A Theory of Military Dictatorships*

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Abstract

We investigate how nondemocratic regimes use the military and how this can lead to the emergence of military dictatorships. Nondemocratic regimes need the use of force in order to remain in power, but this creates a political moral hazard problem; a strong military may not simply work as an agent of the elite but may turn against them in order to create a regime more in line with their own objectives. The political moral hazard problem increases the cost of using repression in nondemocratic regimes and in particular, necessitates high wages and policy concessions to the military. When these concessions are not sufficient, the military can take action against a nondemocratic regime in order to create its own dictatorship. A more important consequence of the presence of a strong military is that once transition to democracy takes place, the military poses a coup threat against the nascent democratic regime until it is reformed. The anticipation that the military will be reformed in the future acts as an additional motivation for the military to undertake coups against democratic governments. We show that greater inequality makes the use of the military in nondemocratic regimes more likely and also makes it more difficult for democracies to prevent military coups. In addition, greater inequality also makes it more likely that nondemocratic regimes are unable to solve the political moral hazard problem and thus creates another channel for the emergence of military dictatorships. Finally, we show that greater natural resource rents make military coups against democracies more likely, but have ambiguous effects on the political equilibrium in nondemocracies. This is because with abundant natural resources, repression becomes more valuable to the elite, but also more expensive to maintain because of the more severe political moral hazard problem that natural resources induce.

Keywords: coups, democracy, military, nondemocracy, political economy, political transitions.

JEL Classification: H2, N10, N40, P16.

Preliminary. Comments welcome.

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"The class that bears the lance or holds the musket regularly forces its rule upon the class that handles the spade or pushes the shuttle." Gaetano Mosca (1939 p. 228).

1 Introduction

Nondemocratic regimes almost always rely on some degree of repression against competing groups. This repression is often exercised by a specialized branch of the state, *the military*.[1] Despite the prevalence of nondemocratic regimes both in history and in the current world, the typical assumption is that the military is a "perfect agent" of some social group, such as the elite, and there has been little systematic analysis of why and how the military uses its coercive powers to support a nondemocratic regime rather than setting up a regime more in line with its own preferences. This question is relevant since, while many nondemocratic regimes survive with the support of the military, there are also numerous examples of *military dictatorships* that have emerged either as a result of a coup against a nondemocratic regime or against the subsequent democratic government.

In this paper, we take a first step in the analysis of the role of the military in nondemocratic regimes and develop a theory of military dictatorships. At the center of our approach is the agency relationship between the elite in oligarchic regimes and the military.[2] The main idea is that creating a powerful military is a double-edge sword for the elite. On the one hand, a more powerful military is more effective in preventing transitions to democracy. On the other hand, a more powerful military necessitates either greater concessions to the military or raises the risk of a military takeover. We investigate the conditions under which the military will act as the agent of the elite in nondemocratic regimes (oligarchies) and the conditions under which oligarchies will turn into military dictatorships. Our approach also sheds light on the role of the military in coups against democracy. If the elite create a powerful military to prevent democratization, then the military also plays an important role in democratic politics until it is reformed, and such reform is not instantaneous.[3] In particular, we show that faced with a powerful military, a newly-emerging democratic regime will either need to make costly

[1] Throughout the paper, the military may be thought to include the secret police and other law-enforcement agencies. We also use the terms the military and the army interchangeably.

[2] Since we draw a distinction between military dictatorships and nondemocratic regimes controlled by the elite, we use the term *oligarchy* to refer to the latter and nondemocracy as a general term encompassing both military dictatorships and oligarchies.

[3] This assumption is consistent with O'Donnell and Schmitter's (1986) emphasis that the power of the army plays an important role at the early stages of democratic transitions. For instance, a relatively weak army may be easier to reform than a stronger one. Our model will show that this is generally true, but also that weaker militaries may sometimes be more difficult to control.

concessions or face a high probability of a coup. This coup threat disappears once the military is reformed. Interestingly, however, it is the anticipation that the military will be reformed as soon as the opportunity arises that makes it difficult to control the military during the early phases of a democratic regime—because this creates a *commitment problem*, making it impossible for democratic governments to make credible promises to compensate soldiers for not taking actions against democracy.

Our model economy consists of two groups, the rich elite and the citizens, distinguished by their incomes (endowments). Democracy leads to redistributive policies, in particular, to the provision of public goods, which are beneficial for the citizens and costly for the rich elite. Consequently, starting from an *oligarchy* in which they hold power, the elite are unwilling to allow a transition to democracy. The only way they can prevent this is by creating a specialized unit of the state, the military, responsible for using force and repressing demands for democratization.[4] A powerful military, however, is not only effective in preventing a transition to democracy but also creates *a political moral hazard problem* because it can turn against the elite and take direct control of the government (for example, in order to create greater redistribution towards its own members). Consequently, the elite have three potential strategies in oligarchy: (1) no repression, thus allowing a rapid (*smooth*) transition to democracy; (2) repression, while also paying soldiers an *efficiency wage* so as to *prevent* military takeovers; (3) repression without significant concessions to soldiers, thus opting for *non-prevention* and facing the risk of a military takeover.

We characterize the equilibria in this environment and analyze the role of the military in politics. The presence of a strong military changes both democratic and nondemocratic politics. If democracy inherits a large military from the previous nondemocratic regime, then it will also be confronted with a choice between making concessions to the military and facing a coup threat. The decisive voter in democracy always wishes to prevent coups but this may not be possible. In particular, soldiers realize that when the opportunity arises democracy will reform the military reducing their rents. Since democracy cannot commit to not reforming the military when it has the chance to do so, it can only make current concessions to soldiers (since promises of future concessions are not credible) and current concessions may not be

[4] In principle, the elite may prevent democratization by using some combination of "carrot" and of "stick," that is, not only by using repression but also by making concessions and promising redistribution of income to (some of) the poor. The scope and limitations of such promises of redistribution have been analyzed in previous work (see Acemoglu and Robinson, 2000 and 2006) and here we ignore them for simplicity. We also ignore the possibility of cooptation of some subset of the citizens using various means, such as the distribution of public jobs (see, for example, Acemoglu, Ticchi and Vindigni, 2006).

sufficient to compensate the soldiers for the prospect of a military dictatorship. Consequently, our first result shows that societies in which nondemocratic regimes in the past have chosen large militaries may have difficulty consolidating democracy and may instead end up with military dictatorships.[5] This result is not only intuitive but also provides us with a particular reason why social conflict in nondemocracy may create costs for democracies. More specifically, the desire of the rich to prevent democratization, by bequeathing a large army to democracy, may lead to worse economic performance during democracy because of the conflict between citizens and soldiers that this induces.

In oligarchy, whether the elite prefer to set up a large military depends on the effectiveness of the military and on the extent of inequality. When the military is not very effective or inequality is limited, the elite prefer to allow a smooth transition to democracy, because such a regime will not be highly redistributive (while repression is likely to fail). On the other hand, when military repression is likely to be effective and inequality is high, the elite prefer to build a strong military for repression and deal with the political agency problem by paying the military an efficiency wage. This equilibrium configuration will therefore correspond to a situation in which the military is (effectively) an agent of the elite, which is the presumption in the existing literature. However, we also show that under certain circumstances the elite may prefer to use repression but not pay high wages to soldiers, thus allowing military coups against their own regime to take place along the equilibrium path. In this case, nondemocratic regimes persist due to the repression of the citizens, though the military undertaking the repression is *not* an agent of the elite and acts in its own interests. These interests involve attempting a coup against the elite whenever there is an opportunity for doing so.[6]

An interesting implication of our model concerns the relationship between inequality and the size and composition of government spending. When inequality is low, the society is democratic, but the amount of spending is relatively low, and most of it is in the form of public goods. As the level of inequality increases and the society remains democratic, the size of the government (the amount of public good provision) increases. In contrast, when inequality is even higher, the society is likely to be nondemocratic. In this case, the level of taxes and the amount of government spending depend on the nature of the nondemocratic

[5]Most military dictatorships in Central and South America, which have resulted from coups against democratic regimes, are of this type. These examples are further discussed in Section 6.

[6]Examples of military dictatorships that have resulted from coups against oligarchic/nondemocratic regimes include the majority of the military regimes that have emerged in Peru between the 1820s and the 1930s, the army-backed regime created in Thailand after the 1932 coup that ended the rule of the Thai absolutist monarchy, the regime created in Egypt after Major Nasser's coup against the monarchy, and the junta in Panama in 1968 that followed the coup by the National Guard under the leadership of Omar Torrijos.

regime. If it is oligarchic, taxes and spending are low. However, if it is a military dictatorship, then taxes and government spending are high, but all of this spending is on the military—not on public goods.

We then enrich our baseline model by introducing natural resources. Natural resources increase the *political stakes* because soldiers realize that they will be able to capture the natural resource rents if they take power. As a result, natural resource abundance makes democracies more likely to fall to military coups. The effect of natural resources on oligarchic regimes is ambiguous, however. On the one hand, the oligarchic regime has a stronger preference for repression and may be able to use the natural resources in order to buy off the military. On the other, the military is more tempted by coups against the oligarchic regime.

The two key implications (or building blocks) of our approach are that the military should be considered as a potentially self-interested body—or in fact, a collection of self-interested individuals—and that there should be a distinction between nondemocratic regimes controlled by the economic elite ("oligarchies") and military dictatorships. Both of these receive support from the qualitative evidence in the political science literature. The self-interest of soldiers and the corporate self-interest of the army are major themes of the political science literature on military dictatorships, emphasized by, among others, Finer (1976), Nordilinger (1977) and Needler (1987).[7] Nordilinger (1977 p. 78), for example, argues that

> "The great majority of coups are partly, primarily, or entirely motivated by the defense or enactment of the military's corporate interests."

Similarly, Needler (1987 p. 59) observes:

> "... the military typically intervenes in politics from a combination of motives in which defense of the institutional interests of the military itself predominates, although those interests are frequently construed so as to be complementary to the economic interests of the economic elite."

[7] This contrasts with existing models of democratic transitions or coups, such as those in Acemoglu and Robinson (2001, 2005), where the military is assumed to be a perfect agent of the elite. This same perspective is often adopted in political science and sociology literatures with Marxian foundations (e.g., Moore, 1966, Luebbert, 1991). For instance, Barrington Moore's (1966) classic work suggests an explanation for divergent paths of political development in terms of different types of class coalitions. The possibility that any state apparatus, including the army, may have some independent role as a coalition partner, is ignored. Subsequent contributions inspired by Marxian approaches, including work by Poulzantas (1978) and Skocpol (1979), pay greater attention to the "agency" of the state, but do not focus on the role of the military in politics nor note the interactions we emphasize here.

The distinction between oligarchic regimes and the military dictatorships is also well rooted in a large political science literature (see for example the survey in Brooker, 2000, and the references there). Huntington (1968) and Finer (1976), for example, emphasize the prevalence of authoritarian elite-controlled regimes supported by the military, which are similar to our oligarchic regimes, and contrast these with military dictatorships. Examples of the former include the dictatorship that Getulio Vargas established in Brazil in 1937, which was a mainly civilian authoritarian regime, relying on the support of the military for its political survival, and other Central and South American regimes formed at roughly the same time (see also the discussion in Section 6 below). More recent examples include Marcos's long lasting regime in the Philippines and President Fujimori's regime's in Peru, which was established following his de facto coup to extend his rule and powers beyond their constitutional limits. Both of these regimes were backed by the army, but the military establishment did not have important decision-making powers.

Perhaps more common in practice are military dictatorships, where the military or a subset of officers are in direct control. Such military dictatorships are studied in detail by Brooker (2000), Welch and Smith (1974), Perlmutter (1977, 1981), Nordlinger (1977).[8] Contemporary examples include the regimes established in Pakistan by General Ayub Khan, by General Muhammad Zia-ul-Haq and by General Pervez Musharraf, the regimes established in Turkey after the coups in 1960, 1972 and 1980, in Guatemala after the coup of 1954 under the leadership Carlos Catrillo Armas, in El Salvador in 1956 with Oscar Osorio's government, in Brazil after the overthrow of President Joao Goulart's government in 1964, and in Greece after the military coup of 1967. The military has also been the dominant political force in Thailand since the 1932 coup and has repeatedly intervened in politics whenever it perceived a threat to its own power by nascent civilian political institutions.[9] The political science literature documents that oligarchic regimes and military dictatorships differ in the organization of their polities.

[8] A hybrid regime type, "bureaucratic authoritarianism," based on a coalition between the military and the economic elites, whose primary goal is the promotion of economic modernization, has also been identified by O'Donnell (1973). The practical applicability of this concept has appeared quite limited though, and we do not pursuit it in this paper.

[9] It is also possible to give a slightly different (somewhat more speculative) interpretation to the possibility of non-prevention in oligarchy. According to this interpretation, the case where the elite allow a powerful military to form but do not take steps to prevent coups can be viewed as an implicit support for military dictatorships by the elite. An example of this is the experience of Peru in early 1930s. The raise of the Alianza Popular Revolucionaria Americana (a violent revolutionary movement) led the Peruvian elites to support a coup d'état by Colonel Sanchez Cerro. Roquié (1987 p. 115) describes this as follows: "The ruling classes that had long been civilian in their orientation put aside their distrust of the military and supported the colonel's coup. The massacres in Trujilio in 1932 involving the army and the APRA were to establish a long-lasting defensive alliance between the military and the upper bourgeoise."

Our paper is a contribution to a number of distinct literatures. First, there is now a substantial literature on political transitions, but to the best of our knowledge, no paper in this literature models the relationship between the elite and the military (see Acemoglu and Robinson, 2006, for an overview of this literature). Consequently, this literature does not distinguish between oligarchic regimes and military dictatorships discussed above.

Second, there is a large literature on political agency in democracies, where citizens try to control politicians using elections and other methods (e.g., Barro, 1973, Ferejohn, 1986, Besley and Case, 1995, Persson, Roland and Tabellini, 1997, 2000, Acemoglu, 2005, Acemoglu, Golosov and Tsyvinski, 2006, Alesina and Tabellini, 2007; see Persson and Tabellini, 2000 and Besley, 2006, for surveys). In contrast, the potential agency relationship between the elite and the military has not been modeled. In this regard, the literature on the organization of nondemocratic regimes and other aspects of agency relationships in dictatorships is closely related to our work. This area includes the early important work by Wintrobe (1998), as well as recent papers by Acemoglu, Robinson and Verdier (2004), Egorov and Sonin (2004), Dixit (2006) and Debs (2007a,b) focusing on nondemocratic agency relationships. These works neither address the issue of controlling the military nor provide a framework for thinking about the emergence of military dictatorships. The only exceptions are Ticchi and Vindigni (2003), which study the effect of the organization of the military on the consolidation of democracy, and recent work by Besley and Robinson (2007), which investigates the relationship between the military and civilian governments, though focusing on a different set of questions than our paper.

Third, the recent literature in comparative politics of public finance (e.g., Persson, Roland and Tabellini, 1997, 2000, Persson and Tabellini, 2003) investigates the influence of different types of democratic institutions on fiscal policy and economic outcomes, but does not investigate the impact of different types of nondemocratic regimes, and in particular, the contrast between oligarchic regimes and military dictatorships. Our paper adds to this literature by modeling the impact of different types of nondemocratic institutions on fiscal policy and economic outcomes. In particular, a distinctive implication of our theory in this respect, is that nondemocracies should typically have more military spending than democracies.[10]

Finally, as mentioned above, there is a substantial political science literature on military dictatorships, though this literature does not provide formal models of the relationship between the military and the elite, nor does it approach it as an agency problem. Some of the important

[10] This result is consistent with the evidence presented in Mulligan, Gil and Sala-i-Martin (2004), which finds that nondemocratic regimes spend more on the military than democracies.

contributions in this literature have been cited above.

The rest of the paper is organized as follows. Section 2 presents our basic model. Section 3 characterizes the Markov Perfect Equilibrium in this environment and presents our main results. Section 4 shows that the equilibria characterized in Section 3 are also the subgame perfect equilibria. Section 5 presents a number of extensions of the baseline environment of Section 2. Section 6 illustrates some of the main ideas of our analysis with a brief discussion of the emergence and consolidation of democracy and the role of the military in Central America. Section 7 concludes, while the Appendix contains the proofs omitted from the text.

2 Basic Model

In this section, we describe the economic and political environment. We consider an infinite horizon economy in discrete time with a unique final good. Each agent j at time $t = 0$ maximizes

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left(c_{j,t} + \chi_{j,t} G_t \right), \tag{1}$$

where $\mathbb{E}_0$ is the expectation at time $t = 0$, $c_{j,t} \geq 0$ denotes the consumption of the agent in terms of the final good, $G_t \geq 0$ is the amount of public good provided at time t, and $\chi_{j,t} \in \{0, 1\}$ is an indicator function denoting the occupational choice of the agent. This variable determines whether or not the individual benefits from the public good.

