Emotions and Political Unrest*

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Abstract

How does political unrest influence public policy, and which groups exert more influence through this channel? This is the question addressed in this paper. 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. Groups that are more ideological and homogeneous are more influential. Even if the government is benevolent and all groups are identical in their propensity to riot, 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 delay unpleasant policy choices because this mitigates social unrest. The evidence is consistent with these implications.

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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 There too the proposed legislation was soon withdrawn, to interrupt protests by angry taxi drivers who blocked traffic in Rome and other Italian cities. These anecdotes suggest that political unrest is often a major force shaping public policy even in advanced democracies. Despite external constraints and unsustainable status quo, such as during the Euro area sovereign debt crisis, democratically elected governments enjoying broad legislative support bend to the opposition of street rioters. Yet, this channel of political influence is often neglected by the literature. Except for a few contributions, most political economics has focused on voting and lobbying, ignoring 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, explaining how political unrest influences public policy and how this differs from voting and lobbying.[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 explore a way to escape the collective action problem. The mechanisms that we highlight can be a stepping stone to address other issues, such as how groups can be mobilized in non-democratic societies or during a civil war, and more generally 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, rather than by instrumental motives. 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.

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

[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.

expected participation is large, then more individuals are attracted to 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 that also takes into account the government constraints. Thus, policy entitlements provide reference points for individuals' feelings of aggrievement. They are endogenously determined in equilibrium, and change with the external situation. In particular, if the government becomes more constrained, individuals take this into account and adjust their entitlements accordingly.

In a dynamic framework, this has important 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 scale back their expectations 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 the policymaker to delay unpleasant policy choices. The reason is that delay forces individuals to become less demanding, and this mitigates social conflict.

Finally, we assume that there is a self-serving bias in moral judgements. Fairness is determined behind a veil of ignorance. But the veil is not thick enough to hide one's individual situation. Thus, policy entitlements are systematically tainted by selfish 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 decisions, 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 insights. First, even if the government is benevolent and all groups in society are identical in their propensity to riot, equilibrium policy can be distorted. This contrasts with standard models of probabilistic voting and lobbying, where equilibrium policy is undistorted if all groups are equally represented in politics (cf. Persson and Tabellini, 2000). The reason for this difference is a richer model of political participation, where participation is endogenous and reacts systematically to policy choices.

Second, and most novel, in a dynamic environment the threat of political unrest induces

an intertemporal distortion in economic policy. The reason is the resignation effect described above: for instance, even a benevolent government finds it optimal to accumulate an inefficient amount of public debt, in order to mitigate future unrest. This distortion is more pronounced if 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 instability (Woo, 2003). Such correlation in the data has traditionally been interpreted as reflecting myopia induced by the risk of alternation in government, as in Alesina and Tabellini (1987). Here government instability is ruled out by assumption, however, and the intertemporal distortion reflects a far sighted attempt by a benevolent policymaker to mitigate social conflict.[2]

Third, the framework uncovers additional sources of political influence. The more influential groups are those that can mobilize more easily. These tend to be more homogeneous groups, with more radical and ideological political preferences, and who have stronger feelings of policy entitlements. These features are consistent with a large sociological literature on social movements that stresses how strong shared emotions reinforce group identity and may trigger collective action - see the survey by Koopmans (2007). Some of these predictions are opposite to those emphasized by theories of probabilistic voting, where the influential groups are those with many "swing voters", i.e. centrist voters who are mobile across parties and who reward policy favors with their vote (e.g. Persson and Tabellini, 2000). Thus, different channels of political participation confer influence to different groups. More radical and ideological groups are less likely to influence policy at the ballot, but more likely to do so in the streets. Finally, the literature on lobbying is generally silent on which groups have the ability to get organized; if this question is addressed, the consensus is that small groups or highly concentrated industries are better able to overcome the free rider problem. Here instead larger groups can better exploit the complementarities and are more likely to engage in protests (see Koopmans, 1993 for supporting evidence).

We derive these results in a general theoretical framework, and then we illustrate the mechanisms at work in a simple model of social insurance and redistribution. Political unrest leads to two distortions: an excessive amount of redistribution towards sectors that are hit by adverse shocks, and an excessive accumulation of public debt. We also provide evidence consistent with some of these findings.

This paper is related to a large and extensive literature in several areas of social sciences. Ponticelli and Voth (2011) and Voth (2011) describe episodes of social unrest, with data going back to the prewar period and with a special focus on Europe and Latin America. They

[2] 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 asymmetric information. Here instead there is no information asymmetry and a single policymaker is in charge of all policy decisions.

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 policy draws many more people in the streets compared to other political causes.[3] We use some of these data to test some implications of our model in section 4.

Our model of individual participation in riots extends the framework pioneered 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 (2014) 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 and to take "revenge", is present in a number of recent economic studies. Hart and Moore (2008) point to the role of complete contracts as reference points that reduce costly misunderstanding within organizations, and Fehr et al. (2011) 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, and Di Tella and Dubra (2009) explore the implications of a similar idea for the regulation of monopoly. A large empirical literature in psychology argues that perceived unfairness is a major instigator of anger and violence.[5] These ideas have been used by social psychologists to explain social movements as emotional phenomena (cf. Gould, 2004, Jasper 1997, and the relative-deprivation theory by Gurr, 1970).

In our model individuals have expectations about a fair policy and a corresponding level of entitled utility in every state of the world. Thus the fair policy is a reference point against which to assess actual policies. This ties our model to regret theory (Sugden, 2003) and, in general, to the recent literature on endogenous and stochastic reference points (Shalev, 2000; Koszegi and Rabin, 2006). Like in some of these papers, our reference point is endogenous

[3] 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).

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

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

and it is part of the equilibrium. The precise definition of the reference point differs from that in the literature, however, because here it has a normative interpretation related to fairness. In this, our paper resembles Akerlof (1982).

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). This reaction is consistent with the classical Frustration-Aggression paradigm in psychology, 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). Battigalli et al. (2015) 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.

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; Ubeda, 2013). 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 lays out the general theoretical framework in a static setting and illustrates the mechanisms at work in a simple example of social insurance and redistribution. Section 3 extends the analysis to an intertemporal setting, both in general and in the model of social insurance, and illustrates how the resignation effect can lead to the accumulation of public debt. Section 4 presents some evidence consistent with the general implications of the model. Section 5 concludes.[6]

2 A static model

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

[6] An Online Appendix contains the proofs of propositions and lemmas, computations for comparative statics, data sources and variable definitions.

the indirect utility function $V^i(q,\theta)$, where q is the policy, θ is a state variable and $V^i(.)$ a concave function.

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, $p^i = P^i(q,\theta)$.

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 welfare loss 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. A literal interpretation is that the government is benevolent and riots inflict a material loss of social welfare.[7] The probability $P^i(.)$ can also be interpreted as the risk that a critical threshold is reached, beyond which something costly happens: a government crisis, or a deep political crisis that could undermine the values and social norms that support any well functioning democracy. Yet another interpretation is that the government is opportunistic or politically motivated, and 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). 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 salience of issues that otherwise would be neglected by voters (Marcus et al., 2000).

[7] Collins and Margo (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. DiPasquale and Glaeser (1998) documented that the L.A. riots in 1992 resulted in 52 deaths, $2,500$ injuries and at least \$446 million in property damages.

In this paper we retain the interpretation of a benevolent government who wants to mitigate the social disruptions caused by political unrest, without modelling explicitly what these costs are. We focus instead 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.[8]

2.1 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 frustration caused by the policy, or of contributing to take a revenge on an unfair government. Thus, rioting is like a punishment strategy in the anger games of Battigalli et al. (2015), namely a costly action that is taken not for instrumental reasons, but to "take revenge" or to display anger for an unfair outcome (see also Gurr, 1970; Koopmans, 2001; Jasper, 1997; Gould, 2004). This formulation allows us to abstract from the free rider problem in collective action, because the benefit of riots is purely psychological and non-instrumental.

We refer to the psychological benefit of rioting, denoted a^i, as the aggrievement caused by the policy to members of group i, because we assume that this benefit is related to the emotion of being the victim of an unfair treatment. The next subsection derives individual aggrievements from an explicit formulation of individual expectations of what constitutes a fair policy.

Joining a riot also entails 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 individuals, and reflects external conditions such as 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 superscript ij 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.[9]

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 is a plausible assumption, although it is not necessary for the results that follow. As explained below, aggrievement is an individual emotion, but it is related to the feeling that

[8] 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.

[9] DiPasquale and Glaeser (1998) found that opportunity cost of time and potential cost of punishment, which may be different across individuals, had a relevant influence on the incidence of L.A. riots.

the group to with which the individual identifies is treated unfairly. Hence, the psychological benefit of a public display of anger is likely to be stronger if more group members join, because this indicates a more widely shared emotion. Moreover, participation could proxy for the probability that a critical threshold is reached, beyond which a political crisis or a policy reversal takes place (as in Atkeson, 2000); in this interpretation, the complementarity captures the idea that the individual feels that he is contributing to a more meaningful event with a greater chance of success. Equivalently the complementarity could also be on the cost side: the probability of being arrested is smaller in a larger crowd.[10]

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 $\varepsilon^{ij} \leq p^i \lambda^i a^i - \mu$. This occurs with probability $\Pr(\varepsilon^{ij} \leq p^i \lambda^i a^i - \mu) \equiv F^i(p^i \lambda^i a^i - \mu)$. The fraction of individuals who participate is given by this probability, or:

$$p^i = F^i(p^i \lambda^i a^i - \mu) \tag{3}$$

The equilibrium participation rate in group i, p^{*i}, is a fixed point of (3) such that $p^{*i} \in [0, 1]$.

