Resource Concentration and Civil Wars*

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Abstract

This paper highlights the importance of natural resource concentration and ethnic group regional concentration for ethnic conflict. A new type of bargaining failure due to multiple types of potential conflicts (and hence multiple threat points) is identified. The theory predicts war to be more likely when resource and group concentration are high, and the empirical analysis, both at the country level and at the ethnic group level, confirms the essential role of geographic concentration variables for civil war.

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1 Introduction

This paper provides a novel theoretical explanation and novel empirical investigation of the importance of natural resources for civil war, focusing in particular on the role of geography. We show that the presence (or discovery) of natural resources matters the most when such resource discoveries happen in the homelands of minority groups. Such a concentration of potential resource rents in a minority group region can increase the value of secession or autonomy. A war with this type of objectives is different from a centrist type of war aimed to alter the balance of power at the center of a State, or from the type of war determined by a repression attempt by the military. The existence of multiple types of war technologies, and hence different probabilities of winning depending on which war is fought, are key ingredients for the new type of bargaining failure that we highlight in the paper. When there are multiple threat-points in a bargaining game, bargaining can break down for reasons that are similar to those highlighted in the literature on preemptive wars. The finding that this type of bargaining failure is most likely to occur when resources and groups are most concentrated geographically, lead us to an empirical investigation that focuses primarily on the geographical distribution of natural resources, rather than on the total resource amounts or on the relationship with institutions.

Several historical examples suggest that natural resource *location* matters indeed in reality. When the presence of a local ethnic group coincides with large natural resource abundance concentrated in its region, this local ethnic group could be financially better off if it were independent and may under some conditions have incentives to start secessionist rebellion. This corresponds for example to the separatist movement in the now independent Timor-Leste, and the recent turmoil in the oil-abundant regions of Nigeria. Also the rebellion of the Aceh Freedom Movement in Indonesia starting in 1976 and the armed fight of the Sudan People's Liberation Army beginning in 1983 can to a large extent be explained by the abundance of natural resources in these separatist regions.[1] Other countries where secessionist movements have been linked to large local natural resources include Angola, Myanmar, Democratic Republic of Congo, Morocco and Papua New Guinea (see Ross, 2004, for a discussion).

In all the cases mentioned above, an uneven natural resource distribution has been amplified by ethnic divisions. In contrast, if natural resources are absent or if natural resources (and political power) are evenly dispersed in a country, there are typically fewer conflictual incentives, even when there are ethnic divisions.[2] Similarly, when there are large amounts of natural resources available,

[1] For a discussion of these cases see Ross (2004b).

[2] This is for example the case of countries like Benin, which has only few natural resources, or of small oil-rich countries like Brunei or Qatar, where natural resources are evenly spread.

but the society is ethnically homogeneous, war incentives are weak.[3]

Inspired in part by the above anecdotal evidence on the importance of geographic concentration of resources and ethnic groups for conflict onset,[4] the paper first presents a game-theoretic argument for why concentration of resources and groups should be a general reason to worry about civil war risk. We then proceed with an extensive empirical investigation at the country level as well as ethnic group level, which confirms the predictions of the model.

One motivation for the introduction of the model of bargaining breakdown presented in the first part of the paper is that two things seem to matter in general for civil war incentives: balance of strength and balance of control on resources. When trying to resolve a conflict between two groups over control of resources, one difficulty is that the *relative strength* of the two groups may differ from the *relative wealth* of natural resources of the territories they occupy. Pushing the power sharing towards making it reflect relative strength (*strength proportionality*) eliminates the incentives to "centrist" wars, but "secessionist" wars could then materialize; on the other hand, making power sharing depend on the groups' relative endowments of natural resources avoids secession tensions but may cause incentives for the majority group to use their strength to gain more power. Recognizing this tension between the two most important determinants of bargaining power, we have decided to focus attention on a connected observation about bargaining games: while in a standard bargaining game there is a unique "threat point" (for example a unique type of war that players could fall into if bargaining breaks down), in reality there are multiple threat points, which depend on the balance of strength and geographic distribution of natural resources. If an ethnic group is particularly influential for the government of a country but another group has an important presence (in terms of population size and rootage to the territory) in a region of the country that is particularly rich in terms of natural resources, the tensions between the two criteria of power sharing mentioned above are maximized, and are exacerbated by the fact that the two groups have access to different threats: the powerful group controlling government forces should typically be stronger in an all-out ethnic conflict on the whole territory, but the minority group could sustain the secession threat with guerrilla war and focus its lower total strength on the defense of the area where it is locally stronger. We model these tensions in the following way: in a country divided in two regions and populated by two major groups, we assume that the stronger group nationally has a realistic advantage in all-out conflict, while a minority group mostly concentrated in one region has a probability of winning in a secessionist civil war that

[3] Examples for this include Chile and Mongolia.

[4] In this paper we use the terms "war" and "conflict" interchangeably. In the empirical analysis we focus on large-scale civil wars with more than 1000 battle-related deaths per year, as explained in more detail below.

exceeds, for multiple reasons, the probability of winning in the all-out civil war. Even though there are no frictions limiting bargaining on how to share the rents of natural resources, we show that peace may be impossible to guarantee, due to the possibility for the two main players to trigger two different threats. In particular, the characterization of the set of parameters where bargaining fails yields the prediction that the most conflict prone situations are those in which the mineral resources of value are mostly concentrated in the minority group region, and the risk is especially high in case of low State capacity, high regional concentration of the minority group in question, and large geographic distance from the capital.

In a country level empirical analysis, we study how the unevenness of geographical distribution of petrol fields across ethnic groups in a given country affects the likelihood of conflict. For this purpose we have put together a panel of 157 countries with sample period 1960-2008, and have constructed a new variable, *Oil Gini*, which captures how unevenly oil holdings are spread between different ethnic groups in a country.[5] To the best of our knowledge we are the first ones to have constructed such a measure of inter-ethnic inequality in abundance of petrol fields. In the regression analysis we include –in addition to our main, new variable of interest– the standard battery of control variables, as well as country fixed effects and annual time dummies. We find that our novel Oil Gini measure has a statistically significant and quantitatively strong positive effect on the likelihood of civil war onsets, as predicted by our theory.

Next, we move to a more disaggregated level of analysis: we study the effect of natural resource unevenness on civil war with a panel dataset *at the ethnic group level*, covering 1120 ethnic groups and spanning over the period 1960-2006. This has the advantage that unobserved heterogeneity and omitted variable problems are reduced, and ethnic group level data allows us to better discriminate between our theory and competing explanations: our model predicts that conflicts are fuelled by non-governing ethnic minority groups living in very oil rich regions; alternative mechanisms could predict conflict onsets in the presence of oil-rich ethnic groups that control the government. While our country level regressions only establish the link between inter-group oil unevenness and civil war onset, the ethnic group level regressions will be able to distinguish such different mechanisms, and show that it is indeed oil availability in the regions mostly inhabited by powerless groups, rather than in the homelands of governing ethnic groups, that drives civil wars.

Our main, novel independent variable on the ethnic group level is the surface of an ethnic

[5] As discussed in detail in section 3.1.1, we have used the GIS-coordinates of all ethnic groups in the "Geo-referencing of ethnic groups" (GREG) dataset (Weidmann, Rod and Cederman, 2010), and have merged them with the geo-referenced petroleum dataset (PETRODATA) from Lujala, Rod and Thieme (2007), which allowed us to construct a time-varying measure of how relatively petrol-rich the homelands of a given ethnic group are. Using this information, we have been able to apply the Gini formula to capture geographical oil unevenness.

group's territory covered with petrol (i.e. oil and gas) as a percentage of the country's total surface covered with petrol. To the best of our knowledge we are the first ones to study civil conflict using an ethnic group panel with natural resource variables that vary for different ethnic groups. We find a statistically significant and quantitatively strong positive effect of the relative resource abundance of a non-governing ethnic group on the likelihood that this group is involved in a civil war onset. We also find that the interaction terms of an ethnic group's relative resource abundance with its group concentration are positive, very sizeable and statistically significant, which is in line with our theoretical predictions. The results are robust for very demanding specifications that control for ethnic group fixed effects, annual time dummies, time-varying ethnic group level controls and all country-level control variables used in the country-regressions. These findings point out that indeed civil war is likely when resource discoveries or resource valuation hikes happen in regions that are significantly populated by groups that do not belong to the governing coalition in the country.

