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BEYOND DIVIDE AND RULE: WEAK DICTATORS, NATURAL RESOURCES, AND CIVIL CONFLICT

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Beyond Divide and Rule: Kleptocracy and Civil War*

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Abstract

We propose a model where an autocrat rules over an ethnically divided society. The dictator selects the tax rate over domestic production and the nation's natural resources to maximize his rents under the threat of a regime-switching revolution. We show that a weak ruler may let the country plunge in civil war to increase his personal rents. Inter-group fighting weakens potential opposition to the ruler, thereby allowing him to increase fiscal pressure. We show that the presence of natural resources exacerbates the incentives of the ruler to promote civil conflict for his own profit, especially if the resources are unequally distributed across ethnic groups. We validate the main predictions of the model using cross-country data over the period 1960-2007, and show that our empirical results are not likely to be driven by omitted observable determinants of civil war incidence or by unobservable country-specific heterogeneity.

"While Two Dispute, the Third Enjoys".
Popular Italian proverb.

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1 Introduction

In many countries around the world, autocrats impose highly rapacious policies on their population and yet manage to remain in power for long periods of time. Surprisingly, such practices have also been observed in countries plagued by internal civil strife in spite of the potential threat these conflicts constitute to the government's stability (Reno 1998). The weakly institutionalized environment characterizing these societies implies that democratic instruments available to balance the power of the ruling elites are limited and highly dysfunctional: legislators and interest groups are typically co-opted by the elite and, as a consequence, elections fall short of disciplining ill-performing leaders (Gandhi and Przeworski 2006). Such de facto dictatorships have been studied by scholars who emphasize the web of personal ties and targeted transfers which guarantee the stability of the elites (Bates 1981 and Jackson and Rosberg 1984).[1]

Acemoglu et al. (2004) explore a strategy - which they call *Divide-and-Rule* - adopted by rulers who seek to implement more profitable kleptocratic policies by weakening the opposition. They propose a model whereby the ruler can be overthrown only if a sufficiently large opposition is mobilized. The ruler prevents this collective action by providing selective incentives, thereby making it impossible for a successful challenging coalition to emerge.

Padro i Miquel (2007) considers an alternative strategy of regime survival implemented by rent-extracting autocrats in ethnically divided societies. The proposed mechanism rests on what the author defines as *The Politics of Fear*. Indeed, "[T]he fear to fall under an equally inefficient and venal ruler that favors another group is sufficient to discipline supporters" (Padro i Miquel 2007: 1260). In other words, by dampening the livelihood of the other ethnic groups, the ruler obtains support from his own group and still manages to extract rents from them. The co-ethnics' obedience is rooted in the fear of receiving a worse treatment under the potential rule of a non co-ethnic leader.

In line with Padro i Miquel (2007) we propose a model whereby an autocrat rules over an ethnically divided society. The ruler selects the tax rates on income and on natural resources that maximize his private rents under the threat of rebellion: While the ruler is not accountable to the people through elections, his power can be challenged through popular uprising. If the rebellion is successful, the ruler looses the capacity to levy taxes. We characterize the equilibrium conditions under which it is in the interest of the ruler to let an civil conflict among ethnic groups to escalate within the boundaries of his country. Inter-group violence weakens the citizens' potential to collectively revolt against the ruler,

[1]See also the subsequent work on co-optation and patronage, including Acemoglu et al. (2008), Egorov and Sonin (2009) and Sekeris (2011).

hence allowing the latter to increase the fiscal pressure without risking his power.

Our simple model delivers three novel predictions. First, we show that weaker rulers profit more from the emergence of a civil strife. Second, we show that the ruler's gains from internal conflict are larger the greater is the country's endowment of natural resources. Indeed, when the ruler's income is mainly derived from taxing natural resources, the costs of inter-ethnic violence are lower since violence affects especially labor production. In turn, the potential gains from conflict are large because in the face of weakened ethnic groups the ruler can capture a larger share of the natural resources without triggering a revolution.[2] Third, the ruler's gains from internal conflict are larger if resources are distributed unequally across ethnic groups.

While the salience of ethnic divisions in triggering civil conflicts has received mixed support by empirical studies (Fearon and Laitin 2003, Collier and Hoeffler 2004, Montalvo and Reynal-Querol 2005), ethnic violence has been widely studied in conflict theory. Yet, most contributions explain ethnic conflicts by exploring only the incentives of the parties directly involved in the dispute (Caselli and Coleman II 2006, Esteban and Ray 2008, Esteban et al. 2010). Instead, we emphasize a mechanism that highlights the incentives of an idividual ruler *above and beyond* his ethnic identity. Indeed, the private interests of a rent seeking autocrat are not necessarily aligned with those of his ethnic base. Considering the ruler as a separate agent is an abstractions that helps us then explore the proposed mechanism theoretically.

The incentives for a ruler to stress the ethnic divide have already been addressed in the literature (E.g. Fearon and Laitin 2000). According to Snyder and Ballentine (1996) and Snyder (2000), political elites exploit the nationalistic argument in newly democratizing countries as a way to preserve their dominant position. Similarly, Glaeser (2005) proposes a theory in which political leaders dig existing societal cleavages by conveying messages that exacerbate hatred between groups with the ultimate goal of fostering electoral support for particular policies. We push this argument one step further and argue that a ruler might consciously let inter-ethnic violence degenerate into a destructive conflict in order to maximize his personal rents.[3]

We illustrate our formal argument with case studies from the recent history of Africa. Most importantly, however, we provide robust cross-country empirical evidence which is

[2]This constitutes a different mechanism than those proposed by the literature for the positive association between natural resources and conflict. This association has been highlighted, among others, by Collier and Hoeffler (1998) and (2004), Reynal-Querol (2002), Ross (2004), and Hodler (2006).

[3]While Rocco and Ballo (2008) also show that an autocrat may find it profitable to plunge their country into a wasteful civil war, their underlying mechanism is fundamentally different. In their theory the ruler uses the government's army against the opposition's forces when the odds of winning the conflict exceed the chances to remain in power in peaceful times.

consistent with our main theoretical predictions. In particular, using a dataset on conflict incidence as well as novel data on presence of oil and diamonds fields over the period 1960-2007, we show that the likelihood of autocratic and ethnically-polarized countries experiencing civil war is higher when weak rulers govern states endowed with natural resources. This finding is robust to controlling for the variables identified by the recent literature on civil war as the most robust correlates of conflict (Collier and Hoeffler 2004; Fearon and Laitin 2003), as well as to the inclusion of regional dummies. In addition the results survive the inclusion of country and time fixed effects. This suggest both that our theory can also account for the within-country variation overtime in the exploitation of natural resources, the autocracy level, and the relative weakness of the ruler, and that the results are not driven by year specific shocks common across countries.

The rest of the paper is organized as follows. Section 2 discusses anecdotal evidence from recent conflict among ethnic groups in Nigeria and Kenya, which were exploited by the countries' rulers to pursue their personal interests. We develop the theoretical model in section 3 and present the empirical analysis in section 4. Section 5 concludes.

2 Anecdotal evidence from recent history

2.1 Nigeria

In 1993, in the middle of widespread economic downturn, General Sani Abacha seized political power and was the *de facto* President of Nigeria until 1998. Driven by the drop of oil prices, Nigeria was facing balance of payment difficulties, increasing deficits and debt burden, and high inflation rates (Bolanle 1999, Ikelegbe 2001). In addition, old patronage politics were collapsing partly because of the cut in external support after the end of the Cold War (Reno 1998). Due to the diversion of large shares of the oil revenue to the pockets of the political elite, the popularity of the regime was particularly low among the Ogoni, an ethnic group located in the oil-rich southeastern region.

Abacha's government heavily depended on oil revenue and could not afford to give in to the pressing requests of the Ogoni. Instead, the president dealt with the hostility by destabilizing the Ogoni region through the use of state violence in the form of killings, rapes, and looting by the security forces, and with deliberate attempts to foster conflicts between the Ogoni and their neighboring ethnic groups (Reno 1998). Indeed, the regime constantly tagged as ethnic rivalries attacks that independent observers attributed to the regular army (Ibeanu 2000, Human Right Watch 1995, Reno 1998). For instance, when four traditional chiefs were killed during an Ogoni rally in 1995, Abacha blamed local Ogoni activists for the killings and sentenced them to death (Ifeka 2000, Ikelegbe 2001). The evidence that emerged afterwards, however, suggests that Abacha's regime was behind the murders (Reno 1998).

The strategy proved successful and Ibeanu (2000, p. 26) laconically concludes: "[...] at that point, the implosion of MOSOP [Movement for the Salvation of Ogoni People] was completed and the struggle became Ogoni against Ogoni".

A similar strategy was adopted to instigate violence between Nembe and Kalabari ethnic groups. According to witness reports, regular army soldiers killed fourteen Nembe, whereas officials claimed it was part of a Kalabari plot to appropriate Nembe's land. According to Reno:

> The militarization of local factions is an effective way to ensure that communities in oil-producing areas cannot unify to challenge the regime. This tactic effectively destroys civil society, replacing it with sets of rival ethnic organizations [...] (Reno 1998, p. 206).

This strategy enabled Abacha to contain successfully the outbreak of rebellion. His five-year rule over Nigeria was primarily used for his own benefit and in favor of his associates, despite his relative weakness and the unfavorable economic conditions (Bolanle 1999). After Abacha's death on June 7 1998, his family members were forced to give up thirty-seven residences and $750 million. It has been estimated, however, that before his death Abacha managed to secure about $5-7 billion abroad (Reno 1999).

2.2 Kenya

Kenya has experienced repeated episodes of ethnic violence over the last 20 years. The ethnic legacy passed from the British colonialists to Jomo Kenyatta in 1964 is one of deep antagonisms, reflecting the divide-and-rule policy pursued during the colonial years. Both Kenyatta, an ethnic Kikuyu, and his successor Daniel arap Moi, an ethnic Kalenjin, implemented redistribution policies favoring their ethnic group, thus further nourishing the pre-existing ethnic tensions (Burgess et al. 2011). On the eve of the 1991 elections, as well as in the aftermath of both the 1991 and the 2007 elections, the country experienced severe episodes of ethnic strife that led to thousands of killings and hundreds of thousands of internally displaced people. Most analysts converge on blaming the resource-greedy elites for having engineered these violent events to serve their personal interests (Kahl 2006, Kagwanja 2009, and Rutten and Owuor 2009).