The total population of the society is normalized to 1. Of those $1 - n > 1/2$ have low skills and can produce $A^L \geq 0$, while the remaining n agents are high-skill and can produce $A^H \geq A^L$. We will often refer to the (rich) high-skill agents as the "elite" since at the beginning they will be in control of the political system, and we will refer to low-skill agents as the "citizens." There are two occupations: producer and soldier. With a slight abuse of notation, we use the subscript $j \in \{L, M, H\}$ to also denote low-skill producers, military (soldiers) and high-skill producers. Soldiers do not produce any output, while producers produce A^L or A^H depending on their skill level. To simplify the analysis and reduce notation, we assume that only low-skill agents can become soldiers.[11]

Furthermore, we also assume that $\chi_{j,t} = 1$ for $j = L$ and $\chi_{j,t} = 0$ otherwise. This implies that only production workers benefit from the public good, for example, because the public good corresponds to services that rich agents and the military receive through other means

[11] This is natural, since military wages are more attractive to low-skill than to high-skill agents. We could introduce an additional constraint to ensure that the income of rich agents is greater than those of soldiers whenever the military is recruiting, though we do not do so to simplify notation.

(such as health care or schooling) or because the public good is associated with roads and other infrastructures mostly used by low-skill production workers. This assumption is also adopted to simplify the expressions and has no effect on our qualitative results.

The size of the military at time t is denoted by x_t. We normalize the size of the military necessary for national defense to 0, thus the only reason for $x_t > 0$ is for the use of the military in domestic politics. In particular, we assume that x_t takes one of two values, $x_t \in \{0, \bar{x}\}$, where $\bar{x} > 0$ is size of the military necessary for repression and coups. We denote the decision to have (build) an army at time t by $a_t \in \{0, 1\}$, with $a_t = 1$ corresponding to $x_t = \bar{x}$. The government (social group) in power chooses $a_t \in \{0, 1\}$, except that, as we will describe further below, it may take a while for a newly-emerging democracy to reform (disband) an already-existing army by choosing $a_t = 0$, so that there will be further constraints on the choice of a_t in democracy. We also assume throughout that

$$\bar{x} < 1/2 - n, \tag{2}$$

so that low-skill producers are always the absolute majority in the population. This implies that, given the policy instruments specified below, in majoritarian elections the median voter will always be a low-skill producer.

Aggregate (pre-tax) output at time t will be

$$Y_t = \varphi_t \left((1 - n - x_t) A^L + nA^H \right), \tag{3}$$

where $\varphi_t \in \{1 - \phi, 1\}$ captures potential distortions from coups with $\phi \in (0, 1)$. When there is no coup attempt (against oligarchy or democracy), we have $\varphi_t = 1$. Instead, when there is a coup attempt, a fraction ϕ of production is lost due to the disruption created by the coup, thus $\varphi_t = 1 - \phi < 1$. Let us also denote

$$Y \equiv (1 - n) A^L + nA^H, \tag{4}$$

as the *potential output* of the economy, which will apply when the size of the military is equal to 0 and there are no disruption from coups.

Aggregate output can be taxed at the rate $\tau_t \in [0, 1]$ to raise revenue for public good provision and to pay the salaries of soldiers. We model the distortion of the costs of taxation in a simple reduced-form manner: when the tax rate is τ_t, a fraction $C(\tau_t)$ of the output (thus a total of $C(\tau_t) Y_t$) will be lost due to tax distortions. These may result from distortions resulting because taxes discourage labor supply or savings, or because of the administrative costs of collecting taxes. This fiscal technology implies that when the tax rate is equal to τ_t, government revenues per unit of production will be

$$\tau_t - C(\tau_t). \tag{5}$$

We assume that $C : [0,1] \to \mathbb{R}_+$ is a continuously differentiable and strictly convex function that satisfies the following *Inada conditions* (which will ensure interior solutions): $C(0) = 0$ (so that there are no distortions without taxation), $C'(0) = 0$ and $C'(1) > 1$. Let us also define $\hat{\tau} \in (0,1)$ as the level of taxation at which fiscal revenues are maximized (i.e., the peak of the Laffer curve), which is uniquely defined by

$$\hat{\tau} \equiv \left(C'\right)^{-1}(1), \tag{6}$$

where $(C')^{-1}$ is the inverse of the derivative of the C function. This tax rate $\hat{\tau}$ is strictly between 0 and 1 because of the Inada conditions.

Finally, without loss of any generality, we parameterize A^L and A^H as

$$A^L \equiv \frac{1-\theta}{1-n}Y \text{ and } A^H \equiv \frac{\theta}{n}Y, \tag{7}$$

for some $\theta \in (n,1)$. This parameterization implies that a higher θ corresponds to greater inequality. We do not make the dependence of A^L and A^H on θ explicit unless this is necessary for emphasis.

We will represent the economy as a dynamic game between soldiers, low-skill producers (citizens) and the elite. As will be explained further below, given the policy instruments, there is no conflict within the groups, so we can suppose without any loss of generality that a representative agent from each group (e.g., the commander of the army, a decisive voter in democracy, or a representative agent in oligarchy) makes the relevant policy choices.[12]

In principle, there are two state variables in this game. The first one is the size of the military from the previous period, $x_{t-1} \in \{0, \bar{x}\}$. The second is the political regime denoted by s_t, which takes one of three values, democracy D, oligarchy (elite control) E, military M. The size of the military from the previous period, x_{t-1}, only matters because immediately following a transition to democracy (without a coup attempt) it will not be possible for the democratic government to choose $a_t = 0$ and reform the military. Instead, they will have to wait for one period before being able to reform the military. This assumption captures the realistic feature

[12] Alternatively, we could consider a citizen-candidate model (e.g., Besley and Coate, 1997) in which in democracy all agents vote, in military only the soldiers vote, and in oligarchy only the rich elite vote. The results would be identical in this case.

that once a large army is in place, a new and potentially weak democratic government may not be able to disband the army immediately. The fact that it takes only one period for it to be able to do so is only for simplicity and in subsection 5.3, we consider the case where the opportunity to reform the military arises stochastically.

This structure simplifies not only the analysis but also the notation. In particular, instead of carrying x_{t-1} as a state variable we can define an additional regime, "transitional" democracy TD, which occurs if, and only if, $x_{t-1} = \bar{x}$, $s_{t-1} = E$, and there has been no coup attempt. Loosely speaking, transitional democracy corresponds to a situation in which the majority (low-skill producers) have *de jure* political power but this is constrained by the *de facto* political power of the military. The only difference between $s_t = TD$ and $s_t = D$ is that with $s_t = TD$, $a_t = 0$ is not possible. Otherwise, in both regimes, a representative low-skill producer is in power. Since in our baseline model transitional democracy lasts for one period, $s_t = TD$ is immediately followed by $s_{t+1} = D$, unless there is a successful military coup, in which case it is followed by $s_{t+1} = M$. Given this description, we represent the state of the dynamic game by $s_t \in \mathcal{S} \equiv \{D, E, M, TD\}$.

Key policy decisions are made by the government in power. The policy decisions are a linear tax rate $\tau_t \in [0, 1]$ on the income of the producers, the level of public good provision, $G_t \geq 0$, wage for soldiers, $w_t \geq 0$, and the decision regarding the size of the army, $a_t \in \{0, 1\}$. In addition to a_t, τ_t, G_t and w_t, the military decides whether or not to undertake a coup against the regime in power, which is denoted by $\psi_t \in \{0, 1\}$, with $\psi_t = 1$ corresponding to a coup attempt, and, if $\psi_t = 0$, it also decides whether or not to repress the citizens in oligarchy, which is denoted by $\rho_t \in \{0, 1\}$, with $\rho_t = 1$ corresponding to repression.

If in oligarchy the elite choose $a_t = 0$, then there is a *smooth transition* to democracy, in particular, $s_{t+1} = D$ following $s_t = E$. The important point here is that when the elite choose smooth transition, there is no transitional democracy since the oligarchic regime has not set up a military. In contrast, if in oligarchy, the military is present but chooses not to repress ($\rho_t = 0$), then the regime transitions to transitional democracy, that is, $s_{t+1} = TD$. Finally, if $a_t = 1$ and $\rho_t = 1$, so that there is an effective military and it chooses to repress the citizens, then transition to democracy takes place with probability $\pi \in [0, 1]$. Therefore, π represents an inverse measure of the effectiveness of the military repression, with $\pi = 0$ corresponding to the case in which the repression of the democratic demands of the citizens by the military is fully effective.

We also assume that when the military attempts a coup against either regime, which, in both cases, is denoted by $\psi_t = 1$, it succeeds with probability $\gamma \in (0,1)$. If the coup succeeds, then a military dictatorship, $s_{t+1} = M$, emerges. To simplify the analysis, we assume that $s = M$ is *absorbing*, so the society will remain as a military dictatorship if a coup ever succeeds (and in equilibrium, $s_t = D$ will also be absorbing). However, if a military coup fails, then we immediately have $s_{t+1} = D$ regardless of the regime at time t. This is because if the regime at time t is $s_t = TD$, then the transitional period will be over and the army will be reformed at $t+1$. If $s_t = E$, then the conflict between the military and the elite implies that there is no effective repression and a democratic regime emerges immediately and can use the window of opportunity resulting from the failure of the coup to reform the military. Finally, recall that when the military attempts a coup ($\psi_t = 1$), the society suffers an income loss and $\varphi_t = 1 - \phi < 1$ in equation (3).[13]

Throughout we adopt the convention that fiscal policies enacted at time t are implemented even if there is regime change and the new regime starts enacting policies from $t+1$ onwards. Moreover, the military wage w_t announced by any non-military regime is conditional on both repression and no coup attempt. These wages are withheld if there is a coup attempt.

The government budget constraint at time t can therefore be written as

$$w_t x_t + G_t \leq (\tau_t - C(\tau_t)) Y_t, \tag{8}$$

where Y_t is aggregate income at time t given in (3), $(\tau_t - C(\tau_t)) Y_t$ is total tax revenue resulting from the linear tax τ_t, and the left-hand side is the total outlays of the government, consisting of public good expenditures, G_t, and spending on the military, $w_t x_t$.

We now summarize the timing of events. At time t, the economy starts with the state variable $s_t \in \mathcal{S}$, which determines the group in power.

1. Unless $s_t = TD$, the group in power chooses $a_t \in \{0,1\}$ and announces a fiscal policy vector (τ_t, w_t, G_t) that satisfies the government budget constraint (8). If $s_t = TD$, then $a_t = 1$ and the group in power only chooses (τ_t, w_t, G_t).

2. In oligarchy, if there is no military ($a_t = x_t = 0$), then there is a transition to fully-consolidated democracy and $s_{t+1} = D$.

3. When $x_t = \bar{x}$, in democracy and in oligarchy the military decides whether or not to attempt a coup $\psi_t \in \{0,1\}$. If a coup is attempted, it is successful with probability γ

[13] An additional decision concerns whether low-skill agents would like to apply to the military. Since, the military will always generate at least as high an income level as production for low-skill agents, all low-skill agents would like to do so and we economize on notation by not introducing an additional variable for this decision.

and a military dictatorship is established (and $s_{t+1} = M$). If it fails, a consolidated democratic regime, $s_{t+1} = D$, emerges next period.

4. If the elite have formed a military ($x_t = \bar{x}$), and the military does not attempt a coup $\psi_t = 0$, the military decides whether or not to repress the citizens, $\rho_t \in \{0, 1\}$. If repression fails (probability π) or if the military chooses not to repress, then $s_{t+1} = TD$.

5. Taxes are collected and wages are paid according to the announced policy vector (τ_t, w_t, G_t) if there is no military coup attempt. If there is such an attempt, then $w_t = 0$.[14]

Finally, we assume that the society starts with $s = E$, i.e., an oligarchic regime, and also with $x_{-1} = 0$, so the elite are free to either form a military of size $\bar{x}$ or leave $x_0 = 0$ in the initial period.

3 Characterization of Equilibria

We now characterize the Markov Perfect Equilibria of the game described in the previous section. Markov Perfect Equilibria are both simple and natural in the current context. In Section 4, we show that all of our results generalize to Subgame Perfect Equilibria.

3.1 Definition of Equilibrium

We first focus on pure strategy Markov Perfect Equilibria (MPE). Let $h^{t,k}$ denote the history of the dynamic game described above up to time t and stage k of the stage game of time t, and let $H^{t,k}$ be the set of such histories. Strategies assign actions for any history in $H^{t,k}$. Markovian strategies, instead of conditioning on the entire history, condition only on the payoff-relevant state variables, here $s_t \in \mathcal{S}$, and on the prior actions within the same stage game, denoted by $k_t \in \mathcal{K}$. Consequently, a MPE is defined as a set of Markovian strategies that are best responses to each other given every possible history $h^{t,k} \in H^{t,k}$. In the context of the game here, MPE is a natural equilibrium because it directly introduces the commitment problems that are central to our analysis. However, we will see that the same commitment problems are present in a very similar fashion when we focus on subgame perfect equilibria.

[14] This description of the timing of events makes it clear that when a particular vector of policies, (τ_t, w_t, G_t), is announced, it is not known for sure whether this will satisfy the government budget constraint, (8), because there might be a coup attempt reducing income and tax revenues, and also removing the burden of military expenditures. In such cases, we assume that the amount of public good provision, G_t, is the "residual claimant," so that if (τ_t, w_t, G_t) does not satisfy (8) as equality, G_t adjusts up or down to ensure this.

More formally, let σ be a Markovian strategy mapping, that is,

$$\sigma : \mathcal{S} \times \mathcal{K} \rightarrow [0,1] \times \mathbb{R}_+^2 \times \{0,1\}^3 ,$$

which assigns a value for each of the actions, the tax rate $\tau_t \in [0,1]$, the military wage $w_t \in \mathbb{R}_+$, the level of the public good $G_t \in \mathbb{R}_+$, the decision of whether to create or reform the military $a_t \in \{0,1\}$, and the coup and repression decisions of the military, $\psi_t \in \{0,1\}$ and $\rho_t \in \{0,1\}$, for each value of the state variable $\mathcal{S}$ and each combination of prior moves in the stage game given by $\mathcal{K}$. An MPE is a mapping σ^* that is a best response to itself at every possible history $h^{t,k} \in H^{t,k}$. To characterize the dynamics of political institutions, we define the one-step transition probability of s_t conditional on its past value and the limiting distribution of s induced by the MPE strategy profile σ^* as

$$p\left(s_t \mid s_{t-1}\right) : \mathcal{S} \times \mathcal{S} \rightarrow [0,1] \text{ and } q\left(s\right) : \mathcal{S} \rightarrow [0,1] .$$

These concepts will be useful in describing how regimes change in equilibrium and what the likelihood of different regimes are in the long run.

We next proceed to characterizing the MPE by first determining (the net present discounted) values of different individuals (groups) under different regimes.

3.2 Values under Military Rule

A military regime, $s = M$, can only occur when $x_t = \bar{x}$ and it is assumed to be an absorbing state. Since $x_t \in \{0, \bar{x}\}$, the military government has no option to change the size of the military without disbanding itself (and obviously it would not want to expand the military even if it could, since this would imply dissipation of the rents captured by the military among a greater number of soldiers). Consequently, the military government will always leave $x_t = \bar{x}$ and maximize the utility of soldiers subject to the government budget constraint. Moreover, the same set of individuals serve as soldiers, as they reapply every period to the army in order to benefit of the high military wage paid. Finally, because in state M the military can never lose power, this problem boils down to that of maximizing the static utility of a representative soldier subject to the government budget constraint.

Proposition 1 *The unique MPE starting in any subgame starting with $s = M$ (i.e., military dictatorship) involves the following policy vector at each date: $\tau^M = \hat{\tau}$ as in defined in (6), $G^M = 0$, and*

$$w^M \equiv \frac{\left(\hat{\tau} - C\left(\hat{\tau}\right)\right)\left(Y - \bar{x}A^L\right)}{\bar{x}}, \tag{9}$$

where Y denotes the potential output defined in (4).

Moreover, military dictatorship is an absorbing state so that $p(M \mid M) = 1$ and starting with $s = M$ at any point, we have $q(M) = 1$.

Proof. In view of the discussion preceding the proposition, $x_t = \bar{x}$ for all t and thus the best allocation from the viewpoint of the military can be characterized as a solution to the following static maximization program:

$$u^M(M) \equiv \max_{\tau \in [0,1], w \in \mathbb{R}_+, G \in \mathbb{R}_+} w \qquad (10)$$
$$\text{subject to } w\bar{x} + G \leq (\tau - C(\tau))\left(Y - \bar{x}A^L\right),$$

where the objective function incorporates the fact that soldiers do not benefit from the public good (i.e., $\chi_{M,t} = 0$ in (1)). Since τ does not feature in the objective function, the solution to (10) involves taxing at rate $\hat{\tau}$ defined in (6) to maximize tax revenues (thus maximizing the constraint set) and also setting to zero the public good, $G_t = 0$. This generates a per soldier wage of w^M as in (9) and gives the unique maximum of (10). ■

Intuitively, the military dictatorship extracts as much revenue from the producers as possible (by taxing all income at the rate $\hat{\tau}$) and redistributes all the proceeds to the soldiers. Given the unique continuation equilibrium in Proposition 1, the (net present discounted) values for individuals who are currently members of the military, for low-skill non-military and for high-skill elite agents are given by

$$V^M(M) = \frac{u^M(M)}{1-\beta} \equiv \frac{1}{1-\beta} \frac{(\hat{\tau} - C(\hat{\tau}))\left(Y - \bar{x}A^L\right)}{\bar{x}}, \qquad (11)$$

$$V^L(M) = \frac{u^L(M)}{1-\beta} \equiv \frac{(1-\hat{\tau})A^L}{1-\beta}, \qquad (12)$$

and

$$V^H(M) = \frac{u^H(M)}{1-\beta} \equiv \frac{(1-\hat{\tau})A^H}{1-\beta}, \qquad (13)$$

where $\hat{\tau}$ is given by (6) and Y is defined in (4). Here and throughout, M (or E, D or TD) in parentheses denotes the regime, while superscripts denote the identity of the agent. In addition, u denotes per period returns and V denotes "values," that is, the net present discounted values. Notice that the expressions for $u^L(M)$ and $V^L(M)$ do *not* include a term for the option value of low-skill producers becoming a soldier. This is because even though each low-skill producer would like to become a soldier, the military will not be hiring any more soldiers, since $x_t = \bar{x}$ already and there are no quits from the army.