Related literature

Natural resources and ethnic divisions are known to be correlated with civil conflict (see e.g., Collier and Hoeffler 2004, Ross 2004, Montalvo and Reynal-Querol 2005, Fearon 2005, Lujala, Gleditsch and Gilmore 2005, Humphreys 2005, Lujala 2010, Dube and Vargas 2013). The existing theoretical explanations of the effect of natural resources on conflict do not relate to geographic concentration: Caselli and Coleman (2013) focus on the decision of the dominant ethnic group to exploit or not the other groups in terms of the proceeds from extraction of natural resources, but do not take into account how the geographic distribution and the economic features of natural resources affect the risk of ethnic conflict of different kinds; Reuveny and Maxwell (2001) and Grossman and Mendoza (2003) use a dynamic framework to predict that present resource scarcity and future resource abundance cause appropriative competition; Hodler (2006) finds that natural resources lead to more conflicts in fractionalized countries; Rohner, Thoenig and Zilibotti (2013) predict natural resources to have a particularly detrimental effect if initial trust in a country is low; Fearon (2005) argues that natural resources can foster conflict by weakening state capacity; Besley and Persson (2011) emphasize that weak institutions, low income and large natural resources lead to a greater risk of civil war, and Bell and Wolford (2011) propose a very similar explanation; Van der Ploeg and Rohner (2012) study the two-way interaction between natural resource extraction and civil war, focusing on depletion speed. To repeat, none of these papers focus on what seems to matter a lot in the data, namely geographic concentration of resources and how it overlaps with

the geographic concentration of minority groups.[6]

The value of mineral resources is a stream of expected future rents, and hence the most important rationalist explanation of war should be commitment problems.[7] It is difficult to commit to any sharing rule if there is an expectation of resource-based changes in the future balance of power, intended both as balance of strength and as balance of control of natural resources that we alluded to above. The fact that commitment problems can lead to preventive war incentives is well established in the literature (see e.g. Levy, 1987, Powell, 1996 and 2006, and the early work of Taylor, 1954). However, the preventive war incentive analysis does not separate or highlight the role of geography or concentration of resources: a minority group could have preventive war incentives to rebel wherever the future enrichment and strengthening of the majority group is expected to come from. Perhaps for this reason, the most recent works on civil war rationalization and natural resources that emphasize commitment problems, like Besley and Persson (2011), Lei and Michaels (2011), Bell and Wolford (2012), focus on the effects of changes in total amounts or values of resources rather than on distribution and concentration variables.

While the effect of the total quantity and/or value of oil on conflict is ambiguous,[8] we are able to demonstrate that the unevenness of oil has a robust effect. The shadow of the future argument (related to the fear that an oil discovery could strengthen the government) is equally strong when the oil discovery is in the region controlled by the government; hence the fact that we find a strong and robust impact of the concentration of resources in the regions mostly populated by minority groups speaks in favor of the type of preemptive war motivation theory that we develop – see section 2.2 for a richer discussion about how our model relates to the preemptive war theory literature.

Our paper could also be usefully contrasted with the literature in international relations. There is a common view that preemptive as well as preventive war motivations relate to *fear*, and not to *greed*.[9] In our view preemptive and preventive wars are much more likely if fear goes hand in hand with greed: in Esteban, Morelli and Rohner (2012) the decision by a minority group to start a war is preventive, and certainly due to fear of mass killings, but this fear comes up precisely because the group in power is made more greedy (or is afraid that the minority group will become more

[6] Caselli, Morelli and Rohner (2013) find that geography, and in particular location of borders and resources, matter a lot also for inter-state wars.

[7] Asymmetric information and indivisibility, two other popular rationalist explanations of war, do not seem to be particularly relevant in the presence of significant natural resources to be extracted in the future. See Fearon (1995) and Jackson and Morelli (2011) for comparative discussions of the various rationalist explanations of war.

[8] Cotet and Tsui (2013) find that there is no robust effect of oil reserves on civil wars when controlling for country fixed effects. In contrast, Lei and Michaels (2011) find that oil discoveries lead to more civil wars, perhaps consistently with preventive war motivations.

[9] "... the spiral model contends that even a state interested in protecting the status quo can go to war (out of fear), whereas the deterrence model posits that there are status quo states and revisionist states and that only the latter are attackers." (Reiter, 1995: 8). There is a large literature in international relations on this: See e.g. Schelling (1966), Jervis (1978), and all the subsequent literature on the security dilemma and spiral of fear.

greedy in the future) due to larger amounts of resources. In this paper, the preemptive war story is one where the attack is due to the fear of being involved soon in another type of conflict that is less advantageous, but once again this fear would not materialize without the complementary greed on one side or the other. Moreover, given the existence of multiple conflict technologies that we emphasize, spirals of events or spiral of beliefs are not necessary for the existence of preemptive war motivations.[10]

In terms of relationship with other empirical studies on civil war, our findings are broadly consistent with the empirical results of Walter (2006) on the importance of group concentration; Reynal-Querol (2002), Saideman et al (2002), and Cederman and Girardin (2007) on the importance of ethnic discrimination; Gates (2002) and Buhaug, Gates and Lujala (2009) on the importance of situations where the rebelling minority group is concentrated in remote peripheral areas, where its odds of winning in the local war are larger and conflict tends to be harder to eradicate. As far as the recent empirical literature on inequality and civil conflict is concerned (see e.g. Alesina, Michalopoulos, and Papaioannou (2012) and Huber and Mayoral (2013)), our contribution is to show that between-group inequality can be expected to correlate with civil conflict if such inequality is mostly in terms of control or shares of resource extraction rents, and especially when interacted with resource concentration and group concentration.

The econometric specification that we use in the analysis at the country level is related to that in Fearon and Laitin (2003), Collier and Hoeffler (2004), Montalvo and Reynal-Querol (2005), Cederman and Girardin (2007), Collier and Rohner (2008), and Esteban, Mayoral and Ray (2012).

The paper is organized as follows: in section 2 we present our theory of bargaining failure and the corresponding predictions; section 3 displays the country level analysis first, followed by the ethnic group level extensive analysis. Section 4 offers some brief concluding remarks. As usual, the proof of the theoretical prediction and the description of the data are relegated to the appendix.

[10] The offense defense balance theory did already allow for the possibility that preemptive wars can occur due to technology, but in that case they talk about countries having advantages in offense technology over defense technology (see e.g. Snyder, 1984), while we talk about different technological distinctions, more related to geography and motivations.

2 Model

2.1 Setup

Consider a country populated by two ethnic groups, i and j.[11] The country is divided in two clearly defined regions, $1, 2$. We allow for different values of extractable natural resources in regions 1 and 2, labeled R_1 and R_2, respectively.[12] For simplicity, natural resource extraction and export of such resources is the only activity in the country, and this sole activity is conducted by a unique State firm. The group in power can control the sharing of the ensuing surplus.[13]

There are N_i^1 and N_i^2 members of group i in regions 1 and 2 respectively, and N_j^1, N_j^2 of group j. Assume that the two groups are to some degree concentrated in the two regions, group i in region 1 and group j in region 2, $N_i^1/N_j^1 > N_i^2/N_j^2$.

We assume that group j controls the government at the beginning of the game, which may mean that group j is a majority group ($N_j = N_j^1 + N_j^2 > N_i = N_i^1 + N_i^2$) in a democracy, or simply that j had won some conflict for power in a prior period. Group j in power can choose the shares $\alpha, (1-\alpha)$ of the surplus to be attributed respectively to group i and j.

There are three potential outcomes: peace (P), secessionist conflict (S), centrist (or all-out) conflict (C).[14] Secessionist conflict refers to war started by the powerless group with the aim of founding an independent State in region 1, while centrist conflict is about gaining the control of the whole country in all-out conflict.[15]

The time line is as follows:

1. Group j selects α;

2. Both groups select non-cooperatively whether they want to initiate a conflict of their choice. In particular, the powerless group can engage in rebellion to initiate all-out centrist conflict (c), it can initiate secessionist conflict (s) or it can remain peaceful (p). The group in power can either engage in repression aiming to capture all rents in all-out conflict (c) or remain

[11] We assume that ethnicity is the only cleavage, hence abstracting from class conflict or other differences within groups that could induce different political alignments or coalitions to form. See Ray (2009) for a treatment of multiple markers.

[12] The variables R_1 and R_2 capture the total value of rents, corresponding to the product of the amounts extracted times their price. Hence, R_1 and R_2 increase when there are resource discoveries in the two regions or when the world demand for natural resources increases.

[13] Future work could include explicit consideration of the interaction between a government, the minority groups and the extraction companies, rather than assuming State control. For a motivating case study for this future extension, see Morelli and Pischedda (2013).

[14] It is easy to allow also for accepted secession, which however does not add much to the analysis and does not change any of the key results.