The 1991-1993 events are particularly telling. The intensification of pro-multiparty voices compelled president Moi to repeal in 1991 *Section 2A*, a constitutional amendment that made

Kenya a single-party state. The response of the ruling elite was immediate and came in the form of a series of political rallies (known as the *Majimbo* rallies) organized by the Kenya African National Union's (KANU) across all the country. The speeches of officials during these meetings conveyed particularly violent messages of hatred and intolerance towards the Kikuyu and Luo ethnic groups. The elites accused them of stealing the ancestral lands of the Kalenjin and the Maasai (Africa Watch 1993, Kahl 2006: 143). KANU officials radicalized local populations by explicitly demanding land evictions by violent means, while emphasizing that the bravery of Kalenjin and Maasai "warriors" would not tolerate the usurpation (Africa Watch 1993: 12-18, Klopp 2001).

As a result of the ethnic confrontation over 1500 were killed and over 300,000 were forcibly displaced over the 1991-1993 period (Africa Watch 1993, Kahl 2006). While the authorities emphasized their inability to cope with the situation because of lack of resources, posterior court testimonies revealed the active role of highly ranked KANU figures in the organization of death squads recruited from the cities' slums (Kagwanja 2009). In addition, many argue that the length of the confrontation and the idleness of security forces reveal the unwillingness of the ruling party to deter the ethnic conflict, irrespective of the ethnicity of the victims (Kahl 2006).

That the conflict appears to have been orchestrated by a weakened central regime that exploited existing enmities, inequalities and grievances between the country's various ethnic groups has been emphasized by various scholars.[4] This strategy was crafted at the end of the Cold War era, when the power of the ruling elite was significantly reduced and political opposition from other parties became a real threat. In this context ethnic clashes eventually allowed the ruling elite to retain power and pursue their extractive policies.

These stories motivate the argument that we now formalize in the next section. Subsequently, however, we show that the scope of our argument goes beyond the case studies emphasized here, by highlighting robust longitudinal empirical patterns that support the predictions of our theory.

3 The Model

3.1 Set up

We consider a country populated by two equally-sized ethnic groups respectively designated by A and B, and a ruler L. Each group i is composed of n agents who control the natural

[4]See especially Colin H. Kahl's thesis of the *state exploitation conflicts* (Kahl 2006), and the Africa Watch 1993 report on divide-and-rule politics in Kenya (Africa Watch 1993).

resources located on their own territory. Thus group i owns a share φ_i of the country's total resources R, with $\varphi_A + \varphi_B = 1$. Each ethnic group decides on the manpower to allocate to productive, w_i, and fighting, f_i, activities. The production technology is assumed to be linear and hence the total income of group i equals $\varphi_i R + w_i$. The ruler can tax all the nation's income by applying group-specific taxes, τ_A and τ_B.[5]

If group i decides to allocate manpower to fighting, $f_i > 0$, this force may serve two purposes: On the one hand this militia can be used to loot the resources of the other ethnic group, in which case we have a conflict. On the other hand it may serve to mount a rebellion against the ruler so that the group can avoid paying taxes. If a rebellion occurs, the ruler's army fights the rebels and no taxes are collected if the rebellion succeeds. The ruler controls an army of force a, and decides how to divide it between protecting himself from a potential rebellion, a_L, and deterring potential inter-group conflicts from arising, a_D.

Given the above description of the agents' actions, we now turn to the associated payoffs. In the absence of a *civil war* (superscript C) and of a *rebellion* (superscript R), the country is at *peace* (superscript P), and ethnic group i's payoff is given by its after tax income:

$$U_i^P = (1 - \tau_i)(\varphi_i R + w_i) \tag{1}$$

Meanwhile the tax proceeds are entirely consumed by the ruler whose utility therefore is:

$$U_L^P = \sum_i \tau_i (\varphi_i R + w_i) \tag{2}$$

If in the absence of civil conflict group i decides to mount a rebellion (superscript PR), its payoff equals:

$$U_i^{PR} = \frac{f_i}{a_L + f_i}(\varphi_i R + w_i) \tag{3}$$

where $\frac{f_i}{a_L + f_i}$ is a simple *ratio-form* contest success function that constitutes the probability that group i's rebellion is successful, and hence it can stop paying taxes. Similarly, the ruler's utility becomes:

$$U_L^{PR} = \frac{a_L}{a_L + f_i}\Big(\varphi_i R + \tau_{-i}(\varphi_{-i} R + w_{-i})\Big) \tag{4}$$

where $\frac{a_L}{a_L + f_i}$ is the probability that the rebellion is unsuccessful in which case the ruler appropriates all the rebelling group's natural resources, and enjoys the revenues from taxing the other group.

[5] Modifying this assumption and constraining the ruler to impose a unique tax rate in the whole country reduces the ruler's utility at equilibrium. All results are however robust to such a change. Similarly, allowing the ruler to impose different tax rates on natural resources and on labor production leaves the results completely unchanged.

When group i initiates a conflict over the control of group j's natural resources (a civil war), but refrains from rebelling against the ruler, it obtains:[6]

$$U_i^C = (1 - \tau_i) \frac{f_i}{a_D + f_i + f_{-i}} (R + w_i) \tag{5}$$

where the contest success function features the ruler's effort to deter inter-groups' conflict, a_D, a share of the army which we assume is deployed to help the targeted group. Equation (5) also assumes that only natural resources and not the production of the rival ethnic are appropriated through conflict. In case of defeat, however, an ethnic group is not able to carry on production successfully.

The attacked group's payoff is then given by:

$$U_{-i}^C = (1 - \tau_{-i}) \frac{a_D + f_{-i}}{a_D + f_i + f_{-i}} (R + w_{-i}) \tag{6}$$

The ruler's payoff takes into account that, absent rebellion, taxes on both groups can still be levied. Hence:

$$U_L^C = \tau_i \frac{f_i}{a_D + f_i + f_{-i}} (R + w_i) + \tau_{-i} \frac{f_{-i} + a_D}{a_D + f_i + f_{-i}} (R + w_{-i}) \tag{7}$$

Lastly, when there is both civil war and rebellion (superscript CR), the rebelling group's payoff is:

$$U_i^{CR} = \frac{f_i}{a + f_i + f_{-i}} (R + w_i) \tag{8}$$

In such event, the ruler backs the non-rebelling group, which he keeps taxing. His utility is therefore:

$$U_L^{CR} = \tau_{-i} \frac{a + f_{-i}}{a + f_i + f_{-i}} (R + w_{-i}) \tag{9}$$

3.1.1 Timing

The timing of the game is as follows:

1. The ruler decides the pair $\tau = \{\tau_A, \tau_B\}$, and the allocation of the army between protecting himself a_L from rebellion, and deterring civil conflicts a_D.

[6] Even in in reality some share of individuals engaging in inter-group violence are more motivated by ethnic hatred than by a rational economic calculus, the driving reason is often linked with wealth redistribution issues.

2. The two ethnic groups simultaneously decide whether to attack each other or not. If either group initiates hostilities, civil war ensues.
3. Each ethnic group individually decides whether or not to mount a rebellion against the ruler.

We solve the model backwardly by looking at Subgame Perfect Equilibria.

3.2 Analysis

Stage 3:

The optimal response of group i at stage 3 depends on the outcome of stage 2, i.e. whether the country experiences civil war not.

i) Suppose the outcome of stage 2 is *not civil war.*

Group i should decide whether or not to rebel. If it rebels it then optimally allocates its n individuals between production activity and rebellion. The maximization problem of group i is therefore:

$$\max_{f_i} \left\{ \frac{f_i}{a_L + f_i} (\varphi_i R + n - f_i) \right\} \tag{10}$$

Subject to the manpower constraint: $n_i = f_i + w_i$.

The optimization yields the following interior solution:

$$f_i^{PR} = (a_L (a_L + n + \varphi_i R))^{1/2} - a_L \tag{11}$$

Replacing this value in (3) gives:

$$U_i^{PR} = \left[(a_L + n + \varphi_i R)^{1/2} - a_L^{1/2} \right]^2 \tag{12}$$

On the other hand, if the the group *does not rebel*, it allocates all the manpower to the productive activity, which gives ethnic group i the following payoff:

$$U_i^P = (1 - \tau_i)(\varphi_i R + n) \tag{13}$$

The group thus decides to mount a revolution if $U_i^{PR} > U_i^P$. Rearranging this inequality allows us to identify the tax rate, τ_i^P, above which group i would opt for rebellion:

$$\tau_i^P = 1 - \frac{\left[(a_L + n + \varphi_i R)^{1/2} - a_L^{1/2} \right]^2}{\varphi_i R + n} \tag{14}$$

ii) Suppose the outcome of stage 2 is *civil war.*

Denote by f_i^C the number of fighters allocated by group i to the inter-group conflict in stage 2. In stage 3, if group i decides to rebel, it adjusts the number of fighters to optimize the following problem:

$$\max_{f_i} \left\{ \frac{f_i}{a + f_{-i}^C + f_i} (R + n - f_i) \right\} \tag{15}$$

Starting a rebellion would mean facing the entire army (both the share deployed to guard peace and the share protecting the ruler) as well as the other group's army. On the other hand, no taxes are paid to the ruler in case of a successful rebellion.