3.3 Values in Democracy

Let us next turn to the values of the three groups in democracy, $s_t = D$. Decisions in democracy are made by majoritarian voting and the median voter will always be a low-skill producer. Democracy is also an absorbing state as long as $a_t = 0$ is chosen in all future periods, and clearly, $a_t = 0$ is always a dominant strategy for a low-skilled producer in democracy. In view of this, we obtain the following proposition.

Proposition 2 *The unique MPE starting in any subgame with $s = D$ (i.e., a consolidated democracy) involves $\left(a_t = 0, \tau_t = \tau^D, w_t = \cdot, G_t = G^D\right)$ at each date t, where the democratic tax rate τ^D is given by*

$$\tau^D \equiv \left(C'\right)^{-1}\left(1 - \frac{A^L}{Y}\right), \tag{14}$$

and the level of public good is given by

$$G^D = \left(\tau^D - C\left(\tau^D\right)\right) Y. \tag{15}$$

Moreover, consolidated democracy is an absorbing state so that $p\left(D \mid D\right) = 1$ and $q\left(D\right) = 1$.

Proof. As noted above, democracy would never choose $a_t = 1$, since this would reduce its tax base and potentially create a coup threat against democracy. Therefore, democracy is an absorbing state and the optimal policy can be characterized by the solution to the following static maximization problem

$$u^L\left(D\right) \equiv \max_{\tau\in[0,1], G\in\mathbb{R}_+} \left(1-\tau\right) A^L + G \tag{16}$$
$$\text{subject to } G \leq \left(\tau - C\left(\tau\right)\right) Y.$$

Given the Inada conditions and the convexity of $C\left(\tau\right)$, (16) has a unique interior solution. The first-order condition of this problem then gives the unique equilibrium tax rate as (14), and the corresponding level of public good as (15). ■

The values of low- and high-skill producers are then given by

$$V^L\left(D\right) = \frac{u^L\left(D\right)}{1-\beta} \equiv \frac{\left(1-\tau^D\right) A^L + G^D}{1-\beta} \tag{17}$$

and

$$V^H\left(D\right) = \frac{u^H\left(D\right)}{1-\beta} \equiv \frac{\left(1-\tau^D\right) A^H}{1-\beta}. \tag{18}$$

The value of an ex soldier in this regime is also $V^M\left(D\right) = V^L\left(D\right)$, since former soldiers will now work as low-skill producers. At this point, it is also useful to define

$$a^L \equiv \left(1-\tau^D\right) A^L + G^D \tag{19}$$

as the net per period return to a low-skill producer in democracy. This expression will feature frequently in the subsequent analysis.

Finally, recall that according to our parameterization $A^L \equiv (1-\theta)\, Y/(1-n)$. It is then evident that τ^D does not depend on Y and is a strictly increasing function of θ. This last result is due to the well-known effect of inequality on redistribution in models of majority voting on linear taxes (e.g., Romer, 1975, Roberts, 1977, Meltzer and Richard, 1981). We note this as a corollary for future reference (proof omitted).

Corollary 1 *The democratic tax rate τ^D, given by (14), is strictly increasing in the extent of inequality parameterized by θ.*

3.4 Values in Transitional Democracy

We now turn to the analysis of transitional democracy, where $s_t = TD$. Recall that this regime will emerge when $s_{t-1} = E$, $x_{t-1} = \bar{x}$, $\rho_{t-1} = 1$ and repression fails (probability π). Moreover, this regime is indeed "transient"; if there is no coup attempt or the coup attempt fails at this point, then $s_{t+1} = D$, and if there is a successful coup attempt, then $s_{t+1} = M$. Clearly, depending on the subsequent regime, either the equilibrium of Proposition 1 or that of Proposition 2 will apply. We now investigate policy choices and the reaction of the military during the transitional period.

Suppose that the democratic government during the transitional period has announced the policy vector $\left(\tau^{TD}, w^{TD}, G^{TD}\right)$. If the military chooses $\psi_t = 0$ (that is, no coup attempt), then the value of a typical soldier is

$$V^M(TD \mid \text{no coup}) = w^{TD} + \beta V^L(D), \tag{20}$$

which incorporates the fact that the soldiers will receive the military wage w^{TD} today and do not receive utility from the public good. We have also substituted for the continuation value to the soldiers, which, from Proposition 2 and equation (17), is given as the value in a consolidated democracy $V^M(D) = V^L(D)$. In particular, in line with Proposition 2, at the next date the government will choose to reform the army and all former soldiers will become low-skill producers, accounting for the continuation value of $V^L(D)$.

In contrast, if $\psi_t = 1$, the value of a soldier is

$$V^M(TD \mid \text{coup}) = \beta\left[\gamma V^M(M) + (1-\gamma)\, V^L(D)\right], \tag{21}$$

which incorporates the fact that when the military undertakes a coup, the soldiers do *not* receive the wage w^{TD}, and that the coup succeeds with probability γ. Following a successful coup, a military dictatorship is established and the continuation value of the soldiers is given by $V^M(M)$ as in (11) (cf. Proposition 1). If the coup fails (probability $1-\gamma$), soldiers become low-skill producers and simply receive the continuation value of the low-skill producer in a consolidated democracy, $V^L(D)$ as in (17)—there is no differential taxation or further punishments that are possible on former soldiers. Comparing these two expressions, we obtain the *no-coup constraint*:

$$V^M(TD \mid \text{no coup}) \geq V^M(TD \mid \text{coup}).$$

Using (20) and (21), the no-coup constraint can be written as

$$w^{TD} \geq \frac{\beta}{1-\beta}\gamma\left(w^M - a^L\right), \tag{22}$$

where w^M is defined in (9) and a^L in (19). Constraint (22) defines the minimum military wage that democracy must offer to soldiers in order to prevent a coup attempt. In what follows, we will use w^{TP} for the ("transitional prevention") wage that makes this constraint hold as equality and τ^{TP} for the corresponding tax rate. This wage level can be thought of as an *efficiency wage* for the military to induce them to take the right action (that is, not to undertake a coup). Clearly, this wage depends on the success probability of the coup γ, and the gap between the value that soldiers will receive in a military dictatorship, $V^M(M) = w^M/(1-\beta)$, and their value in democracy, $V^L(D) = a^L/(1-\beta)$.

The question is whether a democratic government would pay this minimum military wage in order to prevent a coup attempt. This will depend on two factors. First, whether it is *feasible* to pay such a wage (and satisfy the government budget constraint, (8)). Second, whether it is *desirable* for low-skill producers to pay this wage. The feasibility condition requires this minimum wage times the number of soldiers to be less than the maximum revenue that can be raised, that is,

$$w^{TP}\bar{x} \leq (\hat{\tau} - C(\hat{\tau}))\left(Y - \bar{x}A^L\right). \tag{23}$$

The right-hand side is the maximum revenue that can be raised, since it involves taxation at the revenue-maximizing rate $\hat{\tau}$ and the tax base consists of the entire population except the $\bar{x}$ soldiers. Using the expression for w^M in (9), the condition (23) can be seen to be equivalent to $w^{TP} \leq w^M$. Alternatively, using the expression for w^{TP} from (22), we find that the feasibility constraint, (23), is satisfied if and only if

$$\gamma \leq \frac{w^M}{w^M - a^L}\frac{1-\beta}{\beta} \equiv \hat{\gamma}. \tag{24}$$

This condition states that preventing a coup attempt is feasible only if γ is less than some critical threshold $\hat{\gamma}$. Otherwise, only very high wages will discourage soldiers from attempting a coup and such high wages cannot be paid without violating the government budget constraint.

Next, suppose that it is feasible for democracy to pay the wage w^{TP}. Is it beneficial for low-skill producers to pay this wage or is it better for them to face the risk of a military coup? To answer this question, suppose that a wage of w^{TP} can indeed be paid—i.e., (24) is satisfied—and compare their utilities under the two scenarios. When they pay the necessary efficiency wage, the value of low-skill producers is

$$V^L(TD \mid \text{no coup}) = \left(1-\tau^{TP}\right) A^L + G^{TP} + \beta V^L(D), \tag{25}$$

where τ^{TP} is the utility-maximizing tax rate for the low-skill producer subject to the no-coup constraint, (22), and $G^{TP} \geq 0$ is the utility-maximizing level of public good spending during the transitional phase. Alternatively, if there is no coup prevention during the transitional democracy, the value of a low-skill producer is

$$V^L(TD \mid \text{coup}) = \left(1-\tau^{TN}\right)(1-\phi) A^L + G^{TN} + \beta\left[(1-\gamma) V^L(D) + \gamma V^L(M)\right], \tag{26}$$

since in this case there are no payments to the military, and now τ^{TN} and G^{TN} denote the utility-maximizing policy choices when coup attempts are not prevented.[15] The rest of the expression incorporates this fact. Current output is a fraction $1-\phi$ of regular output because of the disruption caused by the coup attempt and there is a probability γ that the coup is successful and the regime from tomorrow on will be a military dictatorship, giving value $V^L(M)$ to the representative low-skill producer. Now combining the previous two expressions, we obtain that a low-skill producer will prefer to prevent coups during transitional democracy if

$$V^L(TD \mid \text{no coup}) \geq V^L(TD \mid \text{coup}). \tag{27}$$

The next proposition shows that whenever (24) is satisfied, (27) is also satisfied, so that coups against democratic governments are always prevented when prevention is fiscally feasible.

Proposition 3 *Let $\hat{\gamma}$ be defined by (24). Then, the unique MPE in any subgame starting with $s = TD$ is as follows.*

- *If $\gamma \leq \hat{\gamma}$, then the transitional democracy chooses the policy vector $\left(\tau^{TP}, w^{TP}, G^{TP}\right)$ and prevents a military coup. At the next date, $s' = D$ (i.e., $p(D \mid TD) = 1$), the military is*

[15] The full maximization program when the low-skill producer chooses not to prevent coups is given in the proof of Proposition 3.

reformed and the policy vector in consolidated democracy characterized in Proposition 2 is implemented. The long-run equilibrium in this case involves democracy with probability 1, i.e., $q(D) = 1$.

- *If $\gamma > \hat{\gamma}$, then transitional democracy chooses the policy vector $(\tau^{TN}, w^{TN}, G^{TN})$ and the military attempts a coup, i.e., $\psi = 1$. Consequently, we have $p(D \mid TD) = 1 - \gamma$ and $p(M \mid TD) = \gamma$, and thus starting with $s = TD$, $q(D) = 1 - \gamma$ and $q(M) = \gamma$.*

Proof. See the Appendix. ■

The essence of Proposition 3 is that condition (27) is always satisfied, so low-skill producers are better off when coups are prevented. However, this may not be possible because coup prevention may require excessive efficiency wages. In particular, this will be the case when condition (24) is not satisfied. There is a clear *inefficiency* in equilibria involving coups (because of the economic disruption that they cause). The source of this inefficiency is in the commitment problem; if the democratic regime could promise high wages to soldiers in the future, both low-skill producers and soldiers could be made better off. Nevertheless, as shown in Proposition 2, the unique MPE after $s = D$ involves reform of the military and thus no efficiency wages for the soldiers. Thus the inability of the democratic regime to commit to future rewards to soldiers is the source of coup attempts. We will see in Section 4 that the restriction to Markovian strategies is not important here. Instead, the commitment problem emerges from the underlying economics of the interaction between democracy and the military—the fact that the military, whose main function here is repression, is not needed in democracy.

A number of other features related to this result are worth noting. First, if (24) is satisfied, then transitional democracy may pay even higher wages (and thus make greater concessions) to the military than an oligarchic regime would (which we will study in the next subsection). This again reflects the commitment problem; because democracy has no use for a large military, it cannot commit to not reforming it and thus it needs to make greater concessions today in order to prevent coup attempts. Second, the extent of income inequality influences whether there will be coup attempts against democracy. In particular, the threshold $\hat{\gamma}$ in (24) depends on the inequality parameter θ via its effects on a^L and w^M. It can be verified easily that greater inequality—a higher θ—increases w^M and reduces a^L, thus reducing $\hat{\gamma}$. This makes coups more likely in more unequal societies. Intuitively, this is because in a more unequal society, $V^L(D)$ is lower, and thus the prospect of becoming a low-skill producer is less attractive for the current soldiers, who are more tempted to undertake a coup to secure a military dictatorship. The rents that soldiers can appropriate in the military regime are also greater in a more unequal society because net output is greater (a smaller fraction of the potential output Y given in (4) is foregone as a result of the fact that some of the potential producers are joining the army). We state this result in the next corollary (proof in the text):

Corollary 2 *Higher inequality (higher θ) reduces $\hat{\gamma}$ and makes coups in transitional democracy more likely.*

Finally, it is also useful to compute, for future reference, the values to soldiers and the elite in a transitional democracy. First, the value to soldiers in transitional democracy does *not* depend on whether there is coup prevention or not. This is because in both cases soldiers receive the value of a coup against democracy, either as expected return for undertaking a coup or as a result of the efficiency wages paid by the democratic government to satisfy their no-coup constraint. This value is given by

$$V^{M}(TD) = \beta\gamma V^{M}(M) + \beta(1-\gamma)V^{L}(D). \tag{28}$$

In contrast, the value to the elite depends on whether γ is greater or less than $\hat{\gamma}$, which determines whether transitional democracy can prevent coups. When $\gamma > \hat{\gamma}$, there will be a coup attempt in transitional democracy and their value is given by

$$V^{H}(TD \mid \text{coup}) = (1-\phi)\left(1-\tau^{TN}\right)A^{H} + \beta\left[\gamma V^{H}(M) + (1-\gamma)V^{H}(D)\right]. \tag{29}$$

In contrast, when $\gamma \leq \hat{\gamma}$,

$$V^{H}(TD \mid \text{no coup}) = \left(1-\tau^{TP}\right)A^{H} + \beta V^{H}(D), \tag{30}$$

where τ^{TN} and τ^{TP} refer to the tax rates defined in Proposition 3.

3.5 Values in Oligarchy

We now turn to the analysis of subgames starting with $s = E$. The key economic insight here is that unlike democracy, an oligarchic regime may benefit from having a military used for repression (thus preventing democratization). Counteracting this, is the *political moral hazard* problem mentioned in the Introduction, whereby the military may turn against the elite and try to establish a military dictatorship.

In oligarchy, the elite have three possible strategies:

1. choose $x_t = 0$ and allow immediate democratization (recall that $x_{-1} = 0$). We denote this strategy by S, "smooth transition."

2. choose $x_t = \bar{x}$ and allow coups. We denote this strategy by N for "non-prevention."

3. choose $x_t = \bar{x}$ and pay high enough military wages to prevent coups. We denote this strategy by P for "prevention."

The third strategy would not be attractive for the elite if the military chooses not to repress, since they would obtain no benefit from having the military and pay both direct (financial) costs and indirect costs (in terms of the risk of a military dictatorship). Lemma 1, which is at the end of this section, shows that the military always prefers repression, that is, $\rho = 1$ whenever $s = E$, thus the third strategy for the elite is indeed viable. Throughout this subsection we make use of the result of this lemma, which will be stated and proved at the end.

We next compute the values to the elite corresponding to these three strategies. In all cases, the elite always supply no public good, since this is costly for them in terms of taxes and they do not obtain any benefit from public good. Consequently, if they choose the first strategy, that of smooth transition, they will set the lowest possible tax rate (i.e. set $\tau^S = 0$) and accept the fact that $p(D \mid E) = 1$. This will give them a value of

$$V^H(E, S) = A^H + \beta V^H(D), \tag{31}$$

where $V^H(D)$ is the value of the high-skill (elite) individuals in consolidated democracy given by (18).

The second strategy of the elite, non-prevention, is to create an army, but not to prevent military coups. In this equilibrium, soldiers attempt a coup against the oligarchic regime and therefore receive zero wages. Consequently, zero taxes are again feasible and optimal for the elite, and their value from this strategy can be written as

$$V^H(E, N) = (1 - \phi) A^H + \beta \left[\gamma V^H(M) + (1 - \gamma) V^H(D)\right], \tag{32}$$

where $(1 - \phi) A^H$ is the flow payoff to the elite (net of the disruption caused by the coup), $V^H(M)$, given by (13), is the value to the elite under military dictatorship, which occurs if the coup attempt by the military is successful (probability γ), and finally $V^H(D)$, given by (18), is the value to the elite in consolidated democracy, which occurs if the coup attempt by the military fails (probability $1 - \gamma$). Recall that here we are making use of the assumption that if a coup attempt against the oligarchic regime fails, this immediately leads to a consolidated democracy.

