Emotions and Political Unrest*

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Abstract

This paper formulates a theory of how political unrest influences public policy. Political unrest is motivated by emotions. Individuals engage in protests if they are aggrieved and feel that they have been treated unfairly. This reaction is predictable because individuals have a consistent view of what is fair. This framework yields novel insights about the sources of political influence of different groups in society. Even if the government is benevolent and all groups have access to the same technology for political participation, equilibrium policy can be distorted. Individuals form their view of what is fair taking into account the current state of the world. If the government is more constrained, individuals accept a lower level of welfare. This resignation effect in turn induces a benevolent government to procrastinate unpleasant policy choices. These theoretical implications are consistent with aggregate evidence on the determinants of political unrest.

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1 Introduction

In September 2012, the government of Portugal introduced an ambitious plan to shift a fraction of social security contributions from employers to employees, in an attempt to restore competitiveness of the Portuguese economy. In the subsequent days hundreds of thousands of workers took to the streets, and the government withdrew the proposal. A few months earlier, the Italian government had attempted to liberalize taxi licences. There too the proposed legislation was soon withdrawn, to interrupt protests by angry taxi drivers who were blocking traffic in Rome and other Italian cities. These anecdotes suggest that the threat of political unrest is often a major force shaping public policy even in advanced democracies. Yet, this channel of political influence is often neglected by the literature. Despite a few exceptions, much of the extensive work in political economics has focused on voting and lobbying, neglecting that protests and riots are often equally relevant forms of political participation in democracies. One of the goals of this paper is to fill this gap, formulating a general theory of how political unrest influences public policy.[1]

Ever since Olson (1965), any theory of group-based political participation has to explain how groups overcome the collective action problem. This problem is particularly acute with regard to costly forms of political participation, such as riots and violent protests, where the individual incentive to free ride on other group members is very strong. A second goal of this paper is to address the collective action problem. The mechanisms highlighted in this paper can be a stepping stone to address other issues, besides the formation of public policy. In particular, they can provide the foundations to explain how groups can be mobilized in non-democratic societies or during a civil war, and more generally to explain what motivates rational individuals to take costly political actions, including voting.

Our starting point is the idea that political unrest is largely motivated by emotions. Individuals participate in costly political protests because they are aggrieved and feel that they have been treated unfairly. Other than in this emotional reaction, however, individuals are assumed to be rational.

[1] The literature on democratic transitions asks how the threat of violence influences the evolution of political institutions (e.g. Acemoglu and Robinson (2006a), Persson and Tabellini (2009)), without however paying much attention to the mechanisms that trigger this form of political participation. Lohman (1993) and Battaglini and Bénabou (2003) study costly political activism as signals of policy preferences.

Individuals behave rationally in two respects. First, they choose whether to participate in collective actions weighting the pros and cons. Participation in a group protest provides a psychological reward to the individual, which is commensurate to the feeling of aggrievement, and which is traded off against other considerations. The net benefit of participation depends on how many other individuals also participate. Hence, a complementarity is at work: if expected participation is very large, then more individuals are attracted into the protest for the same level of aggrievement. This complementarity amplifies the mass reaction to controversial policy decisions, and yields additional implications.

Second, individuals have a structured and rational view of what they are entitled to. A policy entitlement is a policy outcome that individuals expect on the ground of fairness. If the government violates these expectations of fair behavior, then individuals are aggrieved and react emotionally. The emotional reaction, however, is predictable, because individual feelings of aggrievement are not arbitrary or indeterminate, but follow from a consistent and logical view of policy entitlements. In particular, policy entitlements are endogenously determined in equilibrium, and change with the external situation.

Finally, we assume that there is a self-serving bias in moral judgments. Fairness is determined behind a veil of ignorance, as in Harsanyi (1953) or Rawls (1971). But the veil is not thick enough to hide one's individual situation. Thus, policy entitlements are systematically tainted by material interests, as individuals at least partly conflate what is fair with what is convenient for them. This in turn implies that there is political conflict, as members of different economic or social groups have conflicting and mutually incompatible views of policy entitlements.

In order to focus on how political unrest influences policy decision, we assume that no other political distortion is at work. Hence, policy is set by a benevolent government who strives to find an optimal compromise between possibly incompatible views of what is a fair policy, with the goal of reaching economic efficiency but also mitigating political unrest.

This general framework yields several novel implications. First, even if the government is benevolent and all groups in society have identical access to the same technology for political participation, equilibrium policy can be distorted. This contrasts with standard models of probabilistic voting and lobbying, where equilibrium policy is undistorted if all groups in society are equally represented in politics (cf.

Persson and Tabellini, 2000). The reason for this difference is a richer model of political participation, where the participation of each group is endogenous and reacts systematically to policy choices.

Second, the framework also uncovers additional sources of political influence. The more influential groups are those that can mobilize more easily. This in turn depends on homogeneity within the group, on the strength of feelings of policy entitlements, on the extent of self-serving bias of group members, and on other organizational features of the group. Of course, groups that can inflict more disruption through their protests are also more influential (e.g. workers in public transport). Some of these group features are reminiscent of concepts such as group identity and ideology emphasized by a large sociological literature on social movements.[2]

Third, in a dynamic setting the theory has important additional implications. Under the requirement of sequential rationality, individuals form their policy entitlements taking into account the current state of the world. If fewer policy options are available, then rational individuals are forced to scale back their policy entitlements. In other words, individuals become more resigned, and accept a reduction in welfare that, in other circumstances, would have caused aggrievement and political unrest. Whenever this resignation effect is operative, it creates an incentive for a benevolent government to procrastinate unpleasant policy choices. The reason is that procrastination forces individuals to become less demanding, and through this channel it mitigates social conflict. Thus, in a dynamic environment the threat of political unrest also induces an intertemporal distortion in economic policy. This distortion is more pronounced if the relevant groups are more prone to social unrest, or if ideological conflict is more intense. This result is consistent with empirical findings that, in a large sample of countries, debt accumulation is positively correlated with social and political instability (Woo, 2003).[3]

This paper is related to a large and extensive literature in several areas of social sciences. Our model of individual participation in riots extends the framework pio-

[2]See Jasper (1997), Gould (2004) and the survey by Koopmans (2007). When people identify with their group, they are more likely to develop a subjective sense of injustice and group-based emotions (e.g. anger or resentment (Smith and Ortiz, 2002). Group identification is then a strong predictor of collective action (Ellemers, 2002).

[3]Alesina and Drazen (1991) show that equilibrium policy procrastination can result from a war of attrition between opposing groups who have veto power over public policy; inefficient delay is caused by asymetric information. Here instead there is no asymmetry of information and a single policymaker is in charge of all policy decisions.

neered by Granovetter (1978), who however stopped short of modeling riots as Nash equilibria. Diermeier (2012) takes a similar approach, but also does not study equilibrium behavior, focusing instead on a dynamic framework where citizens' participation in a boycott follows a behavioral rule.

The role of emotions in explaining economic behavior is at the heart of several papers.[4] Koszegi (2006) studies the role of emotions in agency theory, focusing on an agent who has to send information to an emotional principal. Grillo (2012) extends this approach to a political setting where the government is the agent who sends information to his principals (the voters). In our framework there is no asymmetric information and, unlike in these other papers, emotions are linked to political conflicts between citizens.

The specific idea that aggrievement is caused by unfair treatment, and that individuals take costly actions to manifest their aggrievement or to take "revenge", is present in a number of recent economic studies. Hart and Moore (2008) point to the role of contracts as reference points that reduce costly misunderstanding within organizations, and Fehr et al. (2011a, 2011b) find experimental evidence supporting this idea. Rotemberg (2009) studies a model in which fairness as perceived by consumers acts as a constraint on pricing decisions by profit maximizing firms. A large empirical literature in psychology suggests that one major instigator of anger and violence is perceived unfairness.[5] In social psychology, the relative-deprivation theory (Gurr, 1970) and the constructionist approach (Gould, 2004; Jasper, 1997) explain social movements as emotional phenomena.

The idea that people engage in riots to punish behavior which violates expectations ties this paper to the recent literature on psychological games (cf. Geanakoplos et al., 1989; Battigalli and Dufwenberg, 2009). Battigalli et al. (2013) propose a general game theoretic framework in which anger is a function of the material payoff that a player expects at the start of the game. Using a power-to-take game, Bosman et al. (2000) find experimental evidence that individuals are willing to give up their material payoffs in order to harm players who violate their sense of fairness.

In our model an individual has expectations about what a fair policy is, and about what an agent's utility should be in every state of the world. In this respect, the fair policy is like a reference point to assess the actual policy of the government. An

[4] Cf. Elster (1998) for a survey and extensive references.

[5] See Berkowitz and Harmon-Jones (2004) for a survey and additional references.

individual in a given state feels entitled to the reference (i.e. fair) utility in that state. Since the state is random, also the reference point is random. This idea that an individual compares the outcomes of the government policy with the outcome of the reference point in the same state of the world ties our model to regret theory (Loomes and Sugden, 1982; Sugden, 2003) and, in general, to the recent literature on endogenous and stochastic reference points (Shalev, 2000; Koszegi and Rabin, 2006). The precise definition of the reference point differs from that in the literature, however, because here it has a normative interpretation related to fairness.

Several papers have stressed the existence and implications of self-serving bias in moral judgments, and more generally in the formation of expectations of fair behavior (Babcock et al., 1995; Rabin, 1995; Bénabou and Tirole, 2009). In our model, self-serving bias affects all individuals of the same group. This kind of common distortion that affects group members is a robust phenomenon in psychology. Early empirical studies are Hastorf and Cantril (1954), and Messick and Sentis (1979).

Our paper is also closely related to the rapidly growing literature on how endogenous values or beliefs shape the strategic behavior of agents in a variety of economic and political circumstances (Alesina and Angeletos, 2005; Bénabou and Tirole, 2006, 2009; Brunnermeier and Parker, 2005; Tabellini, 2008). The details and specific implications of those models are however quite different from those emphasized in this paper.

The outline of the paper is as follows. Section 2 summarizes some stylized facts and presents some novel evidence concerning political unrest in a large sample of countries. Section 3 lays out a general framework that illustrates the mechanisms at work. Section 4 presents a specific dynamic example of how the threat of political unrest shapes a policy of social insurance and redistribution, and can induce policy procrastination; this section also presents some evidence consistent with these general implications. Section 5 concludes. The appendix contains the omitted proofs of propositions and lemmas. Computations for comparative statics, and second order conditions can be found in the Supplementary Material available online.

2 Some Evidence

Banks (2012) collects data on political events including episodes of unrest for a large sample of countries over a century, based on news archives. Figure 1 illustrates the pattern in the data during the postwar period, for OECD and non-OECD countries. Political unrest is defined as the sum of riots, general strikes and anti-government demonstrations (see the Data Appendix for a precise definition), that is as lawful or unlawful collective action aimed against the national political authority and not entailing any military violence. This definition excludes episodes of individual violence, such as terrorism, political assassination and civil wars, as well as protests not aimed against national political authority (e.g. firms, or local governments). The solid and thicker line depicts the average yearly number of events in an OECD country, while the thinner line refers to about 170 Non-OECD countries.

Figure 1 here

Political unrest is not very frequent: during the postwar period there are on average about two episodes per year in an OECD country, even less in the typical non-OECD country (several of the non-OECD countries are non-democracies who repress domestic political unrest). Political unrest increased in the OECD during the 1960s, and everywhere in 2011. This latest surge is concentrated in Southern Europe and Northern Africa, reflecting the Euro crisis and the Arab Spring.

Ponticelli and Voth (2011) and Voth (2011) study these data going back to the prewar period, with a special focus on Europe and Latin America. They show that political unrest increases systematically during recessions and fiscal retrenchments. Similar results are obtained using the more detailed database constructed by Francisco (2006) for 28 European countries in 1980-1995. Francisco also records the issue that triggered each unrest episode, showing that unrest associated with fiscal retrenchments draws many more people in the streets compared to other political causes.[6]

These correlations suggest that the threat of political unrest can be an important source of political influence; in particular, they can shed light on a puzzle emphasized by Alesina et al. (2012). Fiscal retrenchments are widely regarded as politically very difficult. Yet, there is little evidence that voters punish fiscally responsible governments at the elections. Alesina et al. consider a sample of 19 OECD countries from 1975 to 2008, and show that governments that achieve large reductions in the

[6] The average protest associated with spending cuts in the database by Francisco (2006) sees the participation of almost 200,000 individuals, against an average of almost 6,000 participants for the environment, 20,000 for peace, and 50,000 for education (cf. Ponticelli and Voth, 2011).

budget deficit are not punished at the subsequent elections.[7] But then, why do budgetary consolidations seem so difficult? A plausible conjecture is that governments struggle to overcome the opposition of vocal and politically active minorities. In other words, political unrest, rather than majority voting or lobbying behind closed doors, is the form of political participation that discourages fiscal retrenchments.

To explore this conjecture, we ask whether the same episodes of fiscal retrenchments that were shown by Alesina et al. to be uncorrelated with electoral outcomes can instead explain political unrest. Table 1 uses the same data and sample as Alesina et al., except that here the dependent variable is political unrest (as defined in Figure 1). The specification includes the same macroeconomic and policy variables appearing in the core regressions of Alesina et al. (except for features of the government and of the electoral system that here are left out). The main variable of interest is the change in cyclically adjusted primary deficit (in % of GDP). The other regressors are inflation, GDP growth and the growth in unemployment, in the country and also expressed as deviations from the average in the G7 countries (to isolate domestic events from external shocks that also affect the rest of the world). Since political unrest is a count variable, we estimate by Poisson Quasi-Maximum Likelihood methods conditioning on country fixed affects.[8]

Table 1 here

Column 1 reports the most parsimonious specification. Column 2 adds national macroeconomic variables in deviation from the G7 average. Column 3 adds year fixed effects. The estimated coefficient on the change in primary deficit is always statistically significant and with a negative sign, meaning that a deficit reduction increases political unrest. The estimated coefficient of -0.2 means that a fiscal adjustment of 1% of GDP is associated with an increase in political unrest of about 20%, a very large effect. Although reverse causation cannot be ruled out, it is likely to imply an attenuation bias in the estimated coefficient: a more unstable political situation (i.e. more unrest) is likely to lead to political inaction and to smaller fiscal adjustments (i.e. to larger primary deficits), rather than vice versa. The data also reveals that

[7] Alesina et al. also consider the possibility of omitted variables (e.g. only strong and popular governments dare to engage in fiscal retrenchements), but conclude that this cannot explain their findings.

