitutional constraint makes all the poor better-off, the rich are worse-off. Indeed, the new equilibrium has a higher expenditure level but a lower debt level than the original one, and, as seen above, the utility of the rich falls with expenditure and goes up with debt. Therefore, they are necessarily worse off.[23]

It is interesting to remark that the purpose of the debt ceiling considered here is not to curb government size but to reduce the likelihood of fiscal crisis. Since the inefficient outcome (from the point of view of the poor) is such that spending G is suboptimally low, clearly an expenditure ceiling would not be able to elicit coordination between the H and L groups of poor so as to make each of them better-off.

6 Conclusions

This paper provides a novel political economy theory of the emergence of fiscal crises using a simple dynamic model of public finance. Our key contribution is to relate the macroeconomic determinants of fiscal policies and fiscal crises to microeconomic features of the adjustment mechanism. In particular, fiscal crises are associated with rationing in accessing publicly provided goods, and some people are in a better situation to get their entitlement through mechanisms such as information networks, political connections or corruption. As a consequence, agents with better connections are in favor of implementing policies which are more likely to create fiscal stress in bad economic times, including relatively high levels of public spending in entitlement goods as well as of public deficits and debt.

[23] There are not many examples of countries with debt ceilings around the world. The U.S. is probably the most notable exception. The Congress of the U.S. created the debt ceiling with the Second Liberty Bond Act of 1917 and instituted the first limit on aggregate federal debt in 1939. While we do not want to argue here that at the root of the establishment of such constitutional constraint there was an attempt to improve the welfare of the poor by changing the future fiscal policy decisions, it is however interesting to note that in both periods the Democrats controlled the House as well as the Senate, and that also the President was a Democrat (Woodrow Wilson and Franklin D. Roosevelt respectively). Denmark is another country that has a debt ceiling. While it seems that the limit is so high to have never played any major role in affecting fiscal policy decisions, it is interesting to note that it was established in 1993 when the Prime Minister was Poul Nyrup Rasmussen leading a center-left coalition. Similarly, when in 1992 a debt ceiling was imposed in the Maastricht Treaty, six out of twelve countries that signed the treaty were ruled by center-left governments (i.e., Belgium, Italy, Luxembourg, France, Netherlands, and Spain).

Our paper offers a theory for the rational implementation of policies characterized by fiscal indiscipline, that may be defined as populist, and that are quite common in (even though not exclusive of) less developed countries. As a matter of fact, uneven connections can be regarded as a form of weak institutionalization since they represent a departure from anonymity in accessing one's entitlement to publicly provided goods. Therefore, our model can shed new light on why crises are especially frequent in developing countries pointing the attention to the fact that they are not the result of policies pursued by irrational groups or leaders. At the same time, our theory can also provide a contribution to the literature on populism that has flourished in recent years following the emergence of some leaders and policies in advanced economies (see Europe and the U.S.).

We have finally extended our model to the analysis of the strategic choice of fiscal capacity and on the effects of institutional constraints, such as the debt limits, on fiscal policy outcomes. Our model can explain that the low fiscal capacity of some countries may be the result of decision of governments representing the interests of the favored groups of the society because a lower fiscal capacity allows to strategically engineer more frequent crises. Finally, we have shown that a constitutional debt ceiling affects the equilibrium level of public expenditure and how it is financed (taxes versus debt) in a way that is beneficial for all members of the lower classes. Specifically, our results suggest that features like debt limits, that one usually expect to be preferred by conservative parties, might also be in the interest of lower income citizens that are supposedly represented by left-wing parties. However, the implementation of such reforms is an issue that we do not address here and leave for future research.

7 References

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Appendix A

A.1 Proof of Proposition 1

A.1.1 Computing utility

We first compute utility and marginal utility for each group: H, L, and R.

A.1.1.1 The utility of group H (the favored poor)

We establish the following Lemma.

Lemma A.1 *The marginal utility of debt for the poor of type H is given by (8), i.e.*

$$\frac{\partial V_H}{\partial D} = -A\left(\frac{1}{\lambda}+\varepsilon\right) - B\varepsilon - C\beta + \beta,$$

where A is the probability of a supercrisis, B is the probability of a mild crisis, and C is the probability of no crisis, as defined in Table 1.

Proof. From Table 1 it is straightforward to fill the following table.[24]

State	c_{H2}	$\mathbb{E}(\tilde{G}_{H2} \mid y_2)$	μ_2	$\mathbb{E}(u_{H2} = c_{H2} + \tilde{G}_{H2} - \mu_2 \mid y_2)$
No crisis	$\beta(y_2 - D - G)$	G	0	$\beta y_2 - \beta D + (1-\beta)G$
Mild crisis	$\beta(1-\bar{\tau})\, y_2$	G	$\varepsilon(G + D - \bar{\tau} y_2)$	$[\beta(1-\bar{\tau}) + \varepsilon\bar{\tau}]\, y_2 + G(1-\varepsilon) - \varepsilon D$
Supercrisis	$\beta(1-\bar{\tau})\, y_2$	$\frac{\bar{\tau} y_2 - D}{\lambda}$	$\varepsilon(G + D - \bar{\tau} y_2)$	$\beta(1-\bar{\tau}) + \bar{\tau}\left(\frac{1}{\lambda}+\varepsilon\right) y_2 - \varepsilon G - \left(\frac{1}{\lambda}+\varepsilon\right) D$

Table A.1 – *Consumption of private, publicly provided good, rationing cost, and utility at date $t = 2$ for the poor of group H.*

Therefore, the marginal utility of debt in period 2 in the supercrisis, mild crisis and no crisis regimes are equal to $-\left(\frac{1}{\lambda}+\varepsilon\right)$, $-\varepsilon$, and $-\beta$, respectively.