The interior solution to this problem is given by:

$$f_i^{CR} = \left(\left(a + f_{-i}^C \right) \left(a + f_{-i}^C + n + R \right) \right)^{1/2} - \left(a + f_{-i}^C \right) \tag{16}$$

Thus implying that group i's utility of rebelling [by replacing (16) in (8)] equals:

$$U_i^{CR} = \left[\left(a + f_{-i}^C + n + R \right)^{1/2} - \left(a + f_{-i}^C \right)^{1/2} \right]^2 \tag{17}$$

On the other hand, *not rebelling* implies that group i gets taxed at some group specific rate τ_i^C where superscript C designates the fact that the two groups are at conflict. Group i therefore obtains:

$$U_i^C = \left(1 - \tau_i^C \right) \frac{f_i^C}{a_D + f_{-i}^C + f_i^C} \left(R + n - f_i^C \right) \tag{18}$$

where a_D is the share of the army deployed by the ruler to guard peace in the country in the first stage of the game. The comparison of equations (17) and (18) allows us to compute the threshold tax rate τ_i^C above which group i would rebel. This yields:

$$\tau_i^C = 1 - \frac{U_i^{CR}}{U_i^C} \tag{19}$$

Stage 2:

Taking into account the optimal responses of stage 3, we now solve for the two groups' optimal allocation of manpower between production and fighting in stage 2, where players choose whether or not to initiate a civil conflict. From ethnic group i's perspective, provided it is profitable to provoke a civil war, the problem consists on maximizing (5) with a_D set to zero since *at equilibrium* a ruler will never reduce his own defense by deploying part of the army across the country if civil war can not be prevented.[7] For interior solutions, the optimal strength to deploy in a civil war from i's perspective (in expectation of a civil war) can be shown to be:

$$f_i^C = \frac{n+R}{3} \tag{20}$$

The utility derived by group i if an ethnic conflict occurs and if no rebellion is mounted is therefore given by:

$$U_i^C = (1-\tau_i^C)\frac{n+R}{3} \tag{21}$$

To determine whether a civil conflict occurs, it is necessary to derive the payoff an ethnic group would obtain if it was to deviate from a peaceful situation. This in turn will allow us to deduce whether any group has incentives to deviate from a peaceful equilibrium. In other words, we need to determine the optimal size of a militia for group i, when the other ethnic group $(-i)$ has allocated all its manpower to the productive activity, and given the forces a_D deployed by the ruler to guard peace. From group i's perspective, the problem consists in maximizing (5) for $f_{-i} = 0$. The utility obtained by group i if it was to deviate from peace equals:

$$U_i^C = (1-\tau_i)\left[(a_D+n+R)^{1/2} - a_D^{1/2}\right]^2 \tag{22}$$

Stage 1:

Since we have derived the ethnic groups' best responses to the ruler's tax rates and optimal army deployment, we can solve the game's first stage. In order to reap the maximal wealth from its citizens, the ruler uses two tools: the tax rates and the army deployment.

Let us first consider the latter tool. The ruler decides the amount of troops a_D that will be deployed across the country to deter the ethnic groups from clashing each other. For deterrence to be successful, it is necessary that *both* ethnic groups are unwilling to initiate hostilities *given that* the other group is unprepared for fighting. Since both groups are endowed with the same fighting technology and face the same opportunity cost of mobilizing fighters, the ethnic group whose resources endowment is the lowest has the highest incentives to start a conflict. Without any loss of generality assume $\varphi_A > 1/2$. If the deterrent force is to be effective, therefore, the following condition should be satisfied: $U_B^C \leq U_B^P$. Using

[7]Notice that for presentational reasons we do not describe the optimization *off the equilibrium path*, though whenever relevant we shall equally refer to these results. In other words, we do not present the situation where the ethnic groups anticipate a rebellion in the game's last stage since at equilibrium the ruler always selects a vector of tax rates that averts rebellion.

equations (13) and (22) for group B, we can easily determine the minimal amount of troops the ruler needs to deploy for the deterrent strategy to be effective, $\bar{a}_D$:

$$\bar{a}_D = \frac{(\varphi_A R)^2}{4\,(n + \varphi_B R)} \tag{23}$$

A ruler with an army $a < \bar{a}_D$ is unable to deter a civil war. For such weak rulers deploying part of the army across the country instead of using it to protect themselves would be suboptimal. Indeed, the lower the protection of the ruler, the easier it is to mount a coup, which eventually translates into a lower optimal tax rate. Similarly, any $a_D > \bar{a}_D$ would unnecessarily reduce the ruler's defense. We thus conclude that $a_D = \{0, \bar{a}_D\}$. In other words, the ruler will either just deter a conflict from occurring or abstain entirely from any deterrent activities.

The optimal vector of taxes from the ruler's perspective is such that he extracts the maximum wealth from the two groups without causing a rebellion.[8] In other words, the ruler will set the taxes such that the subjects are *exactly* indifferent between rebelling and not. Therefore, if the ruler deploys the deterrent contingent $\bar{a}_D$, the optimal tax rate is given by (14), whereas if civil conflict is anticipated, the optimal tax rate is given by (19).

Our discussion around the optimal level of a_D yields a first result.[9]

Proposition 1. *Civil conflicts always occur if the ruler is too weak.*

Proof. A ruler with an army of size $a < \bar{a}_D$ cannot deter a civil war. Indeed, attacking the other group when $a_D < \bar{a}_D$ always yields a larger payoff to A than under peace. The claim in Proposition 1 follows directly. □

The utility of a ruler with an army $a \geq \bar{a}_D$ who chooses to deter civil conflict is given by (2), which after substituting for the optimal tax rates yields:[10]

$$U_L^P = 2n + R - \sum_{i=A,B} \left[\left((a - \bar{a}_D) + n + \varphi_i R \right)^{1/2} - (a - \bar{a}_D)^{1/2} \right]^2 \tag{24}$$

If the ruler, however, does not deploy a deterrent contingent, the ethnic groups always deviate from the peaceful situation. Thus, whenever $a_D = 0$, a civil conflict will occur.

[8]It can be shown that there always exists a tax vector for which the utility of the ruler is higher than under rebellion.

[9]Throughout the paper the results presented in the propositions hold for the entire range of admissible parameters' values. Both interior and corner solutions are formally dealt with in the Appendix.

[10]Notice that U_L^P is not defined for $a < \bar{a}_D$, as the ruler would not have enough power to deter an ethnic conflict.

The utility of the ruler is then given by equation (7) after replacing f_A^C and f_B^C by their equilibrium value (20), and after setting the tax rates to their optimal (conflict) value τ_i^C. This yields:

$$U_L^C = \frac{2}{3}\left[n + R - \left[\left(4\left(n+R\right) + 3a\right)^{1/2} - \left(n + R + 3a\right)^{1/2}\right]^2\right] \tag{25}$$

The ruler therefore decides whether or not to deploy the deterrent forces by comparing (24) to (25). On the one hand, averting a civil conflict grants the ruler the largest tax base. Indeed, when the ethnic groups enter into an armed struggle, potentially productive resources are diverted to fighting activities. On the other hand, despite the partial reduction of the ruler's tax base, civil conflict reduces the contestants' capacity of rebellion and strengthens the defenses of the ruler, thereby increasing the tax rates the ruler can impose. In the context of an on-going conflict between the ethnic groups, the group willing to mount a rebellion will have to fight *both* the other ethnic group and the ruler's army. We now turn to analyze the trade-off between tax-base and tax rate when varying the model's key parameters.

The following proposition describes how the ruler's strength as measured by the size of his army will influence the equilibrium:

Proposition 2. *There exists a unique ruler's strength level above which he preserves peace and below which a civil conflict occurs.*

Proof. A formal proof is provided in Appendix A.1. □

Propositions 1 and 2 deserve a brief discussion. These results suggest that a country ruled by a weak dictator is expected to experience internal conflicts. Indeed, very weak dictators ($a < \bar{a}_D$) do not have the sufficient strength to deter the most motivated group in the society from starting a conflict over natural resources. Interestingly, countries ruled by relatively weak dictators (who nevertheless control an army $a > \bar{a}_D$) are *also* expected to experience civil conflicts. Unlike in the previous case, this is the result of a rational calculus by the ruler: by concentrating all his forces a to protect himself from a potential rebellion he can impose larger tax rates. Refraining from deploying a peace-keeping force results in a civil war which destroys part of the tax base. The gains from larger tax rates, however, exceed the tax base loss.

Figure 1 plots the outcome of a simulation exercise to help visualize the result of Proposition 2. While the horizontal axis represents the strength of the ruler, the vertical axis measures his utility. A ruler whose army is weaker than $\bar{a}_D$ is unable to deter a civil conflict. As a consequence, for that range of a, only U_L^C (dashed curve) is defined. For intermediate strength values ($a \in [\bar{a}_D, \tilde{a}]$), the burden of preserving peace exceeds the increase in tax base, thus the ruler refrains from preventing civil conflict. Interestingly, for $a > \bar{a}_D$, increasing the ruler's strength reduces the gap in the tax rates under peace and conflict, while the gap in tax bases remains constant. Indeed, the tax base loss under conflict is entirely determined by the amount of resources (n and R) at stake, since $a_D = 0$ (see equation 20). The waste of resources under conflict eventually makes the peace-preserving strategy more profitable for sufficiently strong rulers ($a > \tilde{a}$).

A consequence of this finding is that a negative shock on the personal power of a strong autocratic ruler *can be conducive to civil conflict*, either because the ruler is no longer able to support peace (if the shock affects the ruler strength such that his resulting army $a < \bar{a}_D$), or because it is no longer in his interest to do so.

Another parameter of interest in the analysis is R, the amount of natural resources. The next proposition summarizes our findings on the effect of natural resources:

Proposition 3. *There exists a unique stock level of natural resources below which the ruler preserves peace, and above which civil conflict occurs.*

Proof. A formal proof is provided in Appendix A.2. □

Like in Proposition 2, the intuition behind this result lies in the effect of natural resources on the ruler's taxing ability under the two scenarios. Indeed, increasing the amount of natural resources has two effects. On the one hand, under both scenarios a larger stock of natural resources increases the tax base. Interestingly, the tax base increment under peace is larger than under conflict as in the latter scenario more natural resources divert more labor from production to fighting. On the other hand, however, increasing natural resources also inflates the cost for the ruler to preserve peace in terms of soldiers to deploy ($\bar{a}_D$) to deter a civil conflict. As a consequence, larger resource stocks reduce the forces dedicated to directly protecting the central regime from a potential rebellion, thereby pushing downwards the tax rate that can be imposed under the peace scenario. For large resource stocks this last force prevails. Thus, for a sufficiently large amount of natural resources, the ruler should deploy the entire army for deterrence to be successful. This, however, makes the ruler powerless vis-a-vis the potentially rebellious ethnic groups. As a consequence the ruler's payoff is nil. When the presence of abundant resources makes the country very unstable, the ruler finds it more profitable not to avert a civil conflict and to profit from it (by imposing larger tax rates), instead of devoting a large share of his army to maintain peace.

It is worth stressing that the ruler's decision depends on the amount of natural resources *relative* to labor productivity. Throughout this paper we consider a unit marginal productivity of labor. Had we allowed for a more efficient production technology this would have increased the threshold level of natural resources conducive to a conflict equilibrium without, however, qualitatively modifying the findings.