[15] An all-out conflict initiated by the group in power could have repression motives, while it takes the form of a rebellion when initiated by the group out of power.

peaceful (p).[16] As displayed in the matrix below, there is peace (P) when nobody attempts to start any conflict. If only one group attempts to start a conflict or when both groups choose the same type of conflict, in both cases the type of conflict that emerges is clear. If group i tries to initiate secessionist conflict (s), and the government attempts to escalate the conflict in all-out repression (c) this latter attempt succeeds with probability θ.[17]

	i chooses p	i chooses c	i chooses s
j chooses p	P	C	S
j chooses c	C	C	C with prob θ; S with prob $1-\theta$

If P prevails, total group payoffs from natural resources are

$$\begin{aligned} \pi_P^i &= \alpha(R_1+R_2) \\ \pi_P^j &= (1-\alpha)(R_1+R_2) \end{aligned}$$

If C is initiated, we assume that the *winner takes all* the relevant natural resource rents. Thus, the payoffs are as follows:

$$\begin{aligned} \pi_C^i &= p_c(R_1+R_2) - d_i(C) \\ \pi_C^j &= (1-p_c)(R_1+R_2) - d_j(C) \end{aligned}$$

where p_c is the winning probability of group i in centrist conflict and d_i, d_j are the destruction costs expected from this type of conflict. Think of such costs as mainly capital or infrastructure destruction costs, while adding human life costs, although reasonable even in the mind of leaders, would complicate the algebra without altering the qualitative results of the paper.[18]

The logic of secessionist conflict is similar. We assume that when a group i's secession attempt is unsuccessful, i is deprived of all resource rents (again, we could allow for further punishment without affecting the qualitative results). When secession is successful, region 1 splits from region 2, and group i gains control over all resources in region 1. The minorities in the new countries N_j^1

[16] For simplicity, we ignore the (unrealistic) possibility that a group in power proposes secession of some region. We could easily extend the framework to allow for it.

[17] The parameter θ is one of the parameters we use to capture the relative power of a group controlling the government – here, the power to determine the type of conflict when a conflict is unavoidable.

[18] In a complementary paper, Esteban, Morelli and Rohner (2012) deal explicitly with the strategic incentives to decimate the population of enemies.

and N_i^2 are discriminated and do not receive anything after secession. The group leaders have a utilitarian social welfare function with equal weight for any group member. Therefore, the payoffs under secessionist conflict are:

$$\begin{aligned} \pi_S^i &= p_s R_1 - d_i(S) \\ \pi_S^j &= (1-p_s)(R_1+R_2) + p_s R_2 - d_j(S) \end{aligned}$$

where p_s is the probability of winning for group i in secessionist conflict.

The solution concept is Subgame Perfect Equilibrium.

2.2 Interpretation

In a perfect and frictionless world, war could never occur, as it is a costly lottery, and the destruction cost of war implies that there should exist mutually beneficial Pareto improvements through bargaining. One of the standard frictions invoked to explain war is commitment problems.[19] The two most studied subcategories of commitment problems are related to power asymmetries: *preventive wars* can erupt when a country or group expected to become stronger is unable to commit not to use force once such an asymmetry will imply easy victory; *preemptive wars* can erupt when for example moving first can determine an advantage. More generally, in a non-cooperative framework promises to play cooperatively are not credible when a player has a profitable deviation in the future.

An interpretation of our simultaneous move war game is that the group that selects the first aggressive move will be able to determine the type of war. The intuition for why the impossibility to commit not to attack, in conjunction with a sort of first mover advantage, can trigger war (in spite of the possibility to adjust the sharing rule α) is as follows: while the possibility of bargaining with transfers eliminates war when there is only one disagreement point or threat point, the fact that there exist two types of war and the possibility that the probability of winning for group i may differ significantly between the two types of war creates a bargaining game with two threat points, where each one can be triggered by the first mover. Therefore, even if in expectation peace dominates war given the endogenous α and the exogenous θ,[20] what matters is the unilateral incentive to deviate and trigger the preferred war if the opponent stays peaceful. Note, however, that commitment problems and first mover advantage are not sufficient conditions for war in our

[19] The other frictions studied in the literature are asymmetric information, indivisibilities, risk loving or biased leaders. See e.g. Jackson and Morelli (2011) for a survey.

[20] In future dynamic extensions of the analysis, one could consider to endogenize θ as well, along the lines suggested in Powell (2013).

setting. Lack of credible commitment and the agenda-setting power of the first aggressor do not result in war in our model unless natural resources are unevenly spread over the territory. Hence, the geography of natural resources, which is the focal point of the paper, is ultimately the decisive factor driving war and peace in our framework.

Another important note concerns the role of wealth. In the model the variables R_1, R_2 play the role of "prizes", hence they represent the present discounted value of the future stream of rents that can be derived from extraction, production and export. Obviously we could incorporate in the model also the accumulated past wealth, but we decided to leave that out of the utility functions because after all the main channel through which accumulated past wealth can affect utility is through its impact on the probability of winning and on the destruction costs, which are already included in abstract reduced form.[21] Typically only a small fraction of natural resources to be extracted in the future can be damaged by a war, while much of the accumulated physical capital is often destroyed, partly because it is a vital input of the capacity of a fighting group or State in a conflict. Oil fields and diamond mines (and especially their future productivity) "survive" fighting, while high-tech industries and banking suffer considerably from political instability.[22] A similar argument could be applied to distinguish between various sorts of natural resources, according to their risk of destruction in civil war.

2.3 Equilibrium

Here we present the main results, relegating all proofs and derivations to Appendix A. On the basis of the expected outcomes for each group in all subgames for any α, group j selects the preferred level of α at the beginning of the game. Clearly, the choice of α can be reduced to a binary choice between $\alpha = 0$ and the "buying off" minimum level of α making group i indifferent between accepting and challenging, as never any other level of α could be optimal for group j.

While for many parameter values there exists an α that can prevent civil war, we will show that this is not always the case, regardless of θ. This bargaining failure result, holding in spite of the availability of credible transfers, is the main result of this section.[23]

To explain the intuition right away, note first that group j prefers peace to all-out centrist

[21] Note that the qualitative predictions would be unchanged if part of the natural resources were to be destroyed in fighting. Further, the qualitative predictions would also be robust to assuming a part of past wealth to be appropriable in contest.

[22] For these reasons, perhaps, full-blown conflict could be avoided in the Basque country and the Flemish region, even though their economic strength would give them incentives to split from Spain and from Belgium respectively.

[23] Note that it wouldn't help to allow j to choose two separate sharing rules, α_1, α_2, for the two regions: in fact, if the parameters are such that no α exists to make peace an equilibrium in the subsequent simultaneous move subgame, then trivially it is not possible to find any peace inducing pair α_1, α_2, since if this were possible then there would exist α' such that $\alpha'(R_1 + R_2) = \alpha_1 R_1 + \alpha_2 R_2$ that would work, a contradiction.

conflict when $\alpha \leq \overline{\alpha} \equiv p_c + \frac{d_j(C)}{R_1+R_2}$, while group i prefers peace to centrist and secessionist conflict for $\alpha \geq \underline{\alpha}_c \equiv p_c - \frac{d_i(C)}{R_1+R_2}$, and, respectively, $\alpha \geq \underline{\alpha}_s \equiv p_s \frac{R_1}{R_1+R_2} - \frac{d_i(S)}{R_1+R_2}$. Due to the destructions caused by a war, $\underline{\alpha}_c < \overline{\alpha}$ always holds. In line with standard intuition in the presence of a single form of civil war, transfers could always assure peace, as the destruction of war creates some peace dividend to be distributed. Things are different, however, in the presence of multiple conflicts. For a range of parameter values, $\underline{\alpha}_s > \overline{\alpha}$ holds. In these cases no level of α can be found for which civil war can always be avoided. Our bargaining failure result can be summarized in the following proposition:[24]

Proposition 1 *There exist parameter values under which no surplus sharing exists that can avoid a conflict.*

The probability of war increases with the geographical concentration of natural resources in the region with relatively fewer members of the ruling group.

To see this, note that $\underline{\alpha}^s > \bar{\alpha}$ happens when $p_s \frac{R_1}{R_1+R_2} > p_c + \frac{d_i(S)+d_j(C)}{R_1+R_2}$, which obviously becomes more and more likely the greater is $R_1/(R_1+R_2)$.[25]

The zones of peace and of bargaining failure leading to conflict are displayed graphically in Figure 1.[26] We can see that bargaining failure happens when the part of total natural resources ($R \equiv R_1 + R_2$) that are situated in region 1, R_1/R, is large, and when the group out of power has a substantially larger winning probability in secessionist than in centrist conflict, i.e. when $p_s - p_c$ is large. Other interesting predictions can be added when unbundling the probabilities of winning in the different types of conflict, which is what we do in the following subsection.

2.4 Generating empirically testable predictions

There are two necessary conditions for bargaining failure: first, natural resources need to be distributed unevenly (i.e. high $R_1/(R_1+R_2)$), and second, the powerless group's winning probability under secessionist war needs to be substantially larger than the winning probability under centrist conflict (i.e. high $p_s - p_c$). If either of these two conditions does not hold, bargaining will succeed to prevent conflict.