[8] Results are robust to linear estimation with country fixed effects and standard errors clustered by countries.

unrest tends to increase during adverse economic conditions (lower GDP growth or higher unemployment growth) and with higher inflation, but these estimates are much less robust and vary across specifications. Overall, these correlations are suggestive that fiscal retrenchments are indeed associated with political unrest, and that the threat of unrest, more than electoral outcomes, is what makes governments reluctant to engage in budgetary consolidations.

Table 2 here

Survey data can shed light on who participates in riots and other protests. The European Social Survey (ESS) and the World Value Survey (WVS) ask whether the respondent has attended public demonstrations recently (the WVS) or over the last year (the ESS).[9] In Table 2 we use this as the qualitative dependent variable, and estimate by probit including country and wave fixed effects (see the Data Appendix for a precise definition of the variables). Demonstrators are more likely to be educated, males, to be in the labor force or students, and to score high on the WVS autonomy index. More importantly, they also tend to be dissatisfied with the government, of a left wing ideology, to feel discriminated against, and to wish more redistribution. Some of these individual features are consistent with the predictions of the theory that follows.

3 The general framework

Consider a static economy consisting of N sectors/groups, indexed by i, of size $1 > \lambda^i > 0$ with $\sum_{i=1}^{N} \lambda^i = 1$. Individuals in group i have the same policy preferences, represented by the indirect utility function $V^i(q, \theta)$, where q is the policy and θ is a state variable.

As described below, each individual unilaterally decides whether or not to participate in political unrest (henceforth riots) with other members of the same group. Denote with p^i the participation rate in riots within group i. In the next subsection we derive the equilibrium participation rate and show that it can be expressed as a function of the policy and of the state variable, $p^i = P^i(q, \theta)$.

[9] In the ESS this question has been asked in 30 countries and 5 waves (2002-2010), in the WVS we only have one wave (the fifth one) and about 40 countries.

Riots cause social harm, and the government trades off the social welfare effects of the policy against the social harm inflicted by riots. Specifically, let

$$W(q,\theta)=\sum_{i=1}^{N}\lambda^{i}V^{i}(q,\theta) \tag{1}$$

be the standard Benthamite social welfare function. We assume that the government sets policy after having observed the state θ, to maximize

$$W(q,\theta)-\sum_{i=1}^{n}\lambda^{i}\varsigma^{i}P^{i}(q,\theta) \tag{2}$$

The second component in (2) reflects the assumption that the loss of government welfare inflicted by riots is proportional to how many people are involved. The parameter $\varsigma^{i}\geq 0$ captures how harmful riots by group i are.

This formulation can be interpreted in several ways. The most straightforward is that the government is benevolent and riots inflict a real loss of social welfare. If taxi drivers block traffic, or aircontrollers land planes, there is a loss of economic welfare for society as a whole. Riots also reduce social welfare through safety concerns, by raising the risk of damage to properties or individuals.[10] More generally, political unrest beyond a critical threshold could entail the risk of degenerating in uncontrollable social chaos which, if prolonged and extended, could undermine the values and social norms that support any well functioning democracy. The probability $P^{i}(.)$ can also be interpreted as the risk that such a critical threshold will be reached. For all these reasons, a benevolent government is bound to internalize and weight the disruptions caused by political unrest.

An alternative interpretation is that the government is opportunistic or politically motivated, and that riots hinder the pursuit of political objectives. The first component of the government objective function, $W(.)$, can be derived from a probabilistic voting model where the incumbent seeks reelection (cf. Persson and Tabellini, 2000).

[10] Collins and Margo (2004, 2007) studied labor and housing markets in US urban areas most involved by the black riots in the sixties. They found that between 1960 and 1980 black-owned property declined in value by about 14% in those areas compared to others. The average growth in median black family income was approximately $8\%-12\%$ lower, and adult males' employment also showed sign of decline. More recently, the L.A. riots in 1992 resulted in 52 deaths, 2.500 injuries and at least $446 million in property damages (cf. DiPasquale and Glaeser, 1998).

In this setting, riots can be costly for the incumbent because they signal the intensity of voters' preferences (Lohmann, 1993) or the incompetence of the incumbent, or because they increase the saliency of issues that otherwise would be neglected by voters (Marcus et al., 2000), or simply because voters react negatively to political unrest.

In this paper we retain the simpler interpretation of a benevolent government who wants to mitigate the social disruptions caused by political unrest, and focus on providing microeconomic foundations to the participation function, $P^i(q, \theta)$. The analysis of why a politically motivated government may want to avoid riots is left for a future extension.[11]

3.1 A simple model of riots

Our formulation in this subsection draws on Granovetter (1978). Individuals unilaterally decide whether to participate in a riot, trading off the cost and benefit of participation. The benefit is purely emotional: it is the psychological reward of joining other group members in a public display of the aggrievement and frustration caused by the policy (cf. Gurr, 1970; Koopmans, 2001; Jasper, 1997; Gould, 2004).

We refer to this psychological benefit, denoted a^i, as the aggrievement caused by the policy to members of group i. The next subsection derives individual aggrievements from an explicit formulation of individual expectations of what constitutes a fair policy.

Joining a riot also entail costs, in terms of time, or risk of being arrested or injured. We model these costs as the sum of two components: $\mu + \varepsilon^{ij}$. The parameter $\mu > 0$ is known and common to all groups and individuals, and reflects external conditions such as the strength of the police or the probability of violent repression. The term ε^{ij} is a random variable that captures idiosyncratic components of the cost or benefit of participation (the suffix j refers to the individual j in group i), and has a distribution $F^i(.)$ within group i. This distribution is common knowledge, is continuous, has density $f^i(.)$, and its support lies on both sides of 0.[12]

[11] As will become apparent below, implicit in our definition of equilibrium with a benevolent government is the view that the government internalizes the welfare effect of the policy (as captured by $W(.)$) and the social disruptions caused by riots, but it does not give extra weight to the psychological costs (or aggrievements) that induce citizens to protest.

[12] E.g. DiPasquale and Glaeser (1998) found that opportunity cost of time and potential cost of punishment had a relevant influence on the incidence of L.A. riots.

Finally, we assume that there is a complementarity: the benefit of participation grows proportionately with the number of other group members also participating in the riot, $p^i\lambda^i$. This assumption seems plausible on several grounds (although it is not strictly necessary for the results that follow). The psychological benefit of a public display of anger is likely to be stronger if more people join (reflecting a strong group identity); alternatively, participation could proxy for the probability that a critical threshold of rioters is reached such that the crowd overwhelms the police (as in Atkeson, 2000). Equivalently, the complementarity could also be on the cost side: the probability of being arrested is smaller in a larger crowd.

Combining these assumptions, individual j in group i chooses to join the crowd in a riot if benefits are larger than costs:

$$p^i\lambda^i a^i - \mu - \varepsilon^{ij} \geq 0$$

or equivalently, if $\varepsilon^{ij} \leq p^i\lambda^i a^i - \mu$. A realization $\varepsilon^{ij} < -\mu$, which occurs with probability $F^i(-\mu)$, means that individual j in group i draws positive utility from engaging in a riot, even if nobody participates (i.e. $p^i = 0$). The fraction of individuals in group i who participate is thus given by:

$$p^i = \Pr(\varepsilon^{ij} \leq p^i\lambda^i a^i - \mu) \equiv F^i(p^i\lambda^i a^i - \mu) \tag{3}$$

The equilibrium participation rate in group i, p^{*i}, is a fixed point of (3).

To ensure existence of the equilibrium, we must assume that there is a positive mass of individuals who are willing to engage in riots even if they expect to be alone, and a positive mass who never participates even if they expect the whole group to join the riot:

$$F^i(-\mu) > 0 \qquad\qquad F^i(\lambda^i a^i - \mu) < 1 \tag{A1}$$

The first group of individuals corresponds to what Granovetter (1978) calls the "initiators" of the riot, namely group loyalists who set in motion the protest and engage in drawing other members to participate. The second group consists of passive members who would never engage in riots.

In general, given the complementarity, multiple equilibria are possible. To rule out multiplicity, we assume that there is enough heterogeneity within the group, at least in a neighborhood of the equilibrium participation rate p^{*i}. Specifically, we assume:

$$\lambda^i a^i \cdot f^i(p^{*i}\lambda^i a^i - \mu) < 1 \tag{A2}$$

We then have:

Lemma 1 *Suppose that (A1) holds. Then an equilibrium participation rate,* $0 < p^{*i} < 1$, *exists. The equilibrium is unique if (A2) also holds.*

Proof. The inequalities in (A1) ensure that the fixed-point(s) are not on the boundaries; i.e. $p^{*i} > 0$ and $p^{*i} < 1$, respectively. In addition, thanks to continuity of F^i, equation (3) has at least one solution in $(0, 1)$. This is a direct application of the Brouwer's fixed-point theorem. (A2) requires that $F^i(.)$ crosses the p^i line from above in all solutions. Since $F^i(.)$ is continuous, it follows that the solution must be unique.[13] ■

Figure 2 illustrates the equilibrium and the role of assumptions (A1) and (A2). The distribution $F^i(.)$ depicts the share of individuals who participate in riots for different values of the expected participation rate. Under (A1), $F^i(.)$ intersects the 45° line at least once. Under (A2), any intersection occurs from above and hence it must be unique. The equilibrium behavior of the crowd results from the interplay of two contrasting forces. On the one hand, the complementarity in the net benefit of participation makes individuals' choice dependent on what the others do, raising the possibility of multiple equilibria. On the other hand, a large enough heterogeneity in participation cost yields a unique equilibrium.[14]

Figure 2 here

By Lemma 1 and by (3), we can express equilibrium participation as a function $p^{*i} = H^i(a^i)$ of group aggrievement (the other parameters are subsumed under the $H^i(.)$ function). Differentiating equation (3) yields:

$$\frac{\partial p^{*i}}{\partial a^i} \equiv H_a^i = \frac{\lambda^i p^{*i} f^i(.)}{1 - a^i \lambda^i f^i(.)} > 0 \tag{4}$$

[13] The appendix proves that (A1-A2) plus continuity are also necessary conditions. Besides being a Nash equilibrium, p^{*i} is also an attractive fixed-point. It can also be shown that p^{*i} represents a rationalizable equilibrium of the coordination game.

[14] The fact that uniqueness of equilibrium derives from group heterogeneity ties this model to other models of mass behavior and strategic complementarity. For a survey and an equivalence approach to different classes of games with strategic complementarities see Morris and Shin (2003).

Thus, participation is more sensitive to aggrievement if:

- p^{*i} and λ^i are large: if an agent knows that more people are involved, he/she draws a stronger net benefit from participation. This is how complementarity leads to amplification. Note that this also implies that the aggrievement of large groups is more easily transformed into riots. This prediction contradicts Olson (1965), who suggests that smaller groups find it easier to overcome the collective action problem because they can more easily monitor compliance. The evidence suggests that indeed riots tend to occur in large groups (Ponticelli and Voth, 2011; Koopmans, 1993).

- $f^i(.)$ is large: when aggrievement increases, more people are sucked into participation at the margin if the density $f^i(.)$ is high. In other words, as group heterogeneity decreases, the amplifying effect of complementarity becomes stronger and participation becomes more sensitive to aggrievement.

- a^i is high: participation reacts to aggrievement at an increasing rate; this too reflects the complementarity and the interaction between p and a.

Thus, the equilibrium relationship between participation and aggrievement is highly non-linear. When a^i is close to some critical values, small changes in aggrievement may cause explosive reactions by the crowd. When this happens the threat of riots becomes a relevant concern for policy choices.

3.2 Entitlements and aggrievement

This subsection derives the aggrievements a^i from individual expectations of what constitutes a fair policy. Each group member expects to be entitled to a fair level of welfare, that corresponds to a fair policy. Individuals feel aggrieved if their actual welfare falls short of their expected entitlements.

These entitlements are not arbitrary: they are derived from a rational and internally consistent view of the world, although they are tainted by a self-serving bias that reflects the group material interests. In other words, and in line with a large literature in social psychology, individuals develop a subjective sense of justice which is eventually strengthened by psychological feelings of group identity.[15]

Specifically, let $\hat{q}^i = Q^i(\theta)$ be the policy that is deemed fair by group i in state

[15] A well established literature points out that individuals tend to perceive the intergroup differentials as illegitimate and unstable (cf. Tilly, 1978; van Zomeren et al., 2008). In these cases identification with the group is more likely. Social identity is a strong force to mobilize people (Tajfel, 1978; Ellemers, 2002).

θ (henceforth the entitled policy). We assume that $\hat{q}^i$ is derived from a modified social welfare optimization, where group i is over-represented relative to the social optimum. In other words, each individual thinks that his/her position in society is more typical than it actually is. Thus, "fair" policies are computed behind a distorted veil of ignorance. Specifically:

$$\hat{q}^i \in \arg\max_q W^i(q, \theta) \tag{5}$$

where $W^i(q, \theta)$ is defined as $W(.)$ in (1), except that group i receives weight $\lambda^i(1+\delta^i)$ and all groups $\kappa \neq i$ receive weight $\lambda^k(1-\delta^i)$, where $\delta^i \in (0, 1)$ is a parameter capturing the self-serving bias of group i, or possibly other ideological dispositions which lead people to think that their vision of the world is the right one. This fair policy implies an entitled utility, $\hat{V}^i(\theta) = V^i(\hat{q}^i, \theta)$, namely an expected level of welfare for group i that is deemed fair by members of that group.

Individuals feel aggrieved if and only if their actual welfare is below $\hat{V}^i(\theta)$, and aggrievement increases in their sense of deprivation. Specifically, we assume that:

$$a^i = \begin{cases} 0 & \text{if } \hat{V}^i(\theta) \leq V^i(q, \theta) \\ \frac{\omega^i}{2}[\hat{V}^i(\theta) - V^i(q, \theta)]^2 & \text{if } \hat{V}^i(\theta) > V^i(q, \theta) \end{cases} \equiv A^i(q, \theta) \tag{6}$$

where $\omega^i > 0$.

Note that, if at least one group in society is distorted by self-serving bias (if $\delta^i > 0$ for some i), then entitlements need not be mutually consistent within society. If so, some political or ideological conflict is inevitable, and the threat of political unrest represents a relevant constraint on a benevolent government.