In Figure 2 we present the results of a simulation that helps visualizing Proposition 3. While the horizontal axis represents the level of natural resources in the country, the vertical axis measures the utility of the ruler. The dashed curve describes the utility of the ruler under conflict. Instead, the solid curve represents the utility of the ruler if he decided to maintain peace in the country.

While U_L^C is monotonically increasing in R, U_L^P experiences a decrease in R for large stocks of natural resources. Indeed, for large values of R securing peace leaves the ruler with relatively little forces to face a potential rebellion. As a consequence the effect of additional increments of resources on the tax rates under peace becomes increasingly important and eventually exactly offsets the increase in the tax base. This occurs for the level of resources for which the solid curve reaches its maximum. For any larger stocks of natural resources, the tax base expansion does not compensate for the reduction in the tax rates. The negative slope of U_L^P for large resource stocks in Figure 2 captures these dynamics. Eventually, for $R > \bar{R}$, the ruler is better off under civil conflict.

The last comparative statics exercise highlights the role of inequality, i.e. whether and how the initial distribution of natural resources across the two ethnic groups influences the ruler's policy decisions. The next proposition addresses this issue.

Proposition 4. *Higher inequality in initial resource endowments increases the occurrence of civil conflicts.*

Proof. A formal proof is provided in Appendix A.3. □

The impact of inequality on the emergence of an internal conflict has been widely investigated in the literature.[11] From our model we can show that a more unequal distribution of natural resources across groups in the society makes the deterrence strategy more costly for the ruler because of the higher incentives for the society's poorest group to violently appropriate resources. As a consequence, when governing a society characterized by high inequality in the distribution of resorces, a ruler finds it more profitable to have an inefficient conflict over resources, and to exploit his subjects through higher tax rates.

We can now summarize the main findings of the model. We have shown that it may be in the interest of an autocratic ruler to foster an inefficient internal conflict in a divided

[11] Early studies posit that conflicts are mainly triggered by strong grievances (Gurr 1970, Scott 1976). More recently, Fearon and Laitin (2003) and Collier and Hoeffler (2004), among others, challenged this view. Various scholars nevertheless insist on pointing at the increased likelihood of observing conflicts in the presence of unequal distribution of resources (Murshed and Gates 2005, Hidalgo et al. 2010, De Luca and Sekeris 2010).

society by foregoing the peace-keeping role of the army under his control. Such conflicts imply a partial loss of the ruler's tax base since otherwise productive labor gets diverted towards fighting. By protecting himself with the entire army, on the other hand, the ruler can impose higher tax rates which more than compensate the loss in terms of tax base. Our comparative statics predict that internal conflict is more likely to be fostered: (i) by a relatively weak ruler, (ii) in the presence of abundant natural resources, and (iii) in societies where natural resources are distributed less equally.

The next section confronts these predictions to cross-country data on civil wars in recent history.

4 Empirical evidence

We now test the main predictions of the model. We focus for our main empirical analysis on Propositions 1 to 3, which describe the effect of ruler weakness (Propositions 1 and 2) and the stock of natural resources (Proposition 3) on the probability that a civil conflict occurs in an autocratic country that features an ethnic divide. Since we do not have good data on the distribution of natural resources within countries, our test of Proposition 4 is only suggestive and we leave it in the appendix (see section A.4).

Note that, taken together, Propositions 1 to 3 imply that civil conflicts (in ethnically polarized, autocratic societies) occur if two conditions are met: the autocrat must be weak enough, and there should be enough natural resources. We can test this empirically by looking at the effect on the probability of civil war occurrence of the interaction between natural resources and some proxy of the dictator's *weakness* in the subsample of autocratic, ethnically polarized countries. Such is the essence of our empirical strategy, which we explain in detail after we describe the data.[12]

4.1 Data and sample

The dependent variable is a dummy that describes whether a civil conflict took place in country i at year t. The source is the Uppsala/PRIO conflict dataset, available from the Uppsala Conflict Data Program (Gleditsch et al. 2001).[13]

[12]It is important to stress upfront that our empirical exercise is guided by the predictions of our model, and that we are not claiming any clean identification or strong causal interpretation in the empirical exercise, beyond what the theoretical model suggests.

[13]While we present results that use the broader definition of internal conflict of the Uppsala/PRIO data, namely an armed challenge to the central government by an organized group that produces at least 25 battle related deaths over the course of the year, our results are robust to limiting the sample to definitions that increase the battle death threshold.

We use the Polity IV dataset (Marshall and Jaggers 2002), which assigns to each country (each year) a score in the autocracy–democracy spectrum. Because our story is one of the incentives of autocratic rulers, we keep only the subsample of countries closer to pure autocracy using as threshold the median of the distribution of country-years in the regime type spectrum. Our results are robust to variations in the arbitrary cutoff.

Similarly, and in line with our model which highlights that the perverse incentives of the autocratic ruler occur in ethnically polarized societies, our sample of country-years gets further reduced when we take the countries above the median of the ethnic polarization index of Montalvo and Reynal-Querol (2005). Again, our results are robust to variations in this cutoff.

Mainly because of the availability of income data for a large set of countries (source: PWT 6.3, Heston et al. 2009), our sample covers the period 1960–2007.

Table 1 reports the summary statistics of the main set of variables used in the analysis. We report the summary statistics for the entire sample of autocrats, that of ethnically polarized autocracies, and also that of ethnically polarized autocracies that have an unequal distribution of natural resources according to our proxy of resource distribution.[14] In the sample of autocracies (top panel of Table 1) civil war occurs in 14.4% of the country-years. The middle panel of Table 1 shows that the mean incidence of civil war is reduced slightly (13.5%) when looking at the sample of ethnically polarized autocracies.[15]

Our proxy for the presence of natural resources is a time-varying dummy that equals one if a country produces either oil or diamonds. We compute this using two recent and comprehensive datasets that record longitudinal world-wide production of the two minerals (oil: Lujala et al. 2007; diamonds: Gilmore et al. 2005). Roughly 41-42% of the observations produce either or both minerals and this is true both for the sample of autocracies and for that of ethnically polarized autocracies (Table 1).

We control in our regressions for the variables identified by the recent cross-country literature as the most robust correlates of civil war (Collier and Hoeffler 2004 and Fearon and Laitin 2003). These include population, which we also add as a scale control, per capita GDP and its rate of growth, and the proportion of mountainous terrain which controls for the geographic characteristics facilitating the mobilization of rebellious movements. In addition, we control for how open countries are to international markets and add regional dummies.

[14] The proxy is the inverse of the number of oil fields in each country-year (source: Lujala et al. 2007). We take the countries below the median number of fields as indicating the places where resource distribution is likely to be worse. Our results are robust to changes in this cutoff. Because this proxy is only a rough approximation of the actual distribution of natural resources among groups in society, we treat this analysis as exploratory and leave it in the appendix (section A.4).

[15] The mean incidence gets further reduced if the sample is restricted to the countries with unequal distribution of resources (10.1%).

The descriptive statistics of these variables are reported on Table 1.

4.2 Empirical strategy

Propositions 1/2 and Proposition 3 of our model imply that, within the sample of ethnically polarized autocracies, civil conflicts are more likely to occur in places with natural resources (which constitute an incentive to engage in war against other groups) and when the autocrat is weak (which makes him less likely to devote soldiers to prevent inter-group fighting).

Our main empirical specification looks at these predictions jointly by looking at the effect on the probability that civil war takes place in a given country at a given time, of the interaction between the dummy for resource presence and our proxy for weakness of the dictator.

For the latter we exploit the time variation provided by the end of the Cold War, an event which has been widely identified as a negative shock to regimes that received aid from either the US or the Eastern Bloc. Indeed, Reno (1997, 1998), and Ndulu and O′Connell (1999) document how the end of the Cold War came with the decline of interest for the African continent. In addition, Boschini and Olofsgard (2007) estimate that the amount of foreign aid from the West was systematically higher in periods of increased security concerns, as measured by estimated military expenditures in the former Eastern Bloc, only during the Cold War era. Similarly, Fleck and Kilby (2010) demonstrate that foreign aid has not targeted the neediest countries during both the Cold War and the War on Terror (after 2001). Moreover Berthelémy and Tichit (2004) emphasize that since the beginning of the 1990s, aid was directed according to economic criteria as opposed to global strategic reasons.

Thus, we estimate:

$$Y_{i,t} = \alpha + \beta_1 PostColdWar_t + \beta_2 NatRes_{i,t} + \gamma(PostColdWar \times NatRes)_{i,t} + \delta X_{i,t} + \varepsilon_{i,t} \quad (26)$$

where $Y_{i,t}$ is a dummy that equals one if civil wars took place in country i at year t, $PostColdWar_t$ is a time dummy that takes value one starting in 1990, $NatRes_{i,t}$ is a dummy that equals one if country i produces either oil or diamonds at time t, $X_{i,t}$ is a vector of time-varying controls, and $\varepsilon_{i,t}$ is the error term.

The coefficient of interest is γ, which captures the effect on the incidence of civil war of the interaction between the presence of natural resources and the weakness of the dictator.

4.3 Main results and robustness

We estimate equation (26) with a linear probability model.[16] Table 2 reports the benchmark results focusing on γ, the coefficient of interest.

The difference between columns 1 and 2 is that, while the former uses the entire sample of autocracies, column 2 is closer to our model in the sense that it looks at the subsample with higher values in the ethnic polarization index. Interestingly, the positive effect of the interaction between the post Cold War dummy and the presence of natural resources on the likelihood of civil war incidence is higher in the latter subsample, and we stick to it for the remainder of the empirical analysis. According to the estimated coefficient of column 2, which is significant at the 1% level, the probability that an ethnicaly polarized autocracy experiences civil war increases by 8.8 percentage points when the autocrat is weak and the country has natural resources.