The first condition on relative natural resource abundance of the homelands of the powerless group does not require further disaggregation to be operationalized for empirical testing. In con-

[24] Technically we should talk about group j not being able to find an interior value of α that can avoid war, but it is basically a bargaining failure result, because the same impossibility to obtain certain peace under those conditions would arise under any other bargaining procedure to set surplus sharing.

[25] Intuitively, when $R_1/(R_1+R_2)$ or $p_s - p_c$ are very small, secessionist conflict is not attractive and we would fall back into a situation with only one form of salient threat (i.e., centrist conflict).

[26] The following parameter values have been used in this Figure: $R_1 + R_2 = 1$, $p_c = 0.2$, $d_i(S) = 0.05$, $d_j(C) = 0.1$.

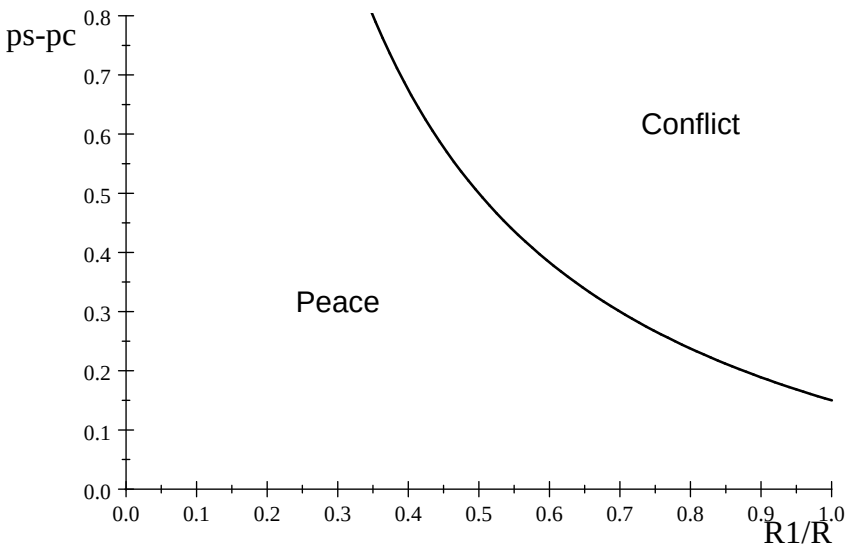

Figure 1: Zones of parameter values for peace and conflict

trast, the winning chances for the powerless group in secessionist versus centrist war are still a blackbox. We now analyze the main determinants of relative strength, and hence of the probability of winning, leading to more testable implications.

Denoting by W_i and W_j the accumulated usable wealth by group i and group j, the probability with which i wins a centrist conflict can be expressed as:

$$p_c = \frac{N_i W_i}{N_i W_i + N_j W_j + \lambda}$$

where λ measures the extra strength of group j due to the control of the government and perhaps the army. In this contest success function (CSF) the ratio of total wealth matters. Like Jackson and Morelli (2007) and Esteban and Ray (2011) we regard accumulated wealth as capacity, and therefore assume a group's probability of winning to be increasing in its total wealth. Finally, this expression allows for the obvious relevance of population sizes, especially in traditional warfare that is typical of many civil conflicts.

Consistently, group i's winning probability in secessionist conflict can be expressed as follows:

$$p_s = \frac{N_i^1 W_i}{N_i^1 W_i + N_j^1 W_j + \lambda/(1+\phi)}$$

where the government's advantage of controlling a standing army (λ) is discounted by $(1+\phi)$, and ϕ is a non-negative parameter that is an increasing function of the geographical distance between the secessionist homelands and the capital. This is in line with the idea that the military power of

the government decays when projected at a large distance (cf. Boulding, 1962). It is also consistent with the recent literature that has found that geographical remoteness and ideological recruitment provide a larger advantage for group i in secessionist than in centrist wars (see e.g. Gates, 2002; Buhaug, Gates and Lujala, 2009). Note also that in case of a secessionist conflict the men used are only those in the conflict region.[27] Using the explicit dependence of p_s and p_c on the distribution of populations of the different groups in the territory, the condition for bargaining failure becomes

$$\frac{N_i^1 W_i}{N_i^1 W_i + N_j^1 W_j + \lambda/(1+\phi)} \frac{R_1}{(R_1+R_2)} > \frac{N_i W_i}{N_i W_i + N_j W_j + \lambda} + \frac{d_i(S) + d_j(C)}{R_1 + R_2}.$$

This reveals that civil war is more likely when the minority group i is very concentrated (large N_i^1) and the corresponding region relatively homogeneous (low N_j^1); and state capacity is low (i.e., low λ)[28]. The results of the comparative statics implied by the characterization of Proposition 1 are summarized below.

Corollary 1 *Conflict becomes more likely when*

1. *most of the natural resources are located in the region of the powerless group,*
2. *the winning chances of the group out of power are much better for secessionist than for centrist conflict,*
3. *war is not very destructive,*
4. *the powerless group is very concentrated in a relatively homogeneous region,*
5. *state capacity is low,*
6. *the region of the group out of power is further away from the capital.*

To establish another natural baseline, consider a proportional democratic benchmark, in which surplus sharing is determined by vote strength, i.e., $\alpha^D = \frac{N_i}{N_i+N_j}$ and where there is perfect wealth equality, i.e., $W_i = W_j$. If conflict is not very destructive and if an ethnic group out of power is very concentrated in an area with large resource rents (high N_i^1 and high R_1), even such democracy in an egalitarian society cannot guarantee peace. We can even end up in a situation where any of

[27] Gates (2002) and Buhaug, Gates and Lujala (2009) find evidence that when the minority group is concentrated the odds of winning are larger.

[28] Conflict is more likely for low state capacity, as long as ϕ (i.e. the parameter capturing remoteness of group i's homelands) is not too large.

the two groups would like to start war because $\underline{\alpha}_s > \alpha^D > \overline{\alpha}$.[29] This can occur when the minority group is very concentrated (large N_i^1/N_j^1), when the geographical distribution of natural resources is unequal (high $R_1/(R_1+R_2)$), conflict is not very destructive, and when state capacity is neither too small nor too large (intermediate λ). For these parameter values either group would like to start conflict. If α^D is either below $\bar{\alpha}$ or above $\underline{\alpha}_s$, but still $\underline{\alpha}_s > \bar{\alpha}$, then only one group has interest in starting a conflict, but we cannot determine which conflict will actually occur, since as soon as at least one group has interest in conflict both groups try to impose their preferred way to fight it.

The relevance of the above considerations about the α^D benchmark is that even when the two groups are equally well off from the past and democracy has already been achieved, a new conflict can erupt because of regional new resources, if R_1 jumps sufficiently high. Note also that if we start from a non democratic surplus sharing regime, for example with an α, such that $\alpha < \bar{\alpha} < \alpha^D < \underline{\alpha}_s$, the most promising policies to establish peace would be related to fostering development rather than pushing democracy, as development would result in larger destruction costs of war, and would thereby make bargaining easier, while democracy would still not secure peace when $\underline{\alpha}_s > \alpha^D > \overline{\alpha}$.[30]

2.5 Robustness of the main predictions

The key theoretical prediction of our model in terms of predicting civil war, is that what matters is not the total amount of natural resources but its geographic concentration. Such a prediction has emerged from a model that emphasizes a particular type of commitment problem, within the family of preemptive war incentives. A "preventive" war incentive logic would generate slightly different predictions: if a region like region 1 is expected to become increasingly richer in terms of resources, the expectation of future increase in strength and sharing demands by the minority group associated with that region can increase the temptation by the ruling group to enact some type or another of preventive repression or expropriation; however, while these incentives would be complementary to the logic of our model, the prevalence of preventive war incentives could also work the other way: an increase in R_2 could determine an expectation of future increase in exploitation power by group j in power, increasing thereby the incentives of group i to rebel. Thus, while our model unambiguously predicts that the civil war probability increases with $\frac{R_1}{R_1+R_2}$, preventive war motivations would not distinguish between increases of R_1 and R_2, both potentially leading to greater shadow of the future.

[29] Expressed in structural parameters, this corresponds to $\frac{N_i^1 W_i}{N_i^1 W_i + N_j^1 W_j + \lambda/(1+\phi)} \frac{R_1}{(R_1+R_2)} - \frac{d_i(S)}{R_1+R_2} > \frac{N_i}{N_i+N_j} > \frac{N_i W_i}{N_i W_i + N_j W_j + \lambda} + \frac{d_j(C)}{R_1+R_2}$.

[30] We show in an earlier version of this paper (Morelli and Rohner 2010) that in the presence of other exogenous bargaining frictions there are indeed cases where democratic power sharing can reduce conflict.