Combining these steps with the results of the previous subsection, we obtain an expression for the equilibrium participation rate in riots, as a function of government policy q and of the state θ, namely:

$$p^{*i} = H^i[A^i(q, \theta)]] \equiv P^i(q, \theta) \tag{7}$$

Thus, government policy affects riot incidence and participation through its effects on aggrievement. Specifically,

$$P^i_q = -H^i_a A^i_q \tag{8}$$

Suppose individuals in group i are aggrieved (i.e. $\hat{V}^i(\theta) > V^i(q,\theta)$). As the policy becomes more favorable to that group (i.e. if $V_q^i > 0$), their aggrievement is reduced (since $A_q^i = \omega^i[\hat{V}^i(\theta) - V^i(q,\theta)]V_q^i > 0$). This in turn entails lower riot incidence (since $H_a^i > 0$ by (4)). Therefore, $P_q^i < 0$ if the policy becomes more favorable to an aggrieved group. The responsiveness of riot participation to the policy is determined by the size of all these effects. Thus, responsiveness is higher if the group is more aggrieved, and if participation is more sensitive to aggrievement (if H_a^i is larger). In particular, larger and more homogenous groups are more responsive to policy, because the amplifying effects of complementarity in riot participation are more pronounced in such groups.

3.3 Equilibrium

We are now ready to define and characterize the full equilibrium.

An equilibrium of this economy consists of a vector of fair policies, $\{\hat{q}^i\}$, and corresponding entitled utilities, $\left\{\hat{V}^i(\theta)\right\}$, a vector of participation rates, $\{p^{*i}\}$, and a policy q^*, such that, in each state θ:

i) Fair policies maximize the modified social welfare functions of each group, (5).

ii) Within each group i, all members optimally choose whether to participate in the riot, given the equilibrium policy q^*, the group's entitled utility $\hat{V}^i(\theta)$, and the equilibrium participation of other group members, p^{*i}.

iii) Government policy maximizes the overall social welfare function (2), taking as given the groups' entitled utilities $\left\{\hat{V}^i(\theta)\right\}$, and taking into account how the policy affects equilibrium participation through (7).

Building on the previous subsections, we can easily characterize the equilibrium policy. Maximization of (2) yields the first order condition:

$$W_q(q^*,\theta) = \sum_i \lambda^i \varsigma^i P_q^i(q^*,\theta) \tag{9}$$

Thus, a benevolent government trades off the direct welfare effects of the policy as captured by W_q, against the possible disruptions caused by riots. By (1) and (8), the optimality condition can be rewritten as:

$$\sum_i \lambda^i [1 + \varsigma^i H_a^i \Phi^i] V_q^i(q^*, \theta) = 0 \tag{10}$$

where $\Phi^i = \omega^i[\hat{V}^i(\theta) - V^i(q, \theta)]$ if group i is aggrieved, and $\Phi^i = 0$ otherwise. Equation (10) provides a full characterization of the equilibrium policy.

We summarize the results so far in the following:

Proposition 1 *The equilibrium policy solves a modified social planner problem, where each group i receives the extra weight $\varsigma^i H_a^i \Phi^i$.*

This equilibrium can be contrasted with other related models where political participation occurs through lobbying or voting, rather than through protests. In these settings too, the equilibrium solves a modified social planner's problem, where group weights reflect political influence of the groups. But here the implications and the drivers of group influence are quite different.

Let $q^0 = \arg\max_q W(q, \theta)$ be the economically efficient policy that would be chosen by a benevolent social planner in the absence of any political constraints. Clearly, if the weights $\varsigma^i H_a^i \Phi^i$ were the same for all groups at the point q^0, then the equilibrium policy would also be economically efficient, i.e. $q^* = q^0$. In this case, the threat of riots would induce no policy distortions. Political unrest would still take place, and this would entail some loss of welfare. But the government would choose the economically efficient policy. If instead the weights $\varsigma^i H_a^i \Phi^i$ evaluated at the efficient policy q^0 differ across groups, then the threat of political unrest also induces policy distortions, and $q^* \neq q^0$. These distortions only reflect the desire to mitigate the social disruptions caused by political unrest, and not other opportunistic motivations by the government.

Clearly only aggrieved groups receive extra weight and exert some policy influence. This can be seen by noting that $\Phi^i = 0$ if the equilibrium policy is deemed fair by that group and the group is not aggrieved.

This result has an important implication. Contrary to existing models of probabilistic voting or lobbying, the equilibrium policy can be distorted away from the economically efficient policy (i.e. $q^* \neq q^0$), even if all groups have access to the same participation technology. Specifically, suppose that all groups have the same parameters or functions describing the social process, namely ς^i, $F^i(.)$, δ^i, ω^i defined above are identical for all groups. Suppose however that, for some group k, the indirect utility function V^k is maximized at the efficient policy q^0. Here group k would receive no extra weight at the efficient policy, because it does not engage in riots. But then, at the margin the government finds it optimal to deviate from the efficient policy, in order to mitigate the riots of other groups. Hence the efficient policy q^0 cannot be an equilibrium. The next section provides a concrete example of this situation, but several others could be constructed. This does not happen under probabilistic voting or lobbying, because there the extra weight received by each group is not affected by whether the group is at its policy bliss point or not.

More generally, the most influential groups are those that receive larger weights. Thus, political influence reflects the following group features:

- A greater ability to inflict social cost (large ς^i). Groups whose riots have more destructive effects on society receive more favorable treatment by a benevolent government.

- A greater ability to mobilize their members in collective action (high H^i_a). As shown by (4), participation is more responsive to aggrievement in larger and more homogenous groups (high λ^i and low $f^i(.)$).

- A stronger sense of entitlements (high ω^i and δ^i). Riot participation is more sensitive to policy if the group is more aggrieved. This happens for two reasons. First, more aggrieved groups are easier to mobilize (by (4), H^i_a is higher if aggrievement is more intense). Second, more aggrieved groups are also more responsive to favorable policy changes (because Φ^i is increasing in the gap between entitled and actual utility). Hence, aggrievement is a source of political influence. The most aggrieved groups (in a neighborhood of the efficient policy q^0) are those with a larger self-serving bias (a large δ^i), and those where aggrievement is more sensitive to deprivation (a large ω^i). In this sense, groups that are more ideological and uncompromising, and with a stronger and more extreme sense of entitlements, are also more threatening and hence influential.

Finally, note that in setting policy the government does not necessarily favor those that already protest a lot. Rather, it tends to please the groups whose protests are more sensitive to the policy. Mass protests can be highly non-linear phenomena. When frustration reaches critical levels, even small changes can cause abrupt explosions of protest. Distorting the policy in favor of these groups is a relatively inexpensive way to reduce the overall incidence of riots.

Some of these predictions are consistent with the evidence from earlier studies. For instance, Bates (1981) claims that African governments favor urban workers at the expenses of rural producers, with policies that reduce the cost of food. His reasoning is consistent with our results: political unrest is much more threatening in urban areas, where mobilization is easier. Similarly, and consistently with our notion of aggrievement, Campante and Chor (2012) claim that the mismatch between high expectations of educated people and the dearth of economic opportunities is at the heart of the recent turmoil in the Arab world.

3.3.1 Dynamics

In a dynamic economy with more than one period, this framework yields additional implications. The reason is that any endogenous state variable such as public debt or aggregate capital can affect entitled as well as actual utilities, with non trivial effects on riot participation. In particular, groups can become resigned or entrenched depending on how the state variable affects entitled utilities. These intertemporal effects in turn shape the policymaker's incentives, giving rise to phenomena like policy procrastination.

This subsection presents the general framework and defines the equilibrium. The characterization of the equilibrium is derived in the next section, in the context of a specific example.

There are two periods, $t = 1, 2$. Let $V_t^i(q_t, b, \theta_t)$ denote group i indirect utility in period t, where the notation is as before, and b is an endogenous state variable set by the government in period 1, like public debt or public investment. Thus, in period 1 b is a policy variable, while in period 2 it is a predetermined state variable. There is no discounting, all individuals live two periods, and θ_t is i.i.d.. Thus, at the beginning of period 1 expected lifetime utility for a member of group i is $V_1^i(q_1, b, \theta_1) + E_\theta V_2^i(q_2, b, \theta)$, where E_θ denotes the expectations operator with respect to the random variable θ.

As before, the government trades off the direct welfare effects of the policies against their impact on political unrest. Thus, the government sets policy $\{q_1, b, q_2\}$ to maximize:

$$\sum_t W_t(q_t, b, \theta_t) - \sum_t \sum_i \lambda^i \varsigma^i P_t^i(q_t, b, \theta_t) \tag{11}$$

where $W_t = \sum_i \lambda^i V_t^i(q_t, b, \theta_t)$ captures the direct welfare effects of the policies.

The model is otherwise identical to the one described above, except that here all decisions are taken sequentially over time. Specifically, in each period:

- Individuals observe the current state (θ_1 in period 1, θ_2 and b in period 2) and form expectations of what is a fair policy for the current period. These fair policies determine the corresponding entitled utilities for the current period.

- The government sets actual policies.

- Individual aggrievements are determined, and individuals decide whether or not to participate in a riot with other group members.

How are decisions made at each node of the game? We take the position that individuals are rational and sophisticated when forming their expectation of what a fair policy is, and fully take into account all information that is available at each node of the game. Thus, we assume that in each period fair policies are sequentially rational and maximize expected residual lifetime utility from that period onwards, behind the usual distorted veil of ignorance and correctly taking into account events in subsequent periods.

Specifically, let $q_2^* = G(b, \theta_2)$ denote the equilibrium policy chosen by the government in period 2, as a function of the relevant (endogenous and exogenous) state variables. In period 1 the policies that are deemed fair by members of group i, $\hat{q}_1^i = Q_1^i(\theta_1)$ and $\hat{b}^i = B^i(\theta_1)$, maximize the following modified social welfare function:

$$W_1^i(q_1, b, \theta_1) = \sum_{k=1}^{N} \pi^{ik} V_1^k(q_1, b, \theta_1) + \sum_{k=1}^{N} \pi^{ik} E_\theta V_2^k[G(b, \theta), b, \theta] \tag{12}$$

where as above the weights π^{ik} are: $\pi^{ik} = \lambda^k(1 + \delta^i)$ if $\kappa = i$, and $\pi^{ik} = \lambda^k(1 - \delta^i)$ if $\kappa \neq i$. Thus, the right hand side of (12) is a weighted average of the residual expected lifetime utilities of all individuals in society, with weights that reflect the self-serving bias δ^i. Note that each $V_2^k(.)$ incorporates the expectation of the future equilibrium policy $q_2^* = G(b, \theta_2)$.[16]

Similarly, in period 2 the policy that is deemed fair by members of group i, $\hat{q}_2^i =$

[16] In the case individuals also considered the cost of future unrest, entitled policies would be less divergent amongst groups, and more similar to the view of the social planner. But still the entitlements would remain different due to the action of the self-serving bias.

$Q_2^i(b, \theta_2)$, maximizes:

$$W_2^i(q_2, b, \theta_2) = \sum_{k=1}^{N} \pi^{ik} V_2^k(q_2, b, \theta_2) \tag{13}$$

Note that the endogenous state variable b is a policy variable in period 1, but a predetermined state variable in period 2. This reflects the assumption that expectations of fair policies are determined sequentially over time, and when forming expectations individuals fully internalize the relevant constraints faced by the policymaker at that point in time.

As in the static model, these fair policies imply corresponding entitled utilities in each period:

$$\hat{V}_1^i(\theta_1) = V_1^i(\hat{q}_1^i, \hat{b}^i, \theta_1) \tag{14}$$

$$\hat{V}_2^i(b, \theta_2) = V_2^i(\hat{q}_2^i, b, \theta_2) \tag{15}$$

In contrast to the rational determination of fair policies, aggrievements are an emotional reaction to the frustration of being treated unfairly. Here the requirement of rationality seems much less compelling. We thus view aggrievement as a reaction to the gap between entitled and actual utility in the current period only, like in the static model. Specifically, $a_t^i = 0$ if $\hat{V}_t^i \leq V_t^i$, while:

$$a_t^i = \omega^i [\hat{V}_t^i - V_t^i]^2 \quad \text{if} \quad \hat{V}_t^i > V_t^i \tag{16}$$

Note the difference: fair policies result from intertemporal maximization of residual lifetime utility (behind a distorted veil of ignorance); aggrievement, on the other hand, results from the gap between current (as opposed to lifetime) entitled vs actual utilities. This captures the idea that, although fairness is firmly based on rational and analytical criteria, our frustration to unfair treatment is largely an emotional reaction to current events. The anticipation of future deprivation, by itself, is not a source of aggrievement. Although this last assumption can be relaxed, it simplifies the analysis and it seems plausible.[17]

[17] This assumption is consistent with the Relative-Deprivation argument to explain mass protests (cf. Gurr, 1970 and a vast subsequent literature), and the Frustration-Aggression Hypothesis, which says that when people are blocked to attain their goals, they express their frustration and anger through violence (cf. Dollard et al., 1939; Berkowitz, 1969).

Finally, in each period t, riot participation is determined exactly as in the static model, based on current aggrievements, yielding an equilibrium participation rate that can be expressed as $p_t^{*i} = P_t^i(q_t, b, \theta_t)$.

Note that period 2 entitled utility depends on the endogenous state variable b, because b is taken as given when expectations of the fair policy $\hat{q}_2^i$ are formed. The sign of the partial derivative $\hat{V}_{2b}^i(b, \theta_2)$ plays an important role in the analysis below. If $\hat{V}_{2b}^i < 0$, accumulation of the state variable b reduces entitled utility, making individuals in group i willing to accept a lower level of welfare without feeling aggrieved (and vice versa if $\hat{V}_{2b}^i > 0$). For this reason, we refer to $\hat{V}_{2b}^i < 0$ as a "resignation effect".

The equilibrium in this dynamic setting is a vector of fair policies, $\left\{\hat{q}_t^i, \hat{b}^i\right\}$ and corresponding entitled utilities, $\left\{\hat{V}_t^i\right\}$, a vector of participation rates, $\{p_t^{*i}\}$, and a vector of actual policies $\{q_t^*, b^*\}$, such that:

In period 1:

i) In each state θ_1, the fair policies $\left\{\hat{q}_1^i, \hat{b}^i\right\}$ maximize the modified social welfare functions of each group, (12), taking into account how the period 2 equilibrium policy q_2^* would react to $\hat{b}^i$.

ii) Within each group i, all members optimally choose whether to participate in the riot, given the equilibrium policy $\{q_1^*, b^*\}$, the group's current entitled utility $\hat{V}_1^i(\theta_1)$, and given the equilibrium participation of other group members, p_1^{*i}.

iii) The equilibrium policies $\{q_1^*, b^*\}$ maximize the overall social welfare function, (11), taking as given the groups' entitled utilities $\left\{\hat{V}_1^i(\theta_1)\right\}$, and taking into account how the policy affects equilibrium participation in current and future riots.