Finally, if the elite set up an army to repress the citizens and also pay the required efficiency wage to prevent military coups, then their value can be written recursively as

$$V^H(E,P) = \left(1-\tau^P\right)A^H + \beta\left[(1-\pi)V^H(E,P) + \pi V^H(TD)\right], \tag{33}$$

where $V^H(TD)$ is given by (29) or (30) in the previous subsection depending on whether γ is greater than or less than $\hat{\gamma}$. (33) also incorporates that to prevent military coups the elite have to impose a tax rate of τ^P on all incomes (to finance the military efficiency wage), and the state of oligarchy with prevention recurs next period with probability $1-\pi$, whereas with probability π, repression fails and the political state switches to transitional democracy, giving the elite the value $V^H(TD)$. Rearranging (33), we obtain

$$V^H(E,P\mid\pi) = \frac{\left(1-\tau^P\right)A^H + \beta\pi V^H(TD)}{1-\beta(1-\pi)}, \tag{34}$$

where, for future reference, we have written this value as a function of the probability that repression fails, π, i.e. as $V^H(E,P\mid\pi)$.

To characterize the equilibrium starting in a subgame with $s=E$, we need to compute the value of the tax rate τ^P necessary to allow for prevention, and then compare the values to the elite from the three possible strategies outlined above. Let us first look at the values to the military.

The military has also three possible strategies. They decide whether to attempt a coup against oligarchy and, if they do not undertake a coup, whether or not to repress the citizens. We refer to these three strategies as "coup", "repression" (to denote no coup and repression), and "non-repression" (to denote no coup and non-repression). Let us first consider the value to the soldiers when they attempt a coup ($\psi=1$). Their value can then be written as:

$$V^M(E\mid \text{coup}) = \beta\gamma V^M(M) + \beta(1-\gamma)V^L(D). \tag{35}$$

This expression incorporates the fact that when they attempt a coup, soldiers will not receive a wage and that the coup will succeed with probability γ giving them a value of $V^M(M)$ and fail with probability $1-\gamma$, in which case the regime will transition to a fully consolidated democracy with a value of $V^L(D)$ for the soldiers.[16]

[16] Notice that the value of a coup against the oligarchy for soldiers is the same as the value of transitional democracy, i.e. $V^M(E\mid\text{coup}) = V^M(TD)$, since a coup gives them the same value regardless of which regime it is attempted against. Furthermore, recall also that in the MPE of the subgame beginning in transitional democracy, soldiers have the same value regardless of whether they attempt a coup (since when a coup is prevented, the no-coup constraint is binding).

The value to the soldiers when they do not attempt a coup and choose repression ($\psi = 0$ and $\rho = 1$), satisfies the recursion

$$V^M(E \mid \text{repression}) = w^P + \beta\left[\pi V^M(TD) + \beta(1-\pi)V^M(E \mid \text{repression})\right].$$

This expression reflects the fact that soldiers receive the wage w^P today because they have successfully carried out the necessary repression. The continuation value then accounts for the fact that the same state will recur tomorrow with probability $1-\pi$ (i.e., as long as repression succeeds). If instead repression fails (probability π), they will receive the continuation value of transitional democracy, $V^M(TD)$, given by (28) (recall that this expression applies regardless of whether γ is greater than $\hat{\gamma}$ or not). Solving the recursion above we obtain that

$$V^M(E \mid \text{repression}) = \frac{w^P + \beta\pi V^M(TD)}{1-\beta(1-\pi)}. \tag{36}$$

The *no-coup constraint* in oligarchy is therefore

$$V^M(E \mid \text{repression}) \geq V^M(E \mid \text{coup}) \tag{37}$$

with $V^M(E \mid \text{repression})$ and $V^M(E \mid \text{coup})$ given in (36) and (35). The expressions in (36) and (35) immediately imply that the constraint (37) is equivalent to $w^P \geq \beta\gamma w^M + \beta(1-\gamma)a^L$. Since the elite will pay the minimum wage consistent with the no-coup constraint, when they do not undertake a coup, the military wage consistent with coup prevention is

$$w^P = \beta\gamma w^M + \beta(1-\gamma)a^L. \tag{38}$$

To finance this military wage, the elite will impose a tax rate of τ^P, which must satisfy the government budget constraint (8), thus

$$w^P\bar{x} = \left(\tau^P - C\left(\tau^P\right)\right)\left(Y - \bar{x}A^L\right). \tag{39}$$

Combining (39) with (38) and using (9), we find that this tax rate is implicitly and uniquely defined by

$$\tau^P = \beta\gamma\left(\hat{\tau} - C(\hat{\tau})\right) + \beta(1-\gamma)\frac{a^L\bar{x}}{Y - \bar{x}A^L} + C\left(\tau^P\right), \tag{40}$$

and moreover $\tau^P \in (0, \hat{\tau})$. The uniqueness of τ^P follows from the fact that $C(\cdot)$ is strictly convex and satisfies $C(0) = 0$, and the remaining term on the right-hand side are strictly positive. Thus at most one value of τ^P can satisfy (40) and moreover, this unique solution is between 0 and $\hat{\tau}$.[17]

[17] That $\tau^P > 0$ follows from the fact that $C(0) = 0$. To establish that $\tau^P < \hat{\tau}$, note from (40) that τ^P is strictly increasing in γ and that, by the definition of $\hat{\tau}$, $\tau - C(\tau)$ is strictly increasing in τ for all $\tau < \hat{\tau}$, and is maximized at $\hat{\tau}$. Moreover, when $\gamma = 1$, we have $\tau^P - C\left(\tau^P\right) = \beta\left(\hat{\tau} - C(\hat{\tau})\right)$, which implies that $\tau^P < \hat{\tau}$ when $\gamma = 1$; since τ^P is strictly increasing in γ, the same conclusion holds for all $\gamma \in [0, 1]$.

Differentiation of (40) with respect to θ also establishes that the tax rate τ^P is strictly decreasing in inequality. Therefore, when inequality is greater, a lower tax rate is sufficient for the elite to prevent coup attempts. This result is the outcome of two counteracting effects of inequality on the no-coup constraint. First, as inequality increases democracy becomes less attractive for the soldiers because in democracy they will become low-skill producers. A consolidated democracy is more likely when the military attempts a coup against the oligarchic regime and thus this "outside option" effect of inequality reduces w^P and τ^P. Counteracting this is the "greed" effect resulting from the fact that as inequality increases, the value to soldiers in military dictatorship, $V^M(M)$, increases (recall (11)). However, the fiscal revenues collected for any level of τ when $x_t = \bar{x}$ are also increasing in θ and in fact proportional to the effect of inequality on $V^M(M)$. Consequently, the outside option effect always dominates the greed effect and τ^P is decreasing in θ (in the extent of inequality).

We next show that the military never chooses no coup and non-repression ($\psi = 0$ and $\rho = 0$) in oligarchy. The remainder of the analysis of equilibrium in oligarchy is presented in the next subsection in the context of the complete characterization of the MPE.

Lemma 1 *In any MPE starting in a subgame with $s_t = E$, the military never chooses $\psi_t = 0$ and $\rho_t = 0$.*

Proof. The value to the soldiers when they choose not to attempt a coup and not repress, $\psi_t = 0$ and $\rho_t = 0$, is $V^M(E \mid \text{no repression}) = \beta V^M(TD)$, since, without repression, soldiers receive no wage and the regime in the next period will be transitional democracy where they receive the value $V^M(TD)$ given in (28). When they choose to attempt a coup, $\psi_t = 1$, they obtain the value $V^M(E \mid \text{coup})$ given in (35), and since this value is equal to $V^M(TD)$, we have that $V^M(E \mid \text{coup}) > V^M(E \mid \text{no repression})$. This implies that in oligarchy there exists a strategy giving the army a strictly higher equilibrium payoff than no coup and non-repression.
■

3.6 Markov Perfect Equilibria and Equilibrium Dynamics

We now combine the results from the previous four subsections, complete the analysis of the elite's decisions in oligarchy, and present a full characterization of MPE.

Two observations facilitate this analysis. First, a direct comparison of $V^H(E, S)$ in (31) and $V^H(E, N)$ in (32) shows that $V^H(E, S)$ is always greater, so the elite will never choose the non-prevention strategy. Thus the choice of the elite in oligarchy boils down to allowing smooth transition to democracy versus building a strong military and dealing with the political moral hazard problem by paying the required efficiency wage. Second, whether the elite will prefer smooth transition to repression (with prevention) can be determined by defining the threshold $\hat{\pi} \in [0,1]$ as the unique solution to the following equation

$$V^H(E,S) = V^H(E,P \mid \pi = \hat{\pi}). \tag{41}$$

When such a solution, $\hat{\pi}$, exists, it is uniquely defined; moreover, it can be established that if $\hat{\pi} \in (0,1)$, then $V^H(E,S) > V^H(E,P \mid \pi)$ whenever $\pi > \hat{\pi}$ and vice versa (see the proof of Proposition 4). However, it may be the case that (41) does not hold for any $\hat{\pi} \in [0,1]$. In this case, if $V^H(E,S) > V^H(E,P \mid \pi)$ for all $\pi \in [0,1]$, we adopt the convention that $\hat{\pi} = 0$, and if $V^H(E,S) < V^H(E,P \mid \pi)$ for all $\pi \in [0,1]$, then $\hat{\pi} = 1$. These observations enable us to provide a full characterization of MPE.

Proposition 4 *Let $\hat{\pi}$ be defined as in (41) and suppose that $\pi \neq \hat{\pi}$. Then, the political game described above has a unique MPE, where*

1. *if $\pi \in [0,\hat{\pi})$, then whenever $s = E$ the elite build an army for repression (i.e., $a = 1$), set $\tau = \tau^P$ and $w = w^P$, and prevent military coups. The military chooses $\psi = 0$ and $\rho = 1$ (no coup and repression). Transitional democracy arises with probability $p(TD \mid E) = \pi$, while oligarchy persists with probability $p(E \mid E) = 1 - \pi$. Proposition 3 characterizes the unique MPE of starting in any subgame $s = TD$, so that we have $q(D) = 1$ when $\gamma \leq \hat{\gamma}$ and $q(D) = 1 - \gamma$ and $q(M) = \gamma$ when $\gamma > \hat{\gamma}$;*

2. *if $\pi \in (\hat{\pi}, 1]$, the elite do not build an army (i.e., $a = 0$). Transition to consolidated democracy occurs with probability $p(D \mid E) = 1$, and in the long run consolidated democracy obtains with probability $q(D) = 1$ with allocations as described in Proposition 2.*

Proof. It has been already observed that the elite never choose non-prevention, so their choice depends on the comparison of S and P only. Next, observe also that from (34), the value from prevention is a continuous function, whose numerator and denominator are both linear in π. This, combined with the fact that $V^H(E,S)$, (31), does not depend on π, implies that there exists $\hat{\pi} \in [0,1]$ as defined in (41)—either because a solution $\hat{\pi} \in (0,1)$ exists, or because, as we have defined it, $\hat{\pi} = 0$ or 1. It can be verified, using the single-crossing property of $V^H(E,S)$ and $V^H(E,P \mid \pi)$, that $\hat{\pi} \in (0,1)$ if only if $V^H(E,P \mid \pi = 0) > V^H(E,S)$ *and* $V^H(E,P \mid \pi = 1) < V^H(E,S)$. The first condition is equivalent to $\tau^P < \beta\tau^D$. The second condition is equivalent to $\tau^P > \beta \left[V^H(TD) - V^H(D)\right]/A^H$ (when there is no coup in the subgame obtaining in state $s = TD$, this condition is equivalent to $\tau^P > \beta \left(\tau^D - \tau^{TP}\right)$ with τ^{TP} given in Proposition 3).

It can also be verified that if $V^H(E, P \mid \pi = 0) \leq V^H(E, S)$, i.e. if $\tau^P \geq \beta\tau^D$, then $V^H(E, P \mid \pi) < V^H(E, S)$ for any $\pi > 0$, which implies that $\hat{\pi} = 0$. Given the definition of $\hat{\pi}$, the description of the equilibrium in Proposition 4 then follows immediately from the fact that whenever $\pi > \hat{\pi}$, the elite prefer S and whenever $\pi < \hat{\pi}$, they prefer P. ■

Remark 1 Note that $\hat{\pi}$ need not be interior—i.e. we could have $\hat{\pi} = 0$ or $\hat{\pi} = 1$. In this case, Proposition 4 still applies, but only one of the two parts of the proposition would be relevant. The necessary and sufficient conditions that guarantee that $\hat{\pi}$ is interior, i.e., $\hat{\pi} \in (0, 1)$, are specified in the proof of Proposition 4. It can be verified easily that the set of parameters that satisfies both of these conditions is not empty (for example, both conditions are satisfied trivially when θ is close to n, i.e. when A^L is very low).

Finally, note also that the requirement $\pi \neq \hat{\pi}$ is only introduced to make the statement of the proposition simpler. When $\pi = \hat{\pi}$, the elite have two best responses, thus the equilibrium is not unique, but its nature is unchanged from that described in Proposition 4.

Proposition 4 shows that the elite will choose to set up an army only when repression is sufficiently effective, i.e., $\pi < \hat{\pi}$. When this happens, oligarchy will persist with probability $1 - \pi$ of recurring in each period, and as long as oligarchy persists, the military receives high (efficiency) wages so that they align themselves with the elite. When repression fails (probability π), the society becomes a transitional democracy. As characterized in Proposition 3 in this case, the democratic government pays the cost of having had a powerful military during the nondemocratic regime. It either has to make significant concessions to the military or risk a coup by the military. In contrast, when repression is not very effective, i.e., $\pi > \hat{\pi}$, the elite do not find it profitable to set up an army and pay the high wages necessary to co-opt the soldiers. In this case there is a smooth transition to a consolidated democracy.

Another important observation follows from the comparison of (31) and (34), which shows that $\hat{\pi}$ is increasing in θ This implies that repression is more likely in a more unequal society (proof omitted):

Corollary 3 *Higher inequality (higher θ) increases $\hat{\pi}$ and makes repression in oligarchy more likely.*

Now putting the results of Proposition 3 together with those of Corollaries 1-3, we summarize the effects of inequality on equilibrium political dynamics and economic choices. Corollary 2 shows that greater inequality makes coups against transitional democracy more likely, so that (conditional on a democratic regime emerging), greater inequality makes military dictatorships more likely. Moreover, Corollary 3 shows that greater inequality also makes democracy more costly for the elite and thus encourages repression. Consequently, greater inequality has three related effects on political dynamics. *First,* it makes repression and the formation of a large and powerful military more likely. *Second,* by encouraging repression, it leads to a longer duration of oligarchic regimes (rather than a smooth transition to democracy). *Third,* it makes military dictatorships more likely both because it leads to the presence of a powerful military in the early stages of a democratic regime and also because it makes it more difficult for democracy to convince the military not to undertake a coup. In addition, however, inequality also affects fiscal policies. As noted in Corollary 1, once a fully consolidated democracy emerges, greater inequality leads to higher taxes and greater public good expenditures. The combination of the effect of inequality on redistribution in consolidated democracy and its effects on regime dynamics implies a novel pattern for the relationship between inequality, taxes and the composition of spending. When inequality is low, a consolidated democracy is likely to emerge, and thus a small increase in inequality starting from a low base leads to higher taxes and greater public good provision. When inequality increases further, oligarchic repression becomes more likely. In such an environment, taxes are lower and all tax revenue is spent on the military (and there is no public good provision). Therefore, the effect of inequality on taxes and public good provision is nonmonotonic. Furthermore, because greater inequality makes military dictatorships more likely, it also increases the likelihood of a regime that will set high taxes and spend all the proceeds on the military (again with no public good provision). These implications might account for the lack of a monotonic relationship between inequality and redistribution across countries (e.g., Perotti, 1996, Bénabou, 2000).

4 Subgame Perfect Equilibria

The analysis so far has focused on Markov Perfect Equilibria, which make strategies depend only on the payoff-relevant states. MPE is a natural equilibrium concept since it captures the commitment problems that are central to political-economic analyses in a simple manner. Nevertheless, it is useful to know whether implicit promises between social groups that may be possible in subgame perfect equilibria might prevent some of the inefficiencies of MPE and lead to significantly different results. In this section, we briefly discuss the Subgame Perfect Equilibria (SPE) of the above-described political game. Recall that $h^{t,k}$ is the history of play of the game up to time t and stage k within the stage game. A strategy profile for all the players in the game can be represented by a mapping $\tilde{\sigma} : H^{t,k} \to [0,1] \times \mathbb{R}_+^2 \times \{0,1\}^3$, where the range of the strategy profiles again refers to the tax rate $\tau_t \in [0,1]$, the military wage $w_t \in \mathbb{R}_+$, the level of the public good $G_t \in \mathbb{R}_+$, the decision of whether to create or reform the military $a_t \in \{0,1\}$, and the coup and repression decisions of the military, $\psi_t \in \{0,1\}$ and $\rho_t \in \{0,1\}$. A strategy profile $\tilde{\sigma}^*$ is a SPE if it is a best response to itself for all $h^{t,k} \in H^{t,k}$ (i.e., if it is *sequentially rational*).

