



## **THE POLITICS OF RESOURCE BOOMS**

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# The Politics of Resource Booms\*

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## Abstract

This paper develops a simple model to investigate how resource-driven economic booms shape the equilibrium political institutions of resource-rich societies and influence the likelihood of experiencing civil war. In our model a strong government apparatus favors property rights protection but also makes the state more powerful and hence may induce predatory autocratic regimes over democracy. We characterize the parameter space of each political outcome in terms of the type of the available natural resources. Economic booms based on resources that are privately exploited empower the citizens and tend to ease democratic transitions. In contrast, booms based on resources exploited by the state tend to favor more dictatorial regimes. Finally, economic booms based on resources that can be exploited either by the state or by private citizens incite preemptive actions by both parties that may result in civil war. We discuss the predictions of the model using historical and contemporary examples.

**Keywords:** Resource Boom, Autocracy, Democracy, Civil War.

**JEL:** O13; O40; O32.

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# 1 Introduction

What causes the discovery of natural resources to overturn the existing political equilibrium in some cases, and what leads to the consolidation of the current political institutions? Under what circumstances do resource booms trigger civil war? In this paper we propose a mechanism of why natural resource booms may result in perverse political institutions or even civil war.

We develop a simple model to study the effect of resource-driven economic booms on the political equilibrium of resource-rich societies. The model considers two types of state political institutions: *democracy* and *autocracy*. While in both cases the monopoly of violence lays in the hands of the state, only under the latter form of government violence can be used to predate from the citizens. Resource booms play the role of empowering either the citizens, the state, or both groups according to the resource production structure. In turn, this process may consolidate or threaten the existing regime type.

The paper shows that unanticipated booms based on commodities that are privately exploited empower the civic society and favor democracy over autocracy. In contrast, booms based on resources exploited by the state favor autocratic systems. Finally, when resources can be exploited either privately or by the state, preemptive actions by both parties make resource booms more likely to produce civil conflict. This is because booms change the *ex post* balance of power, making parties not able to commit *ex ante* to redistribute the proceeds of future resource-rents. We characterize the parameter space that favors regime consolidation, regime transition, or civil war.

The ‘Resource Curse’ literature highlights the correlation between the presence and dependence of natural resources and undesirable outcomes like economic stagnation (Sachs and Warner, 1995), the consolidation of autocratic regimes (Barro 1999 and Ross 2001), and the incidence and duration of civil war (Fearon and Laitin, 2003; Collier and Hoeffler, 1998 and 2004; Collier et al. 2004). Our model contributes to the literature on the latter two aspects and focuses the political consequences of the resource curse.

The theoretical literature suggests several channels through which natural resource-rent windfalls may lead to autocracy or civil strife. (Robinson, 2006), emphasizes the consolidation of rentier states that feature low fiscal revenues, a weak bureaucracy and high levels of patronage and repression. Caselli and Tesei (2011) argue that while resource booms have no effect on democracies, they tend to exacerbate the autocratic nature of dictatorships. In contrast, Dunning (2008) posits that oil booms can lead to both democratic or autocratic

political institutions: while the direct effect of an oil boom is to increase the benefit of taking over political power in order to control the rents, there is an indirect effect whereby resource rents lower the redistributive costs that the elites face under democracy.

Our paper allows for both democratic and autocratic transitions after a resource boom, but through a different mechanism. Booms on resources privately exploited increase the *de facto* political power of the citizens and thus the elite democratizes, not because the boom eased the burden of redistribution under democracy but because the citizens can credibly threaten the autocratic regime with violence. Whether resources are exploited by the state or by private citizens depends both on technological constraints as well as on the structure of society. In general resources that require large industrial scale exploitation generate revenue for the government (e.g. oil and kimberly diamonds), while those that require artisan exploitation enhance the pockets of the citizens (e.g alluvial diamonds, coffee, cacao, etc.). On the other hand, while in well-developed markets large-scale investments can be carried out privately (e.g oil in the US), less developed markets do require the state to take the burden of such investments.

Natural resources have also been associated by the empirical literature both with the incidence of civil war and with fluctuations in political regimes. In terms of the relationship between resource booms and conflict, the cross country evidence suggests these variables are positively associated. Using the share of primary commodity exports to GDP as a proxy for the presence of natural resources, Collier and Hoeffler (1998 and 2004) –C&H, find that resource-rich countries have a higher likelihood of experiencing episodes of civil strife. Fearon and Laitin (2003) –F&L, and Fearon (2005) suggest that what exacerbates the risk of internal conflicts is the production of one resource in particular, namely oil.<sup>1</sup> While the mechanism highlighted by C&H has to do with the looting and financial opportunities of rebels, F&L suggest that oil-rich nations feature weak bureaucracies and state capacity. In sum, a resource boom causes internal conflict by the fueling of rapacious behavior, the financing of rebellion, and the empowerment separatist movements (Le Billon, 2001). Turning to the effect of resource booms on political transitions the evidence is more mixed. While Ross (2012) finds that oil wealth deteriorates the democratic perspectives of countries, especially after the 1970s, and Tsui (2011) claims that oil discoveries undermine the chances of democracy; other authors suggest that there is no evidence that oil wealth harms democracy (Haber and Menaldo, 2011, and Wacziarg, 2012) or even that countries with a greater share of oil

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<sup>1</sup>Fearon (2005) notes that the measure of C&H does not include fuel commodities and in fact that their results are not robust.

in total exports strengthen their democratic institutions following positive oil price shocks (Brückner et al., 2012.)