In period 2:

i) In each state (b, θ_2), the fair policies $\{\hat{q}_2^i\}$ maximize the modified social welfare functions of each group, (13).

ii) Within each group i, all members optimally choose whether to participate in the riot, given the equilibrium policy $\{q_2^*\}$, the group's entitled utility $\hat{V}_2^i(b, \theta_2)$, and the equilibrium participation of other group members, p_2^{*i}.

iii) The equilibrium policy $\{q_2^*\}$ maximizes overall social welfare in (11), taking as given the groups' current entitled utilities $\left\{\hat{V}_2^i(b, \theta_2)\right\}$, and taking into account how the policy affects equilibrium participation in current riots.

The next section illustrates this equilibrium in a dynamic model of social insurance and income redistribution.

4 Social insurance and redistribution

We now apply this framework to a dynamic model of social insurance. The section has two goals. First, to illustrate how the threat of political unrest shapes the design of social insurance. Second, to show that in a dynamic framework the strategic interaction between politically active individuals and the government gives rise to additional important effects.

The economy consists of two equally sized sectors, indexed by $i = 1, 2$. Individuals live two periods, $t = 1, 2$ and do not discount the future, they are risk neutral and draw utility from consumption and disutility from labor. Their utility in period t is:

$$v_t^i = c_t^i - U(l_t^i)$$

where c is consumption, l is labor, and $U(l)$ is an increasing and convex function with $U(0) = 0$.

Let θ_t^i denote labor productivity at time t in sector i, with labor being the only factor of production. In each period, the government can levy a linear income tax τ_t^i and provide a non-negative lump sum transfer s_t^i to either sector. Thus, the lifetime budget constraint of individuals in sector i is:[18]

$$c_1^i + c_2^i = \sum_{t=1}^{2} \left[\theta_t^i l_t^i (1 - \tau_t^i) + s_t^i\right]$$

For simplicity, we assume that θ_t^i is random, with $\theta_t^i \in \{0, 1\}$, and there is no aggregate risk. Thus, $\theta_t^i = 1 - \theta_t^k = \theta_t$ for $k \neq i$. The random variable θ_t equals 1 or 0 with the same probability 1/2. Shocks are uncorrelated over time. With a slight abuse of notation, we denote throughout by $i = p$ (for "poor") the sector hit by the adverse shock in period t, and $i = r$ (for "rich") the other sector (of course the identity of the rich and poor sectors may change over time). In each period, the government observes the realization of θ_t and sets policy. It can easily be verified that in equilibrium the government only provides transfers (if any) to the poor sector. Hence, to simplify notation from here on we denote by s_t the (non-negative) lump sum transfer to the poor sector in period t.

[18] Given the assumption on preferences and the absence of outside assets, the equilibrium real interest rate is always zero in this economy.

Besides setting τ and s, in period 1 the government can also issue government debt b, which has to be repaid in full next period, and in equilibrium it earns no interest. With this notation, the government budget constraint in periods 1 and 2 respectively can be written as:

$$s_1 = \tau_1 L(\tau_1) + b \tag{17}$$

$$s_2 = \tau_2 L(\tau_2) - b \tag{18}$$

The non-negativity constraint on s_2 also implies that $\tau_2 L(\tau_2) \geq b$.

The indirect utility functions of rich and poor individuals in period t are thus respectively:

$$V_t^r(\tau_t) = l_t^*(1-\tau_t) - U(l_t^*), \qquad V_t^p(\tau_t, b) = s_t \tag{19}$$

where $l_t^* = L(\tau_t)$ is labor supply at time t and s_t is given by (17-18).[19]

Let $W_t(\tau_t, b)$ denote aggregate economic welfare in period t, namely:

$$W_t(\tau_t, b) \equiv \frac{1}{2}V_t^r(\tau_t) + \frac{1}{2}V_t^p(\tau_t, b) = \frac{1}{2}[l_t^*(1-\tau_t) - U(l_t^*) + s_t] \tag{20}$$

with s_t given by (17-18). In the absence of any political constraints, the efficient policy in this setting maximizes $\sum_t W_t(\tau_t, b)$ subject to the non-negativity constraint on s_2. Given risk neutrality and distorting taxes, it can easily be shown that the efficient policy entails no policy intervention.

$$\tau_t^0 = s_t^0 = b^0 = 0$$

Of course, the result that no government intervention is socially optimal is an artifact of the model. However, it allows us to abstract from any reason to make transfers, other than the curbing of political unrest.

To simplify notation, we assume that the two groups are identical in the parameters that concern riot participation, such as the social disruptions caused by the riots, ς, the self-serving bias, δ, and the distribution $F(.)$ of the random variable ε^{ij} (the idiosyncratic component of the cost/benefit of participating in a riot). To further simplify the analysis, we also assume that the distribution $F(.)$ is uniform over the interval $[-\sigma, \sigma]$, with the same parameter $\sigma > 0$ in both groups. To ensure that

[19] By the individual first order conditions, the labor supply function is $l_t^* = U_l^{-1}(1-\tau_t)$.

conditions (A1, A2) in Lemma 1 are satisfied, so that the equilibrium exists and is unique, we assume that $\sigma > Max\{\mu, a_t^i/2 - \mu\}$ for all aggrievement values, a_t^i.

The timing of events is as described in the previous section. In each period, having observed the state (θ_1 in period 1, θ_2 and b in period 2), individuals form expectations of fair policies for the current period and derive the corresponding entitled utilities $\hat{V}_t^i$. The government then sets the current policy. Having observed the policy, individuals choose whether or not to participate in riots.

The equilibrium is as defined in the previous section. We now characterize it, working backwards from period 2.

4.1 Period 2

4.1.1 Fair policies

At the start of period 2, individuals observe the initial stock of debt, b, and the realization of the shock, θ_2, that tells them whether they are poor or rich. The policies that they deem fair, $\hat{\tau}_2^i, \hat{s}_2^i$, maximize the following modified social welfare function, subject to $\tau_2 L(\tau_2) \geq b$:

$$W_2^i(\tau_2, b) \equiv \pi^{ir} \cdot [l_2^*(1-\tau_2) - U(l_2^*)] + \pi^{ip} \cdot [\tau_2 L(\tau_2) - b], \quad i = r, p \tag{21}$$

where $\pi^{ik} = \frac{1}{2}(1+\delta)$ if $i = k$, and $\pi^{ik} = \frac{1}{2}(1-\delta)$ if $i \neq k$ $(i, k = r, p)$.

It is easy to show that the rich always want zero subsidies for the poor sector, $\hat{s}_2^r = 0$, and a tax rate which is just sufficient to service the debt: $\hat{\tau}_2^r = T^r(b)$, where the function $T^r(b)$ is defined implicitly by $\hat{\tau}_2^r L(\hat{\tau}_2^r) = b$.[20] This result is intuitive. Given risk neutrality and distorting taxes, the efficient policy entails no subsidies for the poor sector (see the previous subsection). A fortiori, this is also the policy deemed fair by the rich, given that they assign even less weight to the welfare of the poor compared to a utilitarian social planner.

What about the policy deemed fair by the poor sector, $\hat{\tau}_2^p$? Suppose that b is sufficiently small, so that the fair policy is an interior optimum of the poor's modified social welfare function (21). Then, the appendix proves that $\hat{\tau}_2^p = T^p(\delta)$, where $T^p(.)$ is a known increasing function. The corresponding fair subsidy is then obtained from the government budget constraint, (18): $\hat{s}_2^p = \hat{\tau}_2^p L(\hat{\tau}_2^p) - b$. This fair policy is

[20] See the proof of Lemma 2 in appendix.

consistent with positive subsidies for $b < \bar{b}$, where

$$\bar{b} \equiv T^p(\delta) \cdot L(T^p(\delta)) \tag{22}$$

Above the threshold $\bar{b}$, the fair tax rate $\hat{\tau}_2^p$ can no longer service the debt and also pay a positive subsidy. Hence, for $b \geq \bar{b}$ the poor are forced to accept $\hat{s}_2^p = 0$, and their fair tax rate coincides with that of the rich. Note that the threshold $\bar{b}$ is increasing in δ, the parameter that captures the extent of self-serving bias.

We summarize this discussion in:

Lemma 2 *The period 2 policy deemed fair by the rich is $\hat{s}_2^r = 0$ and $\hat{\tau}_2^r = T^r(b)$. If $b \geq \bar{b}$, this is also the fair policy for the poor. If instead $b < \bar{b}$, the fair policy for the poor is: $\hat{\tau}_2^p = T^p(\delta) > \hat{\tau}_2^r$ and $\hat{s}_2^p = \hat{\tau}_2^p L(\hat{\tau}_2^p) - b$.*[21]

4.1.2 Aggrievements and riots

Equilibrium riots are obtained as in the previous section, through a series of steps. First, the fair policies imply corresponding entitled utilities for both sectors, $\hat{V}_2^i(b)$. Entitled utilities depend on initial debt because, by Lemma 2, the fair policies vary with b. Second, aggrievements are obtained, as a function of the difference between entitled and actual utilities, as in (16): $a_2^i = A_2^i(\tau_2, b)$. Finally, by Lemma 1 and the assumptions on the distribution $F(.)$, the equilibrium participation rate in riots by group i is the unique fixed point of $p_2^{*i} = F(p_2^{*i} a_2^i/2 - \mu)$. Thus, we can write the equilibrium participation rates as $p_2^{*i} = P_2^i(\tau_2, b)$. Given that $F(.)$ is a uniform distribution, $P_2^i(\tau_2, b)$ has a closed form solution reported in the appendix, and its properties are summarized in the following:

Lemma 3 $P_{2\tau}^p \leq 0$ *and* $P_{2\tau}^r \geq 0$, $P_{2b}^r \leq 0$, *with strict inequality if and only if sector i is aggrieved (i.e. if and only if $\tau_2 < T^p(\delta)$ and $\tau_2 > T^r(b)$ respectively); moreover,* $P_{2b}^p = 0$.

To see the intuition, suppose that there is social conflict over tax policy (i.e. we are in the region $b < \bar{b}$, so that by Lemma 2 we have $\hat{\tau}_2^p > \hat{\tau}_2^r$). The poor are aggrieved if they do not get the positive subsidy they feel entitled to. Conversely, the rich feel

[21] See the appendix for a proof. Second order conditions are computed in the Supplementary Material available online.

aggrieved if taxes are used to pay for subsidies, and not just to service the debt. As τ_2 is raised, aggrievement and riot participation decrease in the poor sector while they increase amongst the rich (as long as actual utility falls short of the corresponding entitled utility).

As initial debt increases, the two groups become less far apart. In particular, holding τ_2 constant, a higher initial debt reduces riot participation by the rich (if they are aggrieved), while it has no effect on riots by the poor ($P^r_{2b} \leq 0$ and $P^p_{2b} = 0$). This happens because, as initial debt increases, both sectors reduce their expectations of what they are entitled to. However, for a given tax rate, a higher value of b reduces entitled utility and actual utility of the poor by the same amount (as subsidies also go down). These two effects exactly cancel out, so the poor aggrievement and participation rate do not depend on b. By contrast, a higher debt reduces entitled utility of the rich, but it does not affect their actual utility. So the rich are less aggrieved as b rises, and their participation rate falls.

This result reflects the resignation effect stressed in the previous section. In our definition of equilibrium, fair policies are sequentially rational: as the circumstances change, individual notions of what is fair adapt. In particular, rational individuals take into account the constraints that bind the policymaker and scale down their entitlements if these constraints become more stringent. As initial debt increases, all groups in society become resigned to a lower level of welfare.

4.1.3 Equilibrium policy

We are now ready to compute the equilibrium policy. The government maximizes period 2 social welfare inclusive of the social cost of riots:

$$W_2(\tau_2, b) - \frac{\varsigma}{2}[P^p_2(\tau_2, b) + P^r_2(\tau_2, b)]$$

subject to the non-negativity constraint on s_2, and where $W_2(\tau_2, b)$ is defined in (18-20), and $P^i_2(\tau_2, b) = \frac{2(\sigma-\mu)}{4\sigma - A^i_2(\tau_2,b)}$ ($i = r, p$; see appendix). The optimality condition is:[22]

$$\tau_2 L_\tau(\tau_2) \leq \varsigma[P^p_{2\tau}(\tau_2, b) + P^r_{2\tau}(\tau_2, b)] \tag{23}$$

[22] In the Supplementary Material we verify that second order conditions for an optimum are also satisfied.

with strict inequality implying $s_2^* = 0$. Thus, the government trades off tax distortions against riot mitigation. Equation (23), together with the government budget constraint (18), defines the equilibrium tax rate and subsidy as implicit functions of initial debt: $\tau_2^* = T(b)$ and $s_2^* = S(b)$. The appendix proves the following:

Proposition 2 *In the second period, the equilibrium tax rate is strictly positive and increasing in b: $T(b) > 0$ and $T_b > 0$. The equilibrium subsidy $S(b)$ is positive or zero, depending on the level of b. There is a threshold level of debt, $0 < \tilde{b} < \bar{b}$, such that if $b < \tilde{b}$ then $S(b) > 0$ and $S_b < 0$, while for $b \geq \tilde{b}$ we have $S(b) = 0$.*

In assessing the properties of this equilibrium, it is useful to recall that the economically efficient policy (which maximizes only the term $W_2(.)$) entails zero subsidies for any level of b. Note that by assumption all groups in society have access to the same technology for political participation and are identical in all political respects. And yet, if $b < \tilde{b}$, the equilibrium policy is distorted away from economic efficiency. As explained more generally in the previous section, this happens because, at the efficient policy, the rich are not aggrieved and hence do not participate in collective action.