Considering other theories of war, changes in the value of resources that do not change the relative potential of the various regions or groups do not alter the information-based potential reasons for war, nor the relevant agency problems. Thus, even though our new theory of bargaining failure proposed in this paper is only one of the many channels that could lead to a bargaining break down, it seems quite intuitive that a concentrated increase in natural resources cannot induce counterbalancing effects through one of the other main rationalizations of war proposed in the literature. Hence the prediction should be considered a theoretically robust one, and it is surprising that neither the theoretical literature nor the empirical one has focused on this, prior to this paper. We will now show that our main robust theoretical predictions also find a strong validation in the data.

3 Empirical Analysis

The existing empirical literature on natural resources and civil war has two main weaknesses: First, it only studies the effects of the total *amount* of natural resources and not of their *geographical distribution*. Second, it studies the impact of natural resource abundance mostly on the country level rather than on the ethnic group level. On such an aggregate level of analysis there is more unobserved heterogeneity in the data, and some of our predictions relate to ethnic group characteristics, which calls for a test on this disaggregated level.

To address these concerns, we will now perform our own empirical analysis. First, we will use panel data on the country level and construct our novel oil inequality measure. Based on georeferenced petrol field and ethnic group location data, we are able to compute a Gini Index of how unevenly petrol fields are spread between different ethnic groups in a given country. Using a standard specification of control variables and including country fixed effects, we will demonstrate that petrol unevenness has a positive and significant effect on the likelihood of civil conflict.

Afterwards, we will move to a panel on the ethnic group level. Using a variety of control variables, as well as country fixed effects / ethnic group fixed effects, it will be shown that indeed the ethnic groups out of power who are relatively oil rich with respect to the rest of the country will be significantly more likely to be involved in civil conflict. We also find that the interaction terms between oil abundance and group concentration, resp. distance from capital are positive and significant, pointing out that indeed civil wars are more likely when $R_1/(R_1 + R_2)$ and $p_s - p_c$ are both large, as predicted by our theory.

3.1 Empirical Analysis: Country Level

Our goal in this section is to analyse how the unevenness of geographical distribution of petrol fields across ethnic groups in a given country impacts on the likelihood of conflict. For this purpose we have put together a panel of 157 countries with sample period 1960-2008, and have constructed a novel variable, *Oil Gini*, which we will describe in more detail below. In our regressions we use –in addition to our main, new variable of interest– the standard battery of control variables, as well as country fixed effects and annual time dummies. Below we start by describing in some detail the data.

3.1.1 Data and Specification

Given that our theory focuses on bargaining failure to avoid conflict outbreaks, a natural choice of dependent variable is the onset of civil conflicts. The source of the civil war data is "UCDP/PRIO Armed Conflict Dataset" (UCDP, 2012), which is the most commonly used standard data source for civil wars at the country level[31]. We focus on the widely used standard definition of civil war, counting a country and year as having a civil war when at least 1000 casualties are recorded in a given year. Our conflict onset variable takes a value of 1 when a new civil war starts, is coded as missing during wars (where by definition a war cannot newly start), and is coded as 0 for peace. In a robustness check we will also show that our results are robust when focusing on war incidence as dependent variable (where ongoing wars are also coded as one).[32]

To construct our main novel "Oil Gini" measure, we started out from the ethnic group level. First, we constructed a panel dataset on the ethnic group and year level using the sample of ethnic groups in the "Geo-referencing of ethnic groups" (GREG) dataset (Weidmann, Rod and Cederman, 2010).[33] Relying on maps from the classical "Soviet Atlas Narodov Mira" from 1964 (Bruk and Apenchenko, 1964), which is still very extensively used for ethnolinguistic fractionalization (ELF) indices, GREG is a geo-referenced dataset with the coordinates of the group boundaries of 1120 ethnic groups.

One major advantage of this dataset is that it provides a global coverage of ethnic groups for the whole world, containing relatively precise information on the geographical location of groups, which enables us to merge it with other geo-referenced group-level data using Geographical Information

[31] This dataset has been used, among others, by Besley and Persson (2011) and Esteban, Mayoral and Ray (2012).

[32] The war onset variable relates to the question of what makes wars break out, while the war incidence variable is designed to capture the total intensity of conflict, which is not only driven by factors making wars start, but also by factors making wars last.

[33] Throughout the database construction we use the country borders from the time-varying, geo-referenced "CShapes" dataset (Weidmann, Kuse, and Gleditsch, 2010).

Systems (GIS). In contrast, the main alternative datasets on ethnic groups like the "Minorities at Risk" data (Minorities at Risk, 2009), the "Ethnologue" (Lewis, 2009), and the lists of ethnic groups from Alesina et al. (2003), resp. Fearon (2003) lack detailed geographical information on the location of ethnic groups in all countries.[34]

The fact that the GREG data is a non-time varying snapshot from the early 1960s has both advantages and disadvantages. On the negative side, it implies that in some instances the group boundaries are not fully accurate in recent decades, although thankfully group borders generally evolve very slowly over time. The fact that the group border information is not time-varying lowers accuracy and hence adds noise to our estimations, which biases the magnitude of coefficients and the significance levels downwards, while there seems to be no other obvious bias of the results. This means that using GREG will tend to bias the results against us and making them appear *less* strong than they are in reality.

On the positive side, using ethnic group borders from the beginning of our sample –which hence pre-date the conflict observations in our regressions– has the advantage to alleviate concerns of ethnic group locations being endogenous to the wars that we want to explain. Still, there remains the possibility that past wars and existing oil fields had some impact on location patterns of ethnic groups –although such concerns are of course alleviated by the fact that ethnic group homelands are very stable. To address such remaining concerns we control for past conflict in all regressions and we include additional robustness tables in the appendix showing that our results also hold for a restricted sample that includes only observations of countries that did not have oil in 1964 when the "Soviet Atlas Narodov Mira" underlying GREG was put together.

Using GIS-Software (ArcGIS) we have then merged the GREG data with the geo-referenced petroleum dataset (PETRODATA) from Lujala, Rod and Thieme (2007), which documents where oil fields lie. Given that discovery dates of oil fields are available, this allowed us to construct a time-varying map of oil fields. Combining this information with the ethnic group data we were able to compute for every country and year the area occupied by a given ethnic group and also the area occupied by oil fields lying in the ethnic group's territory. Using this information, and the standard formula of the GINI inequality index, we were able to compute a novel, time-varying measure of the unevenness of oil field distribution across ethnic group for a given country and year, which we call the "*Oil Gini*" variable.

[34] Very few other datasets on ethnic groups provide geographical information. The "Ethnographic Atlas" (Gray, 1999) includes one longitude and one latitude for each group, but does not provide polygons of the group territories, which are needed for computing our main new variables. Wucherpfennig et al. (2011) have also put together a dataset on ethnic groups with location information. They, however, do not include all ethnic groups, but only those that have been judged as "politically relevant", which could result in endogenous sample selection if the judgement of group "relevance" is affected by past political outcomes like wars.

We use a standard battery of control variables, which results in a specification that is extremely close to the core specifications run by Fearon and Laitin (2003), Collier and Hoeffler (2004), Montalvo and Reynal-Querol (2005), Cederman and Girardin (2007), Collier and Rohner (2008), and Esteban, Mayoral and Ray (2012). Like these papers, we control for natural resource abundance (i.e., an updated version of Fearon and Laitin's (2003) "oil exporter" variable), GDP per capita, democracy, population size, whether a state was recently created, ethnic fractionalization, geography (mountainous terrain and noncontiguous states), and peace duration. In robustness checks we control for alternative war persistence measures (lagged war incidence, the number of war years in the last five year period), and alternative natural resource measures (gold producer, diamond producer, oil production per capita). All these variables are described in more detail in Appendix C. To account for omitted variable bias and unobserved heterogeneity we include from column 2 onwards country fixed effects and annual time dummies, and we allow the robust standard errors to be clustered at the country level. We will as default run linear probability models, which have the advantage of providing easily interpretable coefficients and allowing for clustered standard errors in the presence of country fixed effects. We will however show in a robustness check that the results are robust to using conditional logit.

To summarise, we estimate the following main specification (corresponding to column 3 of Table 1):

$$War_{c,t} = \alpha Oil\_Gini_{c,t} + \mathbf{X}'_{c,t}\boldsymbol{\beta} + \mathbf{Y}'_{c}\boldsymbol{\gamma} + \mathbf{Z}'_{t}\boldsymbol{\delta} + u_{c,t}$$

where $\mathbf{X}'_{c,t}$ is a vector of time-varying and country-varying control variables, $\mathbf{Y}'_{c}$ is a vector of country fixed effects, $\mathbf{Z}'_{t}$ is a vector of annual time dummies, and $u_{c,t}$ is the error term. The coefficient of interest is α, which our theory predicts to be of positive sign.