In recent years, various scholars have contributed to this literature by adding some nuance to the resource curse hypothesis. It has been recognized that not all resources are cursed (Fearon, 2005 and Dube and Vargas, 2012), and that even the resources that are more likely to be correlated with stagnation, autocracy and violence do not generate such outcomes as long as certain institutions is in place (Acemoglu, Johnson and Robinson, 2003 and Mehlum, Moene and Torvik, 2006).<sup>2</sup> For instance, while the discovery of oil reserves in the Middle East in the 1940s changed the political landscape of the region (Chaudhry, 1997), resource windfalls in mineral-rich countries like Botswana and Norway have never been a threat to these countries' political stability.<sup>3</sup>

The importance of the type of resource extraction has been considered by Snyder (2006) and Snyder and Bhavnani (2005) who suggest that when resources need industrial-scale extraction the coercive capacity of the state is enhanced. These authors discuss through case studies how resources are likely to trigger civil war depending on the identity of the extracting party and the relative power of the state. For instance while the presence of alluvial diamonds generated civil strife in Sierra Leone because of their exclusive public exploitation that empowered the state and its predatory capacity, it kept the peaceful status quo in neighboring Guinea where the predominantly private exploitation generated the opposite dynamics.

In turn, we emphasize the commitment problem and argue that war can take place because the possession of resources alter the balance of powers and parties cannot commit ex ante to redistribute resource rents since they will have no incentives to do so ex-post. Anticipating this, they launch preemptive strikes immediately after the resource boom.

The remaining of the paper is organized as follows. In the next section we present the set up of the model by illustrating plausible differences between democratic and autocratic states in terms of the equilibrium tax rate and the size of the army. Section 3 studies the effect of an unexpected resource boom on the equilibrium political institutions. Section 4 concludes.

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<sup>2</sup>These institutions include the protection of property rights and the presence of political checks and balances than constrain the executive from expropriating the citizens.

<sup>3</sup>Ross (2001) shows that oil-impedes-democracy hypothesis holds for most oil-rich states and it is not idiosyncratic to the Middle East region. Moreover he shows that it is in fact not even restricted exclusively to oil-producing nations; it extends to other mineral resources that require extensive public exploitation and thus generates gradual state empowerment.

## 2 Benchmark Model

### 2.1 Set-up

Consider a simple economy with  $N$  individuals, who can specialize as labor force,  $L$ , or be recruited by the state as soldiers or public bureaucrats,  $S$ . Hence  $N = S + L$ . The production function of the economy uses only labor and can be written as:

$$Y = \alpha(S)L \quad \text{with } \alpha' > 0$$

Labor productivity is an increasing function of the extent to which property rights are protected, which we assume proportional to the size of the public apparatus (including soldiers),  $S$ . Hence, in contrast to Grossman (1991), here the Pareto optimal allocation demands certain amount of state involvement. Indeed this allocation is given by:

$$\begin{aligned} \max_{\tau, S} \quad & \alpha(S)(1 - \tau)(N - S) \\ \text{s.t.} \quad & \alpha(S)\tau(N - S) - \alpha(S)(1 - \tau)S \geq 0 \end{aligned}$$

where  $\tau$  is the tax rate that is collected to pay for the bureaucrats hired to protect property rights and  $N - S = L$ . Notice that disposable income is maximized subject to a participation constraint that captures the idea that all the state revenue is used to hire bureaucrats, who in turn should be rewarded to match labor income.

The Pareto optimal allocation  $(S_0, \tau_0)$ , however, is never implemented if the apparatus under the control of the government is also used to extract rents from the citizens.

Let the utility of the government,  $g$ , be given by the tax revenue net of the cost of the public administration, and that of the representative citizen,  $c$ , be given by her disposable income. We have respectively:

$$U_g = \alpha(S)\tau(N - S) - \alpha(S)(1 - \tau)S$$

$$U_c = \alpha(S)(1 - \tau)$$

Since the state can extract rents it is essential to distinguish between two types of political systems: Democracy,  $D$ , in which the policy vector  $(S, \tau)$  is chosen by the representative

citizen; and Autocracy,  $A$ , in which the state directly imposes its preferred vector. While the latter type of government may find it optimal to increase the size of the bureaucracy above the  $S_0$  to maximize its rents, under democracy, and anticipating the risk of rent extraction, the citizens may choose to recruit a number of bureaucrats lower than  $S_0$ .<sup>4</sup>

We allow for the possibility that regardless of the political system in place either the state or the citizens start a civil war with the aim of changing the political status quo.

If a civil war breaks out,  $W$ , the utilities of the agents are given by:

$$V_g^W = p(S)V_g^A + [1 - p(S)]V_g^D - \delta \quad (1)$$

$$V_c^W = p(S)V_c^A + [1 - p(S)]V_c^D - \delta \quad (2)$$

where  $p(S)$  is the probability that the state wins the war (with  $p' > 0$ ) and  $\delta \in (0, 1)$  captures the disutility of conflict.  $V_j^r$  is the utility that group  $j$  derives from regime  $r$ , with  $j = \{g, c\}$  and  $r = \{A, D, W\}$ . Equations (1) and (2) capture the idea that the party that wins the war puts in place its preferred political system.

The timing of the game,  $\Gamma$ , is as follows:

1. Nature decides the initial political system,  $\{A, D\}$ .
2. The entitled body chooses  $(S, \tau)$ .
3. The status quo can be challenged by either player via civil war.

We make the following assumptions:

- A1.** *If civil war breaks out the government cannot hire more agents than those employed in the previous period.*
- A2.** *If indifferent, the citizens (the government) prefer autocracy (democracy) over civil war.*

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<sup>4</sup>Our model does not explain how one political system or the other comes about but rather how resource booms may trigger political transitions. This will become evident when we set up the timing on the game in which ‘nature’ moves first and decides what political regime is in place to start with.