The next proposition shows that in our political game the MPE and the SPE coincide, thus there was no loss of generality in focusing on Markovian equilibria.

Proposition 5 *Suppose that $\pi \neq \hat{\pi}$. The political game described above has a unique SPE identical to the MPE described in Proposition 4.*

Proof. First consider some history $h^{t,0}$ (i.e., at the beginning of the stage game at t) where $s_t = M$. Since military rule is absorbing, it is clear that the unique sequentially rational play will involve the military maximizing their own utility, thus Proposition 1 applies. Next consider a similar history where $s_t = D$. Now democracy is absorbing and the same argument implies that the unique sequentially rational play after this history is identical to that described in Proposition 2. Next consider a similar history with $s_t = TD$. Since there are no strategies that can be used to punish former soldiers in democracy and the continuation play after a successful coup is already pinned down uniquely, this implies that the unique sequentially rational play after any history involving $s_t = TD$ will be the same as that characterized in subsection 3.4, and in particular, soldiers will undertake a coup if the *no-coup constraint*, (22) is violated. Given with this behavior, the unique best response of low-skill agents is provided by Proposition 3. Now since sequentially rational play after any history $h^{t,0}$ involving either of $s_t = M$, D and TD is uniquely pinned down, the behavior after histories where $s_t = E$ is also unique. In particular, if the no-coup constraint in this case, (37), is not satisfied, it is a unique best response for soldiers to undertake a coup. If it fails, they receive exactly the same value as in (17), since the regime will be $s_t = D$, and if it succeeds, they receive the unique continuation value associated with subgames that start with $s_t = M$. Finally, the value to the elite from S is also unchanged, which implies that the results of Proposition 4 hold as the unique subgame perfect equilibrium in this case. ■

5 Extensions

In this section we provide a number of extensions that are useful to map our theory of military dictatorships to the data. First, recall that in Proposition 4 military dictatorships only emerge during transitions to democracy. In practice, there are many cases of military dictatorships that result from coups against oligarchic regimes, such as those discussed in footnote 6 in the Introduction. Our first extension shows how a slight modification of the baseline framework leads to coups both against democratic and oligarchic regimes. This possibility is studied in the next subsection. Second, we introduce rents from natural resources and provide a number of comparative statics about how natural resource abundance affects regime dynamics. This extension is empirically relevant because many military dictatorships emerge in resource-abundant societies and we would like to understand whether the model has clear predictions about the role of the military in politics when natural resources play a more important role in the economy. This is investigated in subsection 5.2. Finally, we show how our baseline setup can be generalized to incorporate additional persistence in regimes, which we introduce by making the reform of the military by a democratic government and the transition to democracy in the absence of repression slow (and stochastic) processes. The parameter regulating the speed at which the military can be reformed can be viewed as another measure of the strength of the military. While the strength of the military coming from its size, corresponding to $x_t = \bar{x}$, makes democratic consolidation more difficult, we will see that this other dimension of military strength might facilitate democratic consolidation.

Throughout the rest of this section we simplify the notation and the analysis by focusing on MPE and also adopting a simpler form for the tax distortion function C. In particular, we assume that there exists $\hat{\tau} > 0$ (not the same as $\hat{\tau}$ defined in (6)) such that $C(\tau) = 0$ for all $\tau \leq \hat{\tau}$ and $C(\tau) = 1$ for all $\tau > \hat{\tau}$. This implies that there are no costs of taxation until $\tau = \hat{\tau}$ and that taxation above $\hat{\tau}$ is prohibitively costly. Furthermore, we assume the following restriction on the fundamental parameters of the model

$$Y > (1 + \bar{x}) A^L. \tag{42}$$

We maintain these assumptions throughout without stating them explicitly.

Faced with the new cost schedule for taxation, the elite still prefer zero taxes (except for paying the military wages when they have to); moreover, by condition (42), both democratic and military regimes would set taxes equal to $\hat{\tau}$. Consequently, the value functions now take simpler forms. For example, the value to the elite in military dictatorship, in consolidated democracy, and in transitional democracy are

$$V^H(M) = V^H(D) = \frac{(1-\hat{\tau})A^H}{1-\beta}, \tag{43}$$

and

$$V^H(TD) = \frac{((1-\beta)\varphi_t + \beta)(1-\hat{\tau})A^H}{1-\beta}. \tag{44}$$

The military wage and the instantaneous payoffs to low-skill producers in consolidated democracy are also modified similarly and become

$$w^M = \frac{\hat{\tau}\left(Y - \bar{x}A^L\right)}{\bar{x}} \text{ and } a^L = (1-\hat{\tau})A^L + \hat{\tau}Y. \tag{45}$$

5.1 Coups Against Oligarchy

We now assume that there are two additional states of the world, denoted by the variable $\eta_t \in \{\eta^I, \eta^{NI}\}$. In state η^I, the elite are insulated from both the threat of a coup and from possible transitions to democracy. In contrast, in state η^{NI}, both types of transitions away from oligarchy can occur. In particular, the army can attempt a coup, and transitions to democracy are possible (with probability depending on the repression decision of the military). The additional state variable η_t evolves according to an exogenous stochastic process, whose realizations are identically and independently distributed over time with $\Pr\left[\eta_t = \eta^{NI}\right] = \mu$. The elite have to decide military wage at time t before the realization of η_t and these wages cannot be conditioned on η_t.

It can be verified that Lemma 1 applies without any change in this modified model. In particular, in any MPE starting in a subgame with $s_t = E$ and $\eta_t = \eta^{NI}$, the military never chooses $\psi_t = 0$ and $\rho_t = 0$.

As in the baseline model, coups against oligarchy can be prevented only if the appropriate no-coup constraint is satisfied. This constraint is still given by (37), that is, by $V^M(E \mid \text{repression}) \geq V^M(E \mid \text{coup})$, where $V^M(E \mid \text{repression})$ is defined in (36) and $V^M(E \mid \text{coup})$ in (35). This is a consequence of the fact that coups are only possible when $\eta_t = \eta^{NI}$ and conditional on this event, they succeed with probability γ as in the baseline model. This ensures that the same expression of the efficiency wage, w^P, necessary to prevent coups against oligarchy as in the baseline model, (38), applies, with the only difference that, because of the change in the fiscal technology, the expressions for w^M and a^L are now given by (45). With these changes, the tax rate for the oligarchy to be able to finance the military wages necessary to prevent coups becomes

$$\tau^P = \beta\gamma\hat{\tau} + \beta(1-\gamma)\frac{a^L\bar{x}}{Y - \bar{x}A^L}. \tag{46}$$

The net present discounted value of the elite from non-prevention, starting with $s_t = E$, is then given by

$$V^H(E,N) = \hat{a}^H + \beta\left[(1-\mu)V^H(E,N) + \mu V^H(\text{coup})\right].$$

The first term in this expression, $\hat{a}^H \equiv (1-\mu\phi)A^H$, is the expected flow payoff to the elite, which takes into account that with non-prevention there will be coups when possible and thus income disruption. The probability that a coup will take place is μ, because a coup can take place only when $\eta_t = \eta^{NI}$. In addition, $V^H(\text{coup}) \equiv (1-\gamma)V^H(D) + \gamma V^H(M)$ denotes the expected *future* value to the elite in case there is a coup. From (43), we have that $V^H(\text{coup}) = (1-\hat{\tau})A^H/(1-\beta)$. In addition, with probability $(1-\mu)$, the elite are insulated from political change today and the same political state recurs tomorrow, i.e. $s_{t+1} = E$. Therefore,

$$V^H(E,N) = \frac{\hat{a}^H + \beta\mu V^H(\text{coup})}{1-\beta(1-\mu)}. \tag{47}$$

The following condition on the set of parameters is useful for the characterization of the equilibrium of the model.

Condition 1 $\mu < \overline{\mu} \equiv \beta\hat{\tau}/(\phi + \beta\hat{\tau})$.

Condition 1 ensures that the elite strictly prefer non-prevention to smooth transition, that is, $V^H(E,N) > V^H(E,S)$, where $V^H(E,S)$ is defined in (31), with $V^H(D)$ now given by (43). If this condition did not hold, the elite would prefer S to N for any value of π (or would be indifferent between them when $\mu = \overline{\mu}$). This follows since both $V^H(E,N)$ and $V^H(E,S)$ are independent of π. Therefore, when Condition 1 fails to hold, the MPE in any subgame starting in $s = E$ would be identical to that in Proposition 4 in the previous section and would not feature coups against oligarchy.[18]

Let us next define $\bar{\pi} \in [0,1]$ in a similar fashion to $\hat{\pi}$ in the previous section. In particular, let $\bar{\pi}$ be the solution to the equation

$$V^H(E,P \mid \pi = \bar{\pi}) = V^H(E,N), \tag{48}$$

where the value of prevention for the elite is defined as in (34), but with τ^P given by (46), and $V^H(TD)$ is defined as in (44). In the proof of Proposition 6 (see the Appendix), we show that equation (48) has a unique solution $\bar{\pi} \in (0,1)$ and moreover, $V^H(E,P \mid \pi) \gtrless V^H(E,N)$ for any $\pi \lesseqgtr \bar{\pi}$.

[18]Notice that $\overline{\mu} < 1$ and also that, except the simplification in the fiscal technology, the baseline framework is a special case of this extended model with $\mu = 1$.

Finally, notice also that the MPE in transitional democracy is still given by Proposition 3 (again with the only difference that the threshold $\hat{\gamma}$ defined in (24) now features w^M and a^L defined by (45)). Using these observations, we obtain:

Proposition 6 *Consider the extended model presented in this subsection and suppose that $\mu \neq \overline{\mu}$, where $\overline{\mu}$ is defined in Condition 1. When Condition 1 does not hold, i.e. when $\mu > \overline{\mu}$, smooth transition always dominates non-prevention and the MPE in this case is similar to that one reported in Proposition 4. When Condition 1 holds and $\pi \notin \bar{\pi}$, where $\bar{\pi}$ is defined by (48), the equilibrium has the following form.*

A. *When $V^H(E, P \mid \pi = 0) > V^H(E, N \mid \pi = 0)$, there exists a unique MPE such that:*

1. *If $\pi \in [0, \bar{\pi})$, then whenever $s = E$ the elite build an army for repression (i.e., $a = 1$), set $\tau = \tau^P$ and $w = w^P$, and prevent military coups. The military chooses $\psi = 0$ and $\rho = 1$ (no coup and repression). Transitional democracy arises with probability $p(TD \mid E) = \mu\pi$, while oligarchy persists with probability $p(E \mid E) = 1 - \mu\pi$. Proposition 3 characterizes the unique MPE of starting in any subgame $s = TD$, so that $q(D) = 1$ when $\gamma \leq \hat{\gamma}$, and $q(D) = 1 - \gamma$ and $q(M) = \gamma$ when $\gamma > \hat{\gamma}$.*

2. *If $\pi \in (\bar{\pi}, 1]$, the elite build an army for repression (i.e., $a = 1$), set $\tau = 0$ and $w = 0$, and do not prevent coups. The military chooses $\psi = 1$ (coup) in state μ^{NI}. Military dictatorship arises with probability $p(M \mid E) = \mu\gamma$, consolidated democracy arises with probability $p(D \mid E) = \mu(1 - \gamma)$, while oligarchy persists with probability $p(E \mid E) = 1 - \mu$. Consequently, the long-run likelihood of regimes are given by $q(D) = (1 - \gamma)$ and $q(M) = \gamma$.*

B. *When $V^H(E, P \mid \pi = 0) < V^H(E, N \mid \pi = 0)$, for any $\pi \in [0, 1]$ there exists a unique MPE that is identical to the equilibrium in Part A case 2.*

Proof. See the Appendix. ■

Remark 2 The requirement that $\pi \neq \bar{\pi}$ plays an identical role to the assumption that $\pi \neq \hat{\pi}$ in Proposition 4 above. When π is equal to $\bar{\pi}$, then the elite will have two best responses, so that the equilibrium is not unique, but its nature is unchanged from that described in Proposition 6. Also, the case where $V^H(E, N \mid \pi = 0) = V^H(E, P \mid \pi = 0)$ is not covered in Propositions 6 since it emerges when $\pi = \bar{\pi} = 0$, which is ruled out by the restriction $\pi \neq \bar{\pi}$. Finally, the requirement that $\mu \neq \overline{\mu}$ rules out the case where the elite obtain the same value from either non-prevention and smooth transition. Once again, in this case the MPE would not be unique, but its nature would be unchanged from that described in Proposition 6.

The important additional result in Proposition 6 is that now coups against oligarchy also arise along the equilibrium path. Previously, the threat of coups against oligarchy affected the equilibrium allocations, but such coups never took place in equilibrium (and military dictatorships always emerged from coups against democracy). The introduction of such coups is important for two reasons. First, coups against oligarchy provide a clearer demonstration of the *political moral hazard* problem facing the elite in building a strong army—that the army can turn against them. Second, the model can now explain why the military dictatorships we observe in practice have different origins; some resulting from coups against democracy, while others are preceded by non-military oligarchy regimes.

5.2 Natural Resources

In this section, we extend the baseline model by assuming that there is a natural resource, which generates income equal to $R \geq 0$ in each period. The natural resources are owned by the elite (high-productivity agents) and all of the natural resource rents initially accrue to them. Since there are now two sources of income, we allow for two different fiscal instruments; a tax rate on income at the rate τ (with tax distortions specified as in the beginning of this section with the function C, so that there are no distortions until $\tau = \hat{\tau}$) and a tax rate on income from natural resources $\zeta \in [0, 1]$. We assume that the taxation of natural resources generates no distortions. This is reasonable, in view of the fact that natural resources are typically supplied inelastically.

The characterization of the MPE is similar to before (in particular, the elite never choose N since it gives a smaller equilibrium payoff than S), and we provide fewer details. The main observation that simplifies the analysis is that both a military regime and a democratic regime will choose $\zeta = 1$, thus taxing all income from natural resources. Consequently, an analysis identical to that in Section 3 implies that military wages in a military dictatorship and instantaneous payoffs to low-skill agents in democracy are

$$\tilde{w}^M = \frac{\hat{\tau}\left(Y - \bar{x}A^L\right) + R}{\bar{x}}, \tag{49}$$

and

$$\tilde{a}^L = (1 - \hat{\tau})\, A^L + \tilde{G}^D, \tag{50}$$

where $\tilde{G}^D = \hat{\tau} Y + R$. These expressions exploit the fact that $\tau = \hat{\tau}$ and $\zeta = 1$, and thus they incorporate the additional revenues coming from natural resource rents either directly in the military wage or in the amount of public good provided in democracy.

Let us start with a subgame where $s = TD$. An analysis identical to that leading to Proposition 3 immediately implies that low-skill producers are always better-off by preventing coups. In fact, now retaining political power has become more valuable because of the additional source of revenues coming from natural resources. However, natural resources also make military coups more attractive for the soldiers. In particular, as in Section 3 a military coup can be prevented only if given the fiscal instruments and natural resource rents, democracy can raise enough revenues to pay soldiers a sufficient amount to satisfy the *no-coup constraint*. This feasibility constraint now takes the form

$$w^{TD} \bar{x} \leq \hat{\tau} \left(Y - \bar{x} A^L \right) + R. \tag{51}$$

In this expression, the revenues include the income raised by taxing production at rate $\hat{\tau}$ and from the taxes on natural resource rents at the rate $\zeta = 1$. The military wage necessary to prevent coups is no longer equal to w^{TP} (given as the wages satisfies (22) as equality) as before, but is instead

$$\tilde{w}^{TP} = \frac{\beta}{1-\beta} \gamma \left(\tilde{w}^M - \tilde{a}^L \right), \tag{52}$$

with $\tilde{w}^M$ and $\tilde{a}^L$ now defined by (49) and (50). It is straightforward to verify that $\tilde{w}^{TP} > w^{TP}$, making coup prevention more difficult. In particular, the combination of (51) and (52) shows that the prevention of coups is now possible if γ satisfies the following condition, which is a simple generalization of (24),

$$\gamma \leq \frac{\tilde{w}^M}{\tilde{w}^M - \tilde{a}^L} \frac{1-\beta}{\beta} \equiv \tilde{\gamma}(R). \tag{53}$$

With this threshold replacing $\hat{\gamma}$, Proposition 3 continues to apply. The proof of Proposition 7 in the Appendix shows that the threshold $\tilde{\gamma}(R)$ is strictly decreasing in R. This is intuitive; greater natural resource rents raise the *political stakes* and make military coups more attractive for soldiers (and the additional revenue available to democracy is not sufficient to compensate soldiers for the prospect of dividing natural resources among themselves). Consequently, transitional democracy is less likely to consolidate in natural resource abundant societies.