To complete the proof, two remarks remain to be made.

First, at the frontier between the mild crisis regime and the no crisis regime, we have that $\bar{\tau} y_2 = G + D$. Substituting the implied value of y_2, $y_m = (G+D)/\bar{\tau}$, into the last column of Table A.1, we get the same expression for $\mathbb{E}(u_{H2} \mid y_2)$ in the no crisis and mild crisis regimes. Therefore, utility as a function of y_2 is continuous at y_m. Similarly, the frontier between the supercrisis regime and the mild crisis regime is such that $\bar{\tau} y_2 = \lambda G + D$. Substituting the implied value of y_2, i.e. $y_s = \frac{\lambda G + D}{\bar{\tau}}$, into the last column of Table A.1, we get the same expression for $\mathbb{E}(u_{H2} \mid y_2)$ in the supercrisis and mild crisis regimes. Therefore, utility is again

[24] Expectations only refer to the fact that access to G is random.

continuous at y_s. It follows that whenever one or both of these thresholds are interior, the effects on expected utility at date 2 of the marginal changes in A, B, or C implied by changes in y_m and y_s cancel out. Therefore, the contribution of date 2 to the marginal utility of raising debt is equal to $-A\left(\frac{1}{\lambda}+\varepsilon\right) -\varepsilon B -\beta C$.

Second, from our assumption of no fiscal crisis at date 1, we see that the utility of a poor of any group at date 1 is equal to

$$u_{1P} = \beta y_1(1-\tau_1) + G.$$

From Equation (3) in the Text we have that $\tau_1 = \frac{G-D}{y_1}$. Substituting this latter expression into the preceding formula, we get

$$u_{1P} = \beta y_1 + (1-\beta)G + \beta D.$$

Therefore, the marginal utility of debt at $t = 1$ to the poor of either group is equal to β.

Putting these two remarks together, we get the expression in (8).

QED ■

Next, we show that group H's preferences are well behaved with respect to D, given G.

As preliminary calculations, we compute and report in the following table the three regime probabilities A, B, and C depending on the value of D, based on Table 1.

Range for D	A	B	C
1. $D \leq \bar{\tau}\underline{y} - G$	0	0	1
2. $\bar{\tau}\underline{y} - G < D \leq \bar{\tau}\underline{y} - \lambda G$	0	$\frac{1}{\sigma}\left(\frac{G+D}{\bar{\tau}} - \underline{y}\right)$	$\frac{1}{\sigma}\left(\bar{y} - \frac{G+D}{\bar{\tau}}\right)$
3. $\bar{\tau}\underline{y} - \lambda G < D \leq \bar{\tau}\underline{y}$	$\frac{1}{\sigma}\left(\frac{\lambda G+D}{\bar{\tau}} - \underline{y}\right)$	$\frac{1}{\sigma}\frac{(1-\lambda)G}{\bar{\tau}}$	$\frac{1}{\sigma}\left(\bar{y} - \frac{G+D}{\bar{\tau}}\right)$

Table A.2 – *Probability of supercrisis (A), mild crisis (B), and normal times (C) depending on D, given G.*

We then state the properties of the utility function of the favored group of poor.

Lemma A.2 *Group H's utility function $V_H(D,G)$ is continuously differentiable, single-peaked in D and reaches its maximum for some $D \geq \bar{\tau}\underline{y} - \lambda G$.*

Proof. Starting from (8) and noting that $A+B+C=1$, we can rewrite the marginal utility as

$$\frac{\partial V_H(D,G)}{\partial D} = \; -A/\lambda + z(1-C),$$

where $z = \beta - \varepsilon > 0$. From there we clearly see that $\frac{\partial V_H(D,G)}{\partial D} = 0$ in Range 1 of Table A.2, and $\frac{\partial V_H(D,G)}{\partial D} > 0$ in Range 2. This proves the last part of the claim. Since A and C are continuous functions of D, so is $\frac{\partial V_H(D,G)}{\partial D}$, implying that V_H is C^1. Next, note that in Range 3, we have that

$$\begin{aligned} \frac{\partial^2 V_H(D,G)}{\partial D^2} &= -\frac{1}{\lambda}\frac{\partial A}{\partial D} - z\frac{\partial C}{\partial D} \\ &= \frac{1}{\sigma\bar{\tau}}\left(-\frac{1}{\lambda} + z\right) < 0, \end{aligned}$$

where the second line comes from Table A.2 and the last inequality from the fact that $z < \beta < 1 < 1/\lambda$.

Putting these observations together with the continuity of $\frac{\partial V_H(D,G)}{\partial D}$, it follows that $V_H(D,G)$ is concave in D over Range 3 and, therefore, single peaked over Ranges 1–3, which completes the proof of the first part of the claim.

QED ■

A.1.1.2 The utility of group L (the unfavored poor)

Regarding group L, we can state the following result.