Columns 3 to 6 illustrate the robustness of our result by additively including various controls. We start with the variables identified in the cross country empirical literature as the most robust correlates of civil war (column 3). These are population size, per capita GDP (both of which we measure in logs) and the rate of growth of the economy.[17] The size of the coefficient is virtually unchanged compared to the regressions without controls. Column 4 adds two additional controls, also frequently significant in the empirical literature, namely the roughness of the terrain (as measured by the proportion of mountainous terrain from Fearon and Laitin's dataset) and openness. The coefficient does not lose significance but doubles in magnitude. Now the interaction of interest increases the probability of civil war in 17 percentage points. This estimate remains very similar (16 percentage points) when introducing regional dummies that capture continent-specific heterogeneity (column 5). The last column of Table 2 shows that clustering the standard errors at the country level does not kill the significance of the effect.[18]

[16] Angrist and Pischke (2008) argue that OLS consistently estimates the linear conditional expectation function and minimizes mean-squared error and, for binary outcomes, recommend linear probability models over limited dependent variable models like Probit or Logit. However, all our results are robust to fitting a Probit model on (26).

[17] The other variable robustly associated with civil war is the presence of natural resources, especially oil. This specific variable is part of our interaction of interest and we include the non interacted version of it [recall equation (26)].

[18] Table A.4 in the appendix repeats the exercise carried out from columns 2 through 6 in a subsample that (beyond the autocracy and ethnic polarization requirements) focuses on countries with unequal distribution of natural resources. We do so as a preliminary test of Proposition 4, which states that the incentive for autocrats to let civil war surge in their countries is higher the more unequal is the distribution of resources. The interaction of interest is not only positive and significant across columns, but it is also larger in magnitude which could be interpreted as support of the proposition.

4.4 Additional robustness checks

The empirical association reported on Table 2 between the incidence of civil war and the interaction of natural resources with the weakness of the ruler is very supportive of our theory. We have shown that this association is robust to controlling for the relevant correlates of civil war identified in the cross-country empirical literature and that it survives the inclusion of continent dummies and even a stringent correction of the standard errors (when we cluster them at the country level). We now look at the robustness of this association to additional tests and alternative measures of our independent variables of interest.

Table 3 presents the additional robustness checks. The first two columns include, additively, country and year fixed-effects. This controls for country specific time-invariant heterogeneity, as well as for time shocks that are common across countries. That is, we estimate the following variant of the model described in (26):

$$Y_{i,t} = \alpha_i + \lambda_t + b_2 NatRes_{i,t} + g(PostColdWar \times NatRes)_{i,t} + \delta X_{i,t} + \epsilon_{i,t}$$

where, in addition to the terms already defined, α_i and λ_t are respectively country and year fixed effects.[19]

The coefficient on our interaction of interest (in this case g) remains positive and significant.

Our main proxy for the weakness of the autocrat is a dummy for the post Cold War period. One limitation of this variable is that it presents no time variation across units or in terms of intensity. As shown respectively in columns 3 and 4 of Table 3, our results are robust to using two other proxies of weakness. Borrowed from the dataset constructed by Humphreys (2005), we look at the interaction of the presence of natural resources with a measure of regime *instability* as well as a measure of regime *strength*, both country and time-varying. Results are still consistent with our theoretical predictions: the interaction between natural resources and regime stability is positive and significant and, conversely, that between natural resources and regime strength is negative and significant. While this robustness is reassuring, our preferred proxy is the dummy for the post Cold War period because the Humphreys variables are not available for the whole sample and they may also have endogeneity problems that are less likely to be present when using the dummy.

Finally, the last two columns disaggregate our benchmark measure of natural resources' presence (a dummy that equals one if a country produces either oil or diamonds in a given year) into two: a dummy for production of oil only (column 5) and one for the production

[19] Note that the variable $PostColdWar$ is not included in its non interacted version. This is because it is a time dummy that gets absorbed by the year fixed-effect.

of diamonds. The estimated coefficient is significant in both cases which suggests that the results are not driven by having the two commodities simultaneously.[20]

Overall, we find a strong support in the data for our political economy story of the perverse incentives of autocrats to profit from ethnic strife in weakly institutionalized and ethnically polarized societies.

5 Conclusions

The observation that some weak autocrats ruling over ethnically divided societies seem to have avoided intervening to control the escalation of violent conflict in their countries (if not favored such escalation altogether) is puzzling and, to the best of our knowledge, no explanation has been offered in the social science literature. We propose a theoretical framework that, by emphasizing the private incentives of autocrats in natural resource-rich, ethnically divided societies, provides a rational explanation to such behavior. In our model, a rent maximizer dictator sets taxes on production and natural resources and allocates military effort both to protect himself from a potential rebellion and to deter the occurrence of civil conflict among the ethnic groups. The occurrence of civil conflict undermines the tax base by disrupting production but also lowers the probability that a group revolts, hence empowering the ruler to set higher tax rates. We then show that weaker rulers (in the sense that are less able to defend their regime) profit from the incidence of civil strife. When the primary source of revenue comes from taxing natural resources the disruption that conflict has on the production economy is lower. Thus a second prediction of our model is that the autocrat's gains from internal conflict are proportional to the country's endowment of natural resources. Moreover, we also show that the civil war dividend for the ruler is increasing in the inequality of resource ownership across ethnic groups. This is explained by the predatory incentives of the disadvantaged group toward the confiscating the assets of the other *vis à vis* engaging in a coup attempt.

But in the paper we go beyond the model and back its predictions with empirical evidence. In line with the model's setting, we look at the subsample of ethnically polarized, autocratic countries over the period 1960-2007. Our dependent variable is the incidence of civil war and our coefficient of interest is the interaction between a dummy for the presence of natural resources and a dummy for the post Cold War period. The latter is our benchmark proxy for the weakness of the autocrat since it identifies a period when most dictatorial regimes lost both geo-strategic importance and access to financial resources. The coefficient associated

[20]The magnitude of the coefficient is about three times larger when using the productions of diamonds as the proxy for natural resources as opposed of using the production of oil.

with the interaction, which supports our main theoretical predictions, is positive, significant, and robust to a variety of controls and the inclusion of country and time-fixed effects: The incidence of internal strife is higher in ethnically polarized countries ruled by weak dictators and rich in natural resources. We also find suggestive evidence that this effect is bigger in places with worse distribution of natural resources.

Our paper contributes to the recent political economy literature on the incentives of autocratic leaders in ethnically polarized and weakly institutionalized societies. By suggesting a driver of civl war that had not previously been emphasized in the literature, we call attention to a seemingly unintended consequence of international efforts for weakening the leaders of autocratic regimes. This suggests that embargoes and other measures that aim at weakening local autocrats in the quest for a more democratic world ought to be weighted against alternative policies when rulers have incentives to hold on to power by any means, even at the expense of the life of their people.

Table 1: Descriptive Statistics

	Obs.	Mean	Std. Dev.	Min.	Max.	Source
Sample of autocracies						
Incidence of civil war	6,472	0.144	0.351	0	1	UCDP
Log Population	6,472	7.926	2.150	2.249	14.095	PWT 6.3
Log Real GDP pc	5,220	8.365	1.180	5.733	11.624	PWT 6.3
GDP growth	5,124	2.269	8.249	-64.360	131.243	PWT 6.3
Log Mountainous terr.	4,696	2.053	1.453	0	4.557	F&L (2003)
Log Openness	5,220	4.222	0.694	0.697	6.434	PWT 6.3
Dummy Prod. Nat. Res	6,472	0.416	0.493	0	1	Lujala et al. (2007)
Sample of ethnically polarized autocracies						
Incidence of civil war	4,312	0.135	0.342	0	1	UCDP
Log Population	4,312	7.815	2.150	2.249	14.095	PWT 6.3
Log Real GDP pc	3,225	8.425	1.161	5.743	11.624	PWT 6.3
GDP growth	3,162	2.356	8.891	-64.360	131.243	PWT 6.3
Log Mountainous terr.	3,064	2.249	1.415	0	4.557	F&L (2003)
Log Openness	3,225	4.221	0.748	0.697	6.434	PWT 6.3
Dummy Prod. Nat. Res	4,312	0.414	0.493	0	1	CSCW/PRIO
Sample of ethnically polarized autocracies with unequal resource dist.						
Incidence of civil war	3,479	0.101	0.301	0	1	UCDP
Log Population	3,479	7.295	1.937	2.249	11.353	PWT 6.3
Log Real GDP pc	2,638	8.406	1.173	5.743	11.624	PWT 6.3
GDP growth	2,585	2.277	8.839	-46.877	131.243	PWT 6.3
Log Mountainous terr.	2,231	1.969	1.466	0	4.557	F&L (2003)
Log Openness	2,638	4.296	0.719	0.697	6.434	PWT 6.3
Dummy Prod. Nat. Res	3,479	0.323	0.468	0	1	CSCW/PRIO

Notes: UCDP is the Uppsala Centre Data Program that maintains the Uppsala/PRIO Armed Conflict Dataset (Gleditsch et al. 2001). PWT is the Penn World Table (Heston et al. 2009). F&L (2003) is the seminal paper of Fearon and Laitin (2003).

Table 2: Benchmark results

Linear probability model. Dependent variable: *Civil war incidence*	(1)	(2)	(3)	(4)	(5)	(6)
Post Cold War x	0.069***	0.088***	0.082***	0.171***	0.164***	0.164*
Resource presence	(0.019)	(0.023)	(0.026)	(0.034)	(0.033)	(0.086)
Controls						
Population			X	X	X	X
GDP level			X	X	X	X
GDP growth			X	X	X	X
Rough terrain				X	X	X
Openness				X	X	X
Regional dummies					X	X
Country cluster						X
Observations	6,472	4,312	3,162	2,240	2,240	2,240
R-squared	0.019	0.019	0.146	0.124	0.160	0.160

Notes: Robust standard errors in parentheses. Post Cold War end is a time-dummy that equals 1 for the post-Cold War period. Resource presence is a dummy that equals 1 for the country-years with positive production of either oil or diamonds, according to the DIADATA and PETRODATA from The CSCW at PRIO. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

Table 3: Additional robustness checks

Linear probability model. Dependent variable: *Civil war incidence*

	Fixed effects		**Weakness measure**		**Measure of N. Res.**	
	Country fe	Year fe	Instability	Strength	Oil	Diamonds
	(1)	(2)	(3)	(4)	(5)	(6)
Post Cold War x	0.113*	0.123*				
Resource presence	(0.065)	(0.066)				
Instability x			0.140*			
Resource presence			(0.077)			
Strength x				-.131**		
Resource presence				(0.060)		
Post Cold War x					0.051***	
Oil presence					(0.012)	
Post Cold War x						0.150***
Diamonds presence						(0.042)
Country fixed effects	X	X				
Year fixed effects		X				
Observations	3,479	3,479	1,519	1,499	1,783	4,099
R-squared	0.024	0.047	0.040	0.043	0.013	0.006