We next turn to subgames starting with $s = E$. Natural resources will again raise political stakes, though in this case their effects will be somewhat more complex. Recalling that the value to the elite in the subgames starting with $s = M$ and $s = D$ are given by (43) above, we obtain the value to the elite from smooth transition as

$$\tilde{V}^H(E, S) = \frac{(1-\beta)\left(A^H + R/n\right) + \beta(1-\hat{\tau})A^H}{1-\beta}, \tag{54}$$

which is identical to (31) in Section 3 above, except that the elite enjoy the rents from natural resources for one period. If, on the other hand, they build a strong army and choose coup prevention, their value, as a function of π, will be given by the solution to the following program

$$\tilde{V}^H(E, P \mid \pi) = \max_{\tilde{\tau}\in[0,\hat{\tau}],\zeta\in[0,1]} \frac{(1-\tilde{\tau})A^H + (1-\zeta)R/n + \beta\pi\tilde{V}^H(TD)}{1-\beta(1-\pi)}, \tag{55}$$

subject to the government budget constraint, which written as an equality takes the form

$$\tilde{\tau}\left(Y - \bar{x}A^L\right) + \zeta R = \tilde{w}^P(R)\,\bar{x}. \tag{56}$$

Expression (55) is obtained from the solution of a recursive equation analogous to (33), but uses (44) and incorporates the fact that to prevent coups the elite have to pay the now higher efficiency wage $\tilde{w}^P(R)$. This efficiency wage has the same expression as in (38), except that w^M and a^L are now replaced by their counterparts $\tilde{w}^M$ and $\tilde{a}^L$ in (49) and (50), so that

$$\tilde{w}^P(R) = \beta\left(\gamma\tilde{w}^M + (1-\gamma)\,\tilde{a}^L\right). \tag{57}$$

Let us also denote the tax levels that solve the maximization problem in (55) by $\tilde{\tau}^P$ and ζ^P. Comparing the maximized value of this program to (54), we obtain a threshold $\tilde{\pi}(R)$ replacing $\hat{\pi}$ in Proposition 4. The rest of this proposition continues to apply. Consequently, we have the following characterization of equilibrium in the presence of natural resource rents.

Proposition 7 *The extended model with natural resources has a unique MPE, identical to that in Proposition 4 (except that $\tilde{\gamma}(R)$ replaces $\hat{\gamma}$ and $\tilde{\pi}(R)$ replaces $\hat{\pi}$). Moreover, we have that:*

- *a higher level of R makes democratic consolidation starting in state $s = TD$ less likely;*
- *there exists a $R^* > 0$ and a $\hat{x} > 0$, such that an increase in natural resources makes repression, starting in state $s = E$, more likely if $\bar{x} > \hat{x}$, for any initial $R > R^*$.*

Proof. See the Appendix. ■

The new results in this proposition are the comparative statics with respect to the size of natural resource rents. As already discussed above, greater natural resource abundance increases the political stakes and makes democratic consolidation more difficult, because the military has more to gain from taking control and democracy is not always able to compensate soldiers for forgoing these returns.

The second part of the proposition shows that greater natural resource abundance also affects the likelihood of repression in oligarchy. Nevertheless, the effect is, in general, ambiguous, because of two opposing effects. On the one hand, greater natural resources make the elite more willing to use repression in order to prevent a transition to democracy again because of the greater political stakes. On the other hand, natural resources also intensify the political moral hazard problem because the military, once formed, will have stronger incentives to undertake a coup. Which effect dominates depends on the size of the army and the size of natural resource rents. With a larger army, per soldier rents in military dictatorship are lower and thus when the size of the army is larger than a threshold $\hat{x} > 0$ and $R > R^*$, an increase in natural resource rents makes repression more likely.[19]

5.3 Persistence

The baseline model analyzed in Sections 2 and 3 was simplified by two assumptions; first, the transitional phase in democracy lasted for one period, i.e., the military could be reformed after one period; second, in the absence of repression in oligarchy, there was immediate transition to democracy. In practice, we may expect both the transition to democracy and the process of reforming the military to be potentially slow and uncertain. In this section, we extend the baseline model by introducing additional persistence both in oligarchy and in the process of reforming the military. In particular, we assume that in the absence of repression, oligarchy persists with probability $\alpha \in (0,1)$. If, instead, there is repression and it fails, democratization happens only with probability $(1-\alpha)\,\pi < \pi$. Thus, α represent a direct measure of the degree of consolidation of the power of the elite. We also assume that in transitional democracy the democratic government can reform the military only with probability $\lambda \in (0,1)$ in each period. Whether there is an opportunity to reform the military at time t is revealed after the army has made its coup decision in that period. Returning to the discussion in footnote 3, λ is therefore another measure of the relative strength of the army in transitional democracy emphasized by

[19] Here the threshold R^*, provided in the Appendix, is such that when $R > R^*$, the elite will use both taxes on production income and natural resource rents to finance military wages.

O'Donnell and Schmitter (1986).[20] For example, a greater value of λ can be interpreted as corresponding to a relatively weak army. We will see, however, that contrary to O'Donnell and Schmitter's conjecture, a "weaker military" can lead to a higher likelihood of coups.

Let us start in a subgame with $s = TD$. The value to the military from attempting a coup, $V^M(TD \mid \text{coup})$, is still given by (21), whereas the return from not attempting a coup is

$$V^M(TD \mid \text{no coup}) = w^{TP} + \beta\left[(1-\lambda)V^M(TD \mid \text{no coup}) + \lambda V^L(D)\right],$$

where we again use w^{TP} to denote the military wage in transitional democracy when there is coup prevention. Note, however, that the expression for this wage is no longer the same as in Section 3 (see below). This value function also takes into account that the same state will recur with probability $1-\lambda$, because an opportunity to reform the army will not present itself in the next period. Rearranging this expression, we obtain

$$V^M(TD \mid \text{no coup}) = \frac{(1-\beta)w^{TP} + \beta\lambda a^L}{(1-\beta)(1-\beta(1-\lambda))},$$

where a^L is now defined in (45). The expression for w^{TP} in this extended environment can be obtained by solving the incentive compatibility equation, $V^M(TD \mid \text{coup}) = V^M(TD \mid \text{no coup})$, as

$$w^{TP} = \frac{1-\beta(1-\lambda)}{1-\beta}\gamma\beta w^M + \frac{(1-\beta(1-\lambda))(1-\gamma)-\lambda}{1-\beta}\beta a^L, \tag{58}$$

where w^M is the soldiers' wage in a military dictatorship given by (45).

As in our analysis in Section 3, transitional democracies will prevent coups if two conditions are satisfied: first, low-skill producers should prefer to prevent coups; second, they should be able to pay high enough wages to the military to achieve this. Let us start with the second requirement. The necessary condition for the transitional democracy to pay high enough wages to the military again takes the form $w^{TP} \leq w^M$. Using the expressions for these two wage levels, the condition for the prevention of coups in transitional democracy can be written as

$$\gamma \leq \frac{(1-\beta)\left(w^M - (1-\lambda)\beta a^L\right)}{\beta(1-\beta(1-\lambda))(w^M - a^L)} \equiv \hat{\gamma}(\lambda). \tag{59}$$

Condition (59) is generalization of condition (24) and shows that transitional democracies can prevent coups as long as the probability that coup attempts will be successful is not too high. Moreover, it can be verified that $\hat{\gamma}(\lambda)$ is a strictly decreasing function of λ and that $\hat{\gamma}(\lambda)$

[20] Naturally, even a more stark measure is whether $x_t = 0$ or $\bar{x}$, and we have already investigated the implications of this measure of military strength on democratic consolidation.

$\to \hat{\gamma}$ as $\lambda \to 1$. This implies the interesting result that condition (59) becomes more difficult to satisfy as λ increases (in the limit as $\lambda \to 1$, this condition coincides with (24)).

We next verify that low-skill producers prefer to prevent coups when this is feasible. If they prevent coups, their value in transitional democracy is

$$V^L(TD \mid \text{no coup}) = (1-\hat{\tau}) A^L + G^{TP} + \beta \left[(1-\lambda) V^L(TD, P) + \lambda V^L(D)\right], \tag{60}$$

where $V^L(TD, P) = V^L(TD \mid \text{no coup})$ and $G^{TP} = \hat{\tau}\left(Y - \bar{x}A^L\right) - w^{TP}\bar{x}$ incorporates the fact that taxes will be equal to $\hat{\tau}$ (given the tax distortion technology adopted at the beginning of this section), and whatever is left over from paying soldiers the efficiency wage goes into public good expenditures.[21] Alternatively, without prevention, the value to low-skill producers is

$$V^L(TD \mid \text{coup}) = (1-\hat{\tau})(1-\phi) A^L + G^{TN} + \beta \left[(1-\gamma) V^L(D) + \gamma V^L(M)\right], \tag{61}$$

where $G^{TN} \equiv \hat{\tau}(1-\phi)\left(Y - \bar{x}A^L\right)$, since in this case zero wages are paid to soldiers (i.e., $w^{TN} = 0$). This expression also takes into account that, as before, when a coup attempt fails, there is an immediate transition to fully consolidated democracy.

The comparison of $V^L(TD \mid \text{no coup})$ and $V^L(TD \mid \text{coup})$ shows that the low-skill producers are better-off preventing military coups by offering a wage to the army equal to w^{TP} if and only if $\lambda \geq \lambda^*$, where $\lambda^* \in [0, 1)$. This leads to the following result.

Proposition 8 *In any subgame beginning with $s = TD$, there exists $\lambda^* \in [0,1)$ and a unique MPE such that the transitional democratic government prevents coup attempts if and only if $\gamma \leq \hat{\gamma}(\lambda)$ and $\lambda \geq \lambda^*$.*

Proof. See the Appendix. ■

The main implication of this proposition is that, because $\hat{\gamma}(\lambda)$ is decreasing in λ, transitional democracy is more likely to prevent coups when λ is high. At some level, this is intuitive; the lower is λ, the less the army is threatened by reform in transitional democracy and this translates into more credible commitments by transitional democracy to compensate soldiers for not undertaking a coup. In contrast, when λ is close to 1, concessions by the transitional democratic regime are not credible for the military, because they foresee imminent reform, and are more willing to attempt coups. While intuitive, this result is also paradoxical, especially in view of O'Donnell and Schmitter's (1986) conjecture above that stronger militaries make the

[21] The hypothesis that coup prevention is possible, that is, $w^{TP} \leq w^M$, ensures that $G^{TP} \geq 0$.

survival of transitional democracies less likely. While our baseline model shows that this basic conjecture is true (i.e., when we compare the military, $x_t = 0$, following a smooth transition to the strong military following repression during the oligarchic regime, $x_t = \bar{x}$), our model also shows why this conjecture may not capture the complete interaction between the strength of the military and transitional democracies because commitments to a strong military are more credible.

The analysis of the interactions between the elite and the military in oligarchy are similar to our analysis in Section 3. Briefly, the value to be an elite agent from smooth transition can be computed using the expressions in (44) as

$$V^H(E,S) = \frac{(1-\beta)A^H + \beta(1-\alpha)(1-\hat{\tau})A^H}{(1-\beta)(1-\beta\alpha)}, \tag{62}$$

and the value from prevention, as a function of π, is

$$V^H(E,P \mid \pi) = \frac{\left(1-\tau^P\right)A^H + \beta\pi(1-\alpha)V^H(TD)}{1-\beta(1-\pi(1-\alpha))}. \tag{63}$$

A similar analysis again shows that non-prevention is dominated by smooth transition (in fact, the persistence of oligarchy without repression makes smooth transition more desirable for the elite relative to non-prevention). Consequently, we immediately obtain the analog of Proposition 4: the elite choose prevention if π is below some threshold $\breve{\pi}$ and smooth transition otherwise, and it is straightforward to verify that $\breve{\pi} \in (0,1)$. The main new result, described in the next proposition, concerns the comparative statics on regime transitions with respect to the persistence parameter α.

Proposition 9 *Let $\breve{\pi}$ be defined by $V^H(E,S) = V^H(E,P \mid \breve{\pi})$. If no coups take place in the subgame beginning in state $s = TD$, then $\breve{\pi}$ is strictly decreasing in α. If coups take place in the subgame beginning in state $s = TD$, then $\breve{\pi}$ is strictly decreasing in α for any $\phi < \phi^*$, and $\breve{\pi}$ is strictly increasing in α for any $\phi > \phi^*$, where $\phi^* \in (0,1]$.*

Proof. See the Appendix. ■

Proposition 9 implies that the elite are *less* likely to choose repression when their power is *more* consolidated (greater α) under two related conditions: first, when coups do not happen in transitional democracy; second, when coups take place in transitional democracy but they do not cause too much income disruption (ϕ small). This result is intuitive; as α increases, both the value to the elite from smooth transition and from prevention increase. Whether the threshold $\breve{\pi}$ increases (and thus whether repression becomes more likely) depends on two opposing forces. Whether coups take place in transitional democracy and what their costs for the elite are (ϕ) determine the balance of these two forces. When coups do not take place, then they are more likely to choose repression when their power is less consolidated (corresponding to a lower value of α). When coups are possible after democratization, then the trade-off for the elite depends on how disruptive these coups are. When they are not very disruptive ($\phi < \phi^*$), then a lower α (less consolidation of elite power in oligarchy) encourages repression. However, when coups are highly disruptive ($\phi > \phi^*$), then a lower α makes transitional democracy more likely after repression and the elite prefer smooth transition in order to avoid the potential costs of coups in the future.

It is also noteworthy that Proposition 9 has the potentially paradoxical implication that democracy is *not* necessarily likely to emerge in societies where the citizens are better organized politically, which we would expect to be associated with a lower value of α. In contrast, smooth transition to democracy may be more likely precisely in societies where the power of the elite is sufficiently consolidated so that they feel less need to create an army for additional repression.

6 The Role of the Military in Recent History

In this section we briefly discuss a number of salient cases of military dictatorships to provide empirical context for our theory. We first contrast the role played by the military in various Central American nations. This highlights both how economic inequality affects regime dynamics and the role that the military plays in politics. At the end of this section, we provide a brief discussion of the impact of natural resource rents on the behavior of the military.

6.1 Military and Democracy in Central America

The case of Central America, and of Costa Rica in particular, provides an interesting illustration of the ideas emphasized by our theory. This case both highlights the role of the military in explaining regime dynamics and also shows how the initial distribution of income affects the subsequent evolution of political institutions.

Among Latin American countries, Costa Rica stands virtually alone for the very limited role played by the army in politics, since the country gained independence in 1821 (e.g., Yashar, 1997). During the 19^{th} century, Costa Rica did not experience predatory caudillos (who were typically influential in the political and economic life in much of the rest of Latin America). Between 1891 and 1948, there was a single coup in Costa Rica, followed by a brief dictatorship. After this episode, in 1949, the Costa Rican military was demobilized and essentially disbanded.

The relative absence of external and internal conflicts during the history of Costa Rica is a major factor in the limited role that the military has played in this country's politics. Even before its demobilization, the Costa Rican army was small and weak, and did not possess the professional traditions and strength typical of many other South American militaries. A key factor that has led to the presence of a weak military in Costa Rica is that historically social conflicts in this country have been relatively limited. This is because of a combinations of factors, including the structure of the economy consisting of many small landholders; the absence of a large indigenous population at the time of colonization, which made the Spaniards not set up major plantations in this area; the poor endowment of natural resources such as gold; and the high agricultural wages resulting from the scarcity of labor due to the absence of a large (indigenous) population. Moreover, the relative homogeneity of Costa Rica's society appears to be an important reason why Costa Rican ruling elites have shown limited interest in the creation of a large and powerful military.[22] The tradition of low militarization of Costa Rica culminated with the formal demobilization of the armed forces in 1949, after these were decimated during a short civil war.[23] This decision has not been reversed ever since.

Consistent with the predictions of our model, the demobilization of the Costa Rican army appears to have contributed significantly to the stability of its nascent democratic institutions. Consequently, Costa Rica has become the most stable democratic country in Latin America. This is in part because of the absence of the military necessary for the formation of an effective "coup threat," perhaps in coalition with the economic elites.[24] Roquié (1987 p. 192), for example, relates the success of Costa Rican democracy directly to the absence of a military and writes: "No doubt because it corresponded to deeper motivations linked to the social equilibrium of the Costa Rican nation, a nonmilitary state has become today one of the bases of its democratic consensus."

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[22] For instance, describing the economic and institutional reforms promoted during the "liberal" era (the period of Latin American history roughly going from 1870 to 1930, following the phase of caudillo politics), Mahoney (2001 p. 266) writes that, "In Costa Rica, where the reform period was launched at the time of independence, liberals were not faced with the kinds of political threats that led reformers elsewhere to build large standing armies...The pattern of reformist liberalism that had developed by the early twentieth century saw neither the creation of a powerful military coercive branch that commanded a prominent position in the state nor an associated rural economy marked by polarized class structures and a high potential for lower-class agrarian revolts."

[23] The economic elite did oppose the abolition of the armed forces, but they were overruled.

[24] As emphasized in Bowman (2004), the abolition of the army in Costa Rica has helped to stabilize democratic institutions not only directly, but also indirectly, by allowing the government to spend more in welfare and public education. Indeed, the broad programs of income redistribution and of provision of goods and services implemented by the National Liberation Party (the preeminent party in Costa Rican politics in the second half of the 20^{th} century) have further alleviated income inequality over time, and thereby reduced the scope of social and political conflicts.

The successful democratic consolidation of Costa Rica since the mid-twentieth century stands in contrast to the different political development paths pursued by other Central American nations. For example, highly repressive military dictatorships were established in the 1950s both in Guatemala and in El Salvador. These regimes persisted until the 1980s. In Honduras and Nicaragua, instead, traditional oligarchic regimes led by civilians elite, but supported by a significant military element, emerged during this time period.