Lemma A.3 *The marginal utility of debt for the poor of type L is given by:*

$$\frac{\partial V_L}{\partial D} = -A\varepsilon - B\left(\frac{1}{1-\lambda} + \varepsilon\right) - C\beta + \beta. \tag{A.1}$$

Proof. The proof is the same as that of Lemma A.1, with Table A.1 replaced by the following table.[25]

State	c_{L2}	$\mathbb{E}(\tilde{G}_{L2})$	$\mathbb{E}(u_{L2} = c_{L2} + \tilde{G}_{L2} - \mu_2 \mid y_2)$
No crisis	$\beta(y_2 - D - G)$	G	$\beta y_2 - \beta D + (1-\beta)G$
Mild crisis	$\beta(1-\bar{\tau})y_2$	$\frac{\bar{\tau}y_2 - D - \lambda G}{1-\lambda}$	$\left[\beta(1-\bar{\tau}) + \bar{\tau}\left(\varepsilon + \frac{1}{1-\lambda}\right)\right]y_2 - \left(\varepsilon + \frac{\lambda}{1-\lambda}\right)G - \left(\varepsilon + \frac{1}{1-\lambda}\right)D$
Supercrisis	$\beta(1-\bar{\tau})y_2$	0	$[\beta(1-\bar{\tau}) + \varepsilon\bar{\tau}]y_2 - \varepsilon G - \varepsilon D$

Table A.3 – *Consumption of private, publicly provided good, and utility of the poor of group L at date $t = 2$.*

QED ■

Next, we prove that the utility of group L is well behaved and single-crossed with respect to that of group H.

[25] Rationing costs are the same as in Table A.1.

Lemma A.4 *V_L is continuously differentiable with respect to D. Furthermore, $\frac{\partial V_L}{\partial D} \leq \frac{\partial V_H}{\partial D}$.*

Proof. That V_L is continuously differentiable can be proved in the same way as in the proof of Lemma A.2. Comparing the LHS of (A.1) with that of (8), we see that

$$\frac{\partial V_L}{\partial D} \leq \frac{\partial V_H}{\partial D} \Longleftrightarrow \frac{B}{1-\lambda} \geq \frac{A}{\lambda}.$$

This obviously holds over Ranges 1 and 2 of Table A.2, since $A = 0$ over those ranges. Over Range 3, the last inequality is equivalent to

$$D \leq \overline{\tau}\underline{y},$$

which holds by Assumption 1.

QED ■

A.1.1.3 The utility of group R (the rich)

Regarding the preferences of the rich, the following result holds.

Lemma A.5 *The marginal utility of debt for the rich of both types is given by:*

$$\frac{\partial V_R}{\partial D} = -(A+B)\varepsilon - C\gamma + \gamma. \tag{A.2}$$

Proof. The proof is the same as that of Lemma A.1, with Table A.1 replaced by the following:[26]

State	c_{R2}	$u_{R2} = c_{R2} - \mu_2$
No crisis	$\gamma(y_2 - D - G)$	$\gamma(y_2 - D - G)$
Crisis	$\gamma(1-\overline{\tau})\, y_2$	$[\gamma(1-\overline{\tau}) + \varepsilon\overline{\tau}]\, y_2 - \varepsilon G - \varepsilon D$

Table A.4 – *Consumption of the private good and utility at date $t = 2$ for the rich.*

One also has to note that utility at date $t = 1$ is

$$u_{R1} = \gamma(1-\tau_1)\, y_1 = \gamma(y_1 + D - G).$$

QED ■

Again we can prove that as a function of D, V_R is C^1 and single-crossed with respect to V_H.

[26]Rationing costs are the same as in Table A1.

Lemma A.6 *V_R is continuously differentiable with respect to D. Furthermore, $\frac{\partial V_R}{\partial D} \geq 0$ and $\frac{\partial V_R}{\partial D} \geq \frac{\partial V_H}{\partial D}$, with strict inequalities absent Ricardian Equivalence, i.e. in Ranges 2 and 3 of Table A.2.*

Proof. From (A.2) we have that $\frac{\partial V_R(D,G)}{\partial D} = -(1-C)\varepsilon - C\gamma + \gamma = (1-C)(\gamma - \varepsilon) > 0$. This proves the first part of the claim. Furthermore, subtracting the RHS of (8) from that of (A.2), we have that

$$\frac{\partial V_R}{\partial D} - \frac{\partial V_H}{\partial D} = A/\lambda + (1-C)(\gamma - \beta) \geq 0.$$

This proves the second part of the claim. Clearly, the above inequalities are strict as long as $C < 1$, i.e. in Ranges 2 and 3 of Table A.2.

QED ■

A.1.2 Existence

The preceding results imply that $\frac{\partial V_L}{\partial D} \leq \frac{\partial V_H}{\partial D} \leq \frac{\partial V_R}{\partial D}$. Consequently, preferences are single-crossed. Since throughout the paper we assume that neither groups L nor R are a majority, the pivotal group is group H. This proves claim 1 in Proposition 1.

A.1.3 Computing the equilibrium value of D

Assume that $G \geq G_{\min}$ as defined by (6), implying that one must have $G_{\min} \leq G_{\max}$. Then, note that this is not the main region of interest but we need to characterize outcomes if G lies in this region for the proofs to be complete.