Notes: Robust standard errors in parentheses. Post Cold War end is a time-dummy that equals 1 for the post-Cold War period. Resource presence is a dummy that equals 1 for the country-years with positive production of either oil or diamonds. Columns (3) and (4) use two different proxies of weakness, both taken from Humphreys (2005): Instability is Fearon and Laitins (2003) measure of political instability and Strength is a combination of Instability and the anocracy measure of the same authors. Oil presence and Diamonds presence are dummies that equal 1 for the country-years with positive production of oil and diamonds respectively. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

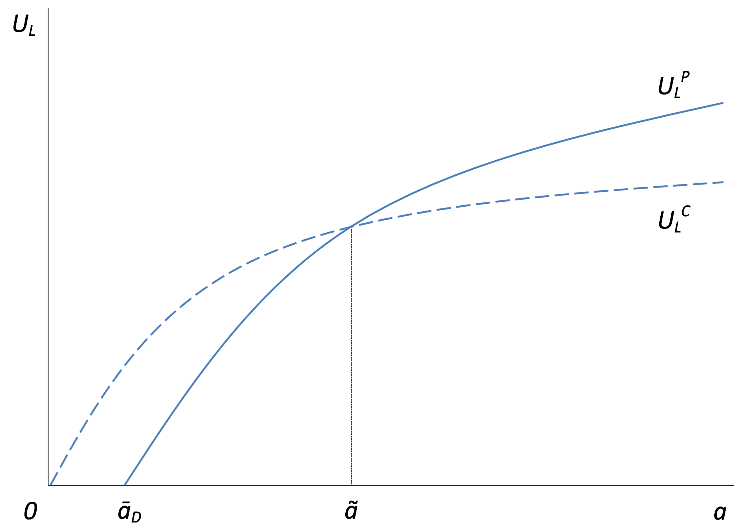

Figure 1: The effect of the ruler's strength.

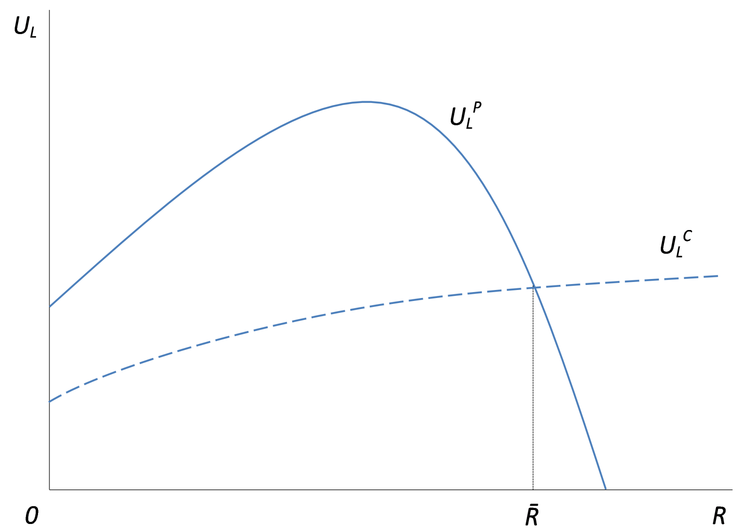

Figure 2: The effect of natural resources.

A Appendix

A.1 Proof of Proposition 2

We need to prove the existence and uniqueness of an army size $\underline{a}$ such that $U_L^P < U_L^C$, $\forall a < \underline{a}$ and $U_L^P > U_L^C$, $\forall a > \underline{a}$. In order to ease the exposition, it is useful to highlight some features that will be used throughout the proof. Notice that the groups' militia reaction functions, $f_i(.)$, are monotonically increasing in the opponents' strength. As a consequence, there always exists a level of a such that the optimal rebellion army equals n. Define by $\hat{a}$ the ruler's army size such that $f_i^{PR} = n$, when $\varphi_i = 1$ (i.e. in the most unequal case). A second important feature directly linked to the previous point is that the utility of the ruler is the lowest when φ_i takes the extreme values of 0 or 1, thus implying that should our reasoning hold for $\varphi_i = 1$, it can always be reproduced for any φ_i.

Since the utilities U_L^P and U_L^C behave differently for interior and corner solutions, we provide the proof for two subcases:

Case 1: $R < 2n$ which implies that at the conflict equilibrium, $f_i^C < n$

Case 2: $R \geq 2n$ which implies that $f_i^C = n$

Case 1

The sketch of the proof is the following. We show that $\exists a = \bar{a}_D$ below which U_L^P is not defined, and at which $U_L^C(\bar{a}_D) > U_L^P(\bar{a}_D) = 0$. We then show that both U_L^P and U_L^C increase monotonically in a, with U_L^P growing at a faster rate. Finally we show that $\exists a = \hat{a}$ in which $U_L^P(\hat{a}) > U_L^C(\hat{a})$, thus implying that U_L^P and U_L^C cross only one time.

To prove the claim in the proposition it is sufficient to show the following conditions:

1. $\partial U_L^P / \partial a > \partial U_L^C / \partial a > 0$
2. $U_L^C = 0$ for $a = 0$
3. $U_L^P = 0$ for $a = \bar{a}_D$
4. $\lim_{a \to \infty} U_L^C = \frac{2}{3}(n + R)$
5. $U_L^P(\hat{a}) \geq \lim_{a \to \infty} U_L^C$

To verify whether condition 1 is satisfied we compute the two partial derivatives:

$$\frac{\partial U_L^P}{\partial a} = -4 + \left((a - \bar{a}_D + n + \varphi_A R)^{1/2} + (a - \bar{a}_D + n + \varphi_B R)^{1/2} \right) (a - \bar{a}_D)^{-1/2}$$
$$+ \left((a - \bar{a}_D + n + \varphi_A R)^{-1/2} + (a - \bar{a}_D + n + \varphi_B R)^{-1/2} \right) (a - \bar{a}_D)^{1/2} \tag{27}$$

Denote $(a - \bar{a}_D + n + \varphi_A R)$ by $\bar{X}_A$, $(a - \bar{a}_D + n + \varphi_B R)$ by $\bar{X}_B$, and $(a - \bar{a}_D)$ by $\underline{X}$. The last expression becomes:

$$\frac{\partial U_L^P}{\partial a} = -4 + \left(\bar{X}_A^{1/2} + \bar{X}_B^{1/2}\underline{X}\right)^{-1/2} + \left(\bar{X}_A^{-1/2} + \bar{X}_B^{-1/2}\right)\underline{X}^{1/2} \tag{28}$$

The partial derivative on U_L^C is given by:

$$\frac{\partial U_L^C}{\partial a} = -4 + 2\left((n+R+3a)^{1/2}\left(4(n+R)+3a\right)^{-1/2}\right) + \\ 2\left((n+R+3a)^{-1/2}\left(4(n+R)+3a\right)^{1/2}\right) \tag{29}$$

Denoting $(n+R+3a)$ by $\underline{Y}$, and $(4(n+R)+3a)$ by $\bar{Y}$, this expression becomes:

$$\frac{\partial U_L^C}{\partial a} = -4 + 2\left(\underline{Y}^{1/2}\bar{Y}^{-1/2} + \underline{Y}^{-1/2}\bar{Y}^{1/2}\right)$$

Notice that both derivatives contains terms with the same structure, which respect the following condition:

$$\left(\frac{\alpha}{\beta}\right)^{1/2} + \left(\frac{\beta}{\alpha}\right)^{1/2} \geq 1 \qquad \text{where} \quad \alpha, \beta > 0$$

This implies that both derivatives are weakly positive.
For (27) to be larger than (29), the following condition should hold:

$$\left(\bar{X}_A^{1/2} + \bar{X}_B^{1/2}\right)\underline{X}^{-1/2} + \left(\bar{X}_A^{-1/2} + \bar{X}_B^{-1/2}\right)\underline{X}^{1/2} > 2\left(\underline{Y}^{1/2}\bar{Y}^{-1/2} + \underline{Y}^{-1/2}\bar{Y}^{1/2}\right)$$

which is true if the following two inequalities are satisfied:

$$\begin{cases} \bar{X}_A^{1/2}\underline{X}^{-1/2} + \bar{X}_A^{-1/2}\underline{X}^{1/2} > \underline{Y}^{1/2}\bar{Y}^{-1/2} + \underline{Y}^{-1/2}\bar{Y}^{1/2} \\ \bar{X}_B^{1/2}\underline{X}^{-1/2} + \bar{X}_B^{-1/2}\underline{X}^{1/2} > \underline{Y}^{1/2}\bar{Y}^{-1/2} + \underline{Y}^{-1/2}\bar{Y}^{1/2} \end{cases}$$

The first inequality is satisfied if:

$$\left|\bar{X}_A - \underline{X}\right| < \left|\bar{Y} - \underline{Y}\right|$$

Substituting the original values of $\bar{X}_A$, $\underline{X}$, $\bar{Y}$ and $\underline{Y}$, we obtain:

$$n + \varphi_A R < 3(n+R)$$

which is always true. Similarly, the second inequality is satisfied if:

$$n + \varphi_B R < 3(n+R)$$

which is always true. This establishes Condition 1.

Condition 2 is verified by setting $a = 0$ in U_L^C as given by (25). Similarly, condition 3 is verified by substituting $a = \bar{a}_D$ in (24).

Let us consider condition 4. Since $\lim_{a\to\infty} \tau_i^C = 1$, the ruler can appropriate the entire tax base, which in the interior conflict equilibrium equals $\frac{2}{3}(n+R)$.

In order to tackle condition 5, we first compute $\hat{a}$. This value is found by setting the fighters' best response when rebelling equal n. This level of a should then satisfy:

$$(\hat{a}-a_D)^{1/2}(\hat{a}-a_D+n+R)^{1/2}-(\hat{a}-a_D)=n \quad \Leftrightarrow (\hat{a}-a_D)(R-n)=n^2$$

Using a_D as given by (23) with $\varphi_i=1$ yields:

$$\hat{a}=\frac{n^2}{R-n}+\frac{R^2}{4n}$$

The utility of group i of rebelling under peace when constrained ($a\geq\hat{a}$) is given by:

$$U_i^{PR}|a\geq\hat{a}=\frac{n}{n+a-\bar{a}_D}R \tag{30}$$

Equating this expression to U_i^P yields the 'corner' tax rate from which we can obtain the utility of the ruler in $\hat{a}$:

$$U_L^P(\hat{a})=n+R-\frac{nR}{n+\frac{n^2}{R-n}}+\tau_{-i}n=(2+\tau_{-i})\,n$$

Where $\tau_{-i}n$ is the tax revenue collected on the non-rebelling group whose share of natural resources is $\varphi_{-i}=0$.