Assumption **A1** implies that in the presence of war the citizens do not show loyalty to the government by joining the public apparatus. In addition the economic disruption associated with war undermines the taxing ability of the government and hence the capacity of hiring bureaucrats. **A2** is just a tie-breaking rule.

We now solve the model by backward induction assuming first that the starting political system is autocratic. We repeat the analysis subsequently starting from democracy.

### 2.1.1 Autocracy

In autocratic regimes the government gets to decide both the size of the public administration and the tax rate.

Consider the last stage of the game. For the government in power it is always optimal to avoid a civil war. Indeed if the citizens were to win the contest the payoff for the government would be  $V_g^D$ . Indeed, its expected payoff from war is  $p(S)V_g^A + [1 - p(S)]V_g^D - \delta$ , which is strictly smaller than their status quo payoff under autocracy:  $V_g^A$ , for any  $S$  and  $\tau$ .

The government's problem is therefore given by:

$$\begin{aligned} \max_{\tau, S} \quad & \alpha(S)\tau(N - S) - \alpha(S)(1 - \tau)S \\ \text{s.t.} \quad & \alpha(S)(1 - \tau) \geq V_c^W \end{aligned} \tag{3}$$

where the constraint ensures that the citizens hold from starting a war as they are better off under the current autocratic regime.<sup>5</sup> We denote the optimal policy vector obtained from such problem as:  $(S^A, \tau^A)$ .

### 2.1.2 Democracy

In this case the citizens get to choose the size of the bureaucracy and the tax rate.

Consider the last stage of the game. The citizens are always better off avoiding conflict initiation since their expected payoff from conflict,  $p(S)V_c^A + [1 - p(S)]V_c^D - \delta$  is strictly smaller than their status quo democratic payoff:  $V_c^D$ , for any  $S$  and  $\tau$ . The problem for the citizens is therefore given by:

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<sup>5</sup>Assumption A2 allows us to write the constraint in (3) with equality.



$$\begin{aligned}
\max_{\tau, S} \quad & \alpha(S)(1 - \tau)(N - S) \\
\text{s.t.} \quad & \alpha(S)\tau(N - S) - \alpha(S)(1 - \tau)S \geq \max\{0, V_g^W\} \\
& V_c^W > V_c^A
\end{aligned} \tag{4}$$

where the first constraint ensures both that no budget deficits are run and that the government is better off under the current democratic regime than by starting a civil war looking to install an autocracy. The second constraint ensures that the citizens can credibly threaten that any coup attempt of the government will be challenged with civil war. We denote the optimal policy vector obtained from such problem as:  $(S^D, \tau^D)$ .

Note that under these circumstances, civil war never breaks out because it is inefficient for both parties and there are bargaining possibilities that make them both better off.

**Proposition 1**

- i)  $V_c^A(S^A) < V_c^D(S^D)$ . The citizens are better off under democracy than under autocracy.*
- ii)  $\frac{\partial V_c^W}{\partial S} < 0$ . The citizens are less willing to fight when the government becomes stronger.*
- iii)  $S^D < S^A$ . The size of the government is larger under autocracy.*

**Proof.** See proof is in the appendix. ■

The intuition of the first part of the proposition is as follows: On the one hand, under autocracy the government wants to extract rents but also has to ensure that the citizens will not rebel, so they set the policy vector  $(S^A, \tau^A)$  such that the citizens' payoff is just equal to what they would get if war broke out. On the other hand, under democracy the citizens must credibly signal that they prefer the current political arrangement over war. Hence democracy is always the preferred political arrangement for the citizens.

As for the second part of the proposition, it asserts that the value of civil war to the citizens goes down as the state becomes stronger.

The last part suggests that the government is weaker under democracy than under autocracy. This is linked to the second part in the sense that stronger governments reduce the citizens' value of civil war and hence the threat of rebellion against a stronger autocratic government is not credible.

### 3 Resource Boom

We now modify the model to allow for a resource boom to take place and investigate the effect of booms associated with different types of natural resources. We characterize such differences in terms of the characteristics and the ownership structure of the resource exploitation. Resources like oil and kimberly diamonds, that require large industrial scale investments are usually exploited by the government. In contrast, resources like coffee, wool, and alluvial diamonds, that require smaller investments and artisan exploitation are exploited by the private citizens. This distinction is not only about technical and financial constraints but it has to do with the how the society is organized. For instance in well developed markets even large scale resources can be exploited by private citizens. Finally, we also study the effect of booms associated with resources that can be exploited either by the state or the private citizens.

In order to study the consequences of the resource boom we modify the benchmark game,  $\Gamma$ , adding one stage. We assume that after the policy vector  $(S, \tau)$  is decided by the entitled body, an *unexpected* boom takes place, changing the balance of power.

The timing of the game,  $\Gamma$ , is as follows:

1. Nature decides the initial political system,  $\{A, D\}$ .
2. The entitled body chooses  $(S, \tau)$ .
3. A resource boom ( $\nabla$ ) takes place, shifting the balance of powers.
4. The entitled body is allowed to adjust  $\tau$ .  $S$  does not change.
5. Either player can challenge the status quo via civil war.

#### 3.1 Resource booms that benefit private citizens

We first consider booms driven by resources that have the private citizens involved in their exploitation, perhaps because they do not require large industrial investments. Commodities of this sort include wool, coffee and cacao. We model such boom as an increase in  $\alpha$ . This in turn changes the productivity of labor, which becomes:  $\bar{\alpha}(S) = \alpha(S) + \nabla > \alpha(S)$ , where  $\nabla$  is a measure of the magnitude of the resource boom.