Note also that $G_{\min} = \frac{1-\lambda z}{1+\lambda-2\lambda z}\bar{\tau}(y_1 + \underline{y}) > \frac{\bar{\tau}(y_1+\underline{y})}{1+\lambda}$. Therefore, $G > \frac{\bar{\tau}(y_1+\underline{y})}{1+\lambda}$, or equivalently $G - \bar{\tau}y_1 > \bar{\tau}\underline{y} - \lambda G$. Consequently, since Assumption 1 holds, only Range 3 (of Table A.2) is non-empty. In that range, V_H is concave; hence, if $\partial V_H/\partial D \leq 0$ at $D = G - \bar{\tau}y_1$, then that is the optimal choice. Recall that $\partial V_H/\partial D = -A/\lambda + z(1-C)$. Computing that expression at $D = G - \bar{\tau}y_1$ using the formulas of Table A.2, we get that

$$\begin{aligned} \frac{\partial V_H}{\partial D}(G - \bar{\tau}y_1, G) \quad &\leq \quad 0 \Leftrightarrow -\frac{1}{\lambda}((1+\lambda)G - \bar{\tau}(y_1 + \underline{y})) + z(\sigma\bar{\tau} - \bar{\tau}(\bar{y} + y_1) + 2G + D) \leq 0, \\ &\iff \quad G \geq G_{\min}. \end{aligned}$$

Therefore, $D = G - \bar{\tau}y_1$ is indeed the optimal choice.

Now assume that $G < G_{\min}$. Since $G_{\min} < \bar{\tau}(y_1 + \underline{y})$, it follows that $G - \bar{\tau}y_1 < \bar{\tau}\underline{y}$. Consequently, only Range 3 is non-empty. It follows that the optimal D must necessarily lie in Range 3, given that $\partial V_H/\partial D = 0$ in Range 1 and $\partial V_H/\partial D > 0$ in Range 2. Let us now show that it is interior in Range 3 and that constraint (2) in the Text is not binding.

From the preceding expression we have that

$$G < G_{\min} \Rightarrow \frac{\partial V_H}{\partial D}(G - \bar{\tau} y_1, G) > 0.$$

Computing $\frac{\partial V_H}{\partial D}(\bar{\tau}\underline{y} - \lambda G, G)$ from Lemma A.1 and noting from Table A.2 that the corresponding value of A is zero, we get

$$\frac{\partial V_H}{\partial D}(\bar{\tau}\underline{y} - \lambda G, G) = (1 - C)z > 0.$$

Consequently,

$$D > \max(\bar{\tau}\underline{y} - \lambda G, G - \bar{\tau} y_1),$$

implying that the second part of constraint (2) in the Text is not binding, and that D is strictly greater than the lower bound of Range 3. Furthermore, computing $-A/\lambda + z(1-C)$ at $D = \bar{\tau}\underline{y}$ and using the expressions in Table A.2 yields

$$\frac{\partial V_H}{\partial D}(\bar{\tau}\underline{y}, G) = -(1 - z)\frac{G}{\sigma\bar{\tau}} < 0.$$

Therefore, the optimal choice of D is in the interior of Range 3 (implying also that the first part of constraint (2) in the Text is not binding) and such that $-A/\lambda + z(1 - C) = 0$. Substituting again the expressions for A and C from Table 1, we get the expression on the RHS of (7) in the Text, which we replicate here for convenience:

$$D = \bar{\tau}\underline{y} - \frac{\lambda(1 - z)}{1 - \lambda z} G. \tag{A.3}$$

This proves claim 2 in Proposition 1. As for claim 3, it derives straightforwardly from (A.3) and from the following expression which computes the crisis probability in Range 3:

$$\begin{aligned} P &= 1 - C \\ &= 1 - \frac{1}{\sigma}\left(\bar{y} - \frac{G + D}{\bar{\tau}}\right) \\ &= \frac{G}{\sigma\bar{\tau}}\left(\frac{1 - \lambda}{1 - \lambda z}\right). \end{aligned}$$

QED ■

A.2 Proof of Proposition 2

A.2.1 Preference ranking over G

A.2.1.1 Group H (the favored poor)

Lemma A.7 *$V_H(D^*(G), G)$ is C^1 and concave in G.*

Proof. Using Tables 1 and A.1, we can write the full utility of group H as

$$\begin{aligned} V_H(D,G) &= \int_{\underline{y}}^{\frac{\lambda G+D}{\overline{\tau}}} \left[a_0 y - \varepsilon G - \left(\frac{1}{\lambda}+\varepsilon\right) D\right] \frac{dy}{\sigma} + \int_{\frac{\lambda G+D}{\overline{\tau}}}^{\frac{G+D}{\overline{\tau}}} \left[a_1 y + (1-\varepsilon) G - \varepsilon D\right] \frac{dy}{\sigma} \\ &+ \int_{\frac{G+D}{\overline{\tau}}}^{\overline{y}} \left[\beta y - \beta D - \beta G + G\right] \frac{dy}{\sigma} + \beta\left[y_1 + D\right] + (1-\beta)G - k\frac{G^2}{2}, \end{aligned} \tag{A.4}$$

where

$$a_0 \equiv \beta(1-\overline{\tau}) + \overline{\tau}\left(\frac{1}{\lambda}+\varepsilon\right),$$

and

$$a_1 \equiv \left[\beta(1-\overline{\tau}) + \varepsilon\overline{\tau}\right].$$

Let us define Region I as the region where $G \leq G_{\min}$, and Region II the one where $G > G_{\min}$.