It is straightforward to show that condition 5 holds for $R<2n$, and $\tau_{-i}\geq 0$:

$$U_L^P=(2+\tau_{-i})\,n\geq\frac{2}{3}(n+R)=\lim_{a\to\infty}U_L^C(a)$$

Case 2

It is useful to sketch the proof of this case as well. We first repeat the steps of the interior Case 1 (steps $1-3$). We then verify that for values of a sufficiently large to induce all individuals in the rebelling group to specialize as fighters, $f_i=n$, the utility of the ruler under peace grows at an even faster rate, thus implying that there is only one crossing between U_L^P and U_L^C for the entire range of admissible values of a (condition 4).

To prove the claim in the proposition it is sufficient to show the following conditions:

1. $\partial U_L^P/\partial a>\partial U_L^C/\partial a$
2. $U_L^C=0$ for $a=0$
3. $\lim_{a\to\infty}U_L^C<\lim_{a\to\infty}U_L^P$
4. Denote by $U_L^{\hat{P}}$ the utility of the ruler under peace if the optimal rebellion for the wealthier group implies everybody rebelling. Then, $\partial U_L^{\hat{P}}/\partial a>\partial U_L^P/\partial a$.

Let us start by computing U_L^C and U_L^P for $R>2n$. Since for $R\geq 2n$ in the conflict scenario all agents are fighters, in case of rebellion and conflict all agents would be fighters as well (because f_i^{CR} is increasing in the opponents' strength). The equilibrium conflict tax rate and U_L^C are thus given by:

$$(1-\tau_i^C)\frac{R}{2}=\frac{n}{2n+a}R \Leftrightarrow \tau_i^C=\frac{a}{2n+a} \text{ and } U_L^C=\frac{a}{2n+a}R \tag{31}$$

Given the construction of the proof, in the peace scenario, we concentrate on the most unequal case, which yields the lowest utility to the ruler. It can be shown that $\bar{a}_D$ as given by (23) would be unnecessarily high for $R>2n$, as $f_i^C(\bar{a}_D)>n$. The adjusted $\bar{a}_D$ which deters the group with no resources from attacking the other group is instead given by:

$$U_{-i}^P=(1-\tau^P)n=(1-\tau^P)\frac{n}{n+\hat{a}_D}R=U_{-i}^C \Rightarrow \hat{a}_D=R-n$$

For any $a<R-n$, U_L^P is not defined, and conflict is the only equilibrium. Like for Case 1, there exists a value of a that we denote by $\hat{a}$ such that $\forall a\geq\hat{a}$, $f_i^{PR}=n$. If $a<\hat{a}$ then U_L^P is given by (24) with $\hat{a}_D=R-n$.

We can now consider condition 1. Notice that $\partial U_L^P/\partial a$ is given by (27) with $\bar{a}_D=R-n$. We still need to compute $\partial U_L^C/\partial a$:

$$\frac{\partial U_L^C}{\partial a}=\frac{2n}{(2n+a)^2}R$$

Imposing condition 1:

$$\left(\frac{a-R+2n}{a-R+n}\right)^{1/2}+\left(\frac{a+2n}{a-R+n}\right)^{1/2}+\left(\frac{a-R+n}{a-R+2n}\right)^{1/2}+$$
$$\left(\frac{a-R+n}{a+2n}\right)^{1/2}-4>\frac{2nR}{(2n+a)^2}$$

Notice first that since $(a+2n)-(a-R+n)>(a-R+n)-(a-R+n)$, then:

$$\left(\frac{a+2n}{a-R+n}\right)^{1/2}+\left(\frac{a-R+n}{a+2n}\right)^{1/2}>\left(\frac{a-R+2n}{a-R+n}\right)^{1/2}+\left(\frac{a-R+n}{a-R+2n}\right)^{1/2}>2$$

Therefore, denoting $\lambda=\frac{nR}{(2n+a)^2}$, it is sufficient to show:

$$\left(\frac{a+2n}{a-R+n}\right)^{1/2}+\left(\frac{a-R+n}{a+2n}\right)^{1/2}>2\left(1+\lambda\right)$$

$$\Leftrightarrow \frac{a+2n+a-R+n}{2}>\left(1+\lambda\right)\left(a+2n\right)^{1/2}\left(a-R+n\right)^{1/2}$$

$$\Leftrightarrow \left(a+\frac{3}{2}n-\frac{1}{2}R\right)^2>\left(1+\lambda\right)\left(a+2n\right)\left(a-R+n\right)$$

$$\Leftrightarrow a^2+\frac{9}{4}n^2+\frac{1}{4}R^2+3an-aR-\frac{3}{2}Rn>\left(1+\lambda\right)\left(a^2-aR+3an-2Rn+2n^2\right)$$

$$\Leftrightarrow \left(\frac{n+R}{2}\right)^2>\lambda\left(a+2n\right)\left(a-R+n\right)$$

Replacing for λ we obtain:

$$(a+2n)\left(\frac{n+R}{2}\right)^2 > nR\,(a-R+n)$$

$$\Leftrightarrow a\,(n-R)^2 + 2n(n^2+3R^2) > 0$$

which is necessarily verified for positive R and n.

Condition 2 can be simply verified by setting $a=0$ in (31).

It can be shown that $\lim_{a\to\infty} U_L^C = R$ whereas $\lim_{a\to\infty} U_L^P = R+2n$ as both tax rates tend to unity, which implies that condition 3 is also verified.

To tackle condition 4, observe first that U_L^P can be re-written implicitly under the following form:

$$U_L^P = 2n + R - \sum_i \frac{f_i^{PR}}{f_i^{PR}+a-\bar{a}_D}\left(n - f_i^{PR} + \varphi_i R\right)$$

Taking the derivative with respect to a yields:

$$\partial U_L^P/\partial a = -\sum_i \frac{\partial \frac{f_i^{PR}}{f_i^{PR}+a-\bar{a}_D}\left(n-f_i^{PR}+\varphi_i R\right)}{\partial a}$$

$$\Leftrightarrow \sum_i -\left(\frac{f_i^{PR\prime}\left(f_i^{PR}+a-\bar{a}_D\right) - f_i^{PR}\left(f_i^{PR\prime}+1\right)}{\left(f_i^{PR}+a-\bar{a}_D\right)^2}\left(n-f_i^{PR}+\varphi_i R\right)\right) +$$

$$f_i^{PR\prime}\frac{f_i^{PR}}{f_i^{PR}+a-\bar{a}_D}$$

$$\Leftrightarrow \sum_i f_i^{PR\prime}\left(-\frac{(a-\bar{a}_D)\left(n-f_i^{PR}+\varphi_i R\right)}{\left(f_i^{PR}+a-\bar{a}_D\right)^2} + \frac{f_i^{PR}}{f_i^{PR}+a-\bar{a}_D}\right) +$$

$$\frac{f_i^{PR}}{\left(f_i^{PR}+a-\bar{a}_D\right)^2}\left(n-f_i^{PR}+\varphi_i R\right)$$

Recall that the FOC for group i, when deciding on f_i^{PR} requires in the interior:

$$\frac{f_i^{PR}}{f_i^{PR}+a-\bar{a}_D} = \frac{(a-\bar{a}_D)\left(n-f_i^{PR}+\varphi_i R\right)}{\left(f_i^{PR}+a-\bar{a}_D\right)^2}$$

If, however, group i is constrained to n when choosing f_i^{PR}, then it would fail to optimally adjust to futher increases in a. This in turn, implies a larger increase of U_L^P for further increases in a.

A.2 Proof of Proposition 3

The variable of interest being R, the utilities are expressed as a function of R. To prove Proposition 3 we sequentially establish the following results:

1. $U_L^P(0) > U_L^C(0)$

2. $\frac{\partial U_L^C(R)}{\partial R} > 0$

3. $\exists \hat{R} > 0$ such that $\partial U_L^C(R)/\partial R$ is constant $\forall R \geq \hat{R}$

4. $U_L^P(0) > U_L^C(\hat{R})$

5. $\frac{\partial^2 U_L^2(R)}{\partial R^2} < 0$

6. $\exists \bar{R}$ such that $U_L^P(\bar{R}) = 0$

Before dealing with each condition in isolation, we briefly explain the intuition of the general proof. By establishing that U_L^P is larger than U_L^C in $R = 0$ (Condition 1), and that the opposite holds true for some $\bar{R}$ (Conditions 2 and 6), we show that there exists at least one switching value of R in the vicinity of which the deterrent strategy is preferable for $R < \bar{R}$ and the conflict strategy is prefered of $R > \bar{R}$. The remaining conditions ensure the unicity of this threshold. Indeed, Conditions 2, 4 and 5 guarantee that if the crossing between U_L^P and U_L^C occurs for $R < \bar{R}$, then $\partial U_L^P/\partial R < 0$, thus necessarily implying that $\partial U_L^C/\partial R > \partial U_L^P/\partial R$ for all $R \geq \bar{R}$ because of conditions 2 and 5. On the other hand, condition 3 ensures us that if the crossing between U_L^P and U_L^C occurs for $R \geq \bar{R}$, then the linearity of U_L^C together with the concavity of U_L^P secures the unicity result.
1. Regarding the first point, notice that if $R = 0$, then $a_D = 0$, as no army is needed to deter a war over resources. Condition 1 is therefore verified if the following inequality holds:

$$U_L^P(0) = 2n - 2\left[((a+n)^{1/2} - (a)^{1/2}\right]^2 > \frac{2}{3}\left[n - \left[(4n+3a)^{1/2} - (n+3a)^{1/2}\right]^2\right] = U_L^C(0)$$