In case of war the now empowered citizens have a higher probability of winning (say because they can buy more weapons). Hence  $p(\gamma S) < p(S)$ , where  $\gamma < 1$  captures the fact that the government's apparatus is now less effective relative to the empowered citizens.

The new values are represented by:  $\bar{V}_j^r$ , with  $j = \{g, c\}$  and  $r = \{A, D, W\}$ .

In this case, if a civil war breaks out the payoffs of the agents are given by:

$$\bar{V}_c^W(\gamma S) = p(\gamma S)\bar{V}_c^A + [1 - p(\gamma S)]\bar{V}_c^D - \delta \quad (5)$$

$$\bar{V}_g^W(\gamma S) = p(\gamma S)\bar{V}_g^A + [1 - p(\gamma S)]\bar{V}_g^D - \delta \quad (6)$$

We make the following assumption:

**A3.** *If  $\bar{\alpha}(S) > \alpha(S)$ , then  $\bar{V}_c^W(\gamma S) - \bar{V}_c^A > V_c^W(S) - V_c^A$ .*

This is, because the rise in individual productivity leads to more combative ability for the citizens, predation from the government is less likely to be tolerated.

We now solve the model by backward induction assuming first that the starting political system is autocratic. We repeat the analysis subsequently starting from democracy.

### 3.1.1 Autocracy

Before the resource boom takes place the autocratic regime sets a policy vector,  $(S^A, \tau^A)$  to dissuade the citizens from mounting a rebellion, as in the optimization described in (3).

However after the boom the empowered citizens are more keen to start a civil war for any  $S^A$ , which by assumption A1 does not change because no hiring of bureaucrats can occur during war. The citizens' payoff from civil war after the boom becomes:

$$\bar{V}_c^W(\gamma S^A) = p(\gamma S^A)\bar{V}_c^A + [1 - p(\gamma S^A)]\bar{V}_c^D - \delta \quad (7)$$

Let  $\tau_{\max}^A$  be the maximum possible tax that can be levied by the government without triggering an insurrection from the citizens when the resource boom has taken place and the number of bureaucrats has not changed. This rate ensures the continuity of the autocratic government in power while extracting the maximum possible rents from the citizens, hence it has to meet:  $\bar{V}_c^W(\gamma S^A) = \bar{V}_c^A$ .

Note that  $\tau_{\max}^A < \tau^A$  because after the resource boom the citizens have more combative power and hence their expected payoff from civil war increases.

There can be two cases. First,  $\tau_{\max}^A$  can be less than a threshold,  $\tau^*$ , such that government finds it unprofitable to maintain the autocratic regime given the previously determined  $S^A$ , since the citizens are stronger after the resource boom. In this case the autocratic government shifts the political power to the citizens and democracy is installed. This happens if,

$$\bar{V}_g^A(\gamma S^A) = \alpha(S^A)\tau_{\max}^A(N - S^A) - \alpha(S^A)(1 - \tau_{\max}^A)S^A < 0. \quad (8)$$

Second, if  $\tau_{\max}^A$  is such that  $\bar{V}_g^A(\gamma S^A) \geq 0$  then the political power is not voluntarily transferred. In this case, to dissuade rebellion from happening, the government has to offer the empowered citizens at least their civil war payoff. Hence, the citizens obtain:

$$\bar{V}_c^A(\gamma \bar{S}^A) = \bar{V}_c^W(\gamma S^A)$$

where  $\bar{S}^A$  is the optimal level of government force after the resource boom has taken place.

### 3.1.2 Democracy

When the government is democratic to start with, before the resource boom takes place the citizens set a policy vector  $(S^D, \tau^D)$  to dissuade the government from trying to become autocratic. This is done both by ensuring that the government is happy with the current regime:  $V_g^D(S^D) \geq V_g^W$ , and by making themselves able to commit to respond to autocracy with war:  $V_c^W(S^D) \geq V_c^A$ .

After the boom, the rise in  $\alpha$  empowers the citizens vis a vis the government increasing their probability of winning. By assumption A3 we know that:

$$\left[ \bar{V}_c^W(\gamma S^D) - \bar{V}_c^A \right] > [V_c^W(S^D) - V_c^A] > 0 \quad (9)$$

and hence the citizens maintain the credible threat of mounting a civil war if a shift toward autocracy is attempted. Therefore in this case the resource boom consolidates democracy.

**Proposition 2** *Suppose there is a boom on a privately exploited resource.*

*i) If the regime starts as an autocracy:*

*a. The regime will become unprofitable as long as  $\tau_{\max}^A < \tau^*$ , which ensures  $\bar{V}_g^A(\gamma S^A) <$*

0, and hence the political power will be voluntarily transferred to the citizens and democracy will be installed.

b. If  $\tau_{\max}^A$  is such that  $\bar{V}_g^A(\gamma S^A) \geq 0$  the autocratic system will prevail.

ii) If the regime starts as a democracy it will remain so as long as assumption A3 holds.

When a resource boom such as a surge in the price of cash crops occurs, the power of the citizens is enhanced. If the status quo regime is autocratic, given the pre-boom established size of the state apparatus  $S^A$ , the government may find it unprofitable to assuage the newly strengthened citizens. In this case the government can no longer credibly threaten to hold on to the autocratic regime and democracy is established.

If the starting regime is democratic and hence the initial power structure favors the citizens, a resource boom that increases their combative ability makes the prevailing political structure likely to get consolidated.