In Region I, the value of D chosen by the connected poor (group H), that are pivotal at date $t = 1$, is interior. Consequently, the envelope theorem applies, i.e. $\frac{d}{dG} V_H(D^*(G),G) = \frac{\partial}{\partial G} V_H(D^*(G),G)$. Differentiating $V_H(D,G)$ in (A.4) with respect to G, we obtain that

$$\frac{dV_H}{dG} = -\varepsilon A + (1-\varepsilon)B + (1-\beta)C + 1 - \beta - kG. \tag{A.5}$$

Using (A.3) and the expressions in Table A.2, we get that in Region I,

$$\frac{dV_H}{dG} = G\left[-k + \frac{z(1-\lambda)^2}{\sigma\overline{\tau}(1-\lambda z)}\right] + 2(1-\beta). \tag{A.6}$$

In Region II where $G > G_{\min}$, we have that $D^* = G - \bar{\tau} y_1$, implying that $\frac{dD^*}{dG} = 1$. The differentiation of $V_H(D,G)$ in (A.4) leads to

$$\begin{aligned} \frac{dV_H}{dG} &= -\left[\varepsilon + \left(\varepsilon + \frac{1}{\lambda}\right)\frac{dD^*}{dG}\right] A + \left[(1-\varepsilon) - \varepsilon\frac{dD^*}{dG}\right] B \\ &+ \left[(1-\beta) - \beta\frac{dD^*}{dG}\right] C + 1 - \beta + \beta\frac{dD^*}{dG} - kG. \end{aligned} \tag{A.7}$$

Using again the expressions in Table A.2, the fact that $\frac{dD^*}{dG} = 1$ and that $D^* = G - \bar{\tau} y_1$, we can rewrite the last expression as

$$\frac{dV_H}{dG} = G\left[-k - \frac{1}{\sigma\overline{\tau}}(2 + \lambda + 1/\lambda - 4z)\right] + 2(1-\beta) + \frac{1}{\sigma}(1 + 1/\lambda - 2z)(\underline{y} + y_1). \tag{A.8}$$

Next, we prove the continuity of $\frac{dV_H}{dG}$ at $G = G_{\min}$. For $G \leq G_{\min}$, we have that $\frac{dV_H}{dG} = \frac{\partial V_H}{\partial G}$, as the envelope theorem applies over this region. For $G > G_{\min}$, we have that $\frac{dV_H}{dG} = \frac{\partial V_H}{\partial D} + \frac{\partial V_H}{\partial G}$. All these derivatives are computed at $D = D^*(G)$. But $G_{\min}$, by definition, is such that $\frac{\partial V_H}{\partial D}(G_{\min} - \bar{\tau} y_1, G_{\min}) = \frac{\partial V_H}{\partial D}(D^*(G_{\min}), G_{\min}) = 0$. Therefore, $\lim_{G \to G_{\min}^+} \frac{dV_H}{dG} =$

$\lim_{G \to G_{\min}^-} \frac{dV_H}{dG}$. Since $V_H\left(D^*(G), G\right)$ is regular elsewhere in the $G \leq G_{\max}$ region, this proves that V_H is C^1 throughout.

Finally, we note from Assumption 4 that the first term in brackets in (A.6) is negative, and that is obviously so in (A.8). This proves that $V_H\left(D^*(G), G\right)$ is concave in both regions. Since $\frac{dV_H}{dG}$ is continuous at the frontier $G = G_{\min}$ between the two regions, V_H is clearly globally concave.

QED ■

A.2.1.2 Group L (the unfavored poor)

Lemma A.8 *$V_L(D^*(G), G)$ is continuous, differentiable everywhere except at $G = G_{\min}$, and concave in G. Furthermore, $\frac{dV_L}{dG} < \frac{dV_H}{dG}$ for any $G \in [0, G_{\max}] - \{G_{\min}\}$.*

Proof. From Tables 1 and A.3 we get that

$$\begin{aligned} V_L\left(D, G\right) &= \int_{\underline{y}}^{\frac{\lambda G + D}{\overline{\tau}}} \left[a_1 y - \varepsilon G - \varepsilon D\right] \frac{dy}{\sigma} \\ &+ \int_{\frac{\lambda G + D}{\overline{\tau}}}^{\frac{G + D}{\overline{\tau}}} \left[a_2 y - \left(\varepsilon + \frac{\lambda}{1-\lambda}\right) G - \left(\varepsilon + \frac{1}{1-\lambda}\right) D\right] \frac{dy}{\sigma} \\ &+ \int_{\frac{G+D}{\overline{\tau}}}^{\overline{y}} \left[\beta y - \beta D - \beta G + G\right] \frac{dy}{\sigma} + \beta\left[y_1 + D\right] + (1-\beta) G - k\frac{G^2}{2}, \end{aligned} \tag{A.9}$$

where

$$a_2 = \beta\left(1 - \overline{\tau}\right) + \overline{\tau}\left(\varepsilon + \frac{1}{1-\lambda}\right).$$

Differentiating the RHS of (A.9) and using the expression in (A.1) leads to

$$\begin{aligned} \frac{dV_L}{dG} &= A\left(-\varepsilon - \varepsilon\frac{dD^*}{dG}\right) + B\left[-\left(\varepsilon + \frac{\lambda}{1-\lambda}\right) - \left(\varepsilon + \frac{1}{1-\lambda}\right)\frac{dD^*}{dG}\right] \\ &+ C\left(1 - \beta - \beta\frac{dD^*}{dG}\right) + (1-\beta) + \beta\frac{dD^*}{dG} - kG. \end{aligned} \tag{A.10}$$