After some algebraic manipulation this expression reduces to:

$$2\left(a^2 + an\right)^{1/2} > a \tag{32}$$

And this is always true.
2. Computing next the partial derivative of Condition 2 gives us:

$$\frac{\partial U_L^C(R)}{\partial R} = \frac{2}{3}\left(4\left(\frac{n+R+3a}{4(n+R)+3a}\right)^{1/2} + \left(\frac{4(n+R)+3a}{n+R+3a}\right)^{1/2} - 1\right)$$

Using the notation $X = \frac{n+R+3a}{4(n+R)+3a}$, this term is positive if:

$$4X^{1/2} + X^{-1/2} > 1$$

Which is necessarily true $\forall X > 0$.
3. The third condition states that for any R larger to some threshold value $\bar{R}$, the ruler's utility under conflict is linear in C. The ruler's utility is linear when all individuals are fighting in the conflict scenario. This situation is therefore realized when $f_i^{C*} = n$ for both groups, which is verified when:

$$f_i^{C*} = \frac{\hat{R}+n}{3} = n \Rightarrow \hat{R} = 2n$$

The utility of the ruler when $R \geq \hat{R}$ equals $\frac{R+n}{3}$ and is therefore linear in R.
4. We now turn to Condition 4 which is verified if:

$$U_L^p(0) = 4a^{1/2}\left((a+n)^{1/2} - a^{1/2}\right) > \frac{2an}{2n+a} = U_L^c(\hat{R})$$

$$2\left((a+n)^{1/2} - a^{1/2}\right)(2n+a) > a^{1/2}n$$

$$\Leftrightarrow 4\left(2a+n-2(a+n)^{1/2}a^{1/2}\right)(2n+a)^2 > an^2$$

$$\Leftrightarrow 4\left(2a+n\right)(2n+a)^2 - an^2 > 2(a+n)^{1/2}a^{1/2}(2n+a)^2$$

$$\Leftrightarrow 16\left(2a+n\right)^2(2n+a)^4 + a^2n^4 - 8\left(2a+n\right)(2n+a)^2an^2 > 4(a+n)a(2n+a)^4$$

$$\Leftrightarrow 4(2n+a)^4\left(4(2a+n)^2 - (a+n)a\right) + a^2n^4 - 8\left(2a+n\right)(2n+a)^2an^2 > 0$$

This inequality is necessarily verified if we drop the second (positive) term from the LHS, thus implying that unicity is obtained if:

$$(2n+a)^2\left(4(2a+n)^2 - (a+n)a\right) > 4\left(2a+n\right)an^2 > 0$$

$$(2n+a)^2\left(15a^2 + 4n^2 + 15an\right) > 4\left(2a+n\right)an^2 > 0$$

And this last expression can easily be shown to be true.
5. For Condition 3 we need to consider various cases. On the one hand, a_D may be constrained in the sense that the minimal deterrent amount of guns is inferior to $a_D(f_i^{PC})$ (where $\varphi_i \geq 1/2$). On the other hand, $f_i^{PR}(a_D)$ may be constrained by n. We sequentially show that $U_L^P(R)$ is concave in all cases, starting with the fully unconstrained one.

The second order derivative of the unconstrained equilibrium utility function of the ruler under peace, U_L^P (equation 24) is given by:

$$\frac{\partial^2 U_L^P}{\partial R^2} = a_D^{''}(R)\left(\frac{\partial U_L^P/\partial R}{a_D^{'}}\right)$$

$$+\frac{a_D^{'}}{2}\sum_{i=A,B}\left(\frac{\varphi_i(a-a_d) + a_D^{'}(n+\varphi_i R)}{(a-a_D+n+\varphi_i R)^2}\left(\frac{a-a_D+n+\varphi_i R}{a-a_D}\right)^{1/2}\right)$$

$$-\frac{a_D^{'}}{2}\sum_{i=A,B}\left(\frac{\varphi_i(a-a_d) + a_D^{'}(n+\varphi_i R)}{(a-a_D)^2}\left(\frac{a-a_D}{a-a_D+n+\varphi_i R}\right)^{1/2}\right)$$

$$-\frac{a_D'}{2}\sum_{i=A,B}\varphi_i\left(\frac{a-a_D+n+\varphi_i R}{a-a_D}\right)^{1/2}\frac{\varphi_i(a-a_D)+a_D'(n+\varphi_i R)}{(a-a_D+n+\varphi_i)^2}$$

To establish quasi-concavity, it is sufficient to show that if $\frac{\partial U_L^P}{\partial R}=0$, then $\frac{\partial^2 U_L^P}{\partial R^2}<0$. Assume that $\frac{\partial^2 U_L^P}{\partial R^2}=0$. To conclude that $\frac{\partial^2 U_L^P}{\partial R^2}<0$, it is sufficient to show that the next inequality holds true for any i:

$$\frac{a_D'}{2}\left(\frac{\varphi_i(a-a_d)+a_D'(n+\varphi_i R)}{(a-a_D+n+\varphi_i R)^2}\left(\frac{a-a_D+n+\varphi_i R}{a-a_D}\right)^{1/2}\right)<$$
$$\frac{a_D'}{2}\left(\frac{\varphi_i(a-a_d)+a_D'(n+\varphi_i R)}{(a-a_D)^2}\left(\frac{a-a_D}{a-a_D+n+\varphi_i R}\right)^{1/2}\right)$$

Simplifying this expression, we obtain:

$$a_D'(n+\varphi_i R)>0$$

And this last term is necessarily positive.

In the second case, $a_D=\frac{nR}{\varphi_i R+n}-n$, thus implying that $a_D'>0$, and $a_D''>0$. By the same reasoning as in case 1, this implies that U_L^P is quasi-concave in R.

Lastly, we ought to consider the case where $f_i^{PR}(a_D)=n$. Assume that only group i is constrained (the reasoning extends straightforwardly to both groups being constrained), then U_L^P becomes:

$$U_L^P=2n+R-\left((a-a_D+n+\varphi_{-i}R)^{1/2}-(a-a_D)^{1/2}\right)^2-\frac{n\varphi_i R}{n+a_D}$$

By taking the second order derivative w.r.t. R, applying an analogous reasoning to the one employed in Case 1, we can establish quasi-concavity if the following expression is verified:

$$\frac{\partial^2\left(-\frac{n\varphi_i R}{n+a_D}\right)}{\partial R^2}\leq 0$$

And this can be shown to be true.

6. Condition 6 requires that $U_L^P(\bar{R})=0$ for some $\bar{R}>0$. Fixing $a=a'$, it is therefore sufficient to show that there exists a $\bar{R}$ such that $a_D(\bar{R})=a'$. Condition 6 is therefore satisfied by the fact that $\partial a_D(R)/\partial R>0$, whether a_D is constrained ($a_D=R-n$) or not ($a_D=(\varphi R)^2/(4(n+(1-\varphi)R))$).

A.3 Proof of Proposition 4

Notice first that increasing inequality, modeled as an increase of φ_i in the range $[1/2,1]$, enters the ruler's problem only in U_L^P. As a consequence we only need to check the sign of

$\frac{\partial U_L^P}{\partial \varphi_i}$ for $\varphi_i > 1/2$.

$$\frac{\partial U_L^P}{\partial \varphi_i} = -2\left[(a_L + n + \varphi_i R)^{\frac{1}{2}} - a_L^{\frac{1}{2}}\right]\left(\frac{a'_L + R}{2\left(a_L + n + \varphi_i R\right)^{1/2}} - \frac{a'_L}{2a_L^{1/2}}\right)$$

$$-2\left[\left(a_L + n + (1-\varphi_i)\,R\right)^{\frac{1}{2}} - a_L^{\frac{1}{2}}\right]\left(\frac{a'_L - R}{2\left(a_L + n + (1-\varphi_i)\,R\right)^{1/2}} - \frac{a'_L}{2a_L^{1/2}}\right)$$

where a'_L is a short notation for $\frac{\partial a_L}{\partial \varphi_i}$.
The last expression can be decomposed as:

$$-\left[(a_L + n + \varphi_i R)^{\frac{1}{2}} - a_L^{\frac{1}{2}}\right]\left(\frac{a'_L}{\left(a_L + n + \varphi_i R\right)^{1/2}} - \frac{a'_L}{a_L^{1/2}}\right)$$

$$-\left[\left(a_L + n + (1-\varphi_i)\,R\right)^{\frac{1}{2}} - a_L^{\frac{1}{2}}\right]\left(\frac{a'_L}{\left(a_L + n + (1-\varphi_i)\,R\right)^{1/2}} - \frac{a'_L}{a_L^{1/2}}\right)$$

$$-\left[R - \frac{R a_L^{1/2}}{\left(a_L + n + \varphi_i R\right)^{1/2}} - R + \frac{R a_L^{1/2}}{\left(a_L + n + (1-\varphi_i)\,R\right)^{1/2}}\right]$$

which is always negative for $a'_L < 0$.
Notice that since $a_L = a - \bar{a}_D$. This implies:

$$\frac{\partial a_L}{\partial \varphi_i} = -\frac{\partial \bar{a}_D}{\partial \varphi_i} \tag{33}$$

Consider $\bar{a}_D$ as defined by (23). Increasing φ_i increases the numerator and decreases the denominator. We can conclude that $\bar{a}'_D > 0 \Rightarrow a'_L < 0 \Rightarrow \frac{\partial U_L^P}{\partial \varphi_i} < 0$.

Finally, since U_L^C does not depend on φ_i, we can conclude that increasing inequality makes peace less profitable for the ruler.

A.4 Appendix table

Table A4: Exploring the role of resource inequality

Linear probability model. Dependent variable: *Civil war incidence*	(1)	(2)	(3)	(4)	(5)
Post Cold War x Resource presence	0.144*** (0.024)	0.155*** (0.026)	0.250*** (0.036)	0.257*** (0.037)	0.257*** (0.087)
Controls					
Population		X	X	X	X
GDP level		X	X	X	X
GDP growth		X	X	X	X
Rough terrain			X	X	X
Openness			X	X	X
Regional dummies				X	X
Country cluster					X
Observations	3,479	2,585	1,663	1,663	1,663
R-squared	0.012	0.263	0.188	0.202	0.202

Notes: Robust standard errors in parentheses. Post Cold War end is a time-dummy that equals 1 for the post-Cold War period. Resource presence is a dummy that equals 1 for the country-years with positive production of either oil or diamonds, according to the DIADATA and PETRODATA from The CSCW at PRIO. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.