3.1.2 Results

In Table 1 we display the results of the country level regressions. In the first column we run a linear probability model with just the battery of standard controls, but without our new "Oil Gini" measure. For comparability with most papers in the existing literature (e.g. the classic article of Fearon and Laitin, 2003) we focus on a specification without country and time fixed effects, where standard errors are left unclustered. Besides the "New State" variable, all other variables have the expected sign. In line with the existing literature (cf. for example Fearon and Laitin (2003), Collier and Hoeffler (2004), Montalvo and Reynal-Querol (2005), Cederman and Girardin (2007), Collier and Rohner (2008), and Esteban, Mayoral and Ray (2012)), we find that oil abundant,

ethnically fractionalized and very populated states with low GDP per capita and a track record of past violence are more likely to experience civil war onsets.

In column 2 we add country fixed effects and annual time dummies, and allow for robust standard errors to be clustered at the country level, in the goal of addressing omitted variable bias and unobserved heterogeneity. As noted in the literature (Fearon and Laitin, 2003; Collier and Hoeffler, 2004; Sambanis, 2004; Collier, Hoeffler and Rohner, 2009) adding country fixed effects tends to remove the significance of most variables in such civil war regressions. In column 3 we now add our new "Oil Gini" measure, which has the expected sign and is significant at the 10% level. Its effect is quantitatively important: Moving a country from full ethnic oil equality to full oil inequality increases the war risk by 6.6 percentage points, which is more than four-fold the baseline risk of 1.5 percentage points.

In columns 4 and 5 it is shown that the effect of *Oil Gini* is robust to running logit regressions instead of OLS and to having "civil war incidence" rather than "civil war onset" as dependent variable: In both columns, *Oil Gini* has a positive sign and is significant at the 5 percent level.

In column 6 we also include an interaction term of *Oil Gini* and our dummy variable taking a value of 1 for big oil exporting countries. The coefficient of *Oil Gini* remains positive and significant, while the interaction term also has the expected positive sign, but is not statistically significant.

In Table 3 in Appendix B we provide some additional results. First, columns 1-3 show that *Oil Gini* continues to be statistically significant and to have a coefficient of similar magnitude when we control for an alternative war persistence variable and for other natural resource measures (gold producer, diamond producer and oil production per capita). In columns 4-6 we re-run the main regressions of columns 3, 5 and 6 of Table 1, but restricting the sample to observations from countries that did not have oil in 1964 when the "Atlas Narodov Mira" (Bruk and Apenchenko, 1964) –which is the primary source for our geo-referenced ethnic group location dataset– was put together. This restriction of the sample serves the purpose of alleviating concerns that oil abundance could have affected the location of ethnic groups.

Even in these very demanding regressions run on a restricted sample our main Oil Gini variable has the expected sign and is statistically significant. Interestingly, also the interaction term of Oil Gini with Oil Exporter in column 6 is of the expected positive sign and statistically significant.

3.2 Empirical Analysis: Ethnic Group Level

To test the predictions of our theory on the impact of the relative oil richness of the ethnic groups on civil war onsets, we have put together a panel dataset *on the ethnic group level*, covering 1120

	Dependent variable: Civil War Onsets					
	(1)	(2)	(3)	(4)	(5)	(6)
Oil Gini			**0.066***	**7.955****	**0.098****	**0.065***
			(0.035)	**(3.912)**	**(0.045)**	**(0.035)**
Oil exporter (t-1)	0.016**	0.018	0.021	2.774**	0.014	0.019
	(0.007)	(0.017)	(0.019)	(1.258)	(0.014)	(0.016)
ln GDP p.c.(t-1)	-0.004*	-0.009	-0.006	-0.363	0.001	-0.006
	(0.002)	(0.008)	(0.009)	(0.589)	(0.014)	(0.009)
Democ. (t-1)	0.000	-0.001*	-0.001*	-0.040	-0.000	-0.001*
	(0.000)	(0.000)	(0.001)	(0.042)	(0.001)	(0.001)
ln Popul.(t-1)	0.004***	0.005	0.006	-2.449	0.011	0.006
	(0.001)	(0.010)	(0.011)	(1.974)	(0.014)	(0.011)
New State	-0.014***	0.007	0.008	1.799	0.009	0.009
	(0.004)	(0.006)	(0.006)	(1.273)	(0.008)	(0.006)
Ethnic Fraction.	0.014**					
	(0.007)					
Mountainous Terr.	0.003					
	(0.008)					
Noncontig. State	0.006					
	(0.005)					
Peace duration	-0.001***	-0.000	-0.000	0.025*		-0.000
	(0.000)	(0.000)	(0.000)	(0.014)		(0.000)
Civ. War Incid. (t-1)					0.575***	
					(0.040)	
Oil Exp. * Oil Gini						0.004
						(0.042)
Model	OLS	OLS	OLS	Logit	OLS	OLS
Country Fixed Eff.	No	Yes	Yes	Yes	Yes	Yes
Observations	5289	5417	5180	1093	5421	5180
R-squared	0.024	0.105	0.112	0.227	0.544	0.112

Notes: Dependent variable: Civil war onset (unless in column 5 where the dependent variable is Conflict incidence). The dependent variable is coded as 1 if a conflict causing at least 1000 fatalities is starting in a given year. Sample period: 1960-2008. Number of countries for which observations are available: 157. From column 2 onwards unreported country fixed effects and annual time dummies are included, and robust standard errors are allowed to be clustered at the country level (unless in the conditional logit regression of column 4 where clustering of standard errors is not possible). Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table 1: Country Level Regressions of the Effect of Oil Gini on Conflict Onsets

ethnic groups and spanning over the period 1960-2006. In particular, we include all ethnic groups of the "Geo-referencing of ethnic groups" (GREG) dataset (Weidmann, Rod and Cederman, 2010), and construct group level variables that capture closely the expression $R_1/(R_1 + R_2)$ of the model, as explained above. There is a small number of papers in the literature that study civil war on the ethnic group level (e.g., Walter, 2006; Cederman, Buhaug and Rod, 2009), but these papers typically either ignore natural resources or use a natural resource abundance variable at the country-level, which does not allow to capture unevenness of natural resource distribution.[35] Hence, to the best of our knowledge we are the first ones to study civil war using a panel on the ethnic group level with natural resource variables that vary for different ethnic groups.

Looking at this disaggregated level of analysis has several advantages: With more fine grained data typically unobserved heterogeneity and omitted variable problems are reduced. Further, studying group level data also allows us to better discriminate between our mechanism and other mechanisms. Our theory predicts that conflicts become more likely to break out if a powerless ethnic minority group becomes very oil rich. Alternative theories could predict conflicts to break out when the governing ethnic group becomes more oil rich. So far, our country level regressions only established the link between oil unevenness between ethnic groups and civil war onsets. However, the country level analysis was not able to distinguish between our theory and alternative theories stressing for example war triggered by oil rich governing groups. In contrast, the current ethnic group level regressions will be able to distinguish such different mechanisms, and will be able to conclude whether the dangerous type of oil unevenness is indeed when powerless groups are oil abundant, as predicted by our theory.

3.2.1 Data and Specification

The main dependent variable is civil war onset at the group level and is taken from Cederman, Buhaug and Rod (2009). It varies on the ethnic group and year level and takes a value of 1 when in a given year a civil war newly starts that involves a given ethnic group. It is coded as missing for ongoing wars, and as 0 if the ethnic group is not involved in a civil war in a given year.

Our main independent variable is the surface of an ethnic group's territory covered with oil and gas as a percentage of the country's total surface covered with oil and gas. This proxies well $R_1/(R_1 + R_2)$. To construct this measure, we used as starting point all ethnic groups in the "Geo-referencing of ethnic groups" (GREG) dataset (Weidmann, Rod and Cederman, 2010),

[35] Esteban, Morelli and Rohner (2012) use an ethnic-group level resource abundance measure to study massacres of civilians, but they do not include in their analysis any variable of a group's relative natural resource abundance with respect to the other groups in the country.

which allowed us to know the geographical coordinates of where a given ethnic group is located. Then we merged this with the geo-referenced petroleum dataset (PETRODATA) from Lujala, Rod and Thieme (2007), which documents where oil fields lie and when they have been discovered. Combining this information we were able to compute a variable measuring which part of the territory occupied by a given ethnic group contains oil. Expressing this in terms of the total surface containing oil in the country, we obtain a quite precise, time-varying measure of how relatively petrol-rich the homelands of a given ethnic group are.