The persistence of democratic political institutions following resource booms seems at odds with the standard resource curse literature that emphasizes the correlation of natural resources and autocratic political institutions (e.g Barro, 1999 and Ross, 2001). This prediction is however consistent with the colonial experience of both Australia and California, where the state structure remained unruffled after a series of resource booms spanning for about a century. Australia and California were settler colonies that inherited from their British colonizers democratic institutions that enforced property rights and favored the rule of law. Following a series of booms based on resources like wool, wheat and gold, the institutional structure of the two colonies remained unchanged. Indeed, because the booming commodities were privately exploited, the upsurges made the citizens prosper and become more powerful, thereby consolidating democracy. This contrast to historical cases in which resource booms have favored the government. We turn to this case now.

### 3.2 Resource booms that benefit the government

Consider now booms driven by resources that need large-scale state-led investments. Commodities of this sort include oil and kimberly diamonds, as well as large-scale coal mining. We model such boom as a lump sum revenue,  $R$ , that independently of the status quo political regime, accrues to the government. Even though the profits of the resource exploitation are retained by the government, under democracy the tax rate selected by the citizens help

redistribute part of this rents toward them. In contrast, under autocracy the government chooses the tax rate to retain the lion's share of the revenue.

Now, in case of war the empowered government has a higher probability of winning because with the new revenues it can enhance its combative ability by, for instance, buying weapons. Hence  $p(\phi S) > p(S)$ , where  $\phi > 1$  captures the fact that the empowered government's army is now more effective relative to the citizens. We call this force the *autocratic effect*. An opposite force, the *liberalizing effect* stems from the fact that the value of democracy also goes up in the face of  $R$ .

The new values are represented by:  $\tilde{V}_j^r$ , with  $j = \{g, c\}$  and  $r = \{A, D, W\}$ .

In this case if a civil war breaks out the payoffs of the agents are given by:

$$\tilde{V}_c^W(\phi S) = p(\phi S)\tilde{V}_c^A + [1 - p(\phi S)]\tilde{V}_c^D - \delta \quad (10)$$

$$\tilde{V}_g^W(\phi S) = p(\phi S)\tilde{V}_g^A + [1 - p(\phi S)]\tilde{V}_g^D - \delta \quad (11)$$

We now solve the model by backward induction assuming first that the starting political system is autocratic. We repeat the analysis subsequently starting from democracy.

### 3.2.1 Autocracy

Before the resource boom takes place the autocratic regime sets a policy vector,  $(S^A, \tau^A)$  to dissuade the citizens from mounting a rebellion. After the boom there are two forces. On the one hand, the autocratic government gets stronger and a rebellion can be prevented by redistributing some of the new rents ex-post, through taxation. This autocratic effect makes the autocratic political institutions more likely to prevail. On the other hand, because the value of democracy increases with  $R$  the citizens may find more profitable to start a civil war. This is the liberalizing effect.

Which effect dominates depends on how profitable is it to start a civil war after the boom,  $\tilde{V}_c^W(\phi S^A)$ , relative to before,  $V_c^W(S^A)$ , where,

$$\tilde{V}_c^W(\phi S^A) = p(\phi S^A)\tilde{V}_c^A + [1 - p(\phi S^A)]\tilde{V}_c^D - \delta$$

The post-boom optimization problem of an autocratic government is:

$$\begin{aligned} \max_{\tau, S} \quad & \alpha(S)\tau(N - S) - \alpha(S)(1 - \tau)S + R \\ \text{s.t.} \quad & \alpha(S)(1 - \tau)(N - S) \geq \tilde{V}_c^W(\phi S^A) \end{aligned}$$

If the new expected value of war for the citizens,  $\tilde{V}_c^W(\phi S^A)$ , is such that the autocratic system remains profitable after the boom,  $\tilde{V}_g^A(\phi S^A) > 0$ , then political power is not voluntarily transferred and the government has to offer the citizens their civil war reservation payoff  $\tilde{V}_c^W(\phi S^A)$  to prevent rebellion. In this case the citizens obtain:

$$\tilde{V}_c^A(\phi \tilde{S}^A) = \tilde{V}_c^W(\phi S^A)$$

However if democracy has become so attractive so as to increase the expected value of rebellion such that  $\tilde{V}_g^A(\phi S^A) \leq 0$ , the autocratic government shifts the political power to the citizens voluntarily and democracy is installed. In this case the liberalizing element is so powerful that despite being stronger, the government is unable to withstand the pressure of democratization.

### 3.2.2 Democracy

When the government is democratic to start with, before the resource boom takes place the citizens set a policy vector  $(S^D, \tau^D)$  to dissuade the government from trying to become autocratic, which requires the credible threat  $V_c^W(S^D) > V_c^A$ .

After the boom the balance of power changes and, for a given  $S^D$ , the citizens' payoff of war becomes:

$$\tilde{V}_c^W(\phi S^D) = p(\phi S^D)\tilde{V}_c^A + [1 - p(\phi S^D)]\tilde{V}_c^D - \delta$$

If  $\tilde{V}_c^W(\phi S^D) < \tilde{V}_c^A$  the citizens can no longer commit to respond to autocracy with war and hence abide to the autocratic regime. If however the citizens remain powerful so that  $\tilde{V}_c^W(\phi S^D) \geq \tilde{V}_c^A$  the democratic regime is not relinquished voluntarily. In the latter case the tax rate is set to ensure that the government gets its reservation payoff,  $\tilde{V}_g^W(\phi S^D)$ , to prevent a coup from taking place. Hence it obtains:

$$\tilde{V}_g^D(\phi \tilde{S}^D) = \tilde{V}_g^W(\phi S^D) \tag{12}$$

In expression (12),  $\tilde{S}^D$  results from the citizens' post boom optimization problem:

$$\begin{aligned} \max_{\tau, S} \quad & (1 - \tau)\alpha(S)(N - S) \\ \text{s.t.} \quad & \alpha(S)\tau(N - S) + R - (1 - \tau)S\alpha(S) \geq \max \left\{ 0, \tilde{V}_g^W \right\} \\ & \tilde{V}_c^W(\phi S) > \tilde{V}_c^A \end{aligned} \tag{13}$$