Now, observe that (A.7) also holds in Region I.[27] Therefore, taking differences, over $G \in [0, G_{\max}]$ we have that

$$\frac{dV_H}{dG} - \frac{dV_L}{dG} = A\left(-\frac{1}{\lambda}\frac{dD^*}{dG}\right) + B\left[\frac{1}{1-\lambda}\left(1 + \frac{dD^*}{dG}\right)\right].$$

In Region I, we have from (A.3) that $dD^*/dG = -\lambda(1-z)/\left(1 - \lambda z\right) \in (-1, 0)$. Clearly, then $\frac{dV_H}{dG} - \frac{dV_L}{dG} > 0$. In Region II, we have that $dD^*/dG = 1$. The condition $\frac{dV_H}{dG} - \frac{dV_L}{dG} > 0$ is then equivalent to

$$\frac{2B}{1-\lambda} > \frac{A}{\lambda}.$$

[27] The envelope theorem implies that in this zone the contribution of all terms in dD/dG sum up to zero.

Substituting the expressions in Table A.2 into the last equation, we obtain that this inequality holds if and only if $G < \bar{\tau}(y_1 + \underline{y})/(1-\lambda)$, which is always true since this expression is greater than $G_{\max}$. This proves single-crossing between the preferences of group H and those of group L.

To prove concavity, we proceed in three steps as follows.

1. In Region I, we use the equilibrium value of D^* and the fact that $dD^*/dG = -\lambda(1-z)/(1-\lambda z)$. Using Table A.2 we see that the RHS of (A.10) is linear in G and we can gather the terms in G. We then get the following expression

$$\frac{1-\lambda}{(1-\lambda z)\sigma\bar{\tau}}\left\{-\varepsilon\frac{\lambda(1-\lambda)z}{1-\lambda z} - \varepsilon(1-\lambda) - \lambda z - (1-\beta\frac{1-\lambda}{1-\lambda z})\right\} - k,$$

which, given that $\beta < 1$ and that $\frac{1-\lambda}{1-\lambda z} < 1$, is clearly negative. Therefore, $\frac{d^2V_L}{dG^2} < 0$ over Region I.

2. In Region II, we replicate the steps and obtain the following expression

$$\frac{1+\lambda}{\sigma\bar{\tau}}(-2\varepsilon) + \frac{1-\lambda}{\sigma\bar{\tau}}(-2\varepsilon - \frac{1+\lambda}{1-\lambda}) - \frac{2}{\sigma\bar{\tau}}(1-2\beta) - k.$$

Recalling that $z = \beta - \varepsilon$ and rearranging terms, this last expression can be rewritten as

$$\frac{4z-(3+\lambda)}{\sigma\bar{\tau}} - k.$$

It is easy to prove that $4z - (3+\lambda) < \frac{z(1-\lambda)^2}{1-\lambda z}$. To see this, note that at $z = 1$, these two expressions would be equal. Then, differentiate the expression $z\left[4 - \frac{(1-\lambda)^2}{1-\lambda z}\right]$ with respect to z and note that its derivative is equal to $4 - \frac{(1-\lambda)^2}{(1-\lambda z)^2} > 3$. Therefore, this expression is increasing with z, implying that $4z-(3+\lambda) < \frac{z(1-\lambda)^2}{1-\lambda z}$ for $z \in (0,1)$. Since, by Assumption 4, $k > \frac{z(1-\lambda)^2}{\sigma\bar{\tau}(1-\lambda z)}$, we have that $\frac{4z-(3+\lambda)}{\sigma\bar{\tau}} - k < 0$.

3. Finally, using (A.10), we obtain that the difference between the right and left derivatives of V_L at $G = G_{\min}$ is equal to

$$\frac{dV_L}{dG}^+ - \frac{dV_L}{dG}^- = \Delta\left[-A\varepsilon - B\left(\varepsilon + \frac{1}{1-\lambda}\right) + \beta(1-C)\right],$$

where $\Delta = \frac{dD^*}{dG}(G_{\min})^+ - \frac{dD^*}{dG}(G_{\min})^- = 1 + \frac{\lambda(1-z)}{1-\lambda z} > 0$. Clearly, $\frac{dV_L}{dG}^+ - \frac{dV_L}{dG}^-$ has the same sign as $(1-C)z - \frac{B}{1-\lambda}$. Using the values in Table A.2, and the fact that $D^*(G_{\min}) = G_{\min} - \bar{\tau}y_1$, that is equal to $\frac{z}{\sigma\bar{\tau}}\left(2G_{\min} - \bar{\tau}\left(\underline{y} + y_1\right)\right) - \frac{G_{\min}}{\sigma\bar{\tau}}$, which, given the expression for $G_{\min}$, can be shown to be always negative.

These three facts, altogether, imply that $V_L(D^*(G), G)$ is globally concave in G. ■

A.2.1.3 Group R (the rich)

Lemma A.9 *$V_R(D^*(G), G)$ is continuous, differentiable everywhere except at $G = G_{\min}$. Furthermore, $\frac{dV_R}{dG} < 0$ for any $G \in [0, G_{\max}] - \{G_{\min}\}$.*

Proof. The utility of the rich is

$$V_R(D,G) = \int_{\underline{y}}^{\frac{G+D}{\overline{\tau}}} [a_3 y - \varepsilon G - \varepsilon D] \frac{dy}{\sigma} + \int_{\frac{G+D}{\overline{\tau}}}^{\overline{y}} \gamma [y - D - G] \frac{dy}{\sigma} + \gamma [y_1 + D - G] - k\frac{G^2}{2}, \tag{A.11}$$

where

$$a_3 = [\gamma(1-\overline{\tau}) + \varepsilon\overline{\tau}].$$

Differentiating $V_R(D,G)$ in (A.11) with respect to G gives us the following expression

$$\frac{dV_R}{dG} = -(A+B)\varepsilon\left(1 + \frac{dD^*}{dG}\right) - C\gamma\left(1+\frac{dD^*}{dG}\right) - kG + \gamma\left(\frac{dD^*}{dG} - 1\right). \tag{A.12}$$

Since $-1 < \frac{dD^*}{dG} \leq 1$ in both regions, it is immediate that $\frac{dV_R}{dG} < 0$.