We also include various control variables on the ethnic group level. In particular, we include two time-varying demographic controls, *Group Population / Governing Groups' Population* and *Governing Groups' Population* from Cederman, Buhaug and Rod (2009). Note that while the population estimates of each ethnic group are not time varying, the composition of groups controlling the government is time varying, which makes these measures time-varying. Further, we construct different war persistence measures (*Group Peace Duration*, and lagged *Group War Incidence*). In addition, we control for several time-invariant geographical and demographic factors, i.e. *Group Diamond Mines* (constructed using raw data from Gilmore et al., 2005), *Group co-ethnics abroad* (constructed based on the GREG dataset), *Group's share of mountainous terrain* and *ln group's distance to capital* (from Cederman, Buhaug and Rod, 2009), *Group's soil quality* (constructed using the Harmonized World Soil Database from Fischer et al., 2008), *Group Population Density* (constructed using the geo-referenced population density data from the Socioeconomic Data and Applications Center at Columbia University, cf. Sedac, 2012).

Further, we also include in two columns interaction terms of our main independent variable $R_1/(R_1 + R_2)$ with a group concentration measure constructed using raw data from Alesina and Zhuravskaya (2011), and with a group distance from capital measure (as described above). All these variables are described in more detail in Appendix C.

Finally, we also include –but do not report– all country-level control variables included in the country-level regressions above and annual time dummies. Like in the country-level regressions above we include robust standard errors allowed to be clustered at the country level. As above, we also run as main specifications linear probability models, but show that the results are robust to the use of conditional logit estimators.

To summarise, we estimate the following main specification (corresponding to column 3 of Table 2):

$$War_{e,t} = \alpha(R_1/R)_{e,t} + \mathbf{W}'_{e,t}\boldsymbol{\beta} + \mathbf{X}'_{c,t}\boldsymbol{\gamma} + \mathbf{Y}'_{e}\boldsymbol{\delta} + \mathbf{Z}'_{t}\boldsymbol{\zeta} + u_{e,t}$$

where $\mathbf{W}'_{e,t}$ is a vector of time-varying and ethnic group-varying control variables, $\mathbf{X}'_{c,t}$ is a vector of time-varying and country-varying control variables, $\mathbf{Y}'_e$ is a vector of ethnic group fixed effects, $\mathbf{Z}'_t$ is a vector of annual time dummies, and $u_{e,t}$ is the error term. The coefficient of interest is α, which our theory predicts to be of positive sign.

3.2.2 Results

The focus of our empirical analysis is to assess whether conflict indeed becomes more likely when the group out of power has an ethnic homeland that is abundant in oil, i.e. when $R_1/(R_1 + R_2)$ is large, as predicted by the theory. Hence, for most of our regressions, namely in the main table 2 and in the first four columns of the Appendix Table 4, we will use the sample of all ethnic groups that are out of power, which corresponds to the largest part of all ethnic groups (i.e. on average about 83% of all ethnic groups are non-governing groups).[36] As discussed in more detail below, in the columns 5-6 of the Appendix Table 4 we run as a sort of Placebo test the main regressions on a sample of governing groups.

In the first column of table 2 we regress for a pooled panel our main dependent variable, Civil War Onsets, on the main independent variable R_1/R (where $R \equiv R_1 + R_2$) and on all controls mentioned above. Our main variable R_1/R has the expected positive sign and is significant at the 5% level. The effect is sizeable: If an initially oil-less ethnic group has after a discovery all the country's oil fields on its territory, the risk of being involved in a civil war onset is increased by 2.7 percentage points, which is about 8-times larger than the relatively small baseline risk for a group to be involved in a conflict onset, which is of 0.3 percentage points.

About half of the control variables are significant. Larger ethnic groups and groups occupying valuable soils are more likely to be involved in conflict onsets, while groups with a peaceful past and ethnic groups with co-ethnics in many other countries are less likely to be involved in civil war onsets.

In column 2 we run the same specification, but now including country fixed effects. Our main variable R_1/R remains significant, with a coefficient of similar size. In column 3 we now include group fixed effects. This is a very demanding specification, as all time-invariant group characteristics are controlled for by the group fixed effects (which implies that all time-invariant variables drop from the specification) and the results are purely driven by within-group changes of relative resource abundance over time. Even in this very demanding specification our main independent variable R_1/R remains statistically significant (the p-value is 0.053), with now a somewhat larger coefficient.

[36] Concretely, all ethnic groups are included that do not control the government of their country in a given year, i.e. for which the variable "ethnic group in power" (egip) of Cederman, Buhaug and Rod (2009) takes a value of zero.

In columns 4 and 5 we show that the results of columns 2 and 3 are robust to running conditional logit estimations with country, respectively group fixed effects, instead of the linear probability models used before.

In columns 6 and 7 we run the same regressions like in columns 2 and 3, but with civil war incidence rather than civil war onsets as dependent variable. While our main variable R_1/R remains significant in the presence of country fixed effects, it drops below the 10% significance threshold when group fixed effects are included. This suggest that indeed our theory is better at predicting the break-outs of wars due to bargaining failure rather than war duration, which also depends on additional factors.

Column 8 shows that our main variable R_1/R can also explain the presence of separatist movements in a given ethnic group. Given that this variable is ethnic group specific, but not time-varying, we are only able to include country fixed effects, but not group fixed effects.

Our theory predicts that not only R_1/R will be a main driving factor of bargaining failure to prevent war, but that also the difference between the winning prospects in secessionist versus in centrist wars, $p_s - p_c$, matters. As shown in Corollary 1, the wedge between p_s and p_c is typically larger when a given ethnic group is very concentrated and located far from the capital.

In column 9 we hence interact our main variable of relative resource abundance, R_1/R, with a measure of group concentration ranging from 0 to 1, constructed with raw data from Alesina and Zhuravskaya (2011). While this is the most precise available data for our purpose, it only covers a subset of our ethnic groups, leading to a drop in the sample size. It is also a time-invariant variable, meaning that the baseline group concentration variable drops from the specification as we include group fixed effects, and only its interaction with R_1/R remains in the specification. We find a quantitatively strong effect of the interaction term that is significant at the 1% level, and also R_1/R and (R_1/R) * Group Concentration are jointly statistically significant at the 1% level. This highlights that indeed civil conflict outbreaks are most likely when R_1/R and $p_s - p_c$ are both large, as shown in Corollary 1 and displayed graphically in Figure 1.

In column 10 we include the interaction of our R_1/R variable with a dummy of above-median distance from the capital. In line with Corollary 1 we again expect this interaction term to be positive. Indeed, we find a quantitatively large, positive coefficient of this interaction term that is statistically significant at the 1% level. The variables R_1/R and (R_1/R)* Distance from capital are jointly significant at the 5% level. These findings are consistent with our theory's prediction that indeed civil conflict outbreaks are most likely when R_1/R and $p_s - p_c$ are both large.

The Appendix Table 4 provides additional results. In order to alleviate concerns of oil abundance

affecting ethnic group location, we restrict in columns 1-4 like in some country level regressions the sample to groups from countries that did not have oil in 1964, which is the year when our primary ethnic group location data was put together. Column 1 replicates the main regression of column 3 of Table 2 for this restricted sample finding still a positive coefficient of comparable size that is significant at the 5% level. Also the regression of column 2 –which mirrors the war incidence regression of column 7 of Table 2– finds like before in Table 2 a positive coefficient which however is not quite statistically significant. Like before in the columns 9-10 of Table 2, we find in columns 3-4 that the interaction terms of R_1/R and group concentration, resp. distance from capital are statistically significant at the 1% level.

The columns 5-6 re-run the main regressions of columns 2 and 7 of Table 2, but this time for governing rather than for non-governing groups. According to our theory the expression R_2/R that captures resource abundance of the governing group should –if anything– decrease the risk of civil war. We find indeed a negative coefficient which is however imprecisely estimated and not statistically significant. This is unsurprising given the smaller sample size. Still, running such a regression on a sample of governing groups and finding a non significant coefficient of interest being of opposite, negative sign alleviates concerns that our main results could be driven by some other channel outside our model which mechanically leads to more conflict in resource rich groups.

4 Conclusion

This paper has proposed a simple model to capture how the geographical distribution of natural resources within a country can affect the risk of civil war of different types. We have allowed for uneven resource abundance and two different forms of conflict, secessionist and centrist, and found that bargaining fails to prevent costly conflict if an ethnic minority group is located in a region that is particularly rich in natural resources (relative to the rest of the country) and if its winning probability for the case of secessionist conflict is substantially larger than for centrist conflict. This leads to the presence of two relevant threat points for war, which cannot be addressed at the same time by bargaining.

The new simple theory of bargaining breakdown due to multiple types of civil war is not only interesting per se, in our opinion, but it is also shown to fit nicely with most existing empirical findings and with the estimations on our newly constructed data set with detailed geographic information about ethnic groups and resources.