**Proposition 3** *Suppose there is a boom on a government exploited resource.*

*i) If the regime starts as an autocracy:*

- a. The regime will become unprofitable as long as  $\tilde{V}_g^A(\phi S^A) < 0$ , and hence the political power will be voluntarily transferred to the citizens and democracy will be installed.*
- b. If  $\tilde{V}_g^A(\phi S^A) \geq 0$  then autocracy will prevail.*

*ii) If the regime starts as a democracy:*

- a. If  $\tilde{V}_c^W(\phi S^D) < \tilde{V}_c^A$  then the citizens can no longer commit to respond to autocracy with war and then abide by the autocratic regime.*
- b. If  $\tilde{V}_c^W(\phi S^D) \geq \tilde{V}_c^A$ , then democracy will persist unchallenged.*

When the status quo regime is autocratic and the power of the state is further enhanced by a resource boom, the current political arrangement is likely to remain in place. An alternative but unlikely situation will emerge when the newly found resource encourages the citizens to fight and the government finds it impossible to maintain a credible threat to hold on to the autocratic regime.

A plausible (and empirically relevant) case comes into picture when the status quo regime is democratic and the resource boom is such that balance of power shifts towards the government. This hampers the prospect of preserving the democratic institutions and makes them more likely to be replaced by authoritarian ones. This will only happen when the citizens can no longer credibly commit to launch a civil war in response to any autocratic attempt.

The case of Saudi Arabia is an example where a democratic state was disrupted due to an oil boom. Chaudhry (1997) describes the pre-boom Saudi society as one where the Neidi



political elite coexisted with the Hijazi business elite by developing checks and balances and a state that provided property rights protection instead of being predatory. The oil boom ended abruptly the consolidation of democracy by empowering the political elite as the state was the only beneficiary of the new revenues. Security expenditure increased and the business elite was neglected by the enriched government official. A predatory state emerged thereafter.

On the other hand Botswana is an example of how a these kinds of booms makes people become more conscious of their eventual deprivation under an empowered predatory regime. This makes democracy more valuable and hence constitutes a revolutionary threat. When diamond mines were found in Botswana in the 1970s the country transitioned toward democracy, mostly facilitated by the prevalence of pre-colonial political institutions like 'kgotla, which facilitated checks and balances by challenging the tribal chief in his decision making (Acemoglu, Johnson and Robinson, 2003).

### 3.3 Resource booms with no ex-ante beneficiary

In sections 3.1 and 3.2 civil war does not break out because the citizens and the government can bargain and arrive to a peaceful solution that involves the transfer of resources to compensate the challenging party for not launching a rebellion. The lack of war in these subsections comes directly from two features of our model: i) resources can be exploited only by one group; and ii) combating abilities change instantaneously after the resource boom.

In this section we revisit these two assumptions. On the one hand we allow for the fighting abilities not to change instantaneously with the boom. This implies that either group can strike first and start a civil war. On the other hand the possession of the resource is no longer pre-determined.

The timing of the new game,  $\Gamma''$ , is as follows:

1. Nature decides the initial political system,  $\{A, D\}$ .
2. The entitled body chooses  $(S, \tau)$ .
3. A resource boom takes place, but it does not affect the balance of powers (as neither group has ex-ante possession of the resource).
4. The entitled body is allowed to adjust  $\tau$ .

5. Groups decide whether to go to war or not.

- (a) If they refrain from attacking, the group in control of the government will capture the resource and hence increase its power.
- (b) If only the challenger finds it profitable to attack, power will be transferred voluntarily and hence the control over the resource.
- (c) If both groups go to war, the winner will take control of the resource and increase its power.

If power ends up with the citizens (either peacefully or as the outcome of war), a democratic regime will be established leaving the private citizens with the possession of the resource. In this case the group values will be equivalent to the post-boom values of section 3.1 ( $\bar{V}_g^D$  and  $\bar{V}_c^D$ ) and the *ex post* probability of winning becomes  $p(\gamma S)$ . In turn, if power ends up in the hands of the government, an autocratic regime will be established and the government will exploit the resource. In this case the group values will be as in section 3.2 ( $\tilde{V}_g^A$  and  $\tilde{V}_c^A$ ), and the ex-post probability of winning  $p(\phi S)$ .

If a civil war breaks out the payoffs of the agents are given by:

$$\hat{V}_c^W = p(S)\tilde{V}_c^A + [1 - p(S)]\bar{V}_c^D - \delta \quad (14)$$

$$\hat{V}_g^W = p(S)\tilde{V}_g^A + [1 - p(S)]\bar{V}_g^D - \delta \quad (15)$$

We can establish that:

**Lemma 1:**  $\bar{V}_c^D \geq \tilde{V}_c^D$ .

**Lemma 2:**  $\bar{V}_g^A \leq \tilde{V}_g^A$

**Proof.** See proof is in the appendix. ■

This suggest that the stakes of winning the war have increased for both the citizens and the government. This is because, in addition to be able to install they preferred political institutions, they will be able to capture the resource rents.

We now solve the model by backward induction assuming first that the starting political system is autocratic. We repeat the analysis subsequently staring from democracy.

### 3.3.1 Autocracy

Before the resource boom takes place the autocratic regime sets a policy vector,  $(S^A, \tau^A)$  to dissuade the citizens from mounting a rebellion. After the boom, if the citizens do not go to war, the government will capture the resources. The citizens will then face an empowered government, and their payoff will be  $\tilde{V}_c^A$ .