To ensure existence of an equilibrium with $1 > p^{*i} > 0$, we assume that for all i 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:

$$F^i(-\mu) > 0 \qquad F^i(\lambda^i a^i - \mu) < 1 \qquad \text{for all } i \text{ and all values of } a^i \tag{A1}$$

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 each group, at least in a neighborhood of the equilibrium participation rate p^{*i}. Specifically, we assume that in a neighborhood of all fixed points p^{*i}, for all i and all parameter values (and in particular all a^i),

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

We then have (see also the Online Appendix):

[10] Note that this formulation neglects possible strategic interactions between groups: if the policy opposed by group i is advocated by other groups (or viceversa), a wider participation in other groups could influence my willingness to participate in a riot, because it might affect the probability of success of the collective action, or my feeling of group identity. We leave these considerations to future extensions.

Lemma 1 *If (A1) holds, then an equilibrium participation rate,* $1 > p^{*i} > 0$ *exists. The equilibrium is unique if (A2) also holds.*

Figure 1 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) and by continuity, $F^i(.)$ 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.[11]

Figure 1 here

From here onwards, to simplify the computations we let $F^i(.)$ be a uniform distribution with mean 0 and density $1/2\sigma^i$. To satisfy assumptions (A1) and (A2), we assume throughout that $\sigma^i > Max[\mu, \lambda^i a^i - \mu]$ for all i and all a^i. By Lemma 1 and by (3) and exploiting the uniform distribution, we can express equilibrium participation as an increasing function of group aggrievement:

$$p^{*i} = H^i(a^i) = \frac{(\sigma^i - \mu)}{2\sigma^i - \lambda^i a^i} \tag{4}$$

where $\partial p^{*i}/\partial a^i \equiv H^i_a > 0$. 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. Moreover this derivative is larger (and hence participation is more sensitive to aggrievement) if:

- a^i and λ^i are large. This is how complementarity leads to amplification. If an agent knows that more people are involved, he/she draws a stronger net benefit from participation. Thus, participation reacts to aggrievement at an increasing rate. Moreover, the aggrievement of large groups is more easily transformed into riots. This prediction follows immediately from our assumptions but is the opposite of 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 larger groups (Ponticelli and Voth, 2011; Koopmans, 1993).

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

- σ^i is small: when aggrievement increases, more people are sucked into participation at the margin if the density $1/2\sigma^i$ is high. In other words, as group heterogeneity decreases, the amplifying effect of complementarity becomes stronger and participation becomes more sensitive to aggrievement.

2.2 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.

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. Entitlements are not arbitrary: they are derived from a rational and internally consistent view of the world, although they are tainted by self-serving bias.[12]

Let $\hat{q}^i = Q^i(\theta)$ be the policy deemed fair by group i in state θ (henceforth the "subjectively fair" 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, subjectively fair policies are computed behind a distorted veil of ignorance. Specifically $\hat{q}^i$ maximizes a distorted welfare function $W^i(q,\theta)$ defined as $W(.)$ in (1), except that group i receives weight $\pi^{ii} = \lambda^i(1+\delta^i)$, while all other groups $\kappa \neq i$ receive weight $\pi^{ik} = \lambda^k(1-\delta^i)$:

$$W^i(q,\theta) = \textstyle\sum_k \pi^{ik} V^k(q,\theta) \tag{5}$$

The parameter $\delta^i \in (0,1)$ captures 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. The subjectively fair policy implies a reference (or entitled) utility, $R^i(\theta) = V^i(\hat{q}^i,\theta)$, 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 $R^i(\theta)$, and aggrievement increases in their sense of deprivation. Specifically, we assume that:

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

[12] 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; van Stekelenburg and Klandermans, 2010).

where $\omega^i > 0$.[13]

Note that, if at least one group in society is distorted by self-serving bias (if $\delta^i > 0$ for some i), then entitlements cannot 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. Note also that, in computing fair policies, individuals neglect the riots that may be triggered by such policies. Thus reference utilities are based on policies that are deemed fair, but not necessarily politically feasible.

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

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

Thus, government policy affects riot 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. $R^i(\theta) > V^i(q,\theta)$). As the policy becomes more favorable to that group (i.e. if $V^i_q > 0$), their aggrievement is reduced (since $A^i_q = -\omega^i[R^i(\theta) - V^i(q,\theta)]V^i_q < 0$). This in turn entails lower riot incidence (since $H^i_a > 0$). Therefore, $P^i_q < 0$ 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 (for instance because it has larger parameters ω^i and δ^i, or because policy is less favorable to that group), and if participation is more sensitive to aggrievement (if H^i_a is larger).

2.3 Equilibrium

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

Definition 1 *An equilibrium consists of a vector of subjectively fair policies, $\{\hat{q}^i\}$, and corresponding reference utilities, $\{R^i(\theta)\}$, 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 reference utility $R^i(\theta)$, and the equilibrium participation of other group members, p^{*i}.
iii) Government policy maximizes the social welfare function inclusive of riot costs (2), taking

[13] The results go through with a more general function than quadratic, including a general convex function and a linear function. See footnote 14 below.

as given the groups' reference utilities $\{R^i(\theta)\}$*, and taking into account how the policy affects equilibrium participation through (7).*

We can easily characterize the equilibrium policy. Maximization of (2) yields the first order condition:

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

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:

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

where $\Phi^i = \omega^i[R^i(\theta) - V^i(q, \theta)]$ if group i is aggrieved, and $\Phi^i = 0$ otherwise. Equation (10) provides a full characterization of the equilibrium policy (the Online Appendix verifies the second order conditions).

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 protests. In these settings too, the equilibrium solves a modified social planner's problem, where group weights reflect their political influence. 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 group is not aggrieved at the equilibrium policy. 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, σ^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. That group would be not aggrieved, and its weight $\varsigma^k H_a^k \Phi^k$ would be zero. But then, at the margin the government would find 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. 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.[14] The next subsection illustrates an example of this situation.

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

- A greater ability to mobilize their members in collective action (high H_a^i). As discussed above, participation is more responsive to aggrievement in larger and more homogenous groups (high λ^i and low σ^i). This is the opposite of models of lobbying, where it is generally argued that smaller groups can more easily overcome the free rider problem, and homogeneity plays no role.

- More extreme reference utilities (high δ^i) and a stronger sense of entitlements (high ω^i). Larger values of these parameters imply that the the group is more aggrieved (in a neighborhood of the efficient policy q^0). And aggrievement is a source of political influence, because it makes riot participation more sensitive to policy (P_q^i is larger). This happens for two reasons. First, more aggrieved groups are easier to mobilize (H_a^i is higher if aggrievement is more intense). Second, more aggrieved groups are more responsive to favorable policy changes (because Φ^i is increasing in the gap between reference and actual utility). Hence, more radical and ideological groups, who are more uncompromising and have more extreme views of what is a fair policy, are also more threatening and hence influential. This is in contrast to models of probabilistic voting, where instead the more influential groups are those with more swing voters (i.e. ideologically neutral citizens who don't have strong party preferences and are ready to vote for whoever provides policy favors - cf. Persson and Tabellini, 2000 and Dahlberg and Johansson, 2002). Note that this contrast is not due to the specific form of participation (voting vs protest), but to the different behavioral assumptions. Probabilistic voting assumes that voters trade off party vs policy preferences. Here instead riot participation is driven by aggrievement, which is larger in groups with more extreme reference points (high δ^i) or who feel stronger about their entitlements (high ω^i).

- A greater ability to inflict social cost (large ς^i). Groups whose protests have more destructive effects on society, such as truck or taxi drivers, receive more favorable treatment

[14] Note that this result does not hinge on the assumption that aggrievement is a quadratic function of $R^i - V^i$, and it would hold also for a linear function, say $a^i = Max[0, \omega(R^i - V^i)]$. In this case Φ^i would be the same for all aggrieved groups. However, since H_a^i is increasing in a^i, the more aggrieved groups are more responsive to the policy at the margin. Thus, the government's incentive to favor these groups would still exist.

by a benevolent government.

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. Section 4 discusses other supporting evidence from opinion polls.

2.4 Social insurance and redistribution

This section illustrates the political forces described above with a specific example. We show how the threat of political unrest shapes the design of social insurance, resulting in an excessive amount of redistribution. This also introduces a simple model that will be extended to study intertemporal policies in the next section.

A simple model of social insurance The economy consists of two equally sized sectors, indexed by $i = 1, 2$. Individuals are risk neutral and draw utility from consumption and disutility from labor:

$$v^i = c^i - U(l^i)$$

where c is consumption, l is labor, and $U(l)$ is an increasing and convex function with $U(0) = 0$.[15]

Let θ^i denote labor productivity in sector i, with labor being the only factor of production. The government can levy a linear income tax τ^i and provide a non-negative lump sum transfer s^i to either sector. Thus, the budget constraint of individuals in sector i is:

$$c^i = \theta^i l^i (1 - \tau^i) + s^i$$

For simplicity, we assume that θ^i is random, with $\theta^i \in \{0, 1\}$, and there is no aggregate risk. Thus, $\theta^i = 1 - \theta^k = \theta$ for $k \neq i$. The random variable θ equals 1 or 0 with the same probability 1/2. 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). The government observes the realization of θ and sets policy. It can easily be verified that in equilibrium the

[15] To ensure that the optimal taxation problem described below is well behaved, throughout we assume that $U_{lll} > 0$.

government only provides transfers (if any) to the poor sector. Hence, to simplify notation from here on we denote by $s = \tau L(\tau)$ the (non-negative) lump sum transfer to the poor sector, where $l^* = L(\tau)$ is labor supply, and disregard transfers to the rich sector.[16]

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

$$V^r(\tau) = l^*(1-\tau) - U(l^*), \qquad V^p(\tau) = \tau L(\tau) \tag{11}$$

and aggregate economic welfare, $W(\tau)$ is:

$$W(\tau) \equiv \frac{1}{2}V^r(\tau) + \frac{1}{2}V^p(\tau) = \frac{1}{2}[l^*(1-\tau) - U(l^*) + \tau L(\tau)] \tag{12}$$

In the absence of any political constraints, the efficient policy in this setting maximizes $W(\tau)$. Given risk neutrality and distorting taxes, it can easily be shown that the efficient policy entails no policy intervention: $\tau^0 = s^0 = 0$. Of course, the result that no government intervention is socially optimal, is an artifact of the model. Together with the assumption of a benevolent government, however, it allows us to abstract from any reason to make transfers, other than the curbing of political unrest.