The analysis of the conditions under which discovery of new resources in a developing country can lead to development without conflicts is still incomplete. This paper has highlighted the

Dep. Var.: Civil War	Onsets	Onsets	Onsets	Onsets	Onsets	Incid.	Incid.	Separ.	Onsets	Onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
R1 / R	**0.027****	**0.022***	**0.064***	**2.610*****	**3.189***	**0.021***	**0.048**	**0.126***	**0.024**	**-0.061**
	(0.012)	**(0.012)**	**(0.033)**	**(0.652)**	**(1.859)**	**(0.012)**	**(0.034)**	**(0.074)**	**(0.026)**	**(0.047)**
(R1/R)* Group. Conc.									**0.181*****	
									(0.044)	
(R1/R) * Dist.										**0.169****
										(0.068)
Gr.Pop./Gov.Pop.(t-1)	0.003*	0.006***	0.012***	0.578***	9.627**	0.007***	0.006**	0.081	0.012	0.012***
	(0.002)	(0.002)	(0.002)	(0.158)	(4.589)	(0.002)	(0.002)	(0.050)	(0.010)	(0.002)
Gov. Pop. (t-1)	-0.000	-0.008	0.004	-1.012	0.921	-0.009	0.007	-0.251	0.042	0.004
	(0.001)	(0.009)	(0.007)	(2.365)	(3.476)	(0.006)	(0.008)	(0.250)	(0.054)	(0.007)
Group Peace Duration	-0.001***	-0.001	0.001	-0.062***	0.110***				0.001	0.001
	(0.000)	(0.001)	(0.001)	(0.008)	(0.018)				(0.001)	(0.001)
Group Diamond Mines	0.032	0.029		5.107*		0.043		-0.025		
	(0.032)	(0.031)		(2.931)		(0.041)		(0.124)		
Group Co-Ethnics	-0.001**	-0.000		-0.014		-0.000		-0.011		
	(0.000)	(0.000)		(0.065)		(0.000)		(0.015)		
Group Mount. Terr.	0.002	0.003*		0.583		0.002		0.029		
	(0.002)	(0.002)		(0.391)		(0.002)		(0.048)		
ln Group Dist. Cap.	0.002	0.004		1.325***		0.006**		0.089**		
	(0.001)	(0.002)		(0.232)		(0.003)		(0.039)		
Group Soil Quality	0.005*	0.001		0.028		-0.001		0.074		
	(0.002)	(0.002)		(0.496)		(0.002)		(0.076)		
Group Pop. Dens.	0.009	0.014		3.058**		0.023		0.522		
	(0.012)	(0.012)		(1.227)		(0.015)		(0.399)		
Group War Inc.(t-1)						0.906***	0.801***			
						(0.014)	(0.030)			
Model	OLS	OLS	OLS	Logit	Logit	OLS	OLS	OLS	OLS	OLS
Fixed effects	No	Cou. FE	Gr. FE	Cou. FE	Gr. FE	Cou. FE	Gr. FE	Cou. FE	Gr. FE	Gr. FE
Observations	28549	28594	28594	14799	2013	30164	30164	10282	11828	28594
R-squared	0.024	0.049	0.168	0.274	0.376	0.869	0.878	0.873	0.128	0.169

Notes: Dependent variable: Civil war onsets (unless when specified differently in row 1). Sample period: 1960-2006. Number of non-governing ethnic groups for which observations are available: 930. In all columns unreported annual time dummies are included, and robust standard errors are allowed to be clustered at the country level (unless in the conditional logit regressions of columns 4-5 where clustering of standard errors is not possible). Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table 2: Ethnic Group Level Regressions of the Effect of Oil Unevenness on Conflict Onsets

significance of resource concentration and group concentration for civil war, but of course the complete elimination of the resource curse in terms of violent incentives also requires checking that inter-state wars and other forms of violence and discriminations can be avoided. An integrated study of the role of natural resources for violent incentives of all kinds is left as next step in our research agenda.

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Appendix A: Characterization of equilibrium

Define the threshold $\overline{\alpha} \equiv p_c + \frac{d_j(C)}{R_1+R_2}$, as an upper bound of government concessions that would still make group j prefer peace to centrist conflict. Group i weakly prefers peace to centrist conflict if $\alpha \geq \underline{\alpha}_c \equiv p_c - \frac{d_i(C)}{R_1+R_2}$. Note that $\underline{\alpha}_c < \overline{\alpha}$ always holds. Hence if only centrist conflict were considered as a possibility, there would be an obvious Pareto frontier of intermediate values of α between these two that would avoid war if the two players could bargain about α.

Considering that another type of conflict is possible; group i weakly prefers peace to secessionist conflict if $\alpha \geq \underline{\alpha}_s \equiv p_s \frac{R_1}{R_1+R_2} - \frac{d_i(S)}{R_1+R_2}$. We restrict attention to the most interesting setting where $\underline{\alpha}_c > 0$, $\underline{\alpha}_s > 0$. There are three cases to consider (recall that θ=probability that group j can impose all-out centrist war in the face of a secessionist rebellion). In terms of notation, (x, y) means that i plays x and j plays y.

Case 1 ($\overline{\alpha} > \underline{\alpha}_c > \underline{\alpha}_s > 0$):

The only two possible rent-sharing choices have the following consequences: $\alpha = 0 \Rightarrow (c, \{p, c\})$, $\alpha = \underline{\alpha}_c \Rightarrow (p, p)$.

$$E(\pi^j(\alpha = 0)) = (1 - p_c)(R_1 + R_2) - d_j(C),$$

$$E(\pi^j(\alpha = \underline{\alpha}_c)) = (1 - \underline{\alpha}_c)(R_1 + R_2) = (1 - p_c)(R_1 + R_2) + d_i(C).$$

Group j would always select $\alpha = \underline{\alpha}_c$, followed by peace.

Case 2a ($\overline{\alpha} > \underline{\alpha}_s > \underline{\alpha}_c > 0$ and $\pi_S^j > \pi_C^j$ (which can happen when $d_j(S) << d_j(C)$)):

The only two possible rent-sharing choices have the following consequences: $\alpha = 0 \Rightarrow (s, p)$, $\alpha = \underline{\alpha}_s \Rightarrow (p, p)$.

$$E(\pi^j(\alpha = 0)) = (1 - p_s)R_1 + R_2 - d_j(S),$$

$$E(\pi^j(\alpha = \underline{\alpha}_s)) = (1 - \underline{\alpha}_s)(R_1 + R_2) = (1 - p_s)R_1 + R_2 + d_i(S).$$

Group j would always select $\alpha = \underline{\alpha}_s$, followed by peace.

Case 2b ($\overline{\alpha} > \underline{\alpha}_s > \underline{\alpha}_c > 0$ and $\pi_S^j < \pi_C^j$):

The only two possible rent-sharing choices have the following consequences: $\alpha = 0 \Rightarrow (s, c)$, $\alpha = \underline{\alpha}_s \Rightarrow (p, p)$.

$$E(\pi^j(\alpha = 0)) = \theta\left[(1 - p_c)(R_1 + R_2) - d_j(C)\right] + (1 - \theta)\left[(1 - p_s)R_1 + R_2 - d_j(S)\right],$$

$$E(\pi^j(\alpha = \underline{\alpha}_s)) = (1 - \underline{\alpha}_s)(R_1 + R_2) = (1 - p_s)R_1 + R_2 + d_i(S).$$

Group j will select $\alpha = \underline{\alpha}_s$ iff the following condition holds (and $\alpha = 0$ otherwise):

$$\theta\left[(1 - p_c)(R_1 + R_2) - d_j(C) - (1 - p_s)R_1 - R_2 + d_j(S)\right] < d_i(S) + d_j(S).$$

This always holds when θ is small. It is again possible in this case to guarantee a peaceful outcome.

Case 3a ($\underline{\alpha}_s > \overline{\alpha} > \underline{\alpha}_c > 0$ and $\pi_S^j > \pi_C^j$):

The only two possible rent-sharing choices have the following consequences: $\alpha = 0 \Rightarrow (s, p)$, $\alpha = \underline{\alpha}_s \Rightarrow (s, p)$. Hence, group j will be indifferent between $\alpha = 0$ and $\alpha = \underline{\alpha}_s$. In case 3a for both $\alpha = 0$ or $\alpha = \underline{\alpha}_s$ there will always be secessionist conflict.

Case 3b ($\underline{\alpha}_s > \overline{\alpha} > \underline{\alpha}_c > 0$ and $\pi_S^j < \pi_C^j$):

The only two possible rent-sharing choices have the following consequences: $\alpha = 0 \Rightarrow (s, c)$, $\alpha = \underline{\alpha}_s \Rightarrow (s, c)$. Hence, group j is indifferent between selecting $\alpha = \underline{\alpha}_s$