In the analysis of the previous sections, the autocratic government was able to ensure the citizens obtained the expected benefit of war. In the present case, however, once the resource is transferred to the government, the ex post value of war changes. It becomes:

$$\tilde{V}_c^W(\phi S^A) = p(\phi S^A)\tilde{V}_c^A + [1 - p(\phi S^A)]\tilde{V}_c^D - \delta. \quad (16)$$

This is the new reservation payoff. Note that because  $p(S^A) < p(\phi S^A)$ ,  $\tilde{V}_c^D > \tilde{V}_c^A$  and  $\bar{V}_c^D \geq \tilde{V}_c^D$ , it follows that:

$$\hat{V}_c^W(S^A) > \tilde{V}_c^W(\phi S^A). \quad (17)$$

So, if they opt for rebelling, the citizens obtain  $\hat{V}_c^W(S^A)$  and if they do not, the resource is lost and their payoff is  $\tilde{V}_c^A(\phi \tilde{S}^A) = \tilde{V}_c^W(\phi S^A) < \hat{V}_c^W(S^A)$ . Thus, the citizens have every incentive to fight ex ante for the possession of the resource.

When the government opts for war, its pay off is:

$$\hat{V}_g^W(S^A) = p(S^A)\tilde{V}_g^A + (1 - p(S^A))\bar{V}_g^D - \delta. \quad (18)$$

As in the case of the citizens, this is the ex ante benefit. If it relinquishes power, the ex post benefit of war (or the reservation payoff) will be:

$$\bar{V}_g^W(\gamma S^A) = p(\gamma S^A)\bar{V}_g^A + [1 - p(\gamma S^A)]\bar{V}_g^D - \delta. \quad (19)$$

Since  $p(\gamma S^A) < p(S^A)$ ,  $\tilde{V}_g^A \geq \bar{V}_g^A$  and  $\bar{V}_g^A > \bar{V}_g^D$ , it follows that:

$$\bar{V}_g^W(\gamma S^A) < \hat{V}_g^W(S^A). \quad (20)$$

Notice that if democracy is established the payoff of the government will be the maximum between zero and  $\bar{V}_g^W(\gamma S^A)$ . Therefore, unless  $\hat{V}_g^W(S^A) \leq 0$ , the government will be opting for war as well.

### 3.3.2 Democracy

Under democracy, the state is not as strong as it is if autocracy is in place. Indeed, the citizens can establish check and balances on the government, effectively deciding the policy vector to their own interest. However, when the resource boom takes place, the possibility of a war arises because of the same reasons as in the last subsection. The citizens cannot pre-commit to a high enough size of the bureaucracy. Indeed, following the same logic as above, the ex ante benefit from going to war for the citizens increases with the boom. This is:

$$\widehat{V}_c^W(S^D) > \widetilde{V}_c^W(\phi S^D) \quad (21)$$

Compared to the autocratic status quo, if the regime in place is democratic, the citizens would profit even more from going to war because the state is relatively weaker to begin with. Thus, if challenged the citizens will definitely not acquiesce.

In the case of the government, it is also still true that their reservation payoff is higher before the resource is not transferred to the citizens. Thus:

$$\overline{V}_g^W(\gamma S^A) < \widehat{V}_g^W(S^A). \quad (22)$$

However, since the government is weaker, the possibility of the government going for war is limited. Rather, it is more likely that the democratic state will consolidate without any bloodshed. This is true if:

$$\widehat{V}_g^W(S^D) = p(S^D)\widetilde{V}_g^A + [1 - p(S^D)]\overline{V}_g^D - \delta < 0. \quad (23)$$

#### Proposition 4

*When a resource is not possessed by neither the government nor the citizens, a war is likely to ensue because of preemptive action from both sides.*

The analysis of sections 3.1 and 3.2 showed how resource booms can be politically destabilizing. However in these sections violent conflict was not an equilibrium outcome since both parties could effectively bargain. However when there is uncertainty around the possession of the resource the ex-ante and ex-post values of war diverge for both parties and whoever wins the war captures the resource becoming much more powerful. This hamper any incentive for ex-ante negotiations and both parties opt for the costly fighting scenario.

Sierra Leone is an example in which the presence of a natural resource (alluvial diamonds) led to civil war. It should be emphasized that not all countries that possess this particular resource experience civil war, as was in fact the case of Sierra Leone for several decades. The military regime of Siaka Stevens hired private traders to outsource the resource exploitation. Gradually, however the traders became independent and secured the resource-rents for themselves. The successor of Stevens, General Momoh, inherited a weakened state and, in an attempt to restore the old order, the government forces tried to shift the mode of extraction from the hands of the trader middlemen to a more conventional form of industrial exploitation. The success of such an action would have ended the prospect of rebels while its failure would have dwindled the future of the government itself. Hence, neither side had any other options other than to resort to violence to try to control the resource.

Guinea share many attributes with Sierra Leone. Both are West African countries that had semi-democratic governments, deposits of natural resources, a low per-capita income and similar geographic characteristics. Yet, Guinea escaped from the eruption of internal conflicts. Indeed the main resource of Guinea is Bauxite and it can only be extracted through large-scale investments. This is why even when the rebels attempted to secure their share, the government was firm enough to uproot them.

According to Ross (2004), the rebellion of resource rich province of Aceh in Indonesia had nothing to do with the looting of natural resources or the lack of state presence (as C&H and F&L would respectively argue). Instead, it is explained by the failure of the central government to commit on a fair division of the resource rents. The Aceh locals felt that autonomy would have ensured them a greater share of the revenue. Similarly, the Katanga region of Congo, which at independence accounted for 75% of the country's mineral output, was underrepresented politically and hence lacked credible mechanisms to enforce any commitment made by the central government regarding a fair division of the mineral rents. Violence erupted there as well.