The timing of events and the equilibrium are as described in the previous subsection. Having observed the state θ, individuals form expectations of fair policies $\hat{\tau}^i$ and derive the corresponding reference utilities R^i. The government then sets policy τ and individuals choose whether to riot. 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, the sensitivity of aggrievements, ω, and the density parameter σ.

Fair policies Having observed the realization of the shock θ that tells them whether they are poor or rich, individuals form expectations about the policy that they deem fair, $\hat{\tau}^i$. They maximize the following modified social welfare function:

$$W^i(\tau) \equiv \pi^{ir} \cdot [l^*(1-\tau) - U(l^*)] + \pi^{ip} \cdot \tau L(\tau), \qquad i = r, p \tag{13}$$

where $\pi^{ik} = \frac{1}{2}(1+\delta)$ if $i = k$, and $\pi^{ik} = \frac{1}{2}(1-\delta)$ if $i \neq k$ $(i, k = r, p)$. Given risk neutrality and distorting taxes, we have:

Lemma 2 *For the rich, the fair tax rate is zero: $\hat{\tau}^r = 0$. For the poor, the fair tax rate is an increasing function of their self-serving bias, δ and it is strictly positive if $\delta > 0$: $\hat{\tau}^p = T^p(\delta) > 0$ and $T^p_\delta(\delta) > 0$.*

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

Proof. By the envelope theorem, the optimality condition which pins down subjectively fair policies is ($i = r, p$):

$$-\pi^{ir} l^* + \pi^{ip}(\tau L_\tau(\tau) + l^*) \leq 0 \tag{14}$$

with strict inequality implying $\tau = 0$. For $i = r$, inequality (14) is always strict since $\pi^{rr} > \pi^{rp}$ and $L_\tau < 0$. Thus, the rich want zero taxes: $\hat{\tau}^r = 0$. Next, consider $i = p$. Since $\pi^{pr} > \pi^{pp}$, now (14) holds with equality and pins down $\hat{\tau}^p$. After some algebraic manipulation, (14) can be rewritten as $\eta(\hat{\tau}^p) = 2\delta/(1+\delta)$, where $\eta(\tau) = -\tau L_\tau(\tau)/L(\tau) > 0$ is the elasticity of labor supply, with $\eta_\tau(\tau) > 0$. Thus, $\hat{\tau}^p = T^p(\delta)$, with $\hat{\tau}^p = T^p(\delta) > 0$ if $\delta > 0$ and $T^p_\delta(\delta) > 0$. ■

This result is quite intuitive. Recall that the efficient policy entails no subsidies for the poor. A fortiori, this is also the policy deemed fair by the rich, given that their weight on the poor is smaller than for a utilitarian social planner. Moreover, at $\tau = 0$ there are no distortions. Hence, even an infinitesimal self-serving bias induces the poor to demand some redistribution. As δ rises, the weight on the poor in the modified welfare function increases, and so does the desired tax rate.[17]

Aggrievements and riots Equilibrium riots are obtained as in the previous subsection, through a series of steps. First, the subjectively fair policies imply corresponding reference utilities for both sectors, R^i. Second, aggrievements are obtained, as a function of the difference between reference and actual utilities, as in (6): $a^i = A^i(\tau)$. By (4), $P^i(\tau)$ then has the following properties (see the Online Appendix):

Lemma 3 *$P^p_\tau \leq 0 \leq P^r_\tau$, with strict inequality if and only if sector i is aggrieved (i.e. if and only if $\tau < T^p(\delta)$ and $\tau > 0$ respectively).*

Quite intuitively, the poor are aggrieved if they do not get the positive subsidy they feel entitled to. Conversely, the rich feel aggrieved if taxes are raised above 0. As τ rises, aggrievement and riot participation decrease in the poor sector while they increase amongst the rich.

Equilibrium policy We are now ready to describe the equilibrium. The government maximizes social welfare inclusive of the social cost of riots, $W(\tau) - \frac{\varsigma}{2}[P^p(\tau) + P^r(\tau)]$, where $W(\tau)$ is defined in (12), and $P^i(\tau)$ in (4), with $\lambda^i = 1/2$. The optimality condition is:

$$\tau L_\tau(\tau) = \varsigma[P^p_\tau(\tau) + P^r_\tau(\tau)] \tag{15}$$

[17] It is easy to show that the rich also never want a subsidy directed towards themselves, since they are the only ones to pay for that subsidy and taxes are distorting.

Thus, the government trades off tax distortions against riot mitigation. Equation (15) implicitly defines the equilibrium tax rate, τ^*. We have (see the Online Appendix for a formal proof):

Proposition 2 *In equilibrium* $\hat{\tau}^p > \tau^* > 0$ *and the poor protest more than the rich:* $p^{*p} > p^{*r}$.

As explained more generally in the previous subsection, the equilibrium tax rate is positive because, at the efficient policy ($\tau^0 = s^0 = 0$) only the poor are aggrieved, so that by Lemma 3, $P^r_\tau = 0$ and $P^p_\tau < 0$. Thus, at $\tau = 0$ the RHS of (15) is negative. Hence, this cannot be an equilibrium and 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). 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, the equilibrium policy is distorted away from economic efficiency.

Despite the positive equilibrium tax rate, the poor protest more than the rich. This again follows from (15). Since the RHS of (15) is negative, it must be that $|P^p_\tau| > P^r_\tau$, which given the symmetry of the model also implies $p^{*p} > p^{*r}$. 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 below.

Finally, and as pointed out in the previous subsection, 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 if unrest by the rich becomes more threatening. In particular, suppose that we vary these parameters separately for the rich and poor sectors. The Online Appendix shows that, at an interior optimum, equilibrium taxes and subsidies 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).

3 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 actual as well as reference utilities, with non trivial effects on riot participation. In particular, groups can become resigned or entrenched depending on how the state

variable affects their entitlements. These dynamic effects in turn shape the policymaker's intertemporal incentives, giving rise to seemingly myopic policies.

3.1 The general framework

This subsection presents the general framework and defines the equilibrium. The characterization of the equilibrium is derived in the next subsection, in the context of the previous example of social insurance.

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, b is a policy variable in period 1, but it is predetermined in period 2. 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 over 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:

$$E_{\theta_2} \sum_t \sum_i W_t(q_t, b, \theta_t) - E_{\theta_2} \sum_t \sum_i \lambda^i \varsigma^i P_t^i(q_t, b, \theta_t) \tag{16}$$

where $W_t = \sum_i \lambda^i V_t^i(q_t, b, \theta_t)$ captures the direct welfare effects of the policies.[18]

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 subjectively fair policies determine the corresponding reference utilities for the current period.

- The government sets actual policies.

- Individual aggrievements are determined, and individuals decide whether to riot.

Individuals fully take into account all information that is available at each node of the game. In particular, they are rational and sophisticated also when forming their expectation of fair policies. Thus, in each period subjectively fair policies are sequentially rational and maximize expected residual lifetime utility from that period onwards, behind the usual distorted veil of ignorance but correctly taking into account equilibrium outcomes 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 fair policies for group i, $\hat{q}_1^i = Q_1^i(\theta_1)$ and $\hat{b}^i = B^i(\theta_1)$, maximize the following modified

[18] Note that the expectations operator in (16) is relative to θ_2 only, since in period 1 the government, and the individuals, observe the realization of θ_1 and form expectations about future shock, θ_2.

social welfare function:

$$\sum_{k=1}^{N} \pi^{ik} V_1^k(q_1, b, \theta_1) + \sum_{k=1}^{N} \pi^{ik} E_\theta V_2^k[G(b,\theta), b, \theta] \tag{17}$$

where as above the weights π^{ik} capture i's distorted sense of fairness: $\pi^{ik} = \lambda^k(1+\delta^i)$ if $\kappa = i$, and $\pi^{ik} = \lambda^k(1-\delta^i)$ if $\kappa \neq i$. Thus, the right hand side of (17) 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 $q_2^* = G(b, \theta_2)$.[19]

Similarly, in period 2 the fair policy for group i, $\hat{q}_2^i = Q_2^i(b, \theta_2)$, maximizes:

$$W_2^i(q_2, b, \theta_2) = \sum_{k=1}^{N} \pi^{ik} V_2^k(q_2, b, \theta_2) \tag{18}$$

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 subjectively fair policies imply corresponding reference residual lifetime utilities (denoted with R_t^i) in each period:

$$R_1^i(\theta_1) = V_1^i(\hat{q}_1^i, \hat{b}^i, \theta_1) + E_\theta V_2^i(G(\hat{b}^i, \theta), \hat{b}^i, \theta) \tag{19}$$

$$R_2^i(b, \theta_2) = V_2^i(\hat{q}_2^i, b, \theta_2) \tag{20}$$

Note that period 2 reference 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 $R_{2b}^i(b, \theta_2)$ plays an important role in the analysis below. If $R_{2b}^i < 0$, accumulation of the state variable b reduces reference utility, making individuals in group i willing to accept a lower level of welfare without feeling aggrieved (and vice versa if $R_{2b}^i > 0$). For this reason, we refer to $R_{2b}^i < 0$ as a "resignation effect".