QED ■

Altogether, Lemmas A.7, A.8 and A.9 deliver claim (i) in Proposition 2. The remaining part of the proof of Proposition 2 is straightforward and explained in the Text.

QED ■

A.3 Proof of Proposition 3

We know that V_H is C^1 and concave in G. Let $V'_{H1}(G)$ denote the RHS of (A.6) and $G^*_{H1} = V'^{-1}_{H1}(0)$. Clearly, the optimal G for group H is equal to G^*_{H1} if and only if $G^*_{H1} \leq G_{\min}$.

Assume that this is the case. Then, from (A.6),

$$G^*_H = G^*_{H1} = \frac{2(1-\beta)(1-z\lambda)\sigma\overline{\tau}}{(1-\lambda z)\sigma\overline{\tau}k - z(1-\lambda)^2}, \tag{A.13}$$

and therefore

$$G^*_{H1} \leq G_{\min} \Longleftrightarrow k \geq \hat{k} = \frac{2(1-\beta)(1+\lambda-2\lambda z)}{\overline{\tau}(1-\lambda z)(y_1+\underline{y})} + \frac{z(1-\lambda)^2}{\sigma\overline{\tau}(1-\lambda z)}. \tag{A.14}$$

This proves claim (1).

It is then straightforward from (A.13) that $\frac{\partial G^*_H}{\partial \overline{\tau}} < 0$, $\frac{\partial G^*_H}{\partial \sigma} < 0$, $\frac{\partial G^*_H}{\partial \lambda} < 0$, $\frac{\partial G^*_H}{\partial z} > 0$, implying that $\frac{\partial G^*_H}{\partial \varepsilon} < 0$ since $z = \beta - \varepsilon$.

Now, differentiating the RHS of (A.13) with respect to β, and rearranging terms, we get an expression which is proportional to and has the same sign as

$$-\left(k-\frac{z(1-\lambda)^2}{\sigma\bar{\tau}(1-\lambda z)}\right)+(1-\beta)\frac{(1-\lambda)^2}{\sigma\bar{\tau}(1-\lambda z)^2}. \tag{A.15}$$

We now prove that the expression in (A.15) is negative. To see this, compute the following:

$$\hat{k}-\left[(1-\beta)\frac{(1-\lambda)^2}{\sigma\bar{\tau}(1-\lambda z)^2}+\frac{z(1-\lambda)^2}{\sigma\bar{\tau}(1-\lambda z)}\right]=\frac{1-\beta}{\bar{\tau}(1-\lambda z)}\left(\frac{2\,(1+\lambda-2\lambda z)}{y_1+\underline{y}}-\frac{(1-\lambda)^2}{\sigma}\right). \tag{A.16}$$

Now note that (i) $y_1+\underline{y}<\sigma$ by Assumption 3, and (ii) $2\,(1+\lambda-2\lambda z)>(1-\lambda)^2$. Consequently, the RHS of (A.16) is positive, implying from (A.14) that the expression in (A.15) is negative. Therefore, $\frac{\partial G_H^*}{\partial\beta}<0$.

Since $B=\frac{(1-\lambda)G}{\sigma\bar{\tau}}$, it follows that $\frac{\partial B}{\partial\bar{\tau}}<0$, $\frac{\partial B}{\partial\sigma}<0$, $\frac{\partial B}{\partial\lambda}<0$, $\frac{\partial B}{\partial\varepsilon}<0$, and $\frac{\partial B}{\partial\beta}<0$.

From Table A.2 and (A.3), we get that $A=\frac{z\lambda(1-\lambda)G}{\sigma\bar{\tau}(1-\lambda z)}$. Therefore, $\frac{\partial A}{\partial\bar{\tau}}<0$, and $\frac{\partial A}{\partial\sigma}<0$.

Now note that the probability of a crisis is $P=1-C=A+B=\frac{(1-\lambda)G}{\sigma\bar{\tau}(1-\lambda z)}$, which clearly is decreasing in β and λ.