## 4 Conclusion

Why do some resource booms generate negative outcomes while other do not is a first order question in social science. It has been noted that resource-rich countries tend to have not only slow rates of economic growth, but also dysfunctional political institutions and a higher likelihood of experiencing violent internal strife. In this paper we focus on the disrupted

political equilibrium and the violent consequences of booms experienced by resource-rich societies. We investigate why the prevailing political regimes are often destabilized and new ones are formed, often through means of violence.

To this end, we develop a simple model that, perhaps not surprisingly, suggests that the political consequences of resource booms depend on the type of resource and how it is exploited. Resources such as cash crops often call for exclusively private exploration. When a boom on this type of resource occurs, democratic regimes are likely to prevail, even if more autocratic regimes are in place at the time of the boom. On the contrary, when large-scale investment, mineral-based resources that are usually exploited by the state are booming, the balance of power tilts towards the state. As a consequence this can adversely affect the democratic prospect of a nation. This is exemplified by the widespread prevalence of autocratic regimes in oil-producing nations.

Even more dire consequences arise when there is uncertainty regarding the rights of exploration of the booming resource. Since the ownership of such resource grants power, both the state and the citizens are eager to control its exploitation. Because the possessing party cannot commit *ex ante* or redistribute the rents of the booming commodity, both parties have incentives to launch a preemptive attack to gain its control and thus civil war is a likely outcome of the initially undefined property rights. In future research we plan to incorporate within the theoretical framework the reasons why a particular resource calls mainly for private, public, or mixed exploration. In addition, in the present paper we have defined autocracy and democracy analytically. Future research will explore the actual social underpinnings that give rise to such equilibrium political institutions.

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# Appendix

## Proof of Proposition 1

**Proof.**

i) From the second constraint in (4) it follows that:

$$V_c^W(S^D) = p(S^D)V_c^A + [1 - p(S^D)]V_c^D - \delta > V_c^A.$$

Rearranging:

$$p(S^D)V_c^A + [1 - p(S^D)]V_c^D > V_c^A + \delta > V_c^A.$$

Hence:

$$[1 - p(S^D)]V_c^D > [1 - p(S^D)]V_c^A, \text{ and}$$

$$V_c^D > V_c^A.$$

$$\text{ii) } \frac{\partial V_c^W}{\partial S} = \frac{\partial (p(S)V_c^A + [1-p(S)]V_c^D - \delta)}{\partial S}.$$

$$\frac{\partial V_c^W}{\partial S} = p'(S) [V_c^A - V_c^D] < 0.$$

iii) From i) we know that  $V_c^D(S^D) > V_c^A(S^A)$ .

Moreover, under autocracy the government wants to extract rents but also has to ensure that the citizens will not rebel, so the policy vector is set such that the citizens' payoff is just equal to what they would get if war broke out. Thus,  $V_c^A(S^A) = V_c^W$ , which we know from ii) is a decreasing function of S.

Hence:  $S^D < S^A$ .

■

## Proof of Lemma 1

**Proof.** If the resource is controlled by the government, the optimization problem by the citizens is as follows (assuming  $\tilde{V}_g^W \geq 0$ ):

$$\begin{aligned} \tilde{V}_c^D &\equiv \max_{\tau, S} && (1 - \tau)\alpha(S)(N - S) \\ \text{s.t.} &&& \alpha(S)\tau(N - S) + R - (1 - \tau)S\alpha(S) \geq \tilde{V}_g^A - \frac{\delta}{p(\phi S)} \\ &&& \tilde{V}_c^W(\phi S) > \tilde{V}_c^A \end{aligned}$$

In turn, if the resource is controlled by the citizens, their optimization problem is (assuming  $\widehat{V}_g^W \geq 0$ ):

$$\begin{aligned} \overline{V}_c^D &\equiv \max_{\tau, S} && (1 - \tau)\alpha(S)(N - S) + R \\ \text{s.t.} &&& \alpha(S)\tau(N - S) - (1 - \tau)S\alpha(S) \geq \widetilde{V}_g^A - \frac{\delta}{p(\lambda S)} \\ &&& \widetilde{V}_c^W(\lambda S) > \widetilde{V}_c^A \end{aligned}$$

Note that when the citizens control the resource and the balance of power favors them the constraints are relaxed. Therefore the value obtained in the first optimization is less than that of the second:  $\widetilde{V}_c^D \leq \overline{V}_c^D$ . ■

## Proof of Lemma 2

**Proof.** The proof is similar to that of lemma 1. If the resource is controlled by the government, its optimization problem is:

$$\begin{aligned} \widetilde{V}_g^A &\equiv \max_{\tau, S} && \alpha(S)\tau(N - S) - \alpha(S)(1 - \tau)S + R \\ \text{s.t.} &&& \alpha(S)(1 - \tau)(N - S) \geq \widetilde{V}_c^D - \frac{\delta}{1 - p(\phi S)} \end{aligned}$$

In contrast, if the resource is possessed by the citizens, the optimization problem of the government is:

$$\begin{aligned} \overline{V}_g^A &\equiv \max_{\tau, S} && \alpha(S)\tau(N - S) - \alpha(S)(1 - \tau)S \\ \text{s.t.} &&& \alpha(S)(1 - \tau)(N - S) + R \geq \widetilde{V}_c^D - \frac{\delta}{1 - p(\lambda S)} \end{aligned}$$

The government is more tightly constrained when the citizens possesses the resource. It follows that  $\widetilde{V}_g^A \geq \overline{V}_g^A$ . ■