Sanctions and Incentives to Repudiate External Debt*

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Abstract

Often foreign countries levy sanctions in the attempt to foment discontent with a hostile government. But sanctions may provoke costly reactions by the leaders of the target country. This paper presents a model in which sanctions exhaust the target country economically and impair its government's fiscal capacity. Then, an office-motivated leader may find it convenient to default on foreign debt in order to free resources that she can invest to regain internal political support. The default thus becomes a defensive tool to partially dampen the internal political turmoil sanctions generate.

Keywords: political unrest, sanctions, external debt crisis.

1. Introduction

Myanmar has been ruled by a military junta from 1962 to 2011. In 1988, the regime violently repressed demonstrations against economic mismanagement and in favor of

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a democratic transition. As a reaction, US, EU, and other countries levied economic sanctions against Myanmar. In 2002, the country defaulted on its external debt and, despite the efforts of the international community, the regime remained in power until 2011.

Myanmar is not an isolated case. Other countries, such as Iran in the 80s and 90s or Togo in the 90s followed a similar pattern: first, they were hit by economic sanctions as a retaliation against human rights violations or other misbehaviors by their ruling regimes; second, as a consequence of sanctions, their economic fundamentals deteriorated and this led to financial and sovereign debt crisis. Third, despite the economic hardships caused by sanctions and debt crisis, internal political turmoil did not increase and the regimes survived in office.

In this paper we study the link between economic sanctions, debt crises and political turmoil through the lenses of a formal model. In this respect, most of the existing literature argues that the threat of international sanctions acts as a deterrent for defaults. In other words, the economic behavior of the target country guides and determines the political decision to levy sanctions. Although certainly relevant in several occasions, this explanation cannot easily explain cases like the one of Myanmar. Hence, in this paper, we complement the existing literature by turning the issue around: we study whether sanctions could increase the likelihood of a default on sovereign debt and we highlight that the political incentives of an office-motivated leader play a key role in answering this question. Hence, our paper puts forward a unitary model that rationalizes the interaction among external sanctions, sovereign debt crisis and political turmoil witnessed in the examples mentioned above as well as in other ones.

In our model, the international community levies sanctions that exhaust a country economically in the attempt to foment the population's discontent with an hostile regime and to lead to its overthrown. The regime's leader, in turn, chooses the income tax rate that is used to finance activities to maintain political stability and counteract internal opposition. Tax proceeds are also used to service foreign debt, but government can decide not to repay this debt, namely to default. A default is costly for the leader because its negative economic consequences make the opposition more likely to succeed in overthrowing him. However, a default also yields some benefits: once unburdened of the public debt, the leader can lower taxes and invest more resources to secure his position in office. Hence, by defaulting, a leader targeted by international sanctions may regain some of the stability in office that sanctions undermined in the first place. Importantly, because these defaults are driven by the desire of the leader to remain in power, they can arise also when the economic fundamentals of the country are relatively solid. In other words—and differently from the existing accounts of debt crisis—these defaults are driven by political incentives.

To fully account for the effects of sanctions on defaults, we further assume that, at the time sanctions are levied, financial markets price the government's debt based on (rational) expectations about the probability with which a default occurs in equilibrium. In doing so, markets anticipate that more severe sanctions may increase the likelihood of a default and the risk premium adjusts accordingly. When the risk premium becomes too high, debt repayment ceases to be credible and a default occurs with certainty.

Defaults are costly for sanctioning countries because of capital losses, financial turmoil, and domino effects. Hence, when deciding on the severity of sanctions, the international community faces a tradeoff: in equilibrium, more severe sanctions reduce the leader's survival probability and entail political benefits, but, at the same time, they also increase the likelihood of costly defaults. As a result, sanctions will be harsher when the costs the international community incurs in the event of a default are lower, which is the case for small and relatively more isolated countries. By the logic of our model, these are the countries in which political incentives are more likely to trigger sovereign defaults.

The paper is organized as follows. In Section 2 we overview the related literature. Section 3 describes the model. Section 4 contains the equilibrium analysis and derives its predictions. Section 5 concludes and discusses additional effects of sanctions. All the proofs are in the Appendix.

2. Related Literature

Economic sanctions represent an important foreign policy tool, a middle course of action in-between diplomacy and war. A commonly stated goal of economic sanctions is to induce a change in the policy of the target country.[1] Hence, sanctions can be regarded as a "stick" in the hands of the international community to discipline foreign countries.[2] Within this conceptual framework, some authors argue that, when the interests of the regime in the target country are largely misaligned with those of the international community, sanctions may be used to favor the "political disintegration" of the regime's support and its removal from power (Galtung, 1967; Marinov, 2005; Escribà-Folch and

[1] See Baldwin (2000) for a general discussion of the political logic behind sanctions and Drezner (1999) and Hufbauer *et al.* (2009) for reviews of their scope and effectiveness. As highlighted by this literature, another common goal of sanctions is the resolution of trade disputes. Even in this case, however, sanctions are, at least to a certain extent, grounded on the pressure that the domestic constituency (or its most influential sectors) may exert on the ruling regime. See Lacy and Niou (2004) for the difference between the threat of sanctions and their actual implementations.

[2] The literature has also studied the use of economic aids—the opposite of sanctions—as a "carrot". For instance, Aidt and Albornoz (2011) look at how changes in the flow of FDIs may help aligning the behavior of a leader with the interests of the international community.

Wright, 2010). In this paper, we assume that sanctions are instrumental to the removal of the ruling regime. However, with some minor changes, the logic of our model can be applied also to settings in which the international community wants the leader of a country to modify his policy against his will.

Insofar our paper models the mechanism through which sanctions weaken the leader's stability, it relates to (among others) Kaempfer *et al.* (2004), Wood (2008), Bueno de Mesquita and Smith (2009, 2010), Peksen and Drury (2010), and Oechslin (2014). We differ from these papers in two respects. First, we account for the effect of sanctions on sovereign defaults and we show that the interaction between sanctions and debt crisis may affect internal political stability in a non-trivial way. Second, we model the survival probability of the ruling regime through a global game (Atkeson, 2000; Morris and Shin, 2001; Edmond, 2013).

Despite the importance and widespread use of sanctions in international disputes, their effectiveness in disciplining misaligned regimes is yet controversial. While Marinov (2005), Lektzian and Souva (2007) and Escribà-Folch and Wright (2010) conclude that sanctions weaken authoritarian leaders, other scholars cast doubts on this finding (e.g. Pape, 1997; Allen, 2008; Licht, 2017; Grossman et al., 2017). Moreover, sanctions have been found to decrease living standards within the target country (Weiss, 1997; Allen and Lektzian 2013; Neuenkirch and Neumeier, 2015) and to increase the level or repression and violence (Wood, 2008; Peksen, 2009; Peksen and Drury, 2010; Hultman and Peksen, 2015). Our work contributes to this literature by highlighting an additional effect of sanctions—the increase in the probability of defaults—and by showing how this can undermine their effectiveness.

Our paper focuses on the relationship between international sanctions and sovereign defaults and it is thus related to the literature on " supersanctions" and "gunboat diplomacy" (Bulow and Rogoff, 1989a, 1989b; Weidenmier 2005; Mitchener and Weidenmier 2010).[3] This literature argues that international sanctions can be used to induce debt repayment because of the severe and prolonged economic costs borne by the sanctioned country. In other words, defaults cause sanctions. Although in several instances this has certainly be the case, the link emphasized in this paper goes in the opposite direction: sanctions cause defaults due to the reaction of an office-motivated political leader.[4]

Finally, in our setting, a leader chooses to default only if the cost borne by domestic citizens is not too high. This establishes a link with the literature investigating the costs of a default for the defaulting country (English 1996; Arellano 2008; Borensztein and Panizza 2009; Gelos *et al.* 2011; Guembel and Sussman,2009; Levy Yeyati and Panizza 2011; Cruces and Trebesch 2013; Gennaioli *et al.* 2014; Sandleris 2016).[5]

3. The Model

A country is ruled by an office-motivated leader who enjoys a benefit normalized to 1 from keeping office. The country has an outstanding amount of external public debt equal to $B > 0$ financed through a government bond. The bond must be repaid, together with interests, at the end of the strategic interaction described below. The

[3]See Eaton and Fernandez (1997), Panizza et al. (2009) and Tomz and Wright (2013) on sovereign defaults. See also Cole and Kehoe (1998) for the reputational costs that a default may cause.

[4]Our paper thus shows that political incentives may affect the choice to service public debt (see Brewer and Rivoli, 1997; Amador 2003; Kohlscheen, 2007; van Rijckeghem and Weder, 2009 for empirical evidence on this topic and Cuadra and Sapriza, 2008 and Andreasen *et al.* 2016 for dynamic general equilibrium models). We contribute to this literature by modeling explicitly the link between sanction, revolts, and defaults.

[5]Our paper is also related to Anderson and Sundaresan (1996), Mella-Barral and Perraudin (1997) and Guiso *et al.* (2013) that study strategic defaults for households and corporations.

cost of servicing the debt is thus equal to $(1+r)B$, where r is the interest rate.[6]

The *gross income* of the country is affected by sanctions imposed by the international community. Sanctions vary in their severity, which is captured by $\sigma \in [1, \bar{\sigma}]$. When the severity of sanctions is σ, gross income is $y(\sigma) = 1/\sigma$. Hence, in the absence of sanctions ($\sigma = 1$), gross income is normalized to 1, while as sanctions become more severe the gross income decreases. In practice, the actual economic impact of sanctions depends on factors such as the commercial flows between sanctioning countries and the target country, or the existence of allied countries that do not levy sanctions.

The international community draws a benefit from levying sanctions and from overthrowing the leader. Hence, sanctions aim at a change in the leadership of the target country. However, our mechanism would work also if we assumed that the goal of the international community is to induce a policy change that the leader is not willing to accept.[7] The international community also bears a cost $c > 0$ in the event of a default. Such cost c captures domino effects that reduce the financial stability of members of the international community, or any other form of global instability caused by the default.

Within the target country, a mass of *activists* opposes the leader. Each activist i independently and simultaneously chooses whether to engage in a political attack against the leader in the attempt to overthrow him ($a_i = 1$) or to stay quiet ($a_i = 0$).[8]

[6] B is the debt held by foreign investors. Hence, we abstract away from the debt held by domestic investors, which would affect leader's incentives differently. In particular, the capital losses incurred by domestic investors following a default can be factored into the default cost, ℓ, introduced below.

[7] Indeed, we could assume the leader enjoys a unitary benefit from implementing a policy that inflicts a cost equal to k to the international community (cf. Section 4.5). Revolts could then be interpreted as more general internal political coordination games (e.g., strikes or opposition demonstrations) aimed at a change in policy, and the amount spent in revolt prevention as monetary costly effort against the participants in such endeavors.

[8] The opposition can also be modelled through a representative activist, whose cost in participating to a failed attack increases with amount spent by the leader in revolt prevention. We choose to model the revolt against the leader through a coordination game because coordination among revolters is a key element in these occurrences and because, through the coordination problem, the leader's survival probability becomes a concave function of the the amount spent in revolt prevention.

The interpretation of a political attack may vary. In autocratic regimes it often entails participating in a violent revolt against the dictator. In democratic regimes, instead, it may range from taking part in legal and peaceful political movements to engaging in violent protests. In either case, the ultimate goal of the political attack is to overthrow the leader and replace him.

The leader is overthrown if and only if the share of activists who attack exceeds a threshold, the *regime's stability*. Such threshold depends on the policy implemented by the leader, on the severity of the sanction imposed by the international community, and on other factors, such as the support the leader receives by the ruling elite or his charisma. Formally, the regime's stability is given by:

$$\theta(\sigma, \tau, \delta, \eta) = \underbrace{(1-\tau)y(\sigma)}_{\text{Net Income}} - \underbrace{\delta\ell}_{\text{Default loss}} + \underbrace{\eta.}_{\text{Leader's strength}} \tag{1}$$

The first term in (1) measures the net income in the country. It is equal to the gross income $y(\sigma) = 1/\sigma$, net of the taxes levied by the government through a proportional tax rate, $\tau \in [0, 1]$. The second term, $\delta\ell$, captures the reduction in the regime's stability that a default causes. In particular, $\delta \in \{0, 1\}$ is a binary variable describing whether a default occurs ($\delta = 1$) or not ($\delta = 0$), while $\ell > 0$ is the loss incurred by the country if a default occurs—it captures capital losses in citizens' portfolios, systemic effects on the financial sector, or any utility loss associated with the socioeconomic turmoil triggered by the default. In the model, ℓ is independent of the severity of sanctions, but our qualitative insights extend to the case in which default losses decrease with such severity (see Arellano, 2008 and the discussion in Section 5). We assume that ℓ is uniformly distributed in the interval $[0, \ell_H]$ and that it is realized before the leader chooses whether to default or not, but after the severity of sanctions has been determined. In other words, the leader can condition his behavior on the realization of the default loss, while the international community cannot.[9] Furthermore, we assume that ℓ_H is sufficiently large to guarantee that for extreme realization of the default loss, the leader does not default. Finally, the third element in (1) collects other leader-specific features that affect the regime stability—e.g., the support in the citizenry he enjoys thanks to his charisma, or the solidity of his leadership. We refer to this last component as to the *leader's strength.*

Activists observe the net income and the default loss, but they are uncertain about the leader's strength. This uncertainty is represented by a uniform distribution over the interval $[\underline{\eta}, \overline{\eta}] \subset \mathbb{R}$. Before deciding whether to attack or not, each activist receives an i.i.d. signal ε_i about the leader's strength (see Section 4.1 for more details on these signals). For instance, signal ε_i can represent the leader's popularity within the (restricted) social network of activist i, or the activist's own reading of news concerning the leadership's solidity.

If activist i attacks (i.e., if $a_i = 1$) and the leader is overthrown, activist i enjoys a payoff $g > 0$. Such payoff can be seen as the sum of an hedonic benefit associated to taking part in a successful political action, and a monetary payoff, possibly related to the value of office. On the contrary, if the leader survives in office, each attacker incurs a cost equal to the amount the leader invests in revolt prevention, $\pi \geq 0$. π measures the leader's investment in intelligence or riot police; hence a higher π captures a higher probability of being arrested or injured, or simply a higher opportunity to organize the

[9]This assumption captures the fact that the international community act before the leader chooses to default and not all the relevant information may be available to it. Moreover, the randomness of ℓ smooths the binary decision to default into a probabilistic event. The uniform distribution simplifies the analysis, but none of our results hinges on it.

attack. If the activist does not attack ($a_i = 0$), his utility is equal to 0 independently of the outcome of the revolt. The utility of activist i is:

$$u_i(a_i) = a_i \left[\mathbb{1} g - (1 - \mathbb{1})\pi \right], \tag{2}$$

where $\mathbb{1}$ is an indicator that equals 1 if the attack overthrows the leader and 0 otherwise.

Revolt prevention, π, is paid through tax revenues, $\tau y(\sigma) = \tau/\sigma$. If no default occurs, tax revenues must also finance debt repayment. Hence, the leader's budget constraint is:

$$\tau y(\sigma) = \pi + B(1 + r)(1 - \delta), \tag{3}$$

The interest rate r is determined by financial markets through a no-arbitrage condition before the leader decides whether to default and, in particular, before the default loss ℓ is realized. The no-arbitrage condition equates the expected return on the government bond to a risk-free rate $\tilde{r}$:

$$(1 + r)\left[1 - \Pr(\delta = 1)\right] = 1 + \tilde{r}, \tag{4}$$

where $\Pr(\delta = 1)$ depends on r because the interest rate affects the incentives of the leader to default.

If there is no r satisfying (4), we say that the *country is in a confidence crisis* and we assume that a default occurs with certainty without the leader deciding on it.[10] Instead, if we can find an interest rate that solves (4), we say that the *country is not*

[10]Even in this case investors with high risk tolerance will lend money in exchange of high enough interest rates. Therefore, a country being in a confidence crisis should be interpreted as a situation in which the country cannot rely on regular investors, but has to revert specific subsets of them, e.g. speculative funds or international institutions.

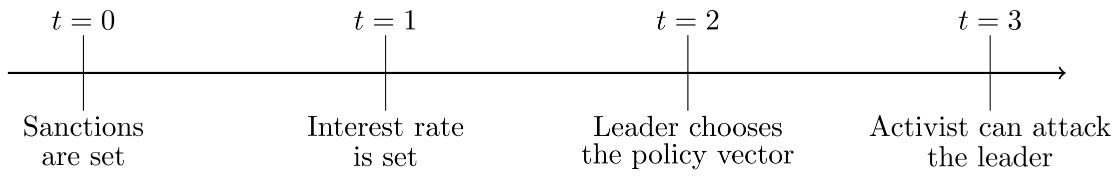

Figure 1. Timeline.

in a confidence crisis. Thus, in our model, we can distinguish between two types of defaults: *economic defaults* that occur when the country is in a confidence crisis—namely when it is impossible to satisfy (4)—and *political defaults* that occur when (4) admits a solution, but the leader chooses to default.

Given the severity of sanctions and the interest rate, the leader chooses a policy vector to maximize his probability to survive in office, which is a random event that, in turn, depends on the outcome of the revolt and, in particular, on the leader's strength η. The policy vector consists in a tax rate τ, an investment in revolt prevention π, and, if the debt is priced, a default decision δ.

Figure 1 summarizes the timing. At time 0, the international community chooses the sanction level σ. At time 1, financial markets form rational expectations on the default probability and the interest rate is determined. At time 2, the leader chooses the policy vector. At time 3, leader's strength is realized, activists' revolt takes place and the leader may be overthrown.

4. Equilibrium Analysis

In this section, we analyze the model and derive its subgame perfect equilibrium (henceforth, equilibrium) implications. We proceed backward starting from the revolt subgame.

4.1 The Revolt against the Leader

At time $t = 3$, each activist i decides whether to participate in a political attack against the leader ($a_i = 1$) or not ($a_i = 0$). The collective attack succeeds and the leader is overthrown if and only if sufficiently many activists revolt, namely if and only if the share of revolters exceeds the regime's stability given by equation (1).

Hence, given the activists' utility (2), the revolt exhibits strategic complementarities: if more activists attack, each activist has an individually higher incentive to attack because the chance of success is higher. To deal with the equilibrium multiplicity that strategic complementarities generate, we model the revolt as a global game (Carlsson and van Damme, 1993, Morris and Shin, 1998, Atkeson, 2000, and Edmond, 2013).

In particular, recall that activists are uncertain about the leader's strength η and share a common uniform prior over $\left[\underline{\eta}, \overline{\eta}\right]$. Before deciding whether to attack or not, each activist i observes a private i.i.d. signal about η represented by a random variable ε_i uniformly distributed in the interval $\left[\eta - \frac{1}{2\psi}, \eta + \frac{1}{2\psi}\right]$.[11]

In line with the literature on global games, Assumption 1 below guarantees that if the leader's strength is sufficiently low (resp., high), then the leader will be overthrown (resp., not overthrown) with certainty. In these cases, activists have a dominant action.

Assumption 1. *For extreme realizations of the leader's strength, the leader is either always or never overthrown:* $\underline{\eta} < -1 < 1 + \ell_H < \overline{\eta}$.

[11]By construction, ε_i can take values in the interval $\left[\underline{\eta} - \frac{1}{2\psi}, \overline{\eta} + \frac{1}{2\psi}\right]$. The posterior belief after signal ε_i can thus be determined through Bayes rule as follows. If $\varepsilon_i \in \left[\underline{\eta} + \frac{1}{2\psi}, \overline{\eta} - \frac{1}{2\psi}\right]$, then $\eta \mid \varepsilon_i \sim U\left[\varepsilon_i - \frac{1}{2\psi}, \varepsilon_i + \frac{1}{2\psi}\right]$. Instead, if $\varepsilon_i > \overline{\eta} - \frac{1}{2\psi}$ (resp., $\varepsilon_i < \underline{\eta} + \frac{1}{2\psi}$), then $\eta \mid \varepsilon_i \sim U\left[\varepsilon_i - \frac{1}{2\psi}, \overline{\eta}\right]$ (resp., $\eta \mid \varepsilon_i \sim U\left[\underline{\eta}, \varepsilon_i + \frac{1}{2\psi}\right]$). The uniform prior together with uniform signal simplifies the analysis, but results extend to other settings (Morris and Shin, 2001).

Under Assumption 1, the revolt subgame has a unique equilibrium for any profile $(\sigma, \tau, \pi, \delta)$. In this equilibrium, each activist follows a symmetric cutoff strategy: attack if the signal he receives is below a cutoff and do not attack if the signal is greater or equal to the cutoff. Proposition 1 characterizes the survival probability of the leader in such equilibrium. Its proof—which includes also the proof of the equilibrium uniqueness—follows the same logic of Morris and Shin (1998).

Proposition 1. *Suppose Assumption 1 holds. Then, for every $(\sigma, \tau, \pi, \delta)$, the equilibrium survival probability of the leader is given by*

$$S(\sigma, \tau, \pi, \delta) = 1 - \frac{1}{\overline{\eta} - \underline{\eta}} \left(\frac{g}{g + \pi} - (1 - \tau) y(\sigma) + \delta \ell \right). \tag{5}$$

Hence, the probability with which the leader survives in office is decreasing in the gain that activists receive from participating in a successful revolt (g), and it is increasing in the income net of taxation and default loss ($(1 - \tau)y(\sigma) - \delta\ell$). Furthermore, in this coordination game, the survival probability of the leader is increasing and concave in the amount spent by the leader in revolt prevention, π. In the next sections, we will show how the leader and the international community take these effects into account when making their own choices.

4.2 The Choice of the Policy Vector

At time $t = 2$, the leader chooses the policy vector to maximize his survival probability subject to the government's budget constraint and the feasibility constraints. If the country is not in a confidence crisis, namely if there exists a finite interest rate r that solves no-arbitrage condition (4) (see Section 4.3 for details), the leader chooses a vector $(\tau, \pi, \delta) \in [0,1] \times [0,1] \times \{0,1\} = C$ to solve:

$$\max_{(\tau,\pi,\delta)\in C} S(\sigma, \tau, \pi, \delta) \text{ s.t. } \tau y(\sigma) = \pi + B(1+r)(1-\delta). \tag{6}$$

Instead, if the country is in a confidence crisis, namely if there is no finite r that solves no-arbitrage condition (4), δ is no longer a choice variable and it equals 1. Hence, the leader solves:

$$\max_{(\tau,\pi)\in[0,1]^2} S(\sigma, \tau, \pi, 1) \text{ s.t. } \tau y(\sigma) = \pi. \tag{7}$$

We analyze each case separately.

Let us consider first the case in which the country is not in a confidence crisis and let us focus on the investment in revolt prevention, π. An increase in π has two effects on the survival probability (5). First, it increases S because a stronger intelligence or police discourages attacks. Fewer activists are thus sucked into the revolt, and overthrowing the leader becomes less likely. Second, through the budget constraint in (6), a higher π must be financed by a higher tax rate τ and this lowers S. The optimal solution to this tradeoff is given by (see Lemma 4 in the Appendix)

$$\pi^{\dagger} = \max\{0, \sqrt{g} - g\}. \tag{8}$$

We refer to $\pi^{\dagger}$ as the *preferred level of revolt prevention.* $\pi^{\dagger}$ is positive if and only if the benefit activists receives from participating in a successful attack is not too high, $g < 1$. If $g \geq 1$, the marginal cost of revolt prevention in terms of taxation is too high compared to the marginal increase in survival probability that it induces. Hence, the leader prefers to set $\pi = 0$. Assumption 2 rules out this latter case to focus on the interesting one.

Assumption 2. *The benefit of a successful attack is not too high:* $g < 1$.

Also the decision to default has a two-fold effect on (5). It yields a loss ℓ that undermines the leader's survival probability. However, it also eliminates the cost of servicing public debt, enabling a reduction in the tax rate τ and/or an increase in the investment in revolt prevention π. Both these effects increase S. The actual balance between these two forces depends on the realized value of the default loss—recall that ℓ is realized before the leader chooses δ. Hence, the leader defaults ($\delta = 1$) if and only if the default loss ℓ is sufficiently low.

The two tradeoffs we just described determine the leader's choice of the policy vector if constraint $\tau \leq 1$ does not bind—recall that $\tau \in [0, 1]$. This happens if the tax base given by the gross income $y(\sigma)$ is sufficiently high. Instead, if $\tau \leq 1$ binds, an additional tradeoff arises because the investment in revolt prevention π and the default choice δ can no longer be set independently. If the leader services the debt ($\delta = 0$), taxes will be as high as possible ($\tau = 1$) and the investment in revolt prevention will be set residually and below $\pi^{\dagger}$. On the contrary, if the leader chooses the preferred level of revolt prevention, he must default to free the necessary monetary resources ($\delta = 1$).

In what follows, we assume that gross income $y(\sigma)$ is always sufficiently high to either finance $\pi^{\dagger}$, or to service the debt in the absence of default risk.[12] Relaxing this assumption would strengthen the link between sanctions and defaults, hence our qualitative insights. However, it would also increase the number of cases to consider in the equilibrium analysis and would make the analysis more cumbersome.

[12]Formally, $y(\overline{\sigma}) \geq \max\left\{\pi^{\dagger}, B\left(1 + \tilde{r}\right)\right\}$; this puts an upper bound on the severity of sanctions.

Summing up, the policy vector chosen by the leader in equilibrium $(\tau^*, \pi^*, \delta^*)$ depends on the severity of sanctions, σ, the interest rate, r, and the realization of the default loss, ℓ. Hence, $(\tau^*, \pi^*, \delta^*) = (T(\sigma, \ell \mid r), P(\sigma, \ell \mid r), D(\sigma, \ell \mid r))$. We characterize such vector in the Appendix (see Lemma 4).

We refer to defaults triggered by the leader ($D(\sigma, \ell \mid r) = 1$) as political defaults. Importantly, the leader's choice to default depends on the default loss ℓ, which is realized after financial markets set the interest rate r (see Figure 1). Hence, from the perspective of financial markets, political defaults are random events, whose probability is given by

$$\Pr(\delta = 1) = F(\sigma \mid r) = \int_0^{\ell_H} \frac{D(\sigma, \ell \mid r)}{\ell_H} d\ell. \tag{9}$$

Proposition 2. *Suppose Assumptions 1 and 2 hold and that the country is not in a confidence crisis, then the probability of a political default, $F(\sigma \mid r)$, is increasing in the severity of sanctions σ for any interest rate r.*

Hence, holding the interest rate fixed, more severe sanctions trigger a default more often. To see why, first observe that a default has three effects—cf. equation (21). First, a default saves the amount $(1 + r) B$ and such savings can be used to reduce the tax rate τ. Second, if constraint $\tau \leq 1$ binds, a default enables the leader to choose the preferred level of revolt prevention, $\pi^\dagger$. Third, a default yields a loss equal to ℓ. The first two effects improve regime's stability, while the third dampens it (see Proposition 1). An increase in the severity of sanctions shrinks gross income $y(\sigma)$ and thus makes constraint $\tau \leq 1$ more likely to bind. This amplifies the second effect, while it does not affect the other two. As a result, the leader defaults more often and (9) increases.

Turning our attention to the case in which the country is in a confidence crisis—see problem (7)—we note that, by our assumptions, gross income is always high enough to allow the leader to choose the preferred level of revolt prevention. Hence, our previous discussion immediately implies that, in equilibrium, $\pi^* = \pi^\dagger$ and $\tau^* = \sigma\pi^\dagger$.

4.3 Financial Markets and the Cost of Debt

At time $t = 1$, financial markets form rational expectations on the probability of a default and set the interest rate on the government bond accordingly. The absence of arbitrage opportunities implies that the expected return on the government bond must equal the safe return that an investor can get from the risk-free asset, $1 + \tilde{r}$.

We say that the country is not in a confidence crisis, if there exists at least one interest rate r that solves the following equation:

$$(1 + r)(1 - F(\sigma \mid r)) = 1 + \tilde{r}. \tag{10}$$

When the amount of outstanding debt B is large enough, Appendix 1.3 shows that there is no finite r that solves (10). In this case the country is in a confidence crisis and a default happens with certainty without the leader deciding on it. We refer to these defaults as economic defaults.

When the country is not in a confidence crisis, equation (10) can admit two solutions. To understand why multiple interest rates can solve the no-arbitrage condition, consider an increase in the interest rate r. On the one hand the gross nominal yield on the bond conditional on repayment, $(1 + r)$, goes up. On the other hand, the service of public debt becomes more costly and defaults thus become more beneficial for the leader. As a result, the probability of repayment, $1 - F(\sigma \mid r)$, goes down. Financial markets can thus charge two different interest rates: a lower one associated with a low probability of default, and a higher one that compensates investors for a higher likelihood of no repayment. When this multiplicity arises, we focus on the lowest of the two solutions, namely on the interest rate closer to the risk free rate.[13]

The probability with which the leader triggers a default depends on the severity of sanctions, and so it does the interest rate that solves (10), $r = r(\sigma)$. Because $r(\sigma)$ must compensate investors for the probability of a default, we have $r(\sigma) > \tilde{r}$. Proposition 3 states that that the interest rate, $r(\sigma)$, and the probability of a political default, $F(\sigma \mid r(\sigma))$, are both increasing in σ. In other words, harsher sanctions increase the frequency of external debt crisis. Differently from Proposition 2, this proposition also takes into account that, in equilibrium, sanctions induce a change in the interest rate $r(\sigma)$. The proposition also states that the country is not in a confidence crisis if the amount of the external debt is sufficiently small.[14]

Proposition 3. *The country is not in a confidence crisis if the amount of debt B lies below a threshold $\bar{B}$. When the country is not in a confidence crisis, the interest rate, $r(\sigma)$, is a continuous function of the severity of sanctions and there exists $\hat{\sigma} \in [1, \bar{\sigma}]$ such that $r(\sigma)$ is constant if $\sigma < \hat{\sigma}$ and increasing if $\sigma \geq \hat{\sigma}$. Furthermore, the probability of a political default, $F(\sigma \mid r(\sigma))$, is increasing in σ.*

We conclude this section by highlighting that, when equation (10) admits at least one solution, a marginal change in the severity of sanctions affects the nominal return

[13]The choice of the lowest interest rate can be justified assuming that international investors, keeping expected yield constant, prefer to minimize the risk of a default. For instance, this could be the case if investors fear the global financial turmoil that a default generates and the consequences that this could have on them.

[14]In particular, it can be shown that the threshold is higher if the default loss is likely to be large (ℓ_H high) or if the risk-free rate is small ($\tilde{r}$). These cases capture instances in which the net benefit of a default is small either because defaulting is costly, or because servicing the debt is cheap.

on the bond, $1 + r(\sigma)$, but not its expected return given by $(1 + r(\sigma))(1 - F(\sigma \mid r(\sigma)))$. This can be seen by totally differentiating (10) with respect to σ and verifying that the marginal change in the yield and the one in the probability of a political default fully offset each other in order to preserve no-arbitrage. In other words, if sanctions become harsher, the interest rate charged by financial markets increases by the exact amount needed to compensate for the leader's higher likelihood to default.

4.4 Sanctions and Leader's Survival Probability

The previous Sections show the effects of sanctions on the interest rate $r(\sigma)$, as well as the policy vector $(T(\sigma, \ell \mid r(\sigma)), P(\sigma, \ell \mid r(\sigma)), D(\sigma, \ell \mid r(\sigma)))$ chosen by the leader. These *indirect* effects of sanctions impact the leader's survival probability S characterized in Proposition 1 and add up to the *direct* effect on gross income, $y(\sigma)$.

To understand the overall effect of sanctions on the leader's survival probability, note that the default loss ℓ is uncertain at time $t = 0$. Hence, the international community regards the survival probability of the leader as a random event with probability $\hat{S}$ given by

$$\hat{S}(\sigma) = \int_0^{\ell_H} \frac{S(\sigma, T(\sigma, \ell \mid r(\sigma)), P(\sigma, \ell \mid r(\sigma)), D(\sigma, \ell \mid r(\sigma)))}{\ell_H} d\ell \tag{11}$$

Proposition 4. *The leader's expected survival probability, $\hat{S}(\sigma)$, is decreasing in the severity of sanctions, σ.*

Proposition 4 implies that, in our model, sanctions carry the traditional instrumental value discussed in the literature: they weaken the leader and favor his overthrowing.

To understand Proposition 4, observe that sanctions directly lower $y(\sigma)$, and thus the leader survival probability—see equation (5). Now, consider the indirect effects of sanctions. On the one hand, harsher sanctions increase the interest rate, $r(\sigma)$ as stated in Proposition 3. Hence, to repay the debt, taxes must go up and this reduces the leader's survival probability. On the other hand, by lowering gross income $y(\sigma)$, more severe sanctions make the constraint $\tau \leq 1$ more likely to bind. When this happens, the leader either defaults and sets the investment in revolt prevention equal to $\pi^{\dagger}$, or repays the debt and choose a level of revolt prevention lower than $\pi^{\dagger}$ (see Section 4.2). In either case, his survival probability goes down. Combining direct and indirect effects, we can conclude that more severe sanctions weaken the regime's stability and reduce the leader's chances to survive in office.

4.5 The Severity of Sanctions

At time $t = 0$, the international community chooses the severity of sanctions taking all economic and political consequences into account. In particular, it forms rational expectations on the interest rate that markets will charge, on the policy vector chosen by the leader—and specifically on his decision to default—and on the probability with which the leader survives in office.

We model the international community as a unitary agent who enjoys a (political or economic) benefit from imposing sanctions and overthrowing the leader, but it also bears a cost if the country defaults.[15] For this reason, this section focuses on the case in which the country is not in a confidence crisis, so that sanctions can have an impact

[15]If we modelled the international community as a collective agent whose members have different political weights representing their abilities to affect the severity of sanctions, Proposition 5 would extend and the final choice of σ would disproportionally represent the interests of the most powerful countries. If these countries were less exposed to the negative consequences of a default—for instance because their loans to the target country represent a small share of their GDP or national wealth—then the severity of sanctions would be inefficiently high.

on defaulting probability.[16] If the country is in a confidence crisis, the default is certain and the level of sanctions is chosen based on the tradeoffs highlighted by the previous literature (see Drezner, 1999, Hufbauer *et al.*, 2009 and the discussion in Section 2 for possible negative effects of sanctions).

In particular, the *instrumental benefit* of sanctions is associated to the overthrowing of the leader and it is given by $k\left[1-\hat{S}\left(\sigma\right)\right]$ with $k>0$. This could capture the improvement in economic and diplomatic relationships if a new friendly leadership replaces the current one, or the gain in popularity associated with a foreign policy success. Independently of what happens to the leader of the target country, sanctions may also carry a political benefit per se. For instance, members of the international community may punish an hostile regime to boost their reputation by showing—to other countries or to their own public opinions—that certain misconducts are not tolerated. Such additional benefits of sanctions positively depends on their severity and we capture them with a continuous and strictly increasing function $V=V(\sigma)$. Insofar harsher sanctions induce a higher default probability (see Proposition 3), our results would go through even if we set $V\left(\sigma\right)\equiv 0$.

Finally, the international community incurs a cost $c>0$ if the target country defaults. This cost captures both the capital losses incurred when the debt is not serviced, and all other negative externalities the default may trigger (e.g., domino effects that hit members of the international community, confidence disruption, higher instability, reduction in trading flows with the defaulting country and so on). Because the event of a default ($\delta=1$) is random, the expected cost incurred by the international com-

[16] As stated in Proposition 3, this is equivalent to assume that the nominal amount of debt B is sufficiently small.

munity is $c\,\Pr(\delta = 1)$. By the analysis carried out in previous sections, we know that $\Pr(\delta = 1) = F(\sigma \mid r(\sigma))$. Hence, the international community chooses the severity of sanctions $\sigma \in [1, \bar{\sigma}]$ to maximize

$$U(\sigma) = k\left[1 - \hat{S}(\sigma)\right] + V(\sigma) - cF(\sigma \mid r(\sigma)) \tag{12}$$

Proposition 5. *Suppose the country is not in a confidence crisis. Then, in equilibrium, the severity of sanctions is decreasing in the cost of a default c and increasing in the benefit of replacing the leader k.*

Because the cost c of a default for the international community is likely to increase with factors such as the integration of the target country in financial markets and/or its trade flows, Proposition 5 suggests that, coeteris paribus, sanctions are more severe against smaller and economically more isolated countries. Given the logic of our model, these are the countries in which sanctions trigger political defaults more often.

To summarize, a key message emerges from our analysis. Although sanctions impair a leader's survival probability, they also increase the probability of a default on external debt. This is because the leader may use a default as a strategic tool to restore some of his stability in office after that sanctions dampened it. These political defaults are triggered more often when the international community does not suffer from them, which, in turn, is likely to be true if the target country is small and economically isolated.

5. Concluding Remarks

This paper studies the relationship between sanctions, defaults on public debt and political unrest. The common view in the literature is that sanctions are imposed to punish insolvent countries or to induce debt repayment. In line with the chain of events that occurred in some countries, this paper proposes a different story: sanctions tighten the government's budget constraint and make it harder for a leader to retain internal support and to survive in office. Thus, if targeted by sanctions, a leader may default on the external debt to relax the budget constraint and free monetary resources to improve his chances to preserve office. In short, defaults can be a viable defensive strategy to regain political support after being hit by sanctions. Thus, our model proposes a unitary story linking the effect of sanctions on the economy of the target country, on its likelihood to repay public debt, and on internal political stability.

Nonetheless, sanctions may also affect the probability of a debt crisis and the stability of the ruling regime through additional and separate channels. For instance, by escalating the level of conflict between the target country and the international community and by generating an observable reduction in the country's GDP, sanctions may provide to the government's of the target country a domestic and international rationale for a default. In our model, some of these effects could be captured assuming that the direct impact of a default on the regime's stability decreases with the severity of sanctions (cf. Arellano, 2008). For instance, the maximal default loss (hence, given the uniform distribution, the expected default loss) may be a decreasing function of σ, $\ell_H(\sigma)$. In this case, when deciding on the severity of sanctions, the international community would take into account that harsher sanctions make a default more likely. Thus our conclusion would survive: more severe sanctions would still increase the likelihood of a default.

Another possible effect of sanctions is to foster nationalistic rhetoric and induce a "rally-'round-the-flag" effect (see Grossman *et al.*, 2018). For instance, on May 24th the Venezuelan President Hugo Chavez commented on Twitter the US sanctions against Venezuela as follows: "Sanctions imposed by the imperialist gringo government? Welcome Mr. Obama! The real impact of the new gringo aggression is potentiating the patriotic and nationalist morale of Venezuela."[17] A boost in nationalistic sentiment can be included in our model through a continuous and increasing function $\rho(\sigma)$ that enters in an additively separable way into the regime's stability given by equation (1). More severe sanctions would thus yield a direct improvement in the regime's stability and, also in this case, all the qualitative findings of our model would remain true.

On a general note, this paper highlights that sanctions by an external entity trigger a political internal response by the ruling regime of the target country and that such response may limit their effectiveness. Hence, while the general evaluation of the political effects of sanctions is yet a controversial issue, this paper provides a novel and complementary explanation for sanctions' puzzling lack of efficacy. Analyzing how a mechanism similar to the one described in this paper can lead a sanctioned regime to the adoption of more general populist policies, and identifying both theoretically and empirically the conditions under which this is more likely to happen, represent natural directions for future research.

[17] https://www.forbes.com/sites/greatspeculations/2011/06/13/silly-sanctions-against-venezuela-boost-hugo-chavez/#1dc3397658fb

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6. Appendix

Table 1: Summary of notation.

Parameters	
k	International community benefit if leader is overthrown.
c	International community cost if target country defaults.
B	Outstanding amount of debt.
$\tilde{r}$	Risk-free interest rate.
$\ell \sim U[0, \ell_H]$	Default loss (realized at the beginning of period 2).
g	Activist benefit from participating in a successful revolt.
$\eta \sim U[\underline{\eta}, \overline{\eta}]$	Leader's strength (realized at the beginning of period 3).
Equilibrium Behavior	
$\sigma \in [1, \overline{\sigma}]$	Severity of sanctions.
$r = r(\sigma) \in [\tilde{r}, +\infty)$	Interest rate on the bond.
$\tau = T(\sigma, \ell \mid r(\sigma)) \in [0, 1]$	Tax rate.
$\pi = P(\sigma, \ell \mid r(\sigma)) \in [0, \tau]$	Investment in revolt prevention.
$\delta = D(\sigma, \ell \mid r(\sigma)) \in \{0, 1\}$	Default choice (or default status if country is a confidence crisis).
$a_i \in \{0, 1\}$	Activist decision on whether to attack.
Important Variables and Functions	
$y(\sigma) = 1/\sigma$	Gross income given sanctions.
$\hat{S}(\sigma)$	Ex-ante survival probability of the leader given sanctions.
$S(\sigma, \tau, \pi, \delta)$	Survival probability of the leader given sanctions and leader's behavior (conditional on the realization of ℓ).
$F(\sigma \mid r(\sigma))$	Probability of political defaults.
$\pi^{\dagger}$	Preferred level of revolt prevention.
$\theta(\sigma, \tau, \delta, \eta)$	Regime's stability.
$\varepsilon_i \sim U\left[\eta - \frac{1}{2\psi}, \eta + \frac{1}{2\psi}\right]$	Activist signal about η.

6.1 Proof of Proposition 1

Fix the severity of sanctions σ and the policy vector (τ, π, δ). Consider a strategy profile for the activists. Let $\alpha(\varepsilon_i)$ be the share of activists who, under this strategy profile, attack after receiving signal ε_i. If the leader's strength is η, the overall mass of activists who attack is $Q(\eta, \alpha) = \int_{\eta-\frac{1}{2\psi}}^{\eta+\frac{1}{2\psi}} \psi\alpha(x)\, dx$. Hence, the leader is overthrown if $\eta \in W(\alpha) := \{\eta \in [\underline{\eta}, \overline{\eta}] : Q(\eta, \alpha) \geq \theta(\sigma, \tau, \delta, \eta)\}$.

We can thus represent the payoff of each activist in the following table:

	$\eta \in W(\alpha)$	$\eta \notin W(\alpha)$
Revolt	g	π
Not Revolt	0	0

and conclude that the activist will attack if $w(\varepsilon_i, \alpha) > 0$ and not attack if $w(\varepsilon_i, \alpha) \leq 0$, where $w(\varepsilon_i, \alpha) = \int_{\eta \in W(\alpha)} g dG(\eta \mid \varepsilon_i) - \int_{\eta \notin W(\alpha)} \pi dG(\eta \mid \varepsilon_i)$, is the expected payoff of attacking when the signal is ε_i ($G(\eta \mid \varepsilon_i)$ is the cdf over η conditional on signal ε_i).

First, we show that the expected payoff of attacking is greater when other activists attack more often for each possible signal realization.

Lemma 1. *If $\alpha_1(\varepsilon_i) \geq \alpha_2(\varepsilon_i)$ for every ε_i, then $w(\varepsilon_i, \alpha_1) \geq w(\varepsilon_i, \alpha_2)$ for every ε_i.*

Proof. Suppose $\alpha_1(\varepsilon_i) \geq \alpha_2(\varepsilon_i)$ for every ε_i. Then, $Q(\eta, \alpha_1) \geq Q(\eta, \alpha_2)$ for every η and $W(\alpha_1) \supseteq W(\alpha_2)$. The lemma follows from the definition of $w(\varepsilon_i, \alpha)$ and the fact that $g > 0 > -\pi$. □

Consider the profile in *symmetric cutoff strategies* in which all activists attack if and only if the signal they receive is below a cutoff $\kappa \in \mathbb{R}$. Denote such cutoff strategy with ι_κ. The next Lemma states that if activists follow ι_κ, the utility of the *marginal attacker*—namely, the activist whose signal is exactly equal to the cutoff κ—is decreasing in the cutoff itself. The intuition is that when the cutoff is higher, the stability of the regime is higher as well and this implies that the activist receives a lower utility from attacking.

Lemma 2. *$w(\kappa, \iota_\kappa)$ is continuous and strictly decreasing in κ.*

Proof. Suppose activists follow ι_κ. Then the share of activists attacking is given by:

$$Q(\eta, \iota_\kappa) = \begin{cases} 0 & \text{if } \eta > \kappa + \frac{1}{2\psi} \\ \frac{1}{2} - \psi(\eta - \kappa) & \text{if } \eta \in \left[\kappa - \frac{1}{2\psi}, \kappa + \frac{1}{2\psi}\right] \\ 1 & \text{if } \eta < \kappa - \frac{1}{2\psi} \end{cases} \tag{13}$$

Because stability is strictly increasing in η, while $Q(\eta, \iota_\kappa)$ is decreasing in it, there exists a unique value of η satisfying $Q(\eta, \iota_\kappa) = \theta(\sigma, \tau, \delta, \eta)$. Let $\varphi(\kappa)$ be the difference between the leader's strength η that satisfies the previous equality and the cutoff κ. In other words, $\varphi(\kappa)$ is the unique value that satisfies $Q(\kappa + \varphi(\kappa), \iota_\kappa) = \theta(\sigma, \tau, \delta, \kappa) + \varphi(\kappa)$. Note that (i) if $\kappa \leq \underline{\eta} - (2\psi)^{-1}$, then $\varphi(\kappa) = (2\psi)^{-1}$, and (ii) if $\kappa > \underline{\eta} - (2\psi)^{-1}$, $\varphi(\kappa) \in (-(2\psi)^{-1}, (2\psi)^{-1})$ and solves $1/2 - \psi\varphi(\kappa) = \theta(\sigma, \tau, \delta, \kappa) + \varphi(\kappa)$. In particular, if we totally differentiate this last equality with respect to κ, we get $\varphi'(\kappa) = -\frac{1}{1+\psi} < 0$. The leader is overthrown if and only if $\eta \in \left[\underline{\eta}, \kappa + \varphi(\kappa)\right)$. Hence, $w(\kappa, \iota_\kappa) = \int_{\kappa - \frac{1}{2\psi}}^{\kappa + \varphi(\kappa)} g d\varepsilon - \int_{\kappa+\varphi(\kappa)}^{\kappa + \frac{1}{2\psi}} \pi d\varepsilon$. Because $\varphi(\kappa)$ is continuous in κ, so is $w(\kappa, \iota_\kappa)$. Applying Leibnitz's rule, we can further see that $\varphi'(\kappa) = -\frac{1}{1+\psi} < 0$ implies that $w(\kappa, \iota_\kappa)$ is decreasing in κ. This concludes the proof. □

The next Lemma shows that the unique equilibrium of the revolt subgame is in cutoff strategies.

Lemma 3. *There is a unique ε^* such that in any equilibrium of the revolt subgame, an activist revolts if and only if $\varepsilon_i < \varepsilon^*$.*

Proof. By the previous lemma, $w(\kappa, \iota_\kappa)$ is continuous and strictly decreasing in κ. If $\kappa < \underline{\eta} - (2\psi)^{-1}$, each activist knows that the leader's stability is so low that he will be overthrown. Hence, $w(\kappa, \iota_\kappa) = g > 0$. Instead, if $\kappa > \overline{\eta} + \frac{1}{2\psi}$, each activist knows that the revolt will fail. Thus $w(\kappa, \iota_\kappa) = -\pi < 0$. By the intermediate value theorem, there must exist a unique ε^* such that $w(\varepsilon^*, \iota_{\varepsilon^*}) = 0$. Now, pick any equilibrium strategy profile in the revolt subgame (this set is non-empty because the strategy profile characterized below is indeed an equilibrium) and let $\alpha(\varepsilon_i)$ be the share of activists who attack after receiving signal ε_i.

Define $\underline{\varepsilon} = \inf\{\varepsilon_i \mid \alpha(\varepsilon_i) < 1\}$ and $\overline{\varepsilon} = \sup\{\varepsilon_i \mid \alpha(\varepsilon_i) > 0\}$. We have that $\overline{\varepsilon} \geq \sup\{\varepsilon_i \mid \alpha(\varepsilon_i) \in (0,1)\} \geq \inf\{\varepsilon_i \mid \alpha(\varepsilon_i) \in (0,1)\} \geq \underline{\varepsilon}$. Observe that, if $\alpha(\varepsilon_i) < 1$, activists must weakly prefer not to attack. By continuity, the same holds at $\underline{\varepsilon}$. Thus, $w(\underline{\varepsilon}, \alpha) \leq 0$. By construction, $\underline{\varepsilon}$, $\iota_{\underline{\varepsilon}} < \alpha$. Lemma 1 thus implies $w(\underline{\varepsilon}, \iota_{\underline{\varepsilon}}) \leq w(\underline{\varepsilon}, \alpha) \leq 0$. Since we know that $w(\varepsilon^*, \iota_{\varepsilon^*}) = 0$, Lemma 2 implies that $\underline{\varepsilon} \geq \varepsilon^*$. A symmetric argument implies that $\overline{\varepsilon} \leq \varepsilon^*$. Thus $\underline{\varepsilon} \geq \varepsilon^* \geq \overline{\varepsilon}$. Therefoe, we have both $\underline{\varepsilon} \geq \varepsilon^* \geq \overline{\varepsilon}$ and $\underline{\varepsilon} \geq \varepsilon^* \leq \overline{\varepsilon}$. Hence, $\underline{\varepsilon} = \overline{\varepsilon} = \varepsilon^*$ and therefore, $\alpha = \iota_{\varepsilon^*}$. □

By Lemma 3, the share of activists attacking in any equilibrium of the revolt subgame is a function of η and it is given by:

$$Q(\eta, \iota_{\varepsilon^*}) = \begin{cases} 0 & \text{if } \eta > \varepsilon^* + \frac{1}{2\psi} \\ \frac{1}{2} - \psi(\eta - \varepsilon^*) & \text{if } \eta \in \left[\varepsilon^* - \frac{1}{2\psi}, \varepsilon^* + \frac{1}{2\psi}\right] \\ 1 & \text{if } \eta < \varepsilon^* - \frac{1}{2\psi} \end{cases} \tag{14}$$

This expression is decreasing in η, while the regime's stability, $\theta(\sigma, \tau, \delta, \eta)$, is strictly increasing in it. Furthermore, by Assumption 1, $\theta(\sigma, \tau, \delta, \eta)$ starts below 0 and ends above 1. Thus, $Q(\eta, \iota_{\varepsilon^*})$ and $\theta(\sigma, \tau, \delta, \eta)$ seen as functions of η cross exactly once. Let η^* be the leader's strength at which this happens. By definition of ε^* and η^*, we have

$$\int_{\eta^* - \frac{1}{2\psi}}^{\varepsilon^*} \psi dz = \frac{1-\tau}{\sigma} - \delta\ell + \eta^*. \tag{15}$$

Furthermore, ε^* is the signal that leaves an activist indifferent between attacking and not attacking. Hence it solves:

$$\int_{\varepsilon^*-\frac{1}{2\psi}}^{\eta^*} \psi g d\eta - \int_{\eta^*}^{\varepsilon^*+\frac{1}{2\psi}} \psi \pi d\eta = 0. \tag{16}$$

Equations (16) and (15) define a system of two equations in two unknowns (ε^* and η^*), whose solution is given by

$$\eta^* = \frac{g}{g+\pi} - \frac{1-\tau}{\sigma} + \delta\ell, \tag{17}$$

$$\varepsilon^* = \frac{g-\pi}{2\psi\,(g+\pi)} + \frac{g}{g+\pi} - \frac{1-\tau}{\sigma} + \delta\ell. \tag{18}$$

The statement of the proposition thus follows from the fact that η is uniformly distributed in the interval $\left[\underline{\eta}, \overline{\eta}\right]$. □

6.1.1 Proof of Proposition 2 and Characterization of the Optimal Policy Vector.

From (3) and (5), we conclude that, absent any feasibility constraint on the tax level, the optimal level of revolt prevention is given by $\pi^{\dagger} = \max\{0, \sqrt{g} - g\}$.

Define $\bar{y} := \sqrt{g} - g + B\,(1+r)$ as the cutoff level on gross income that determines whether the constraint $\tau \leq 1$ binds or not. Let $\pi^*_{|\delta=1}$ and $\tau^*_{|\delta=1}$ (resp., $\pi^*_{|\delta=0}$ and $\tau^*_{|\delta=0}$) be the optimal level of revolt prevention and taxation conditional the leader choosing to default (resp., not to default). These values solve problem (6) if we set $\delta = 1$ (resp., $\delta = 0$). In line with the discussion in the main text, we can write:

$$\pi^*_{|\delta=1} = \sqrt{g} - g \geq \pi^*_{|\delta=0} = \begin{cases} \sqrt{g} - g & \text{if } \frac{1}{\sigma} \geq \bar{y} \\ \max\left\{0, \frac{1}{\sigma} - B\,(1+r)\right\} & \text{if } \frac{1}{\sigma} < \bar{y} \end{cases} \tag{19}$$

$$\tau^*_{|\delta=1} = \sigma\left(\sqrt{g} - g\right) < \tau^*_{|\delta=0} = \begin{cases} \sigma\left[\sqrt{g} - g + B\,(1+r)\right] & \text{if } \frac{1}{\sigma} \geq \bar{y} \\ 1 & \text{if } \frac{1}{\sigma} < \bar{y} \end{cases} \tag{20}$$

Thus, a default leads to a weak increase in the amount invested in revolt prevention and to a weak decrease in the level of taxation.

Denote with $\Delta(\sigma, \ell \mid r)$ leader's benefit from defaulting when sanctions are σ, the default loss is ℓ and the level of interest rate is equal to r. By Proposition 1:

$$\Delta(\sigma, \ell \mid r) = \left[S\left(\sigma, \tau^*_{|\delta=1}, \pi^*_{|\delta=1}, 1\right) - S\left(\sigma, \tau^*_{|\delta=0}, \pi^*_{|\delta=0}, 0\right)\right] =$$
$$= \frac{1}{\overline{\eta} - \underline{\eta}} \cdot \left[\frac{\tau^*_{|\delta=0} - \tau^*_{|\delta=1}}{\sigma} + \frac{g \cdot \left(\pi^*_{|\delta=1} - \pi^*_{|\delta=0}\right)}{\left(g + \pi^*_{|\delta=1}\right)\left(g + \pi^*_{|\delta=0}\right)} - \ell\right]. \tag{21}$$

The squared bracket in (21) identifies the three separate effects of a default mentioned in the main text. First, a default enables the leader to reduce taxation; second, a default may enable the leader to increase the investment in revolt prevention. Third, a default generates a a loss ℓ. Substituting for (19) and (20) in (21) and accounting for the fact that $\tau \leq 1$ may bind, we get

$$\Delta(\sigma, \ell \mid r) = \begin{cases} \frac{1}{\overline{\eta} - \underline{\eta}} \cdot [B(1+r) - \ell] & \text{if } \frac{1}{\sigma} \geq \bar{y} \\ \frac{1}{\overline{\eta} - \underline{\eta}} \cdot \left[\frac{g}{g + \sigma^{-1} - B(1+r)} - 2\sqrt{g} + \frac{1}{\sigma} + g - \ell\right] & \text{if } \frac{1}{\sigma} < \bar{y} \end{cases} \tag{22}$$

$\Delta(\sigma, \ell \mid r)$ is decreasing in ℓ. Moreover, (i) $\Delta(\sigma, \ell \mid r)$ is piecewise increasing in r, (ii) $\bar{y}$ is increasing in r, and (iii) $\Delta(\sigma, \ell \mid r)$ is higher if $\tau \leq 1$ binds rather than if it does not.[18] Then, $\Delta(\sigma, \ell \mid r)$ is increasing in r.

The next lemma describes the optimal policy vector for the leader when the country is not in a confidence crisis.

Lemma 4. *Suppose the country is not in a confidence crisis and Assumptions 1 and 2 hold. Then, the optimal policy vector* $(T(\sigma, \ell \mid r), P(\sigma, \ell \mid r), D(\sigma, \ell \mid r))$ *is given by:*[19]

$$P(\sigma, \ell \mid r) = \begin{cases} \max\left\{0, \frac{1}{\sigma} - B(1+r)\right\} & \textit{if } \frac{1}{\sigma} < \bar{y} \textit{ and } \Delta(\sigma, \ell \mid r) \leq 0; \\ \sqrt{g} - g & \text{otherwise.} \end{cases} \tag{23}$$

[18] To see this last result, observe that if $\frac{1}{\sigma} \leq \bar{y}(r)$, the differences $\tau^*_{|\delta=0} - \tau^*_{|\delta=1}$ and $\pi^*_{|\delta=1} - \pi^*_{|\delta=0}$ are both larger than in the case in which $\frac{1}{\sigma} > \bar{y}(r)$.

[19] We assume that, whenever indifferent between defaulting or not, the leader does not default. None of our results hinges on this tie-breaking rule.

$$D(\sigma,\ell\mid r)=\begin{cases}0 & \textit{if } \Delta(\sigma,\ell\mid r)\leq 0;\\ 1 & \textit{if } \Delta(\sigma,\ell\mid r)>0.\end{cases} \tag{24}$$

$$T(\sigma,\ell\mid r)=\sigma\left[P(\sigma,\ell\mid r)+B(1+r)(1-D(\sigma,\ell\mid r))\right] \tag{25}$$

Proof. Substitute the expression for $S(\sigma,\pi,\delta,\tau)$ in (6) and exploit the budget constraint to verify that the second derivative of the objective function with respect to π is $-\frac{2v}{\bar{\eta}-\underline{\eta}}\frac{g}{(g+\pi)^3}<0$. Hence, the problem is strictly concave in π. If we ignore the constraint $\tau\leq 1$, the preferred level of revolt prevention is $\pi^{\dagger}=\sqrt{g}-g$ (recall Assumption 2 rules out $\sqrt{g}-g<0$).

Suppose the leader defaults ($\delta=1$). In this case, the preferred level of revolt prevention can be attained. Furthermore, because taxation does not entail any direct benefit, the tax rate τ will be set so to finance $\pi^{\dagger}$. Hence, $\pi^{*}_{|\delta=1}=\pi^{\dagger}$ and $\tau^{*}_{|\delta=1}=\sigma\pi^{\dagger}$.

Suppose instead that the leader does not default ($\delta=0$). Then, the leader can spend $\pi^{\dagger}$ in revolt prevention if and only if $1/\sigma\geq\bar{y}$. In this case, $\pi^{*}_{|\delta=0}=\sqrt{g}-g$ and the tax rate is set residually to finance the investment in revolt prevention and to service the debt, $\tau^{*}_{|\delta=0}=\sigma\left[\sqrt{g}-g+B(1+r)\right]$. Instead, if $1/\sigma<\bar{y}(r)$, the preferred investment in revolt prevention cannot be attained. Thus, (6) is solved by choosing the highest possible tax rate and by setting the investment in revolt prevention residually. Hence, $\tau^{*}_{|\delta=0}=1$ and $\pi^{*}_{|\delta=0}=\max\left\{0,\frac{1}{\sigma}-B(1+r)\right\}$.

To sum up, the choice on whether to default or not depends on whether $\Delta(\sigma,\ell\mid r)$ is positive or negative. The investment in revolt prevention is equal to $\sqrt{g}-g$ if $\tau\leq 1$ is not binding or if the leader defaults. Otheriwse, it is equal to $\max\left\{0,\frac{1}{\sigma}-B(1+r)\right\}$. Finally, the tax rate is obtained by the government budget constraint if $\tau\leq 1$ does not bind and it is equal to 1 otherwise. □

Lemma 4 implies that a default occurs if $\Delta(\sigma,\ell\mid r)\geq 0$. Hence, the leader triggers a political default with probability $F(\sigma\mid r)=\Pr\{\Delta(\sigma,\ell\mid r)\geq 0\}$. Because $\Delta(\sigma,0\mid r)\geq 0$, $\Delta(\sigma,\ell\mid r)$ is decreasing in ℓ and ℓ_H is sufficiently high to guarantee $\Delta(\sigma,\ell_H\mid r)<0$, we have $F(\sigma\mid r)=\ell^{*}/\ell_H$, where ℓ^{*} is the unique value of ℓ that solves $\Delta(\sigma, \ell \mid r) = 0$. Hence

$$F(\sigma \mid r) = \begin{cases} \frac{B(1+r)}{\ell_H} & \text{if } \frac{1}{\sigma} \geq \bar{y} \\ \frac{1}{\ell_H}\left[\frac{1}{\sigma} + g\left(\frac{1}{g+1/\sigma - B(1+r)} + 1\right) - 2\sqrt{g}\right] & \text{if } \frac{1}{\sigma} < \bar{y} \end{cases} \tag{26}$$

By (26), $\partial F(\sigma \mid r)/\partial r > 0$ and $\partial F(\sigma \mid r)/\partial \sigma \geq 0$. To see this, consider two cases. If $1/\sigma \geq \bar{y}$, then $F(\sigma \mid r)$ is constant in σ, and increasing in r. If $1/\sigma < \bar{y}$, then $g + 1/\sigma - B(1+r) > 0$ because otherwise the private income could not cover the service of the debt, and the country would then be in a confidence crisis. Thus, $\frac{\partial F(\sigma|r)}{\partial \sigma} = -\frac{1}{\sigma^2} + \left(\frac{\sqrt{g}}{\sigma(g+1/\sigma - B(1+r))}\right)^2 > -\frac{1}{\sigma^2} + \frac{1}{\sigma^2} = 0$, where the inequality follows from observing that, because $1/\sigma < \bar{y}$, we have $0 < g + 1/\sigma - B(1+r) < \sqrt{g}$. Finally, also in this case $\frac{\partial F(\sigma|r)}{\partial r} > 0$. □

6.1.2 Proof of Proposition 3.

Assume (10) has a solution and let $r(\sigma)$ be the lowest root of (10). Suppose first that $1/\sigma \geq \sqrt{g} - g + B(1 + r(\sigma))$. In this case, $F(\sigma \mid r(\sigma)) = B(1 + r(\sigma))/\ell_H$ and the no-arbitrage condition yields a solution if and only if $B \leq \ell_H/[4(1+\tilde{r})]$. When this condition is satisfied, the solution is given by:

$$r(\sigma) = \ell_H \left(\frac{1 - \sqrt{1 - 4B(1+\tilde{r})/\ell_H}}{2B}\right) - 1 := \underline{r}. \tag{27}$$

Substituting for $r(\sigma)$, inequality $\frac{1}{\sigma} \geq \sqrt{g} - g + B(1 + r(\sigma))$ becomes

$$\sigma \leq \frac{2}{2\left(\sqrt{g} - g\right) + \ell_H\left(1 - \sqrt{(1 - 4B(1+\tilde{r}))/\ell_H}\right)} := \hat{\sigma}. \tag{28}$$

Hence, if $\sigma \leq \hat{\sigma}$ and $B \leq \ell_H/[4(1+\tilde{r})]$, the country is not in a confidence crisis and the interest rate is constant with respect to the sanction level and equal to (27). Instead, if $\sigma \leq \hat{\sigma}$ and $B > \ell_H/[4(1+\tilde{r})]$, the country is in a confidence crisis.

Now suppose that $1/\sigma < \sqrt{g} - g + B(1 + r(\sigma))$. Then, the equilibrium interest rate is given by the lowest value of r that solves

$$(1+r)\left(1-\frac{1/\sigma+\frac{g}{g+1/\sigma-B(1+r)}+g-2\sqrt{g}}{\ell_H}\right)-(1+\tilde{r})=0. \tag{29}$$

If $\sigma \to \hat{\sigma}$, the interest rate coincides with (27). Let $R(\sigma, r)$ be the left-hand side of (29). By the implicit function theorem, (29) defines $r(\sigma)$. Moreover, $\frac{dr(\sigma)}{d\sigma} = -\frac{\partial R(\sigma,r)}{\partial \sigma} / \frac{\partial R(\sigma,r)}{\partial r}$. $\frac{\partial R(\sigma,r)}{\partial \sigma}$ has the same sign of $1-\frac{1}{g+1/\sigma-B(1+r)}$. Since we are considering the case in which $\frac{1}{\sigma} < \sqrt{g}-g+B(1+r(\sigma))$ and Assumption 2 holds, we have $1-\frac{1}{g+1/\sigma-B(1+r)} < 1-\frac{1}{g} < 0$. Thus, $\frac{\partial R(\sigma,r)}{\partial \sigma} < 0$ and $\frac{dr(\sigma)}{d\sigma}$ is positive if and only if $\frac{\partial R(\sigma,r)}{\partial r} > 0$, which holds for the lowest root of (29) because (29) has two roots greater than $\tilde{r}$ and $R(\sigma, \tilde{r}) < 0$. We conclude that $r(\sigma) \geq \underline{r}$ for every σ.

Suppose that $\sigma = 1/(\sqrt{g}-g)$. Then the gross income is just enough to finance the preferred level of revolt prevention. In this case (29) becomes

$$(1+r)\left(1-\frac{\sqrt{g}B(1+r)}{\ell_H(\sqrt{g}-B(1+r))}\right)-(1+\tilde{r})=0. \tag{30}$$

which admits a solution if and only if B is sufficiently low (recall that $y(\sigma) = 1/\sigma < 1$ has to repay the debt B plus the interest rates; hence, B must be below one). If this condition fails the country is in a confidence crisis. Putting together the argument for $\sigma < \hat{\sigma}$ and the one for $\sigma \geq \hat{\sigma}$ we conclude that the country is not in a confidence crisis if and only if the nominal amount of public debt B is sufficiently small. Furthermore, one can show that such threshold level of debt is decreasing in $\tilde{r}$ and increasing in ℓ_H.

Now we show that the probability of a political default, $F(\sigma \mid r(\sigma))$, is weakly increasing in σ. If $\sigma \leq \hat{\sigma}$, $r(\sigma)$ is constant in σ and $F(\sigma \mid r(\sigma)) = B(1+r(\sigma))/\ell_H$, which is constant in σ. Suppose instead that $\sigma > \hat{\sigma}$. Then, $r(\sigma)$ is increasing in σ and

$$F(\sigma \mid r(\sigma)) = \frac{1}{\ell_H}\left[\frac{1}{\sigma}+g\left(\frac{1}{g+1/\sigma-B(1+r(\sigma))}+1\right)-2\sqrt{g}\right] \tag{31}$$

Hence

$$\frac{dF(\sigma \mid r(\sigma))}{d\sigma} = \frac{1}{\ell_H}\left[-\frac{1}{\sigma^2} + g\left(\frac{1/\sigma^2 + B\frac{dr(\sigma)}{d\sigma}}{(g + 1/\sigma - B(1 + r(\sigma)))^2}\right)\right] \tag{32}$$

Because $B\frac{dr(\sigma)}{d\sigma} \geq 0$, the same steps used at the end of the proof of Proposition 2 yield $\frac{dF(\sigma|r(\sigma))}{d\sigma} > 0$. Hence, $F(\sigma \mid r(\sigma))$ is increasing in σ. □

6.1.3 Proof of Proposition 4.

The expected survival probability of the leader is:

$$\hat{S}(\sigma) = \int_0^{\ell_H}\left[1 - \frac{1}{\overline{\eta} - \underline{\eta}}\left(\frac{g}{g + P(\sigma, \ell \mid r(\sigma))} - \frac{1}{\sigma} + \right.\right.$$
$$\left.\left. + P(\sigma, \ell \mid r(\sigma)) + (1 + r(\sigma))(1 - D(\sigma, \ell \mid r(\sigma))) + \delta\ell\right)\right]\frac{d\ell}{\ell_H} \tag{33}$$

By definition, $\int_0^{\ell_H}(1 + r(\sigma))(1 - D(\sigma, \ell \mid r(\sigma)))\frac{d\ell}{\ell_H} = (1 + r(\sigma))(1 - F(\sigma \mid r(\sigma)))$. Furthermore, equation (10) implies $d(1 + r(\sigma))(1 - F(\sigma \mid r(\sigma)))/d\sigma = 0$. Hence:

$$\frac{d\hat{S}}{d\sigma} = \int_0^{\ell_H}\frac{1}{\overline{\eta} - \underline{\eta}}\left[-\frac{1}{\sigma^2} - \left(1 - \frac{g}{(g + P(\sigma, \ell \mid r(\sigma)))^2}\right)\frac{\partial P(\sigma, \ell \mid r(\sigma))}{\partial\sigma}\right]\frac{d\ell}{\ell_H} \tag{34}$$

If $1/\sigma \geq \bar{y}$, $\frac{\partial P(\sigma,\ell|r(\sigma))}{\partial\sigma} = 0$. As a result, $\frac{d\hat{S}(\sigma)}{d\sigma} < 0$. Consider, instead, the case $1/\sigma < \bar{y}$. If $\ell < \ell^*$, then $P(\sigma, \ell \mid r(\sigma)) = \sqrt{g} - g$ and $\frac{\partial P(\sigma,\ell|r(\sigma))}{\partial\sigma} = 0$. Hence $\hat{S}(\sigma)$ is decreasing in σ. If $\ell > \ell^*$, $P(\sigma, \ell \mid r(\sigma)) = \frac{1}{\sigma} - (1 + r(\sigma))B$ and $\frac{\partial P(\sigma,\ell|r(\sigma))}{\partial\sigma} = -1/\sigma^2 - B\left(1 + \frac{dr(\sigma)}{d\sigma}\right) < 0$. Because $0 < P(\sigma, \ell \mid r(\sigma)) \leq \sqrt{g} - g$, $g/(g + P(\sigma, \ell \mid r(\sigma)))^2 \geq g/\left(g + \sqrt{g} - g\right)^2 = 1$, which yields $\frac{d\hat{S}(\sigma)}{d\sigma} < 0$.

6.1.4 Proof of Proposition 5.

We prove only the statement concerning c because the other result follows the same steps. Suppose that the country is not in a confidence crisis and that the statement of the proposition is false. Then, we can find c' and c'' with $c' < c''$ and σ' and σ'' such that (i) σ' is optimal under c', (ii) σ'' is optimal under c'', and $\sigma' < \sigma''$. By optimality, we have:

$$\sigma' \in \arg\max_{\sigma\in[1,\bar{\sigma}]} V(\sigma) + k\left[1-\hat{S}(\sigma)\right] - c'F(\sigma \mid r(\sigma)) \tag{35}$$

$$\sigma'' \in \arg\max_{\sigma\in[1,\bar{\sigma}]} V(\sigma) + k\left[1-\hat{S}(\sigma)\right] - c''F(\sigma \mid r(\sigma)) \tag{36}$$

In particular, because σ' is a maximand under c', we have

$$k\left[\hat{S}(\sigma'') - \hat{S}(\sigma')\right] - \left[V(\sigma'') - V(\sigma')\right] \\ - c'\left[F(\sigma' \mid r(\sigma')) - F(\sigma'' \mid r(\sigma'))\right] \geq 0. \tag{37}$$

and because σ'' is a maximand under c'' we have:

$$0 \geq k\left[\hat{S}(\sigma'') - \hat{S}(\sigma')\right] - \left[V(\sigma'') - V(\sigma')\right] \\ - c''\left[F(\sigma' \mid r(\sigma')) - F(\sigma'' \mid r(\sigma'))\right]. \tag{38}$$

Furthermore, by Proposition 3, $F(\sigma \mid \rho(\sigma))$ is weakly increasing in σ.

If $F(\sigma' \mid r(\sigma')) = F(\sigma'' \mid r(\sigma''))$, because $\hat{S}(\sigma)$ is weakly decreasing in σ (see Proposition 4) and $V(\sigma)$ is strictly increasing in σ, we have $k\hat{S}(\sigma') - V(\sigma') - c'F(\sigma' \mid r(\sigma')) > k\hat{S}(\sigma'') - V(\sigma'') - c'F(\sigma'' \mid r(\sigma''))$, which contradicts (37). If $F(\sigma' \mid r(\sigma')) < F(\sigma'' \mid r(\sigma''))$, we have

$$0 \leq k\left[\hat{S}(\sigma'') - \hat{S}(\sigma')\right] - \left[V(\sigma'') - V(\sigma')\right] - c'\left[F(\sigma' \mid r(\sigma')) - F(\sigma'' \mid r(\sigma''))\right] < \\ < k\left[\hat{S}(\sigma'') - \hat{S}(\sigma')\right] - \left[V(\sigma'') - V(\sigma')\right] - c''\left[F(\sigma' \mid r(\sigma')) - F(\sigma'' \mid r(\sigma''))\right],$$

which contradicts (38). □