Consistent with our model, in both Guatemala and El Salvador power militaries, initially created by the elite in order to ensure the repression of the lower strata in these highly polarized societies, later became strong enough to seize power and establish their own dictatorships.[25] These military regimes lasted for extended periods of time in both countries, were highly authoritarian and autonomous. Their policies also led to the reproduction, or even the amplification, of the high income inequality present in these societies at the time of the coups.[26]

Honduras and Nicaragua have also been ruled by nondemocratic governments throughout the 20^{th} century. However, in contrast to the military dictatorships in El Salvador and Guatemala, these were personalistic or oligarchic regimes, in which the military, though actively involved in repression, did not have autonomous power. In fact, the survival of nondemocratic regimes in Honduras and Nicaragua depended more on the distribution of political patronage through the expansion of state bureaucracy rather than the harsh repression of opponents and "state terror," which have been part of the experience in Guatemala and in El Salvador over the same period.[27]

The different path of political development that Honduras and Nicaragua followed since 1930s (relative to Guatemala and El Salvador) may be traced back to the economic and insti-

[25] In Guatemala, the liberal era started in 1871 with the triumph of General Justo Rufino Barrios, and was characterized by a further increment of the concentration of land ownership (also through a new major wave of expropriation of communal lands cultivated by the indigenous population). "Except for a brief democratic interlude in the early 1920s, Liberal military dictators ruled with an iron hand on behalf of the coffee oligarchy and foreign investors for over seventy years," (Vanden and Prevost, 2002 pp. 255-256).

[26] An indication of the differences in the underlying socioeconomic conditions is provided by the average number of economically active individuals in the agricultural sector relative to the number of farms around 1950 (see Needler, 1987, Table 5, p. 98). This ratio was 10.9 in Costa Rica, 38.2 in El Salvador and 48.1 in Guatemala. This comparison therefore suggests a much more equal distribution of income in the agricultural sector in Costa Rica than in El Salvador and Guatemala.

[27] Overall, there was some variation in the military policies implemented in Honduras and Nicaragua. It is possible that this variation might have contributed to the different timing of democratization in these two countries. In Honduras, the army was not a bastion of support of the Carías regime, and militarization in Honduras remained very limited until the late 1950s. In contrast, in Nicaragua the Somoza regime promoted the development of the National Guard as an important pillar of its control over the society. Consequently, though a typical oligarchic regime, Nicaragua was significantly more militarized than Honduras. Nonetheless, the army in Nicaragua did not develop into an autonomous institution, but rather into "a separate military casta, loyal only to their own leader, not to the nation as a whole," (Millet, 1977 p. 198).

tutional evolution of the two countries since the previous period of liberal reforms. Whereas in Guatemala and in El Salvador, officers had both the political incentives and the institutional capacity to attempt coups and to setup their own rule, in Honduras and Nicaragua a structural basis for military authoritarianism was lacking. Indeed, while the liberal period saw a further entrenchment of the coffee elites, as well as the creation of powerful militaries capable of independent political action in Guatemala and in El Salvador, in both Honduras and Nicaragua the liberal era left behind a relatively weak agrarian class and a military that was largely controlled by the ruling elite or dictator (for example, as in the case of the National Guard of the Somoza García regime in Nicaragua).[28]

6.2 Natural Resources and Military Dictatorships

Our model's predictions on the role of the military in natural resource abundant societies is also broadly consistent with the historical evidence. In her authoritative work on natural resource booms, Karl (1997) argues that the two oil price hikes in the early 1970s and 1980s exacerbated political instability and regime transitions toward more repressive forms of government in many "petro-states," in particular, in Iran, Nigeria, Venezuela and Algeria. Nigeria, for example, experienced growing economic and ethnic tensions after the oil price increases and witnessed the reemergence of military rule in 1983. This was followed by a new transition to a fragile democracy between 1986 and 1991, but then again interrupted by a military coup in 1993. Algeria experienced a severe crisis in the early 1990s, which lead to the assassination of the president, Mohammed Boudiaf, to the cancellation of elections, and to frequent switches between military rule and weak civilian rule. Further evidence that oil and abundant endowments of other natural resources may adversely affect democratic consolidation is offered by the empirical evidence presented in Ross (2001), and by Jensen and Wantchekon (2004). In particular, Ross (2001) presents evidence consistent with the notion that increases in natural resource rents lead to increased repressive efforts by nondemocratic governments in order to prevent or delay democratization. Jensen and Wantchekon (2004) show that in African countries, the abundance of natural resources tends to make both the transition to, and the consolidation of democracy, less likely. In fact, many of the more successful examples

[28] While, during the liberal period, the Zelaya autocracy had implemented economic and institutional reforms setting Nicaragua on a development path similar to that of Guatemala and El Salvador, things changed abruptly in 1909, following as US intervention which lead to the creation of an informal protectorate. After the fall of Zelaya's regime, the conservative elite, which took over power relying on the support of US Marines for security, showed little interest in preserving the coercive apparatus created by the previous regime. The Nicaraguan army was eventually disbanded, putting an end the militarization effort of Zelaya.

of democratic transitions in sub-Saharan Africa are by relatively natural resource poor nations such as Benin, Madagascar and Mali. Instead, natural resource abundant countries have experienced greater political turmoil and have not been successful in establishing democratic regimes. Examples include Gabon, Cameroon, Togo, Zambia, Algeria, Nigeria, Congo and Sierra Leone.

Naturally, there are exceptions to this pattern. Botswana, which is a natural resource abundant country, has been the most successful democracy in sub-Saharan Africa. The oil boom was also significant for Norway, but does not seem to have led to any military action or nondemocratic movements in this country. This likely reflects the fact that there is a major interaction between the strength of underlying institutions and the effect of natural resources. Botswana had one of the most participatory indigenous institutions in Africa and a very successful transition to democracy before diamonds were discovered (see Acemoglu, Johnson and Robinson, 2003). Norway is clearly a very strong, consolidated democracy. In such societies, greater natural resource wealth increases the income of the citizens, relaxes the government budget constraint, and may contribute to more productive spending.[29] This is also consistent with the prediction of our model regarding the effect of a positive shock to R in consolidated democracy, which increases the level of public good provision, without affecting political institutions.

7 Concluding Remarks

In this paper, we presented the first analysis of the emergence of military dictatorships and the conditions under which the military will act as an effective agent of the elite (as opposed to acting in its own interests and against those of the elite). These questions are relevant for research in political economy for a number of reasons. First, most nondemocratic regimes survive with significant support from the military, so understanding the objectives of the military is important in the study of political transitions. Second, many nondemocracies in practice are military regimes, and we need to understand whether military dictatorships emerge and persist for different reasons than oligarchic regimes and what their economic consequences are.

An investigation of these questions necessitates a model in which the military consists of a set of individuals who act in their own interests (though they can be convinced to align

[29] See Ross (2001 pp. 343-344) for more evidence that major oil discoveries have not had discernible adverse effects on democracy in such countries as Norway, Britain and the US. See also Mehlum, Moene and Torvik (2006) for evidence of a significant interaction between institutions and natural resources in growth regressions.

themselves with the elite if this is consistent with their interests). We introduced this feature by assuming that the means of violence in the society are in the monopoly of the military, and if the elite decide to form a strong military, then they have to live with the political moral hazard problem that this causes. In particular, a strong military may not simply work as an agent of the elite, but may instead turn against them in order to create a regime more in line with their own objectives. One immediate implication of the political moral hazard problem is that the cost of using repression in nondemocratic regimes is now higher, because the elite need to pay "efficiency wages" to soldiers to prevent coups (or make other social or policy concessions to the military).

An important consequence of the presence of a strong military is that once transition to democracy takes place, the military poses a coup threat against the nascent democratic regime until it is reformed. Precisely, the anticipation that the military will be reformed in the future acts as an additional motivation for the military to undertake coups against democratic governments. Consequently, societies where the elite form a strong military in order to prevent democratization are more likely to later lapse into military dictatorships because the military retains some of its power during transitional democracy and can attempt a successful coup against democracy. This leads to a specific (and to the best of our knowledge, novel) channel for the emergence of military dictatorships, which appears to be consistent with the historical evidence. It also highlights how repression during a nondemocratic era can have important effects on the economic and political success of a later democratic regime.

Our analysis also showed how, under certain circumstances, military coups against nondemocratic elites are also possible, thus creating another channel for the emergence of military dictatorships. In light of these results, one might wish to distinguish between three different types of nondemocratic regimes. The first is oligarchies where the rich elite are in power and the military acts as an agent of the elite. This type of regime emerges endogenously in our model depending on the technology and the incentives of the elite. The second is a military dictatorship that emerges as a result of a coup against a democratic regime. The examples from Central America discussed in Section 6 ensure the relevance of this type of military dictatorships. The third is a military dictatorship that results from coups against oligarchic regimes. The examples of this type of military dictatorship were also discussed in the Introduction.

Our model also provides a range of comparative statics about when such dictatorships are more likely. In particular, we show that greater inequality makes the use of the military in nondemocratic regimes more likely and also makes it more difficult for democracies to prevent military coups. Both of these effects make military regimes following brief democratic episodes more likely. In addition, greater inequality also makes it more likely that nondemocratic regimes are unable to solve the political moral hazard problem and thus creates another channel for the emergence of military dictatorships. Finally, we show that greater natural resource rents make military coups against (unconsolidated) democracies more likely and have ambiguous effects on the political equilibrium in nondemocracies, which become more valuable for the elite, but also more expensive to maintain because of the more severe political moral hazard problem resulting from the high natural resource rents.

We view our paper as a first step in the study of military dictatorships and the political agency problems that are ubiquitous between branches of the state that control the means of violence and the economic elite, especially in nondemocracies. Many topics in this broad area deserve further study. First, a systematic empirical analysis of policy and economic performance differences between different types of nondemocratic regimes is necessary. Second, the current framework can be extended so that an alliance between the military and the elite can be formed during democratic periods as well. Finally, the current framework did not introduce an independent role of the military in national defense. An interesting issue is how the role of the military in national defense interacts with its interventions in domestic politics.

Appendix

7.1 Proof of Proposition 3

When they choose prevention, the low-skill producers recognize that $s_{t+1} = D$ and by definition, they have to pay w^{TP} that satisfies (22) as equality. Thus the only relevant decisions concern the choice of τ^{TP} and G^{TP}, which can be determined as the solution to the following maximization program

$$u^{L}(TD \mid \text{no coup}) \equiv \max_{\tau \in [0,1], G \in \mathbb{R}_{+}} (1-\tau) A^{L} + G \tag{64}$$
$$\text{subject to } G \leq (\tau - C(\tau)) \left(Y - \bar{x} A^{L}\right) - w^{TP} \bar{x}.$$

Next, using the expressions (9) and (22), w^{TP} can be written as

$$w^{TP} = \frac{\beta}{1-\beta} \gamma \left[\frac{(\hat{\tau} - C(\hat{\tau})) \left(Y - \bar{x} A^{L}\right)}{\bar{x}} - a^{L} \right]. \tag{65}$$

Provided that the solution to (64) involves $G^{TP} > 0$, taxes are set at the level τ^{TP} defined implicitly by the first-order condition of the program, which implies

$$A^{L} = \left(1 - C'(\tau)\right) \left(Y - \bar{x} A^{L}\right), \tag{66}$$

and moreover the utility of low-skill producers during the transitional period will be

$$\left(1 - \tau^{TP}\right) A^{L} + \left(\tau^{TP} - C\left(\tau^{TP}\right)\right) \left(Y - \bar{x} A^{L}\right) - w^{TP} \bar{x}.$$

If, on the other hand, the solution to (64) involves $G^{TP} = 0$, then taxes are determined by the government budget constraint (8) as

$$\tau^{TP} = \frac{w^{TP} \bar{x}}{Y - \bar{x} A^{L}} + C\left(\tau^{TP}\right), \tag{67}$$

and the utility of low-skill producers in the transitional period will be $\left(1 - \tau^{TP}\right) A^{L}$.

If, instead, coups are not prevented, the tax rate and the level of public good provision are chosen to maximize the utility of a representative low-skill producer in the transitional period, with no additional constraint, but taking into account the output disruption caused by the coup, which will be forthcoming in this case. In particular, the tax τ^{TN} and the level of public good provision G^{TN} in question, are the solution to the maximization program

$$u^{L}(TD \mid \text{ coup}) \equiv \max_{\tau \in [0,1], G \in \mathbb{R}_{+}} (1-\tau)(1-\phi) A^{L} + G \tag{68}$$
$$\text{subject to } G \leq (1-\phi)(\tau - C(\tau)) \left(Y - \bar{x} A^{L}\right).$$

The low-skill producers benefit from prevention when $V^L(TD \mid \text{no coup}) \geq V^L(TD \mid \text{coup})$, where $V^L(TD \mid \text{no coup}) = u^L(TD \mid \text{no coup}) + \beta V^L(D)$ and $V^L(TD \mid \text{coup}) = u^L(TD \mid \text{coup}) + \beta\left[\gamma V^L(M) + (1-\gamma) V^L(D)\right]$ as given by (25) and (26) above. Rearranging these expressions, we can write the condition for prevention to be preferred, when $G^{TP} > 0$, as

$$\begin{aligned} & (1-\beta)\left[\left(1-\tau^{TP}\right)A^L + \left(\tau^{TP} - C\left(\tau^{TP}\right)\right)\left(Y - \bar{x}A^L\right)\right] - (1-\beta)\, w^{TP}\bar{x} \\ \geq \quad & (1-\beta)\, u^L(TD \mid \text{coup}) - \beta\gamma\left(a^L - (1-\hat{\tau})A^L\right). \end{aligned} \tag{69}$$

Now the result follows from three observations. First, from (65), $(1-\beta)\, w^{TP}$ is linear and increasing in β. This observation, and the facts that $u^L(TD \mid \text{coup})$ does not depend on β, and that τ^{TP} does not depend on β when $G^{TP} > 0$, imply that both the right-hand-side and the left-hand-side of (69) are strictly decreasing linear functions of β. Therefore, there is at most one value of β, β', such that the left- and the right-hand sides are equal. Second, (69) is satisfied at $\beta = 1$, since in this case this condition can be written as

$$(\hat{\tau} - C(\hat{\tau}))\, Y - (\hat{\tau} - C(\hat{\tau}))\, \bar{x}A^L - a^L\bar{x} \leq a^L - (1-\hat{\tau})\, A^L,$$

where $(\hat{\tau} - C(\hat{\tau}))\, Y \leq a^L - (1-\hat{\tau})\, A^L$. Third, condition (69) also holds when $\beta = 0$, because in this case $w^{TP} = 0$ and thus prevention is for free. These observations imply that there exists no $\beta' \notin [0,1]$ such that the right-hand-side and the left-hand-side of (69) are equal, thus this condition is always satisfied and we have $V^L(TD \mid \text{no coup}) > V^L(TD \mid \text{coup})$ for any value of $\beta \in [0,1]$. This establishes that, if $G^{TP} > 0$, coup prevention is always better for transitional democracy.

We next consider the case where $G^{TP} = 0$. It is straightforward to show that this case applies when $\beta \in [\beta^*, 1]$, where β^* is defined as the minimum value of β such that the constraint $G \geq 0$ in problem (64) is binding (this constraint is implicit in $G \in \mathbb{R}_+$). Observe that w^{TP} is a strictly increasing function of β and the tax rate defined by (66) does not depend on β, hence the constraint $G \geq 0$ is slack for $\beta \leq \beta^*$ and binds for $\beta > \beta^*$. The equivalent of condition (69) in this case can be rewritten as

$$\tau^{TP}A^L \leq A^L - u^L(TD \mid \text{coup}) + \frac{\beta}{1-\beta}\gamma\left(a^L - (1-\hat{\tau})\, A^L\right). \tag{70}$$

We now show that (70) holds for any β in the range $[\beta^*, 1]$. Note that the term in square brackets on the right-hand side is positive by the definition of a^L in (19) and $A^L - u^L(TD \mid \text{coup})$ does not depend on β. Therefore, the right-hand side is linear (increasing) in $b \equiv \beta/(1-\beta)$, whereas from (67) and (65) τ^{TP} is a strictly convex function of b. Clearly, condition (70) holds as $\beta \to 1$. Moreover, since the payoff to the citizens is a continuous function of β over $[0,1]$ by Berge's Maximum Theorem (e.g. Stokey, Lucas and Prescott, 1989 Chapter 3), condition (69) also holds at β^*, where the set of active constraints in program (64) changes. Finally, observe that if a convex function is less than a linear function at two end points of an interval in the extended real line, $b^* \equiv \beta^* / (1-\beta^*)$ and $b^\infty \equiv \infty$, then it is also less than the same function at any $b \in (b^*, b^\infty)$. This establishes that (70) also holds for any $\beta \in [\beta^*, 1]$ and completes the proof. ■

7.2 Proof of Proposition 6

We begin by demonstrating the following preliminary result.

Claim 1 *Equation* $V^H(E, P \mid \pi) = V^H(S)$ *has a unique solution* $\hat{\pi} \in (0,1)$.