The effect of inequality represented by an increase in β on total government commitment $G+D$ can be proved as follows. From (A.13) and (A.3) we get that

$$\begin{aligned}D+G&=\bar{\tau}\underline{y}+\frac{1-\lambda}{1-\lambda z}G\\&=\bar{\tau}\underline{y}+\frac{2\,(1-\beta)\,(1-\lambda)\,\sigma\bar{\tau}}{(1-\lambda z)\,\sigma\bar{\tau}k-z\,(1-\lambda)^2}.\end{aligned}$$

Recalling that $z=\beta-\varepsilon$, from the last expression we obtain that the derivative of $D+G$ with respect to β has the same sign as

$$\begin{aligned}E&=-\left[(1-\lambda z)\,\sigma\bar{\tau}k-z\,(1-\lambda)^2\right]+(1-\beta)\left[\lambda\sigma\bar{\tau}k+(1-\lambda)^2\right]\\&=(1-\varepsilon)\,(1-\lambda)^2-(1-\lambda(1-\varepsilon))\sigma\bar{\tau}k.\end{aligned}$$

This expression is decreasing in k. To prove that it is negative, we just have to compute it at $k=\hat{k}$, since $k\geq\hat{k}$ by assumption. Substituting the expression for $\hat{k}$ from (A.14) we see that $E<0$ at $k=\hat{k}$ if and only if

$$\frac{2\sigma(1-\beta)\,(1+\lambda-2\lambda z)}{(1-\lambda z)(y_1+\underline{y})}+\frac{z(1-\lambda)^2}{(1-\lambda z)}>\frac{(1-\varepsilon)\,(1-\lambda)^2}{1-\lambda(1-\varepsilon)},$$

or equivalently

$$\frac{2\sigma(1-\beta)\,(1+\lambda-2\lambda z)}{(1-\lambda z)(y_1+\underline{y})}>\frac{(1-\beta)\,(1-\lambda)^2}{(1-\lambda(1-\varepsilon))\,(1-\lambda z)}.$$

Since $\sigma > y_1 + \underline{y}$ by Assumption 3 and $1 - \lambda < 1 - \lambda(1 - \varepsilon)$, a sufficient condition for this to hold is that

$$2(1 + \lambda - 2\lambda z) \geq 1 - \lambda,$$

which is always verified since $z < 1$ and $\lambda < 1$. Thus, the equilibrium value of $D + G$ falls with β.

Altogether, this proves claim (2).

QED ■

A.4 Proof of Proposition 4

From (A.4) and the expressions in Table A.2, we get that

$$\frac{\partial V_H}{\partial \overline{\tau}} = \left(\frac{1}{\lambda} - \beta\right) \frac{1}{2\sigma} \left[\left(\frac{\lambda G + D}{\overline{\tau}}\right)^2 - \underline{y}^2\right] - \frac{z}{2\sigma} \left[\left(\frac{G + D}{\overline{\tau}}\right)^2 - \left(\frac{\lambda G + D}{\overline{\tau}}\right)^2\right]. \quad \text{(A.17)}$$

In the regime we consider, (A.3) holds, so that substituting it into the preceding expression leads to

$$\begin{aligned} \frac{\partial V_H}{\partial \overline{\tau}} \quad \propto \quad E &\equiv \frac{1 - \lambda\beta}{1 - \lambda z} \left[2\underline{y} + \frac{1}{\overline{\tau}} \frac{\lambda(1 - \lambda)z}{1 - \lambda z} G\right] - \left[2\underline{y} + \frac{1}{\overline{\tau}} \frac{(1 - \lambda)(1 + \lambda z)}{1 - \lambda z} G\right] \\ &= -2\underline{y} \frac{\lambda\varepsilon}{1 - \lambda z} + \frac{(1 - \lambda)}{\overline{\tau}(1 - \lambda z)} \left[\frac{(1 - \lambda\beta)\lambda z}{1 - \lambda z} - (1 + \lambda z)\right] G < 0, \end{aligned}$$

since the last term in squared brackets is negative. Furthermore, as in this regime both G and D are set optimally by group H, by the envelope theorem we have that

$$\frac{dV_H}{d\overline{\tau}} = \frac{\partial V_H}{\partial \overline{\tau}} < 0.$$

QED ■

A.5 Proof of Proposition 5

The proof follows as long as the debt ceiling delivers a perturbation of the initial equilibrium $G = G_L^* + \Delta G$, $D = D^* + \Delta D$, such that $\Delta G > 0$ and $\Delta D / \Delta G < D'(G) = -\frac{\lambda(1-z)}{1-\lambda z}$. First, observe that as long as $\omega > \frac{\lambda(1-z)}{1-\lambda z}$, the debt ceiling will be binding in Region I if and only if $G > G_L^*$. In this zone group H will choose $D = D_{\max}(G)$. Second, as long as ω is close enough to $\frac{\lambda(1-z)}{1-\lambda z}$, the proof of Proposition 2 can be replicated, implying that there exists a voting equilibrium over G whose outcome maximizes the preferences of the poor of group L. Third, note that in our regime where D is constrained by $D_{\max}$,

$$\frac{dV_L}{dG}(G_L^*, D^*(G_L^*))^+ = \frac{\partial V_L}{\partial G} - \omega \frac{\partial V_L}{\partial D} = -\frac{\partial V_L}{\partial D} \left(\omega - \frac{\lambda(1 - z)}{1 - \lambda z}\right) > 0, \quad \text{(A.18)}$$

where the derivatives are computed at $(G_L^*, D^*(G_L^*))$ and Equation (9) in the Text was used. It follows that for ω greater than $\frac{\lambda(1-z)}{1-\lambda z}$ but arbitrarily close to it, G is greater than G^* but arbitrarily close to it. Furthermore, as the debt ceiling is binding, $D - D^* = \Delta D = -\omega(G - G_L^*) = -\omega\Delta G < D'(G)\Delta G$. Since $\Delta G > 0$ and $\Delta D/\Delta G < D'(G)$, the welfare of the poor of both groups increases.[28]

[28] A closed form expression for G_L^* and a lower bound on k such that $G_L^* < G_{\min}$ is available from the authors upon request.