This can be seen most clearly at the point $b = 0$. At the efficient policy, $\tau_2^0 = s_2^0 = 0$, only the poor are aggrieved, so that $P_{2\tau}^r = 0$ and $P_{2\tau}^p < 0$, and the RHS of (23) is negative. Hence, this cannot be an equilibrium. At $b = 0$ the government finds it optimal to raise taxes above zero and provide a positive subsidy, until the marginal tax distortions are just offset by the mitigation of riots by the poor (net of the increase in riots by the rich).

As initial debt increases, however, the equilibrium policy converges towards the economically efficient one, and once $b \geq \tilde{b}$ economic efficiency is achieved. This result reflects the resignation effect discussed earlier. Consider the effect of a larger initial debt in the range $b < \tilde{b}$. The rich realize that a larger debt service implies that taxes have to be raised, and reduce their aggrievement for any given tax rate. This allows the government to raise the tax rate without aggrieving the rich. As this happens, the poor too become less aggrieved, which allows the government to marginally cut subsidies in order to gain efficiency. Once b reaches the threshold $\tilde{b}$, subsidies reach zero and the equilibrium policy coincides with the efficient one, even though the poor remain aggrieved as long as $b < \bar{b}$.

Figure 3 here

The upper graph of Figure 3 illustrates the equilibrium as a function of b (the bold curves). At the point $b = 0$, subsidies coincide with tax revenues: $s_2^* = \tau_2^* L(\tau_2^*)$. As b increases, equilibrium subsidies decrease up to $\tilde{b}$, and are zero for $b > \tilde{b}$. The entitled subsidies of the poor (the dashed curve $\hat{s}_2^p$) are higher and vanish above $\bar{b}$. The level of taxation deemed fair by the rich coincides with the 45° curve. The equilibrium level of taxation (the bold curve $\tau_2^* L(\tau_2^*)$) remains higher until $\tilde{b}$.

The model yields several implications also about the equilibrium incidence of riots. If $b \geq \bar{b}$, then in equilibrium neither the rich nor the poor are aggrieved. As explained in the previous subsection, the poor are not aggrieved because, when debt is so large, they do not expect to receive any subsidy. The rich are not aggrieved because equilibrium subsidies are zero and taxation is at the debt repayment level (cf. Proposition 2). Hence in equilibrium there are no riots (except for the two fractions, $F(-\mu)$, of "initiators"; i.e. individuals with $\varepsilon^{ij} \leq -\mu$).

Consider the range $b < \bar{b}$. How does the equilibrium incidence of riots depend on initial debt? Taking the total derivative of $P_2^p(\tau_2, b) + P_2^r(\tau_2, b)$ with respect to b at the equilibrium policy $\tau_2^* = T(b)$, we get:

$$P_{2b}^p + P_{2b}^r + T_b(P_{2\tau}^p + P_{2\tau}^r)$$

By Lemma 3, $P_{2b}^p = 0$ and $P_{2b}^r \leq 0$. By Proposition 2, $T_b > 0$. The term inside the parenthesis is proportional to the RHS of (23), which we have just seen to be negative in equilibrium. Hence, the whole expression is negative. Thus a higher initial debt reduces equilibrium political unrest.

Finally, if $b < \bar{b}$, then in equilibrium the poor protest more than the rich, even if both groups are identical in all political respects. This again follows from (23). Since the RHS of (23) is negative, it must be that $|P_{2\tau}^p| > P_{2\tau}^r$, which given the symmetry of the model also implies $p_2^{*p} > p_2^{*r}$ (see the appendix). Intuitively, mitigating political unrest by the poor is costly in terms of tax distortions, and so the government stops short of equating marginal aggrievement across the two groups. Although perhaps not too surprising, this result is consistent with the evidence discussed in section 2.

Summarizing, we have:

Proposition 3 *The total equilibrium incidence of riots decreases with b, and it reaches a minimum at $b \geq \bar{b}$. In equilibrium the poor protest more than the rich: $p_2^{*p} > p_2^{*r}$.*

These results are illustrated in the lower graph of Figure 3. The rich stop being aggrieved as soon as taxes equal debt (i.e. $b \geq \tilde{b}$). The poor do so when the debt is so high that their entitlements are zero ($b \geq \bar{b}$).

As pointed out in the previous section, the equilibrium policy also depends on the parameters that describe the participation technology. At an interior optimum, anything that increases the threat of political unrest by the poor also induces the government to raise taxes and subsidies, and vice versa for the rich. In particular, suppose that we vary these parameters separately for the rich and poor sectors. Then at an interior optimum equilibrium subsidies s_2^* increase with the degree of self-serving bias of the poor (δ^p), with the sensitivity of their aggrievement to deprivation (ω^p), with the disruptions caused by their riots (ς^p), and with the homogeneity of their group as captured by the inverse of the parameter σ^p. The reverse applies as we vary the corresponding parameters of the rich (with the exception of δ^r, which has no effect on the equilibrium policy).[23]

4.2 Period 1

4.2.1 Fair policies, aggrievements and riots

This subsection computes the equilibrium of the first period. Individuals observe the current state, θ_1, and hence whether they are rich or poor in the current period. They form expectations of fair policies $\hat{\tau}_1^i, \hat{s}_1^i, \hat{b}^i$, maximizing their modified social welfare function

$$W_1^i(\tau_1, b) + W_2(T(b), b), \qquad i = r, p \tag{24}$$

with respect to τ_1, and b. The first term in (24) is $W_1^i(\tau_1, b) \equiv \pi^{ir} \cdot [l_1^*(1-\tau_1) - u(l_1^*)] + \pi^{ip} \cdot [\tau_1 L(\tau_1) + b]$, while $W_2(.)$ is given by (18-20). The weights $\pi^{ir}$and π^{ip} reflect self-serving bias, as defined above.

Three remarks are in order. First, fair policies are the solution to an intertemporal optimization problem, where individuals are farsighted and correctly take into account the future economic consequences of alternative policies. In particular, they take into account how b affects future equilibrium policy, $\tau_2^* = T(b)$. Second, as the shock θ_t is i.i.d., individuals ignore their future status of rich vs poor. Hence, their evaluation

[23] For details and computations on comparative statics, see the Supplementary Material available online.

of period 2 outcomes is not distorted by any self-serving bias, and W_2 coincides with the true social welfare function. Third, in determining fair policies individuals care about future economic outcomes, but disregard how b affects future political unrest. This seems an appropriate assumption, given that we are determining what individuals deem fair (as opposed to expedient), and it is in line with the definition of equilibrium of the previous section. Not much hinges on this assumption, however.

Repeating the steps illustrated above for period 2, we get:[24]

Lemma 4 *i) In period 1 the fair policy for the rich is:* $\hat{\tau}_1^r = \hat{s}_1^r = \hat{b}^r = 0$*. ii) The fair tax rate for the poor is the same as for period 2:* $\hat{\tau}_1^p = T^p(\delta) > 0$*. iii) The fair debt for the poor can be positive or zero, but* $\hat{b}^p = 0$ *if* $\delta \leq -\tau_2^* L_\tau(\tau_2^*) T_b(0)$*, where* $\tau_2^* = T(0)$*. Thus, if this condition holds, the fair subsidies for the poor are* $\hat{s}_1^p = T^p(\delta) L(T^p(\delta))$*.*

The result on the fair level of debt has the following intuition. Issuing debt entails future expected costs, in terms of higher tax distortions and lower subsidies. The rich do not fully internalize the current benefits of more borrowing, because they realize that the main beneficiaries are the poor. Hence their fair level of debt is zero. The poor do benefit more than proportionately from more debt today, because this allows them to get higher current subsidies. They also realize that future equilibrium tax rates are already suboptimally high, however (since $T(0) > 0$). If these future expected costs are sufficiently high, then the fair debt is zero also for the poor. In what follows we assume that $\hat{b}^p = 0$, since this reduces social pressure to issue government debt. We discuss below how the results would change if $\hat{b}^p > 0$.[25]

Repeating the steps of the previous subsection, we obtain aggrievements and equilibrium participation rates in both sectors, as a function of the period 1 policies, τ_1 and b, namely $p_1^{*i} = P_1^i(\tau_1, b)$. The appendix proves:

Lemma 5 $P_{1\tau}^r \geq 0 \geq P_{1\tau}^p$ *and* $P_{1b}^r = 0 \geq P_{1b}^p$*, where inequalities are strict if sector i is aggrieved* $(i = r, p)$*.*

[24] See the appendix for the proof.

[25] If the modified welfare function (24) also incorprated the cost of political unrest, ζP_t^i, all the qualitative results would be similar, except that the debt deemed fair by the poor is as large as possible, while the fair debt for the rich could be 0 or positive depending on a condition analogous to that in Lemma 4. Intuitively, fair debt increases for all groups, because they take into account that higher b reduces future political unrest.

Intuitively, and as in period 2, raising taxes pleases the poor and hurts the rich, and riots respond accordingly (as long as the sector is aggrieved). Issuing public debt leaves the aggrievement of the rich unaffected, but reduces the aggrievement of the poor (for a given tax rate). Thus the poor riot less. The reason is that, holding τ_1 constant, issuing debt allows the government to raise subsidies in period 1, which benefits the poor without affecting the current welfare of the rich. Note that b reduces the poor's aggrievement even though debt accumulation is not regarded as fair by the poor.

4.2.2 Equilibrium policy

The government sets τ_1, s_1 and b to maximize the following social welfare function, which includes current and future social costs of riots:

$$W_1(\tau_1, b) + W_2(\tau_2^*, b) - \frac{1}{2}\sum_{i=r,p} \varsigma^i P_1^i(\tau_1, b) - \frac{1}{2}\sum_{i=r,p} \varsigma^i P_2^i(\tau_2^*, b)] \tag{25}$$

where $W_t(\tau_t, b)$ is defined in (17,18,20), and $\tau_2^* = T(b)$ is the future equilibrium policy.

Here too the economically efficient policy, $\tau_1^0 = b^0 = 0$, cannot be an equilibrium. The reason is that, with this policy, the poor are aggrieved while the rich are not. To mitigate riots, the government finds it optimal to provide subsidies to the poor, financing them with a mix of debt and current taxes. Issuing debt is costly in terms of future economic efficiency (because it raises future tax distortions), but it reduces future political riots. The reason is the resignation effect discussed earlier: by Proposition 3, a larger debt reduces the future incidence of riots. Since debt, unlike current taxes, does not aggrieve the rich, the government has an incentive to partly finance current subsides through debt rather than through taxation, despite the future tax distortions. Given the linearity of future consumption, equilibrium debt is at least as large as the threshold $\tilde{b}$ cited in Proposition 2, beyond which $s_2^* = 0$. Specifically, the appendix proves:

Proposition 4 *In equilibrium,* $\tau_1^* > 0$, $s_1^* > 0$ *and* $\bar{b} > b^* \geq \tilde{b}$*. Moreover, equilibrium taxes are lower in period 1 than in period 2:* $\tau_1^* < \tau_2^*$.

Thus, the equilibrium policy entails positive tax rates in both periods, in order to finance subsidies to the poor only in the first period, and public debt is issued beyond the point at which tax distortions are equalized over time (since $\tau_1^* < \tau_2^*$). The reason is that issuing public debt reduces aggrievement (and hence riots) by the poor in both periods, without increasing the aggrievement of the rich. Thus, the equilibrium entails two distortions relative to the efficient benchmark: an excessive amount of redistribution to the poor, and an intertemporal distortion. Although the details of the equilibrium depend on some of the special features of the model, and in particular on risk neutrality, the nature of the distortions is general. Excessive redistribution results from the fact that, at the efficient policy, the rich are not aggrieved and thus they do not exert any political influence. The intertemporal distortion is a by-product of the resignation effect discussed above. Because a larger debt reduces the aggrievement of the future poor and does not raise aggrievement of the future rich, a government who is concerned by political unrest has an incentive to procrastinate and accumulate debt.

Repeating the logic discussed above, the economic distortions highlighted in Proposition 4 are enhanced by any parameter change that increases the threat of riots by the poor, such as higher disruption, ς^p, a larger self-serving bias, δ^p, more sensitive aggrievements, ω^p, and more homogeneity, σ^p. The intertemporal distortion is also enhanced by parameter changes that increase the threat of riots by the rich (since the government would then be induced to accumulate further debt in order to avoid protests by the rich in period 1). This is consistent with the evidence by Woo (2003), who shows that in a large sample of countries there is a positive correlation between public deficits and social and political instability (captured by indicators that also include political unrest).

Finally, what happens if the self-serving bias is so strong that $\hat{b}^p > 0$ in Lemma 4 (i.e. the level of debt deemed fair by the poor becomes positive)? The equilibrium would continue to display some of the key features described above, in particular τ_1^*, τ_2^*, $b^* > 0$, and $s_2^* = 0$. Now however the poor would be particularly aggrieved in period 1, because they expect the government to finance subsidies also through b and not just through current taxation. This in turn would enhance both equilibrium distortions, and the equilibrium would display an even larger debt accumulation and a higher level of taxation in period 1 than in period 2. In such a situation, any constraints on the government ability to borrow (such as a balanced budget constraint) could be beneficial. By the requirement of sequential rationality, fair policies would take such constraints into account, and the poor (or other groups expecting large government transfers) would scale down their expectations and feel less aggrieved if such transfers could not be effected.

4.3 Another look at the evidence

One of the main insights of this dynamic model of social insurance is the importance of the resignation effect. When this effect is operative, individuals are more prepared to accept fiscal austerity.

Table 3 here

It is natural to reconsider the evidence on fiscal retrenchments presented in section 2 in light of this result. We have thus re-estimated the previous regressions, with political unrest as the dependent variable. In Table 3, the specifications are identical to those reported in Table 1 of section 2, except that we add an additional regressor: the stock of debt in percent of GDP at the beginning of the period, called lagged debt. As expected, the estimated coefficient on lagged debt is always statistically significant and with a negative sign. Its estimated coefficient of about 0.01 implies that an increase of the debt to GDP ratio of 10 percentage points is associated with an average reduction in the incidence of political unrest of about 10% - a non-negligible amount. The estimated coefficient on the cyclically adjusted primary deficit increases in absolute value and remains highly significant, again as expected.

Table 4 here

Table 4 reproduces exactly the same specification of Table 1 in section 2, without lagged debt as a regressor, but for two different subsamples: for lagged debt above or below the critical threshold of 90% of GDP highlighted by Reinhart and Rogoff (2011a). As shown in Table 4, the estimated coefficient on cyclically adjusted budget deficits is statistically significant only if debt is below this threshold. Thus, in accordance with the resignation effect discussed in the theory, fiscal retrenchments are not associated with political unrest if they take place in a high public debt environment.

Finally, we explore what happens in the vicinity of financial crisis triggered by sovereign debt defaults. A sovereign debt crisis and its aftermath are typically associated with harsh fiscal austerity, prolonged recessions, and wide and sometimes arbitrary redistribution. It is thus plausible to expect a strong association between debt crisis and political unrest. Nevertheless, the theory suggests a particular pattern: political unrest should precede the crisis rather than follow it. The reasons is that a debt crisis makes clear to everyone that the government has no options left. Hence, once the crisis bursts, citizens are more likely to become resigned to a lower level of welfare.

Table 5 here

In Table 5 we regress political unrest (as defined in Tables 1, 3 and 4) on growth of GDP per capita and on five dummy variables that capture the year of a sovereign debt crisis (domestic or external) and a window of up to two years before and after the crisis. The source of the data on debt crisis is Reinhart and Rogoff (2011b).[26] Estimation is by Poisson Quasi-Maximum Likelihood, conditional on country fixed effects, with and without year fixed effects. Columns (1-2) refer to the whole sample (1919-2000), while columns (3-4) refer to the postwar period (1946-2000). The estimates reveal that political unrest goes up in the year of the debt crisis and two years before, while it tends to go down two years after the crisis. This timing thus provides further indirect support to the idea that resignation plays a relevant role in dampening political unrest, and that resignation is related to awareness that the government has few policy options left available.

5 Concluding Remarks

The ideas and the results developed in this paper can be extended in several fruitful directions.

One of the outstanding puzzles in political economics is why atomistic individuals bother to take costly political actions. The ideas developed in this paper can provide a stepping stone for a more general theory of political participation, that applies to voting and other political activities besides riots. Voters can be more easily mobilized against a candidate or a policy platform perceived as unfair, or to punish an incumbent so as to correct grievances. In particular, the idea that individuals form expectations of what they are entitled to, and that such expectations shape political behavior, could explain protest votes and higher turnout by angry or disappointed voters (cf. Scholzman and Verba, 1979). If so, some of the results on the sources of political influence discussed above have wider applicability than just to political protests.

[26] See the Data Appendix for a precise definition

A central insight of the paper is that individuals react emotionally to unfair treatment, but notions of what is fair are internally consistent and adapt to changing circumstances. We have made this idea operational by incorporating the expectation of a fair policy in the definition of equilibrium. The requirement of sequential rationality then drives the result that, as external circumstances deteriorate, individuals become resigned to a lower level of welfare. We have shown that this in turn creates an incentive for policy procrastination. But the idea that expectations of what is fair are endogenous could have very different implications in other settings. For instance, habit formation could raise voters' expectations of what is a fair level of welfare. Alternatively, status quo policies could provide a reference point that discourages policy reversals, just like ex-post renegotiation is more difficult if the ex-ante contract acts as a reference point (cf. Herweg and Schmidt, 2012). If so, policy procrastination or past policy decisions could make voters more entrenched, rather than more resigned. Exploring the circumstances under which entrenchment rather than resignation is more likely is an important item for future research.

This paper studies how the threat of collective action influences public policy, as groups seek to defend their "economic rights". But the same ingredients can be adapted to study the endogenous evolution of political institutions, such as in a transition from autocracy to democracy, when citizens fight to defend their "political rights". This would add other sources of strategic interaction. In the model above, the strategic interaction concerns within-group behavior. The reason is that groups protest against government policy, rather than against other groups. If opposing groups fight each other, as for instance in Acemoglu and Robinson (2006b) or Battaglini and Bénabou (2003), the set of interactions would become richer and additional insights could be obtained.

The idea that individuals take costly actions to display their aggrievement can also be relevant outside of politics. In particular, voice activities such as customer complaints, or other sanctions, can explain the functioning of organizations in different cultural environments (cf. Akerlof, 2012).

Finally, the central role given to notions of fairness and aggrievement opens the door to the possibility of manipulating voters' expectations of what is fair through the media or through social networks. Persuasion plays a central role in politics, but has been largely neglected in political economics, mainly because persuasion is so hard to pin down precisely, but also because much of the literature has focused on the voters' material interests rather than on what they consider fair. Perhaps the framework of this paper can be extended to shed light on these important but difficult issues in the analysis of political behavior.

Appendix

Proof. Lemma 1 Here we prove that (A1-A2) are also necessary conditions. Observe that $\lim_{p^i \to -\infty} F^i(.) = 0$ and $\lim_{p^i \to +\infty} F^i(.) = 1$. If $p^{*i} \in (0,1)$, neither $p^i = 0$ nor $p^i = 1$ can be a solution. This implies (A1); i.e. $F^i(-\mu) > 0$, and $F^i(\lambda^i a^i - \mu) < 1$. Moreover, since the solution(s) lie in $(0,1)$, $F^i(.)$ crosses p^i from above at least once. If the solution is unique, then this must be the case; i.e. also (A2) holds. **QED** ■

Proof. Lemma 2 By the envelope theorem, the optimality condition which pins down fair policies is:

$$-\pi^{ir} l_2^* + \pi^{ip}(\tau_2 L_\tau(\tau_2) + l_2^*) \leq 0 \tag{26}$$

with strict inequality implying $\hat{s}_2^i = 0$. For $i = r$, inequality (26) is always strict. Then, for any b, $\hat{s}_2^r = 0$ and $\hat{\tau}_2^r$ is such that $\hat{\tau}_2^r L(\hat{\tau}_2^r) = b$. The latter equality defines $T^r(b)$. Take $i = p$; if b is "sufficiently small", (26) holds with equality and pins down $\hat{\tau}_2^p$. After some algebraic manipulation on (26),

$$\eta(\hat{\tau}_2^p) = \frac{2\delta}{1+\delta}$$

where $\eta(\tau) = -\frac{\tau L_\tau(\tau)}{L(\tau)} > 0$ is the elasticity of labor supply, with $\eta_\tau(\tau) > 0$. Thus $\hat{\tau}_2^p = T^p(\delta)$ and $T_\delta^p(\delta) > 0$. By "sufficiently small" b we mean that $b < \bar{b}$, where $\bar{b}$ is defined by (22). In this case, $\hat{s}_2^p > 0$. If $b \geq \bar{b}$ then $\hat{s}_2^p = 0$, and $\hat{\tau}_2^p$ is such that $\hat{\tau}_2^p L(\hat{\tau}_2^p) = b$. Therefore, for any $b \geq \bar{b}$, the fair policy of rich and poor are the same: $\hat{s}_2^p = \hat{s}_2^r = 0$ and $\hat{\tau}_2^p = \hat{\tau}_2^r$. **QED** ■

Proof. Lemma 3 Combining (19),(6) and fair policies of both groups determined by (26),

$$\begin{aligned} A_2^r(\tau_2, b) &= \frac{\omega}{2} \cdot \left(\max\left\{0,\ [l_2^{*r}(1 - T^r(b)) - U(l_2^{*r})] - [l_2^*(1-\tau_2) - U(l_2^*)]\right\}\right)^2 \\ A_2^p(\tau_2, b) &= \frac{\omega}{2} \cdot \left(\max\left\{0,\ [T^p(\delta)L(T^p(\delta)) - \tau_2 L(\tau_2)]\right\}\right)^2 \end{aligned}$$

where $T^r(b)$ and $T^p(\delta)$ are defined by Lemma **2**, and where l_2^{*r} denotes labor supply at the tax rate $\hat{\tau}_2^r$. By Lemma 1, $p_2^{*i} = F(p_2^{*i} a_2^i / 2 - \mu)$. Given the assumption of a uniform distribution $F(.)$, and expressing $a_2^i = A_2^i(\tau_2, b)$, we can write $p_2^{*i} =$

$P_2^i(\tau_2, b) = \frac{2(\sigma-\mu)}{4\sigma - A_2^i(\tau_2,b)}$, $(i = r, p)$. Thus, the impact of any policy variable x on riot incidence is given by

$$P_{tx}^i(\tau_2, b) = \frac{1}{2(\sigma-\mu)}[P_t^i]^2 A_{tx}^i \qquad i = r, p,\ t = 2, \text{ and } x = \tau_2, b. \tag{27}$$

Let us compute the partial derivatives, $A_{2\tau}^i$'s:

$$A_{2\tau}^r(\tau_2, b) = \omega(\hat{V}_2^r - V_2^r)l_2^* \geq 0 \tag{28}$$

$$A_{2\tau}^p(\tau_2, b) = -\omega(\hat{V}_2^p - V_2^p)l_2^*(1 - \eta(\tau_2)) \leq 0 \tag{29}$$

Where the inequalities are strict if and only if sector i is aggrieved (i.e. iff $\hat{V}_2^i > V_2^i$), which by Lemma 2 happens in (28) if and only if $\tau_2 > T^r(b)$, and in (29)) if and only if $\tau_2 < T^p(\delta)$. Let us now compute the partial derivatives, A_{2b}^i's. Exploiting the definition of $T^r(b)$ in Lemma 2, $T_b^r(b) = \frac{1}{l_2^{*r}(1-\eta(\hat{\tau}_2^r))}$. Thus we have: $\hat{V}_{2b}^r = -\frac{1}{1-\eta(\hat{\tau}_2^r)}$, and $V_{2b}^r = 0$. Moreover, $\hat{V}_{2b}^p = V_{2b}^p = -1$ if $b < \bar{b}$, and $\hat{V}_{2b}^p = V_{2b}^p = 0$ if $b \geq \bar{b}$ (with τ_2 meeting the budget constraint). Then,

$$A_{2b}^r(\tau_2, b) = -\omega(\hat{V}_2^r - V_2^r)\frac{1}{1-\eta(\hat{\tau}_2^r)} \leq 0 \tag{30}$$

$$A_{2b}^p(\tau_2, b) = 0 \tag{31}$$

where again the inequality in (30) is strict if and only if sector r is aggrieved. Inserting the partial derivatives A_{2x}^i in (28-31) into (27) we complete the proof. **QED** ■

Proof. Proposition 2 *i)* At the point $\tau_2 = 0$ and $b = 0$, $P_{2\tau}^p(0,0) < P_{2\tau}^r(0,0) = 0$. Then (23) is not satisfied and the equilibrium implies a strictly positive value of the tax rate: $\tau_2^* = T(b) > 0$, at the point $b = 0$. By definition of $\tilde{b}$, this also proves that $\tilde{b} > 0$.

ii) Let us prove that $T_b > 0$ for any b. By definition of $\tilde{b}$, if $b < \tilde{b}$, then (23) holds with equality. Differentiating the equation yields,

$$T_b = \frac{\partial \tau_2^*}{\partial b} = \frac{\varsigma\,[P_{2\tau b}^p(\tau_2^*, b) + P_{2\tau b}^r(\tau_2^*, b)]}{SOC_{\tau_2}} > 0 \tag{32}$$

where $SOC_{\tau_2} < 0$ (see the Supplementary Material on SOCs), $P_{2\tau b}^p(\tau_2^*, b) = 0$ and $P_{2\tau b}^r = \frac{\omega}{2(\sigma-\mu)}\left[2P_2^r(\hat{V}_2^r - V_2^r)l_2^* P_{2b}^r + (P_2^r)^2\, l_2^* \hat{V}_{2b}^r\right] < 0$. If $b \geq \tilde{b}$, then $\tau_2^* = T(b)$ is such that $\tau_2^* L(\tau_2^*) - b = 0$. Implicit differentiation yields:

$$T_b = \frac{1}{l_2^*(1-\eta(\tau_2^*))} > 0$$

iii) Now we prove that if $b < \tilde{b}$ then $S(b) > 0$ and $S_b < 0$. Recall that $S(b) \equiv T(b)L(T(b)) - b$. Then $S(b) > 0$ (with $b < \tilde{b}$) follows from the definition of $\tilde{b}$. Moreover, $S_b = T_b l_2^*(1-\eta(\tau_2^*)) - 1$, where T_b is defined by (32). Let $\eta^* \equiv \eta(\tau_2^*)$. It follows that S_b is negative if

$$\varsigma(1-\eta^*) l_2^* P_{2\tau b}^r(\tau_2^*, b) > SOC_{\tau_2}$$

Recall that $\hat{V}_{2b}^r = -\frac{1}{1-\eta(\hat{\tau}_2^r)}$ and $P_{2\tau}^r = -P_{2b}^r l_2^*(1-\eta(\hat{\tau}_2^r))$. Using the equation which defines $P_{2\tau b}^r$ above, and the definition for SOC_{τ_2}, after some algebraic manipulation we can re-write the above inequality as

$$(-\eta^* + \eta(\hat{\tau}_2^r))\varsigma l_2^* \tfrac{\omega}{2(\sigma-\mu)} P_2^r \left[2(\hat{V}_2^r - V_2^r) l_2^* P_{2b}^r - P_2^r l_2^* \tfrac{1}{1-\eta(\hat{\tau}_2^r)}\right] > \\ -l_2^*\eta^* - \varsigma P_{2\tau\tau}^p(.)$$

Note that for any $b < \tilde{b}$, $\hat{\tau}_2^r < \hat{\tau}_2^*$ thus $(-\eta^* + \eta(\hat{\tau}_2^r)) < 0$. This implies that the LHS of inequality above is positive. The RHS is negative. Thus the inequality is satisfied. This proves that $S_b < 0$ for any $b < \tilde{b}$.
iv) Next, we show that $S(b) = 0$ for $b \geq \tilde{b}$. By definition of $\tilde{b}$ and by (23):

$$T(\tilde{b}) L_\tau(T(\tilde{b})) = \varsigma P_{2\tau}^p(T(\tilde{b}), \tilde{b}) \tag{33}$$

This of course implies $S(\tilde{b}) = 0$. The LHS of (23) is decreasing in b (since $T_b(b) > 0$). The RHS of (23) is increasing in b (since for $b > \tilde{b}$, $P_{2\tau b}^p(T(b), b) = 0$ and $P_{2\tau b}^p(T(b), b) = T_b P_{2\tau\tau}^2(T(b), b) > 0$). Hence for $b > \tilde{b}$ (23) holds with inequality, implying $S(b) = 0$.
v) Finally, we show that $\tilde{b} < \bar{b}$. By definition, $\bar{b} = T^p(\delta) \cdot L(T^p(\delta))$. At $\bar{b}$ we have that $A_2^r = 0 = A_2^p$. Hence the RHS of (23) is 0. But the LHS of (23) is lower than zero, so this violates (33). Hence $\tilde{b} < \bar{b}$. **QED** ■

Proof. Proposition 3 The proof of the first statement coincides with the discussion in the main text. Let us prove the second statement. By $p_2^{*i} = \frac{2(\sigma-\mu)}{4\sigma - A_2^i(\tau_2, b)}$, it follows that $p_2^{*p} > p_2^{*r}$ if and only if $A_2^p > A_2^r$. It follows that $p_2^{*p} > p_2^{*r}$ if and only if

$\hat{V}_2^p - V_2^p > \hat{V}_2^r - V_2^r$.
We know from the discussion in the main text that if $b < \bar{b}$ then in the equilibrium $|P_{2\tau}^p| > P_{2\tau}^r$. Combining (27) with (29) and (28), this inequality implies that $(\hat{V}_2^p - V_2^p)(1-\eta(\tau_2^*)) > \hat{V}_2^r - V_2^r$, which also implies that $\hat{V}_2^p - V_2^p > \hat{V}_2^r - V_2^r$. Thus $p_2^{*p} > p_2^{*r}$. **QED** ■

Proof. Lemma 4 The first result on $\hat{\tau}_1^i$ can easily be obtained repeating the same steps illustrated in the proof of Lemma 2. Consider the optimality condition for fair debt, $\hat{b}^i$, which can be written as $(i = r, p)$:

$$\pi^{ip} + W_{2\tau} T_b + W_{2b} \leq 0 \tag{34}$$

where a strict inequality implies $\hat{b}^i = 0$. Evaluated at $b = 0$, and after some simplifications, the last two terms can be written as $W_{2\tau} T_b + W_{2b} = -\frac{1}{2} + \frac{1}{2}\tau_2^* L_\tau(\tau_2^*) T_b(0)$.[27] Consider first the rich individuals. For them, $\pi^{rp} = \frac{1}{2}(1-\delta)$. Inserting this expression in (34) and using the equation above, the LHS of (34) is negative (since $L_\tau < 0$). Hence $\hat{b}^r = 0$. Next consider the poor. For them, $\pi^{pp} = \frac{1}{2}(1+\delta)$. Repeating the same steps, we get that, if the condition stated in the Lemma holds, then $\hat{b}^p = 0$. **QED** ■

Proof. Lemma 5 Using the fair policies derived in Lemma 4, aggrievements are:

$$\begin{aligned} A_1^r(\tau_1, b) &= \frac{\omega}{2} \cdot \left(\max\left\{0, \quad [L(0) - U(L(0))] - [l_1^*(1-\tau_1) - U(l_1^*)]\right\}\right)^2 \\ A_1^p(\tau_1, b) &= \frac{\omega}{2} \cdot \left(\max\left\{0, \quad [T^p(\delta) L(T^p(\delta)) - \tau_1 L(\tau_1) - b]\right\}\right)^2 \end{aligned}$$

Repeating the steps of Lemma 3 and using (27) with $t = 1$, we get: $P_{1\tau}^r(\tau_1, b) \geq 0$, $P_{1b}^r(\tau_1, b) = 0$, $P_{1\tau}^p(\tau_1, b) \leq 0$, $P_{1b}^p(\tau_1, b) \leq 0$, where each inequality is strict if the group is aggrieved. **QED** ■

Proof. Proposition 4 The optimality condition to maximize (25) with respect to τ_1 is similar to that of period 2:

$$\tau_1 L_\tau(\tau_1) = \varsigma P_{1\tau}^p(\tau_1, b) + \varsigma P_{1\tau}^r(\tau_1, b) \tag{35}$$

[27] In deriving this equation we used the fact that, by Proposition 2, $S(0) > 0$, and that by (18) $W_{2b} = -\frac{1}{2}$ and $W_{2\tau} = \frac{1}{2}\tau_2^* L_\tau(\tau_2^*)$.

(here in equilibrium the non-negativity constraint on s_1 does not bind). At the point $\tau_1 = 0$ we have $W_{1\tau}(\tau_1, b) = 0 = P^r_{1\tau}(\tau_1, b)$, but $P^p_{1\tau}(\tau_1, b) \le 0$, with strict inequality if the poor are aggrieved. Hence $\tau_1 = 0$ would be an equilibrium only if the poor were not aggrieved. Otherwise, $\tau_1^* > 0$. It remains to prove that at $b = b^*$ and $\tau_1 = 0$ the poor are aggrieved, which we do below.

Next, turn to the choice of b. Recall that $P^r_{1b} = P^p_{2b} = 0$. Consider first the range $b < \tilde{b}$, over which, by Proposition 2, $s_2^* = S(b) > 0$. By the envelope theorem, we can take τ_2^* as given, since the objective function and the constraints affected by τ_2 are the same in periods 1 and 2. Hence, we can write the derivative of the government objective function (25) with respect to b as:

$$-\frac{\varsigma}{2}P^p_{1b} - \frac{\varsigma}{2}P^r_{2b} \tag{36}$$

where we have used the fact that the partial derivatives $W_{1b}(\tau_1, b) = \frac{1}{2} = -W_{2b}(\tau_2^*, b)$ cancel out. By Lemma 5, $P^p_{1b} \le 0$, and by Lemma 3, $P^r_{2b} < 0$. Hence the expression in (36) is strictly positive and in the range $b < \tilde{b}$, the government finds it optimal to keep issuing debt, because doing so mitigates both current and future riots, without any adverse economic consequences. The equilibrium is found in the region where $b \ge \tilde{b}$, where $s_2^* = 0$.

At the point $b = \tilde{b}$, the derivative of the government objective function (25) with respect to b jumps discontinuously, because if $b \ge \tilde{b}$ then $s_2^* = 0$ and the government is no longer at an interior optimum in period 2, so that $\tau_2^* = T(b)$ is defined implicitly by the second period budget constraint, $\tau_2^* L(\tau_2^*) = b$. Specifically, in the range $b \ge \tilde{b}$, the first order condition of the government objective function (25) with respect to b can be written as

$$W_{1b} + W_{2\tau}T_b - \frac{\varsigma}{2}[P^p_{1b} + P^p_{2\tau}T_b] \le 0 \tag{37}$$

with strict inequality implying $b^* = \tilde{b}$, and where we used the fact that $P^r_{2b} = 0 = P^r_{2\tau}$ (because by Lemma 3 at $s_2^* = 0$ the rich are no longer aggrieved in period 2). By the period 2 government budget constraint, $T_b = \frac{1}{[1-\eta(\tau_2^*)]l_2^*}$, while $W_{1b} = \frac{1}{2}$ and $W_{2\tau} = -\frac{1}{2}l_2^*$. Hence, after some simplifications (37) that determines equilibrium government debt b^* can be rewritten as:

$$\frac{-\eta(T(b^*))}{(1-\eta(T(b^*)))} - \varsigma[P^p_{1b}(\tau_1^*, b^*) + P^p_{2\tau}(\tau_2^*, b^*)\frac{1}{[1-\eta(\tau_2^*)]l_2^*}] \le 0 \tag{38}$$

with strict inequality implying $b^* = \tilde{b}$.
Equation (38) also implies that $b^* < \bar{b}$. We already know by Proposition 2 that $\tilde{b} < \bar{b}$. Could we have an interior optimum of (38) in which $b^* \geq \bar{b}$? To show that the answer is negative, recall that by definition, $\bar{b} = T^p(\delta) \cdot L(T^p(\delta))$, and by the symmetry of the model in periods 1 and 2, this is also the value of subsidies deemed fair by the poor in period 1 (see Lemma 4). Hence, at the point $\bar{b}$ the poor would no longer be aggrieved neither in period 2 nor in period 1 (for any value of τ_1), so that $P^p_{1b} = P^p_{2\tau} = 0$. Since the first term on the LHS of (38) is strictly negative, this rules out an interior optimum in which $b^* \geq \bar{b}$.
Finally, the fact that $b^* < \bar{b}$ also implies that $\tau_1^* > 0$, because at $\tau_1 = 0$ and b^* the poor are still aggrieved. The equilibrium (τ_1^*, b^*) is thus jointly defined by (35) and (38).
To conclude, we prove that $\tau_1^* < \tau_2^*$. Consider (35) and (23). Suppose by contradiction that $\tau_1^* = \tau_2^*$, so that the LHS of (35) and (23) were the same. Consider that, by Lemma 3, poor's aggrievement is independent of b at period 2, whereas by Lemma 4 poor's aggrievement is weakly decreasing in b at period 1. Since we have just proved that $b^* > 0$, if follows that, if tax rates were the same in both periods, the poor would be (weakly) more aggrieved in the second period than in the first one, which would imply $P^p_{1\tau} \geq P^p_{2\tau}$ (recall that $P^p_{t\tau} \leq 0$, for $t = 1, 2$). In addition, the RHS of (35) contains the positive term $P^r_{1\tau}$. Hence, the RHS of (35) would be algebraically larger than the RHS of (23), yielding a contradiction. The same argument rules out $\tau_1^* > \tau_2^*$. **QED** ■

Data Appendix

1. Surveys' regressions

Sources: European Social Surveys (ESS) and World Value Surveys (WVS) (the definition in parenthesis refers to the WVS whenever the definitions differ by source)

• **Recent participation in lawful demonstrations,** Dummy Variable: 1 if "Taken part into lawful public demonstrations on the last 12 months"; (1 if "Political action recently done: attending peaceful/lawful demonstration").

• **Primary education,** Dummy variable: 1 if "Highest level of education, ES-ISCED" = "less than lower secondary" or "lower secondary"; (1 if "Highest educational level attained" = "No formal education" or incomplete primary school" or "complete primary school").

• **Tertiary education,** Dummy variable: 1 if "Highest level of education, ES-ISCED" = "lower tertiary" or "higher tertiary"; (1 if "Highest educational level attained" = "some university-without degree" or "university-with degree").

• **Age 30 or below,** Dummy variable: 1 if "Age" $\leq$ "30". • **Age 50 or above:** Dummy variable: 1 if "Age" $\geq$ "50".

• **Male,** Dummy variable: 1 if "Male".

• **Income 30 percentile,** Dummy variable: 1 if Income belongs to the $30th$ percentile; "Scale of income" 1 = Lowest step; 10 = Highest step; $30th$ Percentile corresponds to income $<$ 3 or = 3. • **Income 70 percentile,** Dummy variable: 1 if Income belongs to the $70th$ percentile; "Scale of income" 1 = Lowest step 10 = Highest step; $70th$ percentile corresponds to income $>$ 6 or = 6.

• **Autonomy index,** "Variable (WVS):Y003"; -2 = "Obedience/Religious Faith" 2 = "Determination, Perseverance - Independence"; It is defined as: y003=(a029 +a039)-(a040 + a042).

The common question asked in "a029","a039","a040" and "a042" is: "Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important?"

- a029 = independence; - a039 = determination,perseverance; - a040 = religious faith; - a042 = obedience.

• **Satisfaction with economy,** "How satisfied with the present state of economy in the country": 0 ="Extremely dissatisfied" 10 ="Extremely satisfied".

• **Satisfaction with democracy,** "How satisfied with the way democracy works in country": 0 = "Extremely dissatisfied" 10 = "Extremely satisfied".

• **State of health services,** "State of health services in country nowadays": 0 = "Extremely bad" 10 = "Extremely good".

• **State of education,** "State of education in country nowadays": 0 = "Extremely bad" 10 = "Extremely good".

• **Discriminated group,** Dummy variable: 1 if "Member of a group discriminated against in this country".

• **Unemployed,** Dummy variable: 1 if "During last 7 days" = "Unemployed-actively looking for job" or "Unemployed-not actively looking for job"; (1 if "V241"= "7" i.e. "Employment status" = "Unemployed").

• **Workers,** Dummy variable: 1 if "Doing last 7 days" = "Paid work"; (1 if "V241" = "1" or "V241" = "2" or "V241" = "3" i.e. "Employment status" = "Full time employee" or "Part time employee" or "Self employed").

• **Students,** Dummy variable: 1 if "During last 7 days" = "Education"; (1 if "V241" = "6" i.e. "Employment status" = "Student").

• **Children at home,** Dummy variable: 1 if "Children living at home".

• **Satisfied with life,** "How satisfied with life as a whole": 0 "Extremely dissatisfied" 10 "Extremely satisfied"; (V22 – "How satisfied are you with your life": 1 = "dissatisfied" 10 = "satisfied").

• **Confidence/satisfaction with government,** "How satisfied with the national government": 0 = "Extremely dissatisfied" 10 = "Extremely satisfied"; (V138 – "Confidence in government": 1 = "not at all" 4 = "a great deal").

• **Left/right scale,** "Placement on left/right scale": 0 = "Left" 10 = "Right"; ("V114" 1 = "Left" 10 = "Right").

• **Income should be made more equal,** "Government should reduce differences in income levels": 1 = "Disagree strongly" 5 = "Agree strongly"; ("V116" – "Incomes should be made more equal vs We need larger income differences as incentives": 1 = "We need larger income differences as incentive" 10 = "Income should be made more equal").

2. Other regressions

• **Δ Cyclically adj. primary deficit** (*), Change in the primary deficit corrected for the cycle, calculated as: percentage point change in the ratio of cyclically adjusted primary expenditures to potential GDP minus percentage point change in the ratio of cyclically adjusted government revenues to potential GDP.

• **GDP Growth – Table 1, 3-4 (*),** Rate of growth of real GDP, percent.

• **Growth of GDP per capita – Table 5 (****),** Rate of growth of GDP per capita.

• **Unemployment growth (*),** Growth of the unemployment rate, percent.

• **Inflation (*),** Rate of change of the GDP deflator, percent.

• **GDP growth dev. g7 (*),** Growth relative to the weighted average growth rate of the G7countries.

• **Unemployment growth dev. g7 (*),** Unemployment rate relative to the weighted average of the G7 unemployment rate.

• **Inflation dev. g7 (*),** Inflation rate relative to the weighted average of the G7 inflation rate.

• **Lagged debt (*),** Government gross debt as a share of GDP, lagged 1 period.

• **Political unrest,** It is defined as the sum of: 1. *General Strikes* (**): "Any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority"; 2. *Riots* (**): "Any violent demonstration or clash of more than 100 citizens involving the use of physical force"; 3. *Anti-government Demonstrations* (**): "Any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature."

• **Debt Crisis (***),** A dummy variable that equals one in the years of either an external or a domestic debt crisis, defined as follows: a) *External debt:* "A sovereign default is defined as the failure to meet a principal or interest payment on the due date (or within the specified grace period). The episodes also include instances where rescheduled debt is ultimately extinguished in terms less favorable than the original obligation"; b) *Domestic Debt Crisis:* "The definition for external debt applies. In addition, domestic debt crises have involved the freezing of bank deposits and or forcible conversions of such deposits from dollars to local currency."

Data and definitions from:

(*) Alesina et al. (2012); Raw Data Source: OECD Economic Outlook Database, no. 84; (**) Banks and Wilson (2012); (***) Reinhart and Rogoff (2011b).

(****) Persson and Tabellini (2009); Raw Data Source: Maddison, Angus (2001), *The World Economy: Historical Statistics*, OECD.

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Figures and Tables

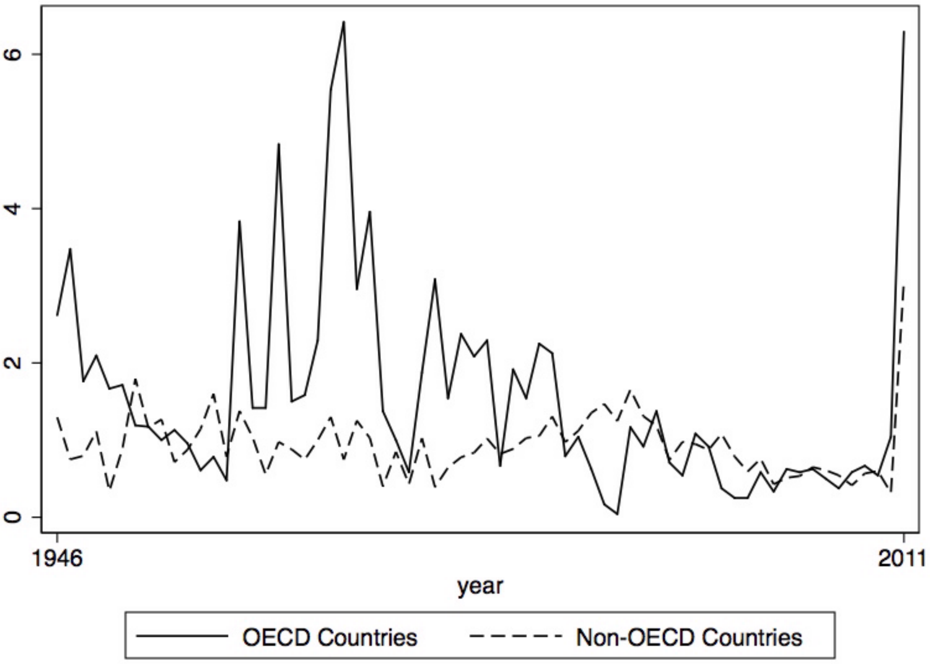

Figure 1: Political Unrest

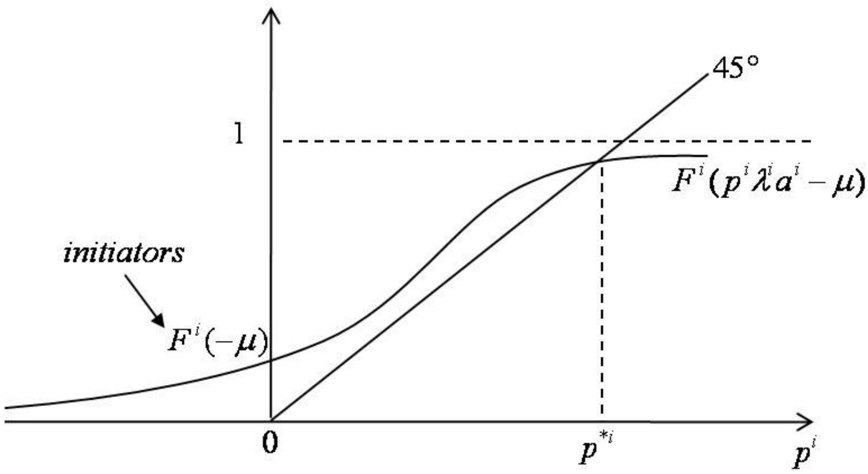

Figure 2: Equilibrium participation rate

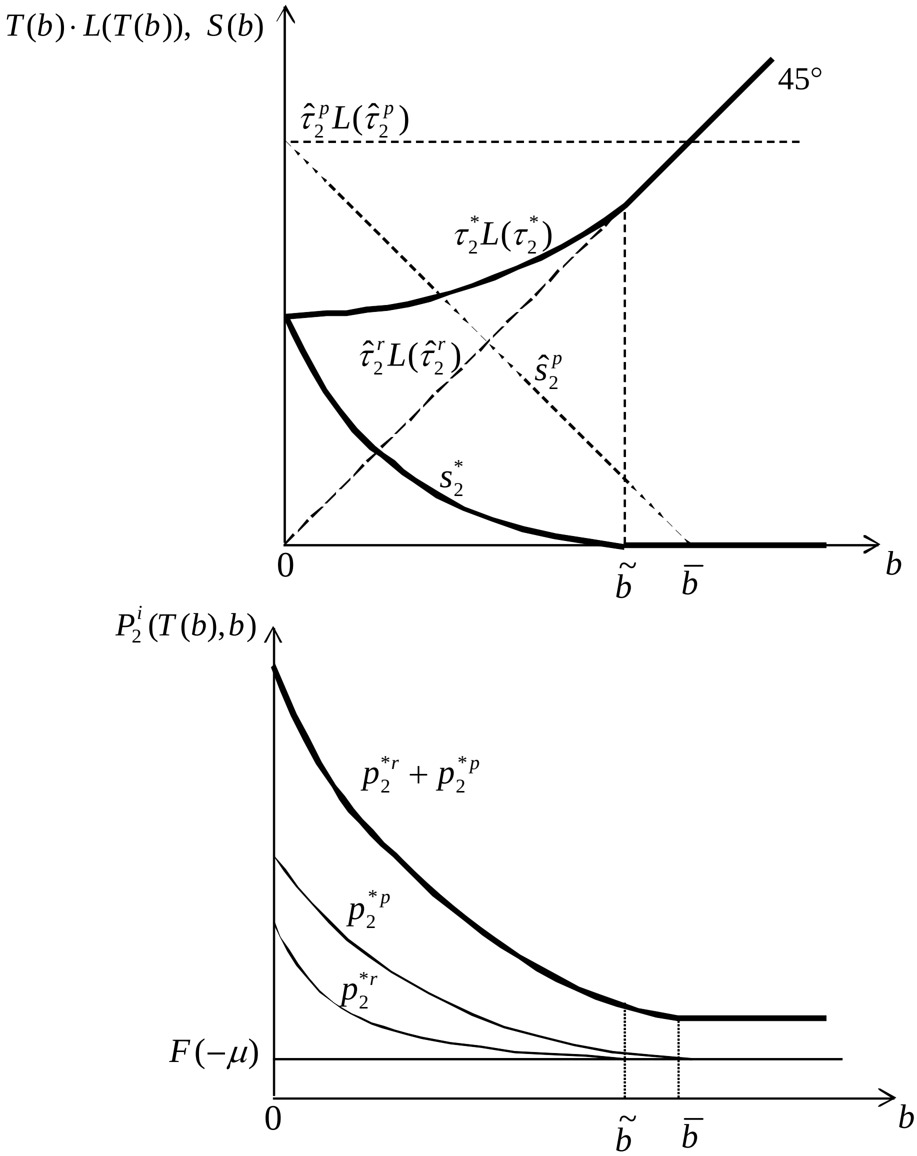

Figure 3: Taxes, subsidies, and riots in period 2.

Table 1: Political Unrest and Fiscal Retrenchments

Dependent variable	Political unrest		
	(1)	(2)	(3)
Δ cyclically adj. primary deficit	-0.20***	-0.19***	-0.30***
	(0.057)	(0.042)	(0.053)
GDP Growth	-0.04	0.01	-1.44
	(0.080)	(0.074)	(1.225)
unemployment growth	0.01	0.01	0.00
	(0.012)	(0.010)	(0.010)
inflation	0.04	-0.00	-0.03
	(0.031)	(0.040)	(0.035)
GDP growth dev. g7		-0.12***	1.37
		(0.036)	(1.261)
unemployment growth dev. g7		0.07	0.09**
		(0.055)	(0.042)
inflation dev. g7		0.10**	8.95
		(0.052)	(10.743)
Year Dummy variables	No	No	Yes
Observations	599	599	599
Number of countries	19	19	19
Estimation	Conditional Poisson Regression FE	Conditional Poisson Regression FE	Conditional Poisson Regression FE

Country FE always included
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2: Participants in Demonstrations

Dependent variable	Recent participation in lawful demonstrations	
	(1)	(2)
Primary education	- .06***	-.02***
	(.005)	(.002)
Tertiary education	.07***	.03***
	(.006)	(.002)
Age 30 or below	-.01*	.01***
	(.006)	(.002)
Age 50 or above	.004	-.002
	(.005)	(.002)
Male	.03***	.01***
	(.004)	(.001)
Income 30 percentile	.01	
	(.005)	
Income 70 percentile	-.001	
	(.005)	
Unemployed	.05***	.02***
	(.009)	(.003)
Workers	.04***	.02***
	(.006)	(.002)
Students	.06***	.06***
	(.011)	(.004)
Children at home	-.01**	-.001
	(.005)	(.001)
Satisfied with life	-.001	.001**
	(.001)	(.0003)
Confidence/satisfaction with government	-.01***	-.002***
	(.002)	(.0004)
Left/right scale	-.01***	-.01***
	(.001)	(.0003)
Income should be made more equal	.002***	.01***
	(.001)	(.001)
Autonomy index	.005***	
	(.002)	
Satisfaction with economy		.001*
		(.0004)
Satisfaction with democracy		.001*
		(.0004)
State of health services		.0004
		(.0004)
State of education		-.003***
		(.0004)
Discriminated group		.05***
		(.004)
Country fixed effect	Yes	Yes
Wave fixed effect	No	Yes
Pseudo R2	0.12	0.12
Observations	33481	121098
Survey	WVS	ESS
Estimation	Probit	Probit

Marginal effects reported
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Political Unrest, Fiscal Retrenchments, and Lagged Debt

Dependent variable	Political unrest		
	(1)	(2)	(3)
Δ cyclically adj. primary deficit	-0.24***	-0.22***	-0.38***
	(0.046)	(0.042)	(0.062)
lagged debt	-0.01**	-0.01***	-0.01**
	(0.005)	(0.005)	(0.005)
GDP growth	0.02	0.06	-1.79
	(0.075)	(0.071)	(1.158)
unemployment growth	0.02*	0.02*	0.02**
	(0.014)	(0.011)	(0.008)
inflation	0.01	0.03	0.06
	(0.025)	(0.060)	(0.042)
GDP growth dev. g7		-0.09**	1.82
		(0.042)	(1.200)
unemployment growth dev. g7		0.12**	0.16**
		(0.061)	(0.065)
inflation dev. g7		0.01	12.25
		(0.081)	(10.170)
Year Dummy variable	No	No	Yes
Observations	508	508	508
Number of countries	19	19	19
Estimation	Conditional Poisson Regression FE	Conditional Poisson Regression FE	Conditional Poisson Regression FE

Country FE always included
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Political Unrest and Fiscal Adjustments, in High and Low Debt Countries

Dependent variable	Political unrest					
	(1)	(2)	(3)	(4)	(5)	(6)
Δ cyclically adj. primary deficit	-0.06	-0.23***	-0.11	-0.19***	-0.09	-0.36***
	(0.13)	(0.04)	(0.11)	(0.04)	(0.09)	(0.05)
GDP growth	-0.26***	0.06	-0.30***	0.12*	-0.36***	0.35
	(0.07)	(0.09)	(0.09)	(0.07)	(0.12)	(0.23)
unemployment growth	-0.02**	0.03**	-0.02**	0.02***	-0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
inflation	0.07**	0.02	0.04*	-0.002	0.01	0.06
	(0.03)	(0.03)	(0.03)	(0.07)	(0.04)	(0.05)
GDP growthdev. g7			0.02	-0.12**	0.22	-0.32
			(0.08)	(0.06)	(0.15)	(0.27)
unemployment dev. g7			0.14**	0.14**	0.11	0.17**
			(0.06)	(0.06)	(0.09)	(0.07)
inflation dev. g7			0.14***	0.06	0.18**	-0.10
			(0.05)	(0.08)	(0.08)	(0.10)
Sample	Debt (t-1) Above 90%	Debt (t-1) Below 90%	Debt (t-1) Above 90%	Debt (t-1) Below 90%	Debt (t-1) Above 90%	Debt (t-1) Below 90%
Year Dummy variables	No	No	No	No	Yes	Yes
Observations	168	423	168	423	168	423
Number of countries	10	18	10	18	10	18
Estimation	Conditional Poisson Regression FE	Conditional Poisson Regression FE	Conditional Poisson Regression FE	Conditional Poisson Regression FE	Conditional Poisson Regression FE	Conditional Poisson Regression FE

Country Fixed effects always included
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Political Unrest and Sovereign Debt Crises

Dependent variable	Political unrest			
	(1)	(2)	(3)	(4)
year of debt crisis	0.31***	0.38***	0.36***	0.40**
	(0.111)	(0.139)	(0.132)	(0.158)
one year before crisis	0.02	0.05	0.12	0.13
	(0.114)	(0.118)	(0.127)	(0.136)
two years before crisis	0.35***	0.29***	0.39***	0.33***
	(0.086)	(0.102)	(0.111)	(0.105)
one year after crisis	0.08	0.08	0.05	0.04
	(0.147)	(0.159)	(0.161)	(0.170)
two years after crisis	-0.23*	-0.18	-0.28*	-0.21
	(0.133)	(0.124)	(0.148)	(0.132)
growth of GDP per capita	-0.03***	-0.04***	-0.03**	-0.04***
	(0.008)	(0.008)	(0.012)	(0.011)
Year fixed effects	No	Yes	No	Yes
Observations	3,381	3,381	2,798	2,798
N. of countries	60	60	60	60
Estimation	Conditional Poisson Regression FE	Conditional Poisson Regression FE	Conditional Poisson Regression FE	Conditional Poisson Regression FE

Country FE always included
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Sample period: columns (1) and (2): 1919-2000; columns (3) and (4): 1946-2000