If actual utilities fall short of these reference points, then individuals are aggrieved, as in

[19] Here we assume that, when forming subjectively fair policies, individuals disregard the cost of future equilibrium riots, although they do take into account that future government policy will be set according to the equilibrium function $q_2^* = G(b, \theta_2)$. Nothing important hinges on this simplifying assumption. In fact, the result on over-borrowing described in the next subsection would be strenghtened under the alternative assumption that groups internalize the cost of future riots when setting $\hat{b}^i$.

the static model. Thus aggrievements in periods 1 and 2 respectively are:

$$A_1^i(q_1, b, \theta_1) = \frac{\omega}{2} Max[0,\ R_1^i(\theta_1) - V_1^i(q_1, b, \theta_1) - E_\theta V_2^i(G(b,\theta), b, \theta)]^2 \quad (21)$$

$$A_2^i(q_2, b, \theta_2) = \frac{\omega}{2} Max[0,\ R_2^i(b, \theta_2) - V_2^i(q_2, b, \theta_2)]^2 \quad (22)$$

Several things are worth noting here. (i) Individuals are forward looking, and their aggrievement takes into account both current and future expected welfare relative to their reference point. Thus, a policy (such as government borrowing) that increases current welfare but reduces future welfare can still cause aggrievement in period 1 if it reduces overall expected utility below R_1^i. (ii) In evaluating future expected welfare (reference and actual), individuals correctly take into account all future implications of current policy choices along the equilibrium path. Thus, the intertemporal policy deemed fair, $\hat{b}^i$, takes into account how future equilibrium policies will respond to b (through $q_2^* = G(b, \theta_2)$). And so does the welfare evaluation of actual policies (the last term on the RHS of (21). (iii) As noted above, the endogenous predetermined variable b affects period 2 aggrievements through both reference and actual utility. Thus, it is entirely possible that in period 2 individuals will not be aggrieved by a loss of welfare due to the state variable b, if this welfare loss was deemed unavoidable and also reduced their reference utility - this is the resignation effect noted above. Of course, the anticipation of a future welfare loss would cause aggrievement in period 1, as captured by the last term on the RHS of (21).

This formulation thus imposes a considerable amount of rationality and sophistication in the emotional reaction that triggers riots. This captures the idea that, although frustration due to unfair treatment is an emotional reaction, fairness is firmly based on rational and analytical criteria.[20]

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 $p_t^{*i} = P_t^i(q_t, b, \theta_t)$.

Definition 2 *The equilibrium is a vector of subjectively fair policies* $\left\{\hat{q}_t^i, \hat{b}^i\right\}$ *and corresponding reference utilities,* $\{R_t^i\}$*, of participation rates,* $\{p_t^{*i}\}$*, and of actual policies* $\{q_t^*, b^*\}$*, such that:*

In period 1:

[20] A previous version considered a simpler set up, where aggrievement results from the gap between current (as opposed to lifetime) reference vs actual utilities. The results were qualitatively similar, and starker in some respects (see further below). This set up with "myopic" aggrievements is consistent with the idea that individuals are subject to a kind of projection bias (Loewenstein and Adler, 1995) and may be unable to predict their feelings against future unfair treatment. A large experimental literature in behavioral economics shows that individuals are incapable to predict their future emotions, and that the time span of emotional reactions is quite short - see DellaVigna (2009) for a survey and extensive references.

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, (17), 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 riot, given the equilibrium policy $\{q_1^*, b^*\}$, the group's reference utility $R_1^i(\theta_1)$, and the equilibrium participation of other group members, p_1^{*i}.
iii) The equilibrium policies $\{q_1^*, b^*\}$ maximize the overall social welfare function, (16), taking as given the groups' reference utilities $\{R_1^i(\theta_1)\}$, 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 subjectively fair policies $\{\hat{q}_2^i\}$ maximize the modified social welfare functions of each group, (18).
ii) Within each group i, all members optimally choose whether to riot, given the equilibrium policy $\{q_2^*\}$, the group's reference utility $R_2^i(b, \theta_2)$, and the equilibrium participation of other group members, p_2^{*i}.
iii) The equilibrium policy $\{q_2^*\}$ maximizes overall social welfare in (16), taking as given the groups' reference utilities $\{R_2^i(b, \theta_2)\}$, and taking into account how the policy affects equilibrium participation in current riots.

3.2 Public debt

We now illustrate this equilibrium in a dynamic version of the previous model of social insurance. The main result is that here the threat of unrest also gives rise to an intertemporal distortion. The government deviates from perfect tax smoothing and issues more public debt than economically efficient. The reason is the resignation effect discussed above: issuing debt enables the government to expand redistribution today, thus pleasing the poor, while making the entire society less demanding (and hence less rioting) in the future. Note that individuals fully understand that issuing debt entails a reduction in future expected welfare, and for this reason the rich become more aggrieved in the current period. But this is more than offset by the reduction of future social conflict.

3.2.1 The economy

Consider the same economy as in subsection 2.4, except that here there are two periods, $t = 1, 2$. We assume no discounting. Thus utility of individual i in period t is $v_t^i = c_t^i - U(l_t^i)$, his lifetime utility is $v_1^i + v_2^i$ and his lifetime budget constraint is:

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

where $\theta_t^i \in \{0,1\}$ is the serially uncorrelated shock to sector i in period t.[21]

As in the static model, in equilibrium the rich sector receives no subsidy. Hence, from here on we drop the i superscript from s_t and we denote the rich and poor sector by $i = r, p$ respectively. The only difference from subsection 2.4 is that now 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. Thus, we implicitly assume that default costs are so high that defaulting on the government debt is not an option. With this notation, the government budget constraint in periods 1 and 2 respectively can be written as

$$s_1 = \tau_1 L(\tau_1) + b \qquad\qquad s_2 = \tau_2 L(\tau_2) - b \tag{23}$$

The non-negativity constraint on s_2 also implies that $\tau_2 L(\tau_2) \geq b$. The indirect utility function of the rich and poor individuals thus are given by:

$$V_t^r(\tau_t) = l_t^*(1-\tau_t) - U(l_t^*) \qquad t = 1,2 \tag{24}$$

$$V_1^p(\tau_1, b) = \tau_1 L(\tau_1) + b, \qquad V_2^p(\tau_2, b) = \tau_2 L(\tau_2) - b \tag{25}$$

where $l_t^* = L(\tau_t)$ is labor supply at time t. Aggregate economic welfare in period t is defined in the usual way, namely:

$$W_t(\tau_t, b) \equiv \frac{1}{2} V_t^r(\tau_t) + \frac{1}{2} V_t^p(\tau_t, b) \tag{26}$$

It is easy to show that, in the absence of any political constraints, the efficient policy continues to entail no policy intervention and no public debt: $\tau_t^0 = s_t^0 = b^0 = 0$.

The timing of events and the equilibrium are as described in the previous subsection. 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 reference utilities R_t^i. The government then sets current policy. Having observed the policy, individuals choose whether to riot. We now characterize the equilibrium, working backwards from period 2.[22]

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

[22] Note the asymmetry: the government can commit to repay its debt obligations, while fiscal policy is chosen sequentially. This assumption is common in the literature on public debt accumulation. It reflects the idea that breaking a formal contractual obligation is more costly and more difficult than modifying a policy already in place. In this context, however, the assumption has additional implications. If debt default was a conceivable policy option, then some groups may conceive it as a fair policy and the resignation effect could be mitigated.

3.2.2 Period 2

Fair policies, aggrievements and riots 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 fair policy, $\hat{\tau}_2^i$, maximizes the following modified social welfare function, subject to $\tau_2 L(\tau_2) \geq b$:

$$W_2^i(\tau_2, b) \equiv \pi^{ir} \cdot [l_2^*(1-\tau_2) - U(l_2^*)] + \pi^{ip} \cdot [\tau_2 L(\tau_2) - b], \qquad i = r, p \tag{27}$$

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

Repeating the steps of Lemma 2, the rich 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 $\hat{\tau}_2^r L(\hat{\tau}_2^r) = b$ and it is increasing in b. What about the policy deemed fair by the poor, $\hat{\tau}_2^p$? Suppose that b is sufficiently small, so that the fair policy is an interior optimum of the poor's modified social welfare function (27). Then, $\hat{\tau}_2^p = T^p(\delta)$, where $T^p(.)$ is the same function as in Lemma 2. The corresponding fair subsidy is then obtained from the government budget constraint, (23): $\hat{s}_2^p = \hat{\tau}_2^p L(\hat{\tau}_2^p) - b$. This fair policy is consistent with positive subsidies for $b < \bar{b}$, where

$$\bar{b} \equiv T^p(\delta) \cdot L(T^p(\delta)) \tag{28}$$

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 subjectively 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 4 *The period 2 policy deemed fair by the rich is* $\hat{s}_2^r = 0$ *and* $\hat{\tau}_2^r = T^r(b)$*, with* $T_b^r(b) > 0$*. If* $b \geq \bar{b}$*, this is also the subjectively 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* $\hat{s}_2^p = \hat{\tau}_2^p L(\hat{\tau}_2^p) - b$*.*

These fair policies imply corresponding reference utilities for both sectors,

$$R_2^r(b) = \hat{l}_2^r(1 - T^r(b)) - U(\hat{l}_2^r) \tag{29}$$

$$R_2^p(b) = \hat{\tau}_2^p L(\hat{\tau}_2^p) - b \tag{30}$$

where $\hat{l}_2^r$ denotes labor supply at the tax rate $\hat{\tau}_2^r = T^r(b)$ deemed fair by the rich. Note that reference utilities negatively depend on initial debt because, by Lemma 4, both fair policies vary in b.

The equilibrium participation rates continue to be given by (4) (with $\lambda^i = 1/2$), except that now aggrievements are

$$a_2^r = A_2^r(\tau_2, b) = \frac{\omega}{2} Max[0, R_2^r(b) - V_2^r(\tau_2)]^2 \quad (31)$$

$$a_2^p = A_2^p(\tau_2, b) = \frac{\omega}{2} Max[0, R_2^p(b) - V_2^p(\tau_2, b)]^2 \quad (32)$$

where actual and reference utilities are given respectively by (24-25) and (29-30). Repeating the same steps as in subsection 2.4, it is easy to show that Lemma 3 continues to hold, so that $P_{2\tau}^p(\tau_2, b) \leq 0 \leq P_{2\tau}^r(\tau_2, b)$, with strict inequality if and only if sector i is aggrieved. Differentiating (31-32) with respect to b and using (24-25) and (29-30) also yields:

Lemma 5 *$P_{2b}^p(\tau_2, b) = 0 \geq P_{2b}^r(\tau_2, b)$, with strict inequality if and only if r is aggrieved (i.e. if and only if $\tau_2 > T^r(b)$).*

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 4 $\hat{\tau}_2^p > \hat{\tau}_2^r$). The poor are aggrieved if they do not get the positive subsidy they feel entitled to. Conversely, the rich feel aggrieved if taxes are used to pay for subsidies, and not just to service the debt. 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 ($P_{2b}^r(\tau_2, b) \leq 0$ and $P_{2b}^p(\tau_2, b) = 0$). This happens because, as initial debt increases, both sectors reduce their expectations of what they are entitled to (by (29-30) $R_2^i(b)$ is decreasing in b). However, for a given tax rate, a higher value of b reduces reference utility and actual utility of the poor by the same amount (as actual 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 the reference utility of the rich, but it does not affect their actual utility (given the tax rate τ_2). So the rich are less aggrieved as b rises, because for a given τ_2 a larger share of the tax burden is used to repay the debt, rather than to finance subsidies. Hence they riot less.

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

Equilibrium policy To compute the equilibrium, we repeat the same steps as in subsection 2.4. The government maximizes period 2 social welfare inclusive of the social cost of riots:

$$W_2(\tau_2, b) - \frac{\varsigma}{2}[P_2^p(\tau_2, b) + P_2^r(\tau_2, b)]$$

taking b as given and subject to the non-negativity constraint $\tau_2 L_\tau(\tau_2) - b \geq 0$, and where $W_2(\tau_2, b)$ is defined in (26). The optimality condition is:[23]

$$\tau_2 L_\tau(\tau_2) \leq \varsigma[P^p_{2\tau}(\tau_2, b) + P^r_{2\tau}(\tau_2, b)] \tag{33}$$

with strict inequality implying $s_2^* = 0$. Equation (33) and the government budget constraint (23) define the equilibrium tax rate and subsidy as implicit functions of initial debt: $\tau_2^* = T(b)$ and $s_2^* = S(b)$. The Appendix proves:

Proposition 3 *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, and it is (weakly) decreasing in 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 $S(b) = 0$.*

The result of a positive equilibrium tax rate, even for $b = 0$, is the same as in Proposition 2 above. As explained in the previous section, this happens because, at the efficient policy, the rich are not aggrieved and hence do not riot. As initial debt increases, 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 2 here

The upper graph of Figure 2 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 subsidies deemed fair by 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 than deemed fair by the rich until $\tilde{b}$.

The model also yields some implications about how equilibrium riots vary with b. If $b \geq \bar{b}$, then in equilibrium neither the rich nor the poor are aggrieved: the poor do not expect to receive any subsidy, and taxation is at the debt repayment level. Hence in equilibrium there are no riots (except for the fractions of "initiators" for which $\varepsilon^{ij} \leq -\mu$). Consider the range

[23] In the Online Appendix we verify that the second order conditions for an optimum are also satisfied.

$b < \bar{b}$. 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 5, $P_{2b}^p = 0$ and $P_{2b}^r \leq 0$. By Proposition 3, $T_b > 0$. The term inside the parenthesis is proportional to the RHS of (33), which we have just seen to be negative in equilibrium. Hence, the whole expression is negative. Thus we have:

Proposition 4 *The total equilibrium incidence of riots decreases with b, and it reaches a minimum at $b \geq \bar{b}$.*

These results are illustrated in the lower graph of Figure 2. 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 ($b \geq \bar{b}$). Finally, and as in Proposition 2, it can be shown that in equilibrium the poor protest more than the rich.

3.3 Period 1

Fair policies, aggrievements and riots This subsection computes the equilibrium of the first period. Individuals observe the current state, θ_1, and form expectations of fair policies $\hat{\tau}_1^i$, $\hat{b}^i$, maximizing their modified social welfare function

$$W_1^i(\tau_1, b) + W_2(T(b), b), \qquad i = r, p \tag{34}$$

with respect to τ_1, and b. The first term in (34) 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 (26) for $t = 2$. The weights $\pi^{ir}$and π^{ip} reflect self-serving bias, as defined above.

Three remarks are in order. First, subjectively 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 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 subjectively 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 subsection, but nothing important hinges on this assumption - see also footnotes 19 and 24.

Repeating the steps illustrated above, we get:

Lemma 6 *i) In period 1 the fair tax rates are as in the static model:* $\hat{\tau}_1^r = 0$ *and* $\hat{\tau}_1^p = T^p(\delta) > 0$. *ii) The fair debt for the rich is zero:* $\hat{b}^r = 0$. *The fair debt for the poor can be positive or zero,* $\hat{b}^p \geq 0$, *but* $\hat{b}^p = 0$ *if*

$$\delta \leq \eta(\tau_2^*) l_2^* T_b(0) \tag{A3}$$

where $\tau_2^* = T(0)$ *is the equilibrium tax rate evaluated at the point* $b = 0$ *and* $\eta(\tau) = -\tau L_\tau(\tau)/L(\tau) > 0$ *is the elasticity of labor supply.*

The result on fair debt has the following intuition. Issuing debt raises current subsidies but entails future expected costs, in terms of higher tax distortions. 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 debt is zero. The poor internalize the benefit of higher current subsidies more than a benevolent social planner, given that $\delta > 0$. They also realize that future equilibrium tax rates are already suboptimally high (since $\tau_2^* > 0$), however, and more debt entails even higher tax distortions. If these expected costs are sufficiently large, because tax distortions as captured by $\eta(\tau_2^*)$ are sufficiently large, then 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 $\hat{b}^p > 0$.[24]

These fair policies imply corresponding reference utilities for both sectors, namely:

$$R_1^r = \hat{l}_1^r - U(\hat{l}_1^r) + W_2(T(0), 0) \tag{35}$$

$$R_1^p = \hat{\tau}_1^p L(\hat{\tau}_1^p) + W_2(T(0), 0) \tag{36}$$

where $\hat{l}_1^r$ denotes labor supply at the tax rate $\hat{\tau}_1^r = 0$ deemed fair by the rich for period 1. As explained above, the second term on the RHS of (35-36) corresponds to period 2 expected welfare, evaluated at the future equilibrium tax rate $T(b)$ and at the fair level of debt, $\hat{b}^i = 0$. Since the productivity shock is uncorrelated over time and fair debt is 0 for both types, this is the same expression for $i = r, p$.

Repeating the steps above, we can then write period 1 aggrievements as:

$$a_1^r = A_1^r(\tau_1, b) = \frac{\omega}{2} Max[0, R_1^r - V_1^r(\tau_1) - W_2(T(b), b))]^2 \tag{37}$$

$$a_1^p = A_1^p(\tau_1, b) = \frac{\omega}{2} Max[0, R_1^p - V_1^p(\tau_1, b) - W_2(T(b), b))]^2 \tag{38}$$

Note that these aggrievements fully internalize the future costs of a debt higher than the fair level incorporated in reference utilities, $\hat{b}^i = 0$. Inserting these expressions in (4) and

[24] If the modified welfare function (34) also incorporated 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 analoguous to that stated in Lemma 6. Intuitively, fair debt increases for all groups, because they take into account that higher b reduces future political unrest.

differentiating, we obtain:

Lemma 7 *$P^r_{1\tau}(\tau_1, b) \geq 0 \geq P^p_{1\tau}(\tau_1, b)$, $P^r_{1b}(\tau_1, b) \geq 0$ and $P^p_{1b}(\tau_1, b) \gtrless 0$, where the first three inequalities are strict if i is aggrieved ($i = r, p$). Moreover $P^p_{1b}(\tau_1, b) \leq 0$ if*

$$\eta(\tau_2^*) l_2^* T_b(b) < 1 \tag{A4}$$

with strict inequality if p is aggrieved, and where $\tau_2^* = T(b)$ is the equilibrium tax rate.

Thus, as above, raising taxes pleases the poor and hurts the rich, and riots respond accordingly (as long as the sector is aggrieved). Issuing debt aggrieves the rich, since they realize that future expected welfare will accordingly be reduced. For a given tax rate, the aggrievement of the poor can be raised or dampened by more debt, because they face a tradeoff: on the one hand, the poor are the beneficiaries of higher borrowing, so their current welfare increases; on the other hand, the poor too realize that higher debt entails future welfare costs. Depending on which welfare effect prevails, their aggrievement can go down or up. But the first (positive) welfare effect prevails for sure if tax distortions are not too high (if (A4) holds), in which case riots by the poor are dampened by issuing at least some debt. Note that this is true even if debt accumulation is not regarded as fair by the poor (condition (A3) in Lemma 6 is consistent with (A4)). The Online Appendix shows that a sufficient condition for (A4) is $\eta(T(b)) < 1/2$.

In what follows we assume that (A3) holds, and that (A4) holds at least in a neighborhood of $b = 0$. As stated in the last two Lemmas, this implies that there is at least some potential conflict over intertemporal policies between the rich and poor sectors, without however assuming that this conflict is driven by self-serving bias. Specifically, if (A4) holds in a neighborhood of $b = 0$, then the poor benefit from issuing at least some debt, because close to $b = 0$ future equilibrium tax distortions are not too large. And (A3) implies that nevertheless the fair debt of the poor is zero, because their self-serving bias (δ) is not too large.

In other words, under (A3-A4) issuing at least some public debt raises expected lifetime welfare of the poor, although the poor themselves regard it as unfair. The fair policy for the poor, at $b = 0$, would entail a higher tax rate τ_1, but not a higher level of debt. Nevertheless, if $\tau_1 < \hat{\tau}_1^p$, the poor become less aggrieved (and hence they riot less) as b is raised above zero, because under (A4) their lifetime welfare increases. This effect of debt on dampening the poor's aggrievement would be stronger if their self-serving bias was larger. As shown below, this would strengthen the government's incentive to issue debt.

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

$$W_1(\tau_1, b) + W_2(\tau_2^*, b) - \frac{\varsigma}{2} \sum_{i=r,p} P_1^i(\tau_1, b) - \frac{\varsigma}{2} \sum_{i=r,p} P_2^i(\tau_2^*, b) \tag{39}$$

where $W_t(\tau_t, b)$ is defined in (24,25,26), 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. 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) and it makes the rich more aggrieved (since it reduces their expected future welfare), but it has two advantages. First, it can reduce the aggrievement of the poor. This happens if debt and tax distortions are not too large (if (A4) holds). Second, it reduces future political riots. The reason is the resignation effect discussed earlier: by Proposition 4, a larger debt reduces the future incidence of riots. It can be shown that, at $b = 0$, these advantages exceed the costs. Hence, under (A4) the government has an incentive to partly finance current subsides through debt rather than through taxation, despite the future tax distortions. Thus we have:

Proposition 5 *Suppose that (A4) holds at $b = 0$. Then in equilibrium, $\tau_1^* > 0$, $s_1^* > 0$ and $\bar{b} > b^* > 0$. Moreover, if (A4) holds also at b^*, then equilibrium taxes are lower in period 1 than in period 2: $\tau_1^* < \tau_2^*$.*

Here we only sketch the proof of the result that $b^* > 0$ and $\tau_1^* < \tau_2^*$ (the proof that $\tau_1^* > 0$ is similar to that of Proposition 3 on $\tau_2^* > 0$). A complete proof is provided in the Online Appendix. For $b < \tilde{b}$ (i.e. if $s_2^* > 0$) and for given tax rates, issuing debt only changes the time profile of subsidies. Since preferences are linear in private consumption, we have $W_{1b}(\tau_1, b) = \frac{1}{2} = -W_{2b}(\tau_2^*, b)$. Thus, in the range $b < \tilde{b}$ the optimal level of debt minimizes total unrest in period 1 and period 2, and at an interior optimum the optimality condition for a maximum of (39) with respect to b reduces to:

$$-[P_{1b}^r + P_{1b}^p + P_{2b}^r + P_{2b}^p] = 0 \tag{40}$$

By Lemma 5, $P_{2b}^p = 0$. Moreover, by Lemma 7 at the point $b = 0$ and under (A4) we have $P_{1b}^p \leq 0$, with strict inequality if the poor are aggrieved (which is certainly the case in equilibrium, since taxes are distorting). Finally, as shown in the Appendix, at $b = 0$ and under (A4) we also have $P_{1b}^r + P_{2b}^r < 0$. In other words, the resignation effect on the future rich more than offsets the current additional aggrievement by the rich of issuing more debt. Thus, the LHS of (40) is strictly positive at $b = 0$, and by the second order conditions the optimal policy entails $b^* > 0$. This in turn increases the current aggrievement of the rich, and under (A4) it reduces the current aggrievement of the poor, allowing the government to reduce

tax distortions in the current period. At the same time, as b rises above zero, the period 2 equilibrium tax rate rises, as shown in the previous subsection. For both reasons, therefore, in equilibrium we must have $\tau_1^* < \tau_2^*$. In other words, to exploit the resignation effect the government finds it optimal to deviate from a policy of intertemporal tax smoothing. Thus, the threat of riots also brings about an intertemporal distortion.

The reason why $P_{1b}^r + P_{2b}^r < 0$ is subtle. In period 1, the rich realize that in equilibrium they will only bear half of the future cost of debt service (in terms of lower subsidies and higher tax distortions), because this cost will be shared between the future rich and future poor, and they can be either rich or poor with probability 1/2. Once period 2 arrives, however, the future rich will be resigned to accept a reduction in their reference utility R_2^r by the full amount of the debt service. This reflects their self-serving bias. Since the future rich will deem fair to set future subsidies at zero ($\hat{s}_2^r = 0$), if b rises they will also deem fair to bear the full cost of the higher debt service (since the poor's welfare would be 0, they have nothing to share). Hence the resignation effect in period 2 bites more than the anticipation of future welfare losses, and overall aggrievement by the rich falls as b rises, at least in a neighborhood of $b = 0$ where tax distortions deemed fair by the rich are infinitesimal.

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 rich and does not raise aggrievement of the future poor, a government who is concerned by political unrest has an incentive to accumulate debt.

Repeating the logic discussed in the static model, the economic distortions highlighted in Proposition 5 are enhanced by parameter changes that increase 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. 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).

What happens if the self-serving bias is so strong that $\hat{b}^p > 0$ in Lemma 6 (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 $\tau_1^* < \tau_2^*$. 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, subjectively 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.

Finally, a previous version considered the case of myopic aggrievements, in which individuals only care about the gap between reference and actual utility in the current period, disregarding the future expected gap. Not surprisingly, the equilibrium policy now becomes even more shortsighted, and the equilibrium level of debt increases further, up to the point in which in equilibrium $s_2^* = 0$ and equilibrium debt lies in the range $[\tilde{b}, \bar{b})$. All the other properties of the equilibrium continue to hold.[25]

4 Some evidence

We now explore some evidence in light of the implications of the theory.

4.1 Who riots ?

Who typically participates in riots and other protests? Survey data can be used to answer this question. 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). In Table 1 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). In the ESS we have 34 countries and 5 waves during the period 2002-2012 (with the 2006 wave missing). In the WVS we have 36 countries and one wave during the period 2005-2009.

Demonstrators are more likely to have extreme political preferences, to be attached to and involved with specific political parties, and to know for which party they will vote for in the next election. This is the opposite of the swing voter in theories of probabilistic voting (cf. Persson and Tabellini, 2000). They are also more likely to have voted in the last election, to belong to a minority that feels discriminated, to have low income, to be dissatisfied with the government or with specific public policies and to be generally dissatisfied. Several of these features are consistent with the predictions of the theory. Moreover, demonstrators tend to be educated, males, to be in the labor force or students, and to be less than 50 years of age.

[25] If the shock θ to sectoral productivity was serially correlated, the conflict between sectors would become stronger, because they would disagree also in their evaluation of future policies. Neverthless, we cannot tell whether this would lead to more or less intertemporal distortions in the equilibrium policy. The reason is that, without additional assumptions, we cannot tell whether serial correlation increases the future welfare costs of governmnet debt by more for the currently rich or for the currently poor.

Table 1 here

4.2 Fiscal retrenchments

Next, consider the political consequences of fiscal retrenchments. This evidence is puzzling, because fiscal retrenchments are widely regarded as politically very difficult, and yet there is little evidence that voters punish fiscally responsible governments at the elections. Alesina et al. (2012) consider a sample of 19 OECD countries from 1975 to 2008, and show that governments that achieve large reductions in the budget deficit are not punished at the subsequent elections.[26] As suggested by Ponticelli and Voth (2011), a plausible conjecture is that 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 define political unrest as the sum of riots, general strikes and anti-government demonstrations, that is as lawful or unlawful collective action aimed against the national political authority and not entailing any military violence (the source is Banks, 2012 - see also the Data Appendix). 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).

Table 2 uses the same data on fiscal retrenchments and the same sample as Alesina et al. (2012), except that here the dependent variable is political unrest. The specification in column 1 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). Column 2 adds year fixed effects. The main variables 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 effects.[27]

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 about -0.2 or -0.3 means that a fiscal adjustment of 1% of GDP is associated with an increase in political unrest of about 20% or 30%, a very large effect. Of course these are just correlation, and reverse causation or omitted variables cannot be ruled out. Note however that reverse causation is likely to imply an attenuation bias in the estimated coefficient: a more unstable political situation (i.e. more unrest) is likely to lead

[26] 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.

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

to political inaction and to smaller fiscal adjustments (i.e. to larger primary deficits), rather than vice versa. The data also reveals that 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.

Next, we ask whether political unrest is mitigated by a higher initial public debt, as predicted by the resignation effect discussed in our theory. Thus, columns 3 and 4 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.

To explore possible non-linear effects, columns 5-8 reproduce exactly the same specification of columns 1 and 2, but for two different subsamples: for lagged debt above or below the critical threshold of 90% of GDP. 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. If the threshold that splits the sample is raised to any number between 91% and 100% of GDP, all results remain largely unaffected. If the threshold is lowered to anywhere between 80% and 89%, it remains true that in a low debt environment fiscal retrenchments are correlated with political unrest, but for some specifications fiscal retrenchments are associated with unrest even above the threshold. In other words, debt has to be sufficiently high for the resignation effect to be operative in affecting the reaction to fiscal retrenchments.

Table 2 here (8 columns, merging former Tables 1 and 2)

4.3 Sovereign debt crises

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. Although our model has no direct implication, because debt default is ruled out by assumption, the logic of a resignation effect suggests that political unrest should precede the crisis rather than follow

it. The reasons is that a debt crisis makes it 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.

In Table A1 in the Online Appendix we regress political unrest (as defined above) 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 (2011) - see also the Data Appendix online. Estimation is by Poisson Quasi-Maximum Likelihood, conditional on country fixed effects, with and without year fixed effects. 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.

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. 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, 2014). 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 model assumes that riots are entirely spontaneous and exclusively motivated by emotions. In reality, political unrest is often initiated by group leaders (such as trade unions) who view riots as instruments to influence future policies or induce policy reversals. Such leaders still need to draw people in the streets, and hence they face constraints similar to those discussed in this paper. Incorporating strategic leaders, who deliberately exploit the emotional reaction of group members in order to obtain policy favor for themselves or for the group, could yield additional interesting implications.

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.

References

[1] Acemoglu, Daron and James A. Robinson (2006a), *Economic Origins of Dictatorship and Democracy*, New York, Cambridge University Press.

[2] Acemoglu, Daron and James A. Robinson (2006b), "De Facto Political Power and Institutional Persistence", *American Economic Association Papers and Proceedings,* 96(2), 325-330.

[3] Alesina, Alberto and George-Marios Angeletos (2005), "Fairness and Redistribution", *American Economic Review*, 95(4), 960-980.

[4] Alesina, Alberto, Dorian Carloni and Giampaolo Lecce (2012), "The Electoral Consequences of Large Fiscal Adjustments", in *Fiscal Policy after the Financial Crisis*, National Bureau of Economic Research, Inc.

[5] Alesina, Alberto and Allan Drazen (1991), "Why are stabilizations delayed?", *American Economic Review*, 81(5), 1170-1188.

[6] Alesina, Alberto and Guido Tabellini (1990) A positive theory of fiscal deficits and government debt, *Review of Economic Studies,* July

[7] Akerlof, George (1982), "Labor Contracts as Partial Gift Exchange", *Quarterly Journal of Economics,* November, Vol XCVII, N.4, 543-569.

[8] Akerlof, Robert (2012), "Anger and Compliance", University of Warwick, *mimeographed.*

[9] Atkeson, Andrew (2000), "Rethinking Multiple Equilibria in Macroeconomic Modeling: Comment", *NBER Macroeconomics Annual*, Vol. 15, 162-171.

[10] Babcock, Linda, George Loewenstein, Samuel Issacharoff and Colin Camerer (1995), "Biased Judgments of Fairness in Bargaining", *American Economic Review*, 85(5), 1337–1343.

[11] Banks, Arthur S. and Kenneth A. Wilson (2012), *Cross-National Time-Series Data Archive*, Databanks International, Jerusalem, Israel; http://www.databanksinternational.com.

[12] Bates, Robert H. (1981), *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies*, Berkeley, University of California Press.

[13] Battaglini, Marco and Roland Bénabou (2003), "Trust, Coordination, and the Industrial Organization of Political Activism", *Journal of the European Economic Association*, 1(4), 851-889.

[14] Battigalli, Pierpaolo and Martin Dufwenberg (2009), "Dynamic Psychological Games", *Journal of Economic Theory*, 144(1), 1-35.

[15] Battigalli, Pierpaolo, Martin Dufwenberg and Alec Smith (2015), "Frustration and Anger in Games", *IGIER working paper.*

[16] Bénabou, Roland and Jean Tirole (2006), "Belief in a Just World and Redistributive Politics", *Quarterly Journal of Economics*, 121(2), 699-746.

[17] Bénabou, Roland and Jean Tirole (2009), "Over My Dead Body: Bargaining and the Price of Dignity", *American Economic Review*, 99(2), 459-465.

[18] Berkowitz, Leonard (1989), "Frustration-Aggression Hypothesis: Examination and Reformulation", *Psychological Bulletin*, 106(1), 59-73.

[19] Berkowitz Leonard and Eddie Harmon-Jones (2004), "Toward an Understanding of the Determinants of Anger", *Emotion*, 4(2), 107–130.

[20] Bosman, Ronald, Matthias Sutter and Frans van Winden (2000), "Emotional Hazard and Real Effort in a Power-to-Take Game", Tinbergen Institute Discussion Papers 00-106/1.

[21] Brunnermeier, Markus K. and Jonathan A. Parker (2005), "Optimal Expectations", *American Economic Review*, 95(4), 1092-1118.

[22] Campante, Filipe R. and Davin Chor (2012), "Why was the Arab World Poised for Revolution? Schooling, Economic Opportunities, and the Arab Spring", *Journal of Economic Perspectives*, 26(2), 167-188.

[23] Collins, William J. and Robert A. Margo (2007), "The Economic Aftermath of the 1960s Riots in American Cities: Evidence from Property Values", *Journal of Economic History*, 67(04), 849-883.

[24] Dahlberg, Matz and Eva Johansson (2002), "On the Vote Purchasing Behavior of incumbent Governments", *American Political Science Review,* 96, 27-40.

[25] DellaVigna, Stefano (2009), "Psychology and Economics: Evidence from the Field", *Journal of Economic Literature*, 47(2), 315-72.

[26] Diermeier, Daniel (2012), *Formal Behavioralism*, Cambridge University Press, *forthcoming.*

[27] DiPasquale, Denise and Edward L. Glaeser (1998), "The Los Angeles Riot and the Economics of Urban Unrest", *Journal of Urban Economics*, 43(1), 52-78.

[28] Di Tella, Rafael and Juan Dubra (2009), "Anger and Regulation", NBER wp 15201.

[29] Dollard, John, Leonard W. Doob, Neal E. Miller, Orval H. Mowrer and Robert R. Sears (1939), *Frustration and Aggression*, New Haven, Yale University Press.

[30] Elster, Jon (1998), "Emotions and Economic Theory", *Journal of Economic Literature*, 36(1), 47-74.

[31] Fehr, Ernst, Oliver Hart and Christian Zehnder (2011), "Contracts as Reference Points–Experimental Evidence", *American Economic Review*, 101(2), 493-525.

[32] Francisco, Ronald A. (2006), *European Protest and Coercion Data, 1980 through 1995*, University of Kansas; http://web.ku.edu/~ronfran/data/index.html.

[33] Geanakoplos, John, David Pearce and Ennio Stacchetti (1989), "Psychological Games and Sequential Rationality", *Games and Economic Behavior*, 1, 60-79.

[34] Gould, Deborah B. (2004), "Passionate Political Processes: Bringing Emotions Back into the Study of Social Movements", in J. Goodwin and J. M. Jasper (eds), *Rethinking Social Movement: Structure, Meaning, and Emotion*, Lanham, Rowman & Littlefield.

[35] Granovetter, Mark (1978), "Threshold Models of Collective Behavior", *American Journal of Sociology,* 83(6), 1420–1443.

[36] Grillo, Edoardo (2014), "Reference Dependence and Politicians' Credibility: the Hidden Cost of Raising Voters' Expectations", Collegio Carlo Alberto, *mimeographed.*

[37] Gurr, Ted R. (1970), *Why Men Rebel,* Princeton, Princeton University Press.

[38] Hart, Oliver and John Moore (2008), "Contracts as Reference Points", *Quarterly Journal of Economics*, 123(1), 1-48.

[39] Hastorf, Albert and Hadley Cantril (1954), "They Saw a Game: A Case Study", *Journal of Abnormal and Social Psychology*, 49(1), 129-134.

[40] Herweg, Fabian and Klaus Schmidt (2014), "Loss Aversion and Ex Post Inefficient Renegotiation", *The Review of Economic Studies*, 01, 1-38.

[41] Jasper, James M. (1997), *The Art of Moral Protest*, Chicago, University of Chicago Press

[42] Koopmans, Ruud (1993), "The Dynamics of Protest Waves: West Germany, 1965 to 1989", *American Sociological Review,* 58, 637-658.

[43] Koopmans, Ruud (2007), "Social Movements", in R. Dalton and H. D. Klingemann, (eds), *The Oxford Handbook of Political Behavior*, Oxford, Oxford University Press.

[44] Koszegi, Botond (2006), "Emotional Agency", *Quarterly Journal of Economics*, 121(1), 121-156.

[45] Koszegi, Botond and Matthew Rabin (2006), "A Model of Reference-Dependent Preferences", *Quarterly Journal of Economics,* 121(4), 1133-1165.

[46] Lohmann, Susanne (1993), "A Signaling Model of Informative and Manipulative Political Action", *American Political Science Review*, 87(2), 319-333.

[47] Loewenstein, George and Daniel Adler (1995), "A Bias in the Prediction of Tastes", *Economic Journal*, vol. 105(431), pp. 929-937.

[48] Marcus, George E., W. Russell Neuman and Michael Mackuen (2000), *Affective Intelligence And Political Judgment,* Chicago, University of Chicago Press.

[49] Messick, David and Keith, Sentis (1979), "Fairness and Preference", *Journal of Experimental Social Psychology*, 15(4), 418-434.

[50] Morris, Stephen and Hyun Song Shin (2003), "Heterogeneity and Uniqueness in Interaction Games", *Cowles Foundation Discussion Papers,* 1402, Yale University.

[51] Olson, Mancur (1965), *The Logic of Collective Action*, Cambridge, MA, Harvard University Press.

[52] Persson, Torsten and Guido Tabellini (2000), *Political Economics: Explaining Economic Policy,* Cambridge, MA, MIT Press.

[53] Persson, Torsten and Guido Tabellini (2009), "Democratic Capital: The Nexus of Political and Economic Change", *American Economic Journal: Macroeconomics*, 1(2), 88-126.

[54] Ponticelli, Jacopo and Hans-Joachim Voth (2011), "Austerity and Anarchy: Budget Cuts and Social Unrest in Europe, 1919-2009", CEPR Discussion Paper No. DP8513.

[55] Rabin, Matthew (1995), "Moral preferences, Moral Constraints and Self-serving Biases", *mimeographed.*

[56] Rotemberg, Julio J. (2010), "Altruistic Dynamic Pricing with Customer Regret", *Scandinavian Journal of Economics*, 112(4).

[57] Reinhart, Carmen and Kenneth Rogoff (2011b), "From Financial Crash to Debt Crisis", *American Economic Review*, 101(5), 1676-1706.

[58] Scholzman, Kay Lehman and Sidney Verba (1979), *Injury to Insult*, Cambridge, MA, Harvard University Press.

[59] Shalev, Jonathan (2000), "Loss aversion equilibrium", *International Journal of Game Theory*, 29(2), 269-287.

[60] Sugden, Robert (2003), "Reference-dependent Subjective Expected Utility", *Journal of Economic Theory,* 111, 172–191.

[61] Tabellini, Guido (2008), "The Scope of Cooperation: Values and Incentives", *Quarterly Journal of Economics*, 123(3), 905-950.

[62] Tajfel, Henri (1978), "The achievement of inter-group differentiation", in H. Tajfel (ed), *Differentiation Between Social groups*, London, Academic Press.

[63] Tilly, Charles (1978), *From Mobilization to Revolution,* Reading, MA, Addison-Wesley.

[64] Ubeda, Paloma (2013), "The consistency of fairness rules: An experimental study", *Journal of Economic Psychology, forthcoming.*

[65] van Stekelenburg, Jacquelien and Bert Klandermans (2010), "The Social Psychology of Protest", *Sociopedia.isa*, 1-13.

[66] van Zomeren, Martijn, Tom Postmes and Russell Spears (2008), "Toward an Integrative Social Identity Model of Collective Action: A Quantitative Research Synthesis of Three Socio-Psychological Perspectives", *Psychological Bulletin*, 134(4), 504–535.

[67] Voth, Hans-Joachim (2011), "Tightening Tensions: Fiscal Policy and Civil Unrest in Eleven South American Countries, 1937-1995", in J. Gal (ed), *Fiscal Policy and Macroeconomic Performance*, Santiago de Chile, Central Bank of Chile.

[68] Woo, Jaejoon (2003), "Economic, Political, and Institutional Determinants of Public Deficits", *Journal of Public Economics*, 87(3-4), 387-426.

Figures and Tables

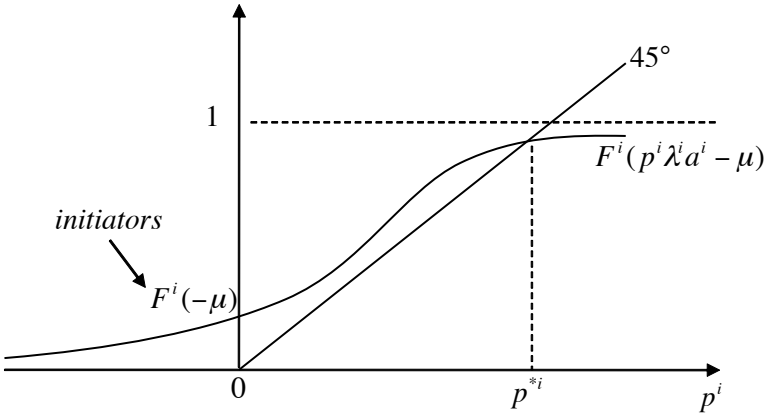

Figure 1: Equilibrium participation rate

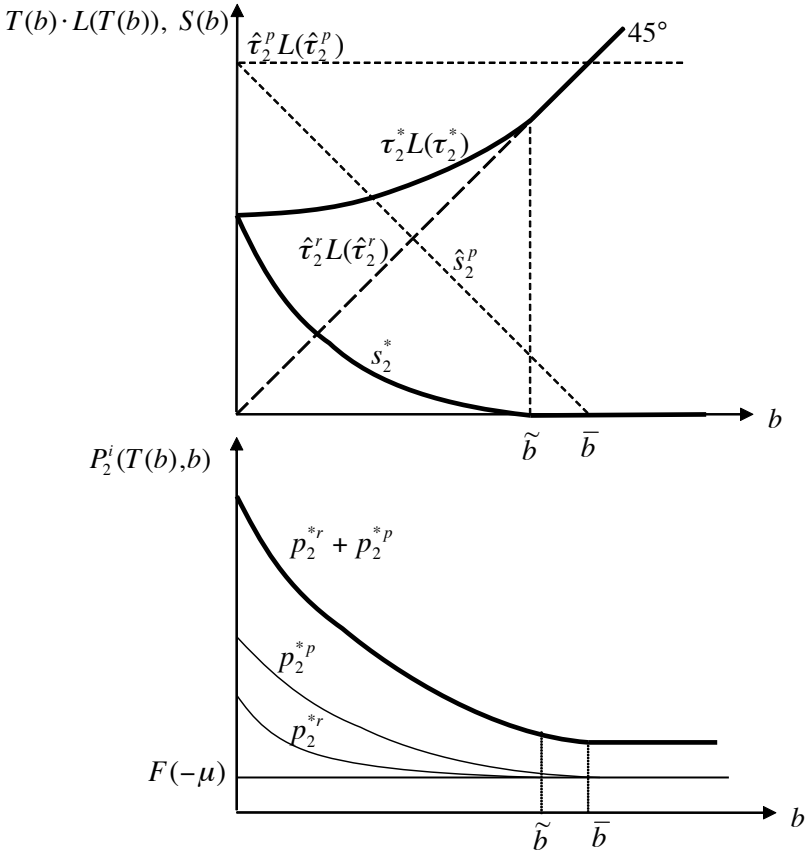

Figure 2: Taxes, subsidies, and riots in period 2

Table 1: Who Participates in Riots

Dependent variable	Recent participation in lawful demonstrations		
	(1)	(2)	(3)
Primary education	-0.054***	-0.051***	-0.015***
	(0.006)	(0.006)	(0.003)
Tertiary education	0.062***	0.063***	0.020***
	(0.006)	(0.006)	(0.002)
Age 30 or below	0.011	0.009	0.012***
	(0.007)	(0.007)	(0.003)
Age 50 or below	-0.015**	-0.015**	-0.008***
	(0.006)	(0.006)	(0.002)
Male	0.035***	0.029***	0.006**
	(0.005)	(0.005)	(0.002)
Unemployed	0.061***	0.058***	0.014***
	(0.009)	(0.009)	(0.002)
Worker	0.046***	0.046***	0.015***
	(0.007)	(0.007)	(0.002)
Student	0.096***	0.094***	0.032***
	(0.011)	(0.011)	(0.003)
Income below 30 percentile	0.014***	0.016***	
	(0.006)	(0.006)	
Income above 70 percentile	-0.014**	-0.014**	
	(0.007)	(0.007)	
Children at home	-0.005	-0.008	-0.001
	(0.006)	(0.006)	(0.002)
Satisfied with life	-0.005***	-0.005***	0.000
	(0.001)	(0.001)	(0.000)
Confidence/satisfaction with government	-0.009***	-0.015***	-0.002***
	(0.003)	(0.003)	(0.001)
Satisfaction with economy			0.000
			(0.000)
Satisfaction with democracy			-0.000
			(0.001)
State of health services			-0.000
			(0.000)
State of education			-0.002***
			(0.000)
Discriminated group			0.029***
			(0.003)
Autonomy Index	-0.004*	-0.002	
	(0.002)	(0.002)	
Income should be made more equal	0.001	0.001	0.006***
	(0.001)	(0.001)	(0.001)
Extreme LEFT on political scale	0.101***	0.094***	0.026***
	(0.006)	(0.006)	(0.003)
Extreme RIGHT on political scale	0.038***	0.030***	-0.005
	(0.006)	(0.006)	(0.005)

Voted parliament/national elections	0.054***	0.049***	0.011***
	(0.006)	(0.006)	(0.002)
Don't know for which party I will vote for	-0.016**	-0.009	
	(0.006)	(0.006)	
Involved in a political party		0.119***	0.053***
		(0.006)	(0.004)
Pct of involvement in a political party			0.071***
			(0.007)
Feel closer to a particular party			0.015***
			(0.002)
Observations	28,799	28,537	136,087
Survey	WVS	WVS	ESS
Pseudo R-squared	0.0928	0.108	0.195

Probit estimations - Marginal effects reported
Wave and Country Fixed effect included
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Political Unrest and Fiscal Retrenchment

Dependent variable	Political unrest							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ cyclically adj. primary deficit	-0.19***	-0.30***	-0.22***	-0.38***	-0.11	-0.19***	-0.09	-0.36***
	(0.042)	(0.053)	(0.042)	(0.062)	(0.11)	(0.04)	(0.09)	(0.05)
lagged debt			-0.01***	-0.01**				
			(0.005)	(0.005)				
GDP Growth	0.01	-1.44	0.06	-1.79	-0.30***	0.12*	-0.36***	0.35
	(0.074)	(1.225)	(0.071)	(1.158)	(0.09)	(0.07)	(0.12)	(0.23)
unemployment growth	0.01	0.00	0.02*	0.02**	-0.02**	0.02***	-0.03***	0.03***
	(0.010)	(0.010)	(0.011)	(0.008)	(0.01)	(0.01)	(0.01)	(0.01)
inflation	-0.00	-0.03	0.03	0.06	0.04*	-0.002	0.01	0.06
	(0.040)	(0.035)	(0.060)	(0.042)	(0.03)	(0.07)	(0.04)	(0.05)
GDP growth dev. G7	-0.12***	1.37	-0.09**	1.82	0.02	-0.12**	0.22	-0.32
	(0.036)	(1.261)	(0.042)	(1.200)	(0.08)	(0.06)	(0.15)	(0.27)
unemployment growth dev. G7	0.07	0.09**	0.12**	0.16**	0.14**	0.14**	0.11	0.17**
	(0.055)	(0.042)	(0.061)	(0.065)	(0.06)	(0.06)	(0.09)	(0.07)
inflation dev. G7	0.10**	8.95	0.01	12.25	0.14***	0.06	0.18**	-0.10
	(0.052)	(10.743)	(0.081)	(10.170)	(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%
Year Dummy variables	No	Yes	No	Yes	No	No	Yes	Yes
Observations	599	599	508	508	168	423	168	423
Number of countries	19	19	19	19	10	18	10	18

The dependent variable is defined as the sum of riots, general strikes and anti-government demonstrations. The variables ending with the name dev. G7 are expressed in deviation from the average of the G7 countries.
Estimation: Conditional Poisson Regression; Country FE always included.
Robust standard errors in parentheses ******* p<0.01, ** p<0.05, * p<0.1