Proof. As noted in the text, the assumption (42) implies that the tax rate in transitional democracy is $\tau^{TD} = \hat{\tau}$ regardless of whether or not coups are prevented. Therefore, starting in state $s = TD$, we always have $V^H(TD) \leq V^H(D)$ (since with transitional democracy, there may be coups reducing incomes; recall (44) and (43)). Next, from (34),

$$\begin{aligned} V^H(E, P \mid \pi = 1) &= \left(1-\tau^P\right) A^H + \beta V^H(TD) \\ &< A^H + \beta V^H(D) \\ &= V^H(S), \end{aligned}$$

where the inequality follows from $\tau^P > 0$ and $V^H(TD) \leq V^H(D)$. Moreover, it can be verified with an argument similar to that in the proof of Proposition 4 that $V^H(E, P \mid \pi = 0) > V^H(S)$ because $\tau^P < \beta\hat{\tau}$ and now $\tau^D = \hat{\tau}$. These two inequalities, together with the fact that $V^H(E, P \mid \pi)$ is a strictly decreasing and continuous function in π, imply that $\hat{\pi} \in (0,1)$. ■

Next, note that, because both $V^H(E, S)$ and $V^H(E, N)$, given in (31) and in (47) respectively, are independent of π, either $V^H(E, S) > V^H(E, N)$ or $V^H(E, S) < V^H(E, N)$ for any value of π (the case where $V^H(E, S) = V^H(E, N)$ is ruled out by the assumption that $\mu \neq \overline{\mu}$). If $V^H(E, S) > V^H(E, N)$, non-prevention is never chosen by the elite, and the equilibrium is the same as in the baseline model. In the following, we focus the attention on the case where $V^H(E, S) < V^H(E, N)$, which obtains when μ is strictly below the upper bound $\overline{\mu}$ expressed in Condition 1, and that is considered in Parts A and B of Proposition 6.

Let us define

$$\mathcal{V}(\pi) \equiv V^H(E, P \mid \pi) - V^H(E, N), \tag{71}$$

which corresponds to the difference between the value to the elite under prevention and under non-prevention respectively. The following claim characterizes the possible set of solutions of the equation $\mathcal{V}(\pi) = 0$.

Claim 2 *If* $\mathcal{V}(0) > 0$, *then* $\mathcal{V}(\pi) = 0$ *has one root* $\pi = \bar{\pi}$ *over the interval* $(0, 1)$ *if, and only if,* $\mathcal{V}(1) < 0$. *If* $\mathcal{V}(0) < 0$, *then* $\mathcal{V}(\pi) < 0$ *for any* $\pi \in [0, 1]$.

Proof. Because $V^H(E, P \mid \pi)$ is a strictly decreasing function of π, and because $V^H(E, N)$ does not depend on π, we have that $\mathcal{V}(\pi)$ is also strictly decreasing in π, which implies that $\mathcal{V}(\pi) = 0$ has at most one root. If $\mathcal{V}(0) > 0$ and $\mathcal{V}(1) < 0$, then $\mathcal{V}(\pi) = 0$ must have a unique root in $(0, 1)$ since $\mathcal{V}(\pi)$ is also a continuous function of π. Moreover, if $\mathcal{V}(0) > 0$ and if $\mathcal{V}(\pi) = 0$ has one root in $(0, 1)$, then $\mathcal{V}(1) < 0$ follows from the strict decreasing monotonicity of $\mathcal{V}(\pi)$. Finally if $\mathcal{V}(0) < 0$, the fact that $V^H(E, P \mid \pi)$ is a strictly decreasing function of π immediately implies that $\mathcal{V}(\pi) < 0$ for any $\pi \in [0, 1]$. ■

Using these preliminary results, we can now complete the proof of Proposition 6.

Part A of Proposition 6 assumes that $\mathcal{V}(0) > 0$ which, together with Condition 1, implies that

$$V^H(E, P \mid \pi = 0) > V^H(E, N) > V^H(S). \tag{72}$$

Moreover, the inequalities reported in (72) and the definition of $\hat{\pi}$ imply that

$$V^H(E, P \mid \pi = \hat{\pi}) = V^H(S) < V^H(E, N),$$

namely that $\mathcal{V}(\hat{\pi}) < 0$. Because $\mathcal{V}(\cdot)$ is strictly decreasing, and because $\hat{\pi} < 1$ by Claim 1, $\mathcal{V}(\hat{\pi}) < 0$ implies that $\mathcal{V}(1) < 0$. By the first part of Claim 2, $\mathcal{V}(0) > 0$ and $\mathcal{V}(1) < 0$ imply that $\mathcal{V}(\pi) = 0$ has a unique root $\bar{\pi} \in (0, 1)$. Furthermore, the monotonicity of $\mathcal{V}(\pi)$ implies that $\mathcal{V}(\pi) > 0$ for any $\pi < \bar{\pi}$, so that the optimal strategy for the elite is prevention (which corresponds to case 1 in Part A), and $\mathcal{V}(\pi) < 0$ for any $\pi > \bar{\pi}$, so that the optimal strategy for the elite is non-prevention (which is case 2 in Part A).

Part B of Proposition 6 assumes that $\mathcal{V}(0) < 0$, which implies, by the second part of Claim 2, that $\mathcal{V}(\pi) < 0$ for any $\pi \in [0, 1]$. Together with Condition 1, this implies that non-prevention gives the elite a higher equilibrium value than any other strategy for any value of π.■

7.3 Proof of Proposition 7

We begin by showing that the threshold $\tilde{\gamma}(R)$ defined in (53) is strictly decreasing in R. Straightforward differentiation of $\tilde{\gamma}(R)$ gives

$$\tilde{\gamma}'(R) = \frac{1-\beta}{\beta} \frac{\bar{x}\tilde{w}^M - \tilde{a}^L}{\bar{x}\left(\tilde{w}^M - \tilde{a}^L\right)^2},$$

where $\tilde{w}^M$ and $\tilde{a}^L$ are defined in (49) and in (50). Next, observe that taking into account the expressions of w^M and a^L defined in (45), we obtain

$$\bar{x}\tilde{w}^M - \tilde{a}^L = \bar{x}w^M - a^L = -\hat{\tau}\bar{x}A^L - (1-\hat{\tau})A^L \leq 0.$$

Therefore, $\tilde{\gamma}'(R) \leq 0$, with equality if and only if $A^L = 0$.

Next consider the decision of the elite. First, define R^* as the level of natural resources such that

$$\tilde{w}^P(R^*)\bar{x} = \hat{\tau}\left(Y - \bar{x}A^L\right). \tag{73}$$

In other words, R^* is the level of natural resources such that when $R = R^*$, total military wages necessary for coup prevention can be financed by taxing production income *only* at the maximum possible rate $\hat{\tau}$. By substituting for $\tilde{w}^M$ and $\tilde{a}^L$ in (57), we obtain

$$\tilde{w}^P(R) = w^P + \beta\frac{\gamma + (1-\gamma)\bar{x}}{\bar{x}}R. \tag{74}$$

Combining this expression with (73), we have

$$R^* = \bar{x}\frac{w^M - w^P}{\beta\left(\gamma + (1-\gamma)\bar{x}\right)}. \tag{75}$$

Claim 3 *Suppose that R^* is given by (75) and $R > R^*$. Then in any MPE with coup prevention, the elite set $\tilde{\tau}^P = \hat{\tau}$ and choose $\zeta^P \geq 0$ to balance the government budget constraint, which implies*

$$\zeta^P = \beta\left(\gamma + (1-\gamma)\bar{x}\right) - \bar{x}\frac{w^M - w^P}{R}. \tag{76}$$

Proof. The expression of the government budget constraint provided by (56) implies that

$$\tilde{\tau}^P = \frac{\tilde{w}^P(R)\bar{x} - \zeta R}{\left(Y - \bar{x}A^L\right)}.$$

Using this expression, the per period utility of the elite in oligarchy can be written as

$$\left(1 - \frac{\tilde{w}^P(R)\bar{x} - \zeta R}{Y - \bar{x}A^L}\right)A^H + (1-\zeta)R/n.$$

This expression is everywhere decreasing in ζ provided that $nA^H + \bar{x}A^L < Y$, which is always the case, since $\bar{x} < (1-n)$ by assumption, and since $Y \equiv nA^H + (1-n)A^L$. Therefore, $\tilde{\tau}^P$ will be set at the maximum possible level $\hat{\tau}$, and ζ will be determined to satisfy the government budget constraint, that is, ζ^P as given in (76). ■

Using the fact that in equilibrium $\tilde{\tau}^P = \hat{\tau}$, and that ζ^P is given by (76), we have that (55) can be written as

$$\tilde{V}^H(E,P \mid \pi) = \frac{(1-\beta)\left((1-\hat{\tau})A^H + \left(1-\zeta^P\right)R/n\right) + \beta(1-\beta)\tilde{V}^H(TD)\pi}{(1-\beta)(1-\beta(1-\pi))}.$$

We also have

$$\tilde{V}^H(E,S) = \frac{(1-\beta)\left(A^H + R/n\right) + \beta(1-\hat{\tau})A^H}{1-\beta}.$$

Moreover, using (54), the threshold $\tilde{\pi}(R)$ at which $\tilde{V}^H(E,S) = \tilde{V}^H(E,P \mid \pi)$ is given by

$$\tilde{\pi}(R) = \frac{1-\beta}{\beta}\frac{\left(1-\zeta^P\right)R/n - \left(\Delta - (1-\hat{\tau})A^H\right)}{\Delta - (1-\beta)\tilde{V}^H(TD)},$$

where $\Delta \equiv (1-\beta)\left(A^H + R/n\right) + \beta(1-\hat{\tau})A^H$. Now since $\partial\left(\left(1-\zeta^P\right)R\right)/\partial R = 1-\beta(\gamma+(1-\gamma)\bar{x})$, we have

$$\begin{aligned}\tilde{\pi}'(R) &= \frac{1-\beta}{\beta}\frac{[1-\beta(\gamma+(1-\gamma)\bar{x})-(1-\beta)]\left[\Delta-(1-\beta)\tilde{V}^H(TD)\right]}{n\left[\Delta-(1-\beta)\tilde{V}^H(TD)\right]^2} \\ &\quad -\frac{1-\beta}{\beta}\frac{\left[\left(1-\zeta^P\right)R/n-\left(\Delta-(1-\hat{\tau})A^H\right)\right](1-\beta)}{n\left[\Delta-(1-\beta)\tilde{V}^H(TD)\right]^2}.\end{aligned}$$

The numerator of this expression is decreasing in $\tilde{V}^H(TD)$ and $\tilde{V}^H(TD) \leq (1-\hat{\tau})A^H/(1-\beta)$. Therefore,

$$[1-\beta(\gamma+(1-\gamma)\bar{x})]\left(\Delta-(1-\hat{\tau})A^H\right) > (1-\beta)\left(1-\zeta^P\right)R/n \tag{77}$$

is sufficient for $\tilde{\pi}'(R) > 0$. Using the fact that $\Delta - (1-\hat{\tau})A^H = (1-\beta)\left(\hat{\tau}A^H + R/n\right)$, substituting for ζ^P and rearranging terms, (77) is equivalent to

$$n[1-\beta(\gamma+(1-\gamma)\bar{x})]\hat{\tau}A^H > \bar{x}\left(w^M - w^P\right),$$

which in turn is the same as the following condition:

$$\bar{x} > \frac{\hat{\tau}(1-\beta\gamma)(1-n)}{\hat{\tau}(1-\beta\gamma)+\beta(1-\gamma)(1-n\hat{\tau})} \equiv \hat{x}.$$

This establishes that when $R > R^*$ and $\bar{x} > \hat{x}$, $\tilde{\pi}'(R) > 0$ and thus higher resource rents make repression more likely. This completes the proof of the proposition. ■

7.4 Proof of Proposition 8

Using the expressions of $V^L(D) = a^L/(1-\beta)$, of $V^L(M)$ in (12), of a^L in (45), and the fact that $G^{TN} \equiv \hat{\tau}(1-\phi)\left(Y - \bar{x}A^L\right)$, the value to low-skill producers when they do not prevent coups $V^L(TD \mid \text{coup})$, given by (61), can be rewritten as

$$V^L(TD \mid \text{coup}) = \frac{(1-\phi(1-\beta))\,a^L - \beta\gamma\hat{\tau}Y}{1-\beta} - \hat{\tau}(1-\phi)\,\bar{x}A^L.$$

Similarly, using the facts that $V^L(D) = a^L/(1-\beta)$, $V^L(TD,P) = V^L(TD \mid \text{no coup})$, that $G^{TP} = \hat{\tau}\left(Y - \bar{x}A^L\right) - w^{TP}\bar{x} \geq 0$, that w^{TP} is given by (58) and that w^M and a^L are given by (45), the value to low-skill producers when they prevent coups $V^L(TD \mid \text{no coup})$, (60), can be rewritten as

$$V^L(TD \mid \text{no coup}) = \frac{a^L - \beta\gamma\hat{\tau}Y}{1-\beta} - \frac{\hat{\tau}\bar{x}A^L}{1-\beta(1-\lambda)} + \frac{\beta\gamma\hat{\tau}\bar{x}A^L}{1-\beta} - \frac{(1-\gamma)\,\beta\bar{x}a^L}{1-\beta} + \frac{\lambda\beta\bar{x}a^L}{(1-\beta)(1-\beta(1-\lambda))}.$$

Assuming that coup prevention is a feasible strategy, low-skill producers prefer to prevent coups if $V^L(TD \mid \text{no coup}) \geq V^L(TD \mid \text{coup})$. Combining the previous two expressions, this condition is equivalent to

$$\begin{aligned} &\hat{\tau}\bar{x}A^L\left\{\beta\lambda\left(\beta\gamma + (1-\beta)(1-\phi)\right) - (1-\beta)\left[\beta(1-\gamma) + (1-\beta)\,\phi\right]\right\} \\ &+\beta\bar{x}a^L\left[(1-\beta+\beta\gamma)\,\lambda - (1-\beta)(1-\gamma)\right] + (1-\beta)(1-\beta+\beta\lambda)\,\phi a^L \geq 0. \end{aligned} \tag{78}$$

The left-hand-side of this inequality is a strictly increasing function of λ and it is strictly positive at $\lambda = 1$. Therefore, there exists a unique $\lambda^* \in [0,1)$ such that (78) holds for all $\lambda \geq \lambda^*$. If $\lambda^* > 0$, then (78) does not hold for all $\lambda < \lambda^*$, $V^L(TD \mid \text{no coup}) < V^L(TD \mid \text{coup})$ and the low-skill producers prefer not to prevent coups. ■

7.5 Proof of Proposition 9

Using (62) and (63), the threshold $\breve{\pi}$ (defined as $V^H(E,S) = V^H(E,P \mid \breve{\pi})$) can be written as

$$\breve{\pi} = \frac{1-\beta}{\beta(1-\alpha)} \frac{\left(\tau^P - \beta\hat{\tau} + \alpha\beta\left(\hat{\tau} - \tau^P\right)\right)A^H}{\left[(1-\beta)\,V^H(TD) - (1-\beta\hat{\tau})\,A^H\right] + \alpha\beta\left[(1-\hat{\tau})\,A^H - (1-\beta)\,V^H(TD)\right]}.$$

If there is no coup in transitional democracy, (44) implies $V^H(TD) = (1-\hat{\tau})\,A^H/(1-\beta)$ and

$$\breve{\pi} = 1 - \frac{(1-\alpha\beta)\,\tau^P}{(1-\alpha)\,\beta\hat{\tau}},$$

which is strictly decreasing in α.

If coups take place along the equilibrium path in transitional democracy, then (44) yields

$$V^H(TD) = (1-\hat{\tau})(1-\phi)A^H + \frac{\beta}{1-\beta}(1-\hat{\tau})A^H.$$

Using this expression, the threshold $\breve{\pi}$ becomes

$$\breve{\pi} = \frac{\tau^P - \beta\hat{\tau} + \alpha\beta\left(\hat{\tau} - \tau^P\right)}{\beta(1-\alpha)\left[\alpha\beta\phi(1-\hat{\tau}) - \hat{\tau} - \phi(1-\hat{\tau})\right]}.$$

Since τ^P does not depend on α, we obtain that the derivative of this expression $d\breve{\pi}/d\alpha$ is proportional to

$$B(\phi) \equiv \left[\alpha(1-\beta)\tau^P - (1-\alpha)\left(\alpha\beta\left(\hat{\tau}-\tau^P\right) - \left(\beta\hat{\tau}-\tau^P\right)\right)\right](1-\hat{\tau})\beta^2\phi - (\hat{\tau} + (1-\hat{\tau})\phi)(1-\beta)\beta\tau^P,$$

where $B(\phi)$ is the numerator of $d\breve{\pi}/d\alpha$. This expression is linear in ϕ, and is negative when $\phi = 0$. Therefore, it has at most one root $\phi = \phi^*$ over the interval $[0,1]$. This implies that for any $\phi < \phi^*$, $B(\phi) < 0$ (so that $\breve{\pi}$ is strictly decreasing in α) and for any $\phi > \phi^*$, $B(\phi) > 0$ (so that $\breve{\pi}$ is strictly increasing in α). Moreover, if $B(\phi)$ has no root in $[0,1]$, then $B(\phi) < 0$ for all $\phi \in [0,1]$ and we set $\phi^* = 1$. This establishes all the claims in the proposition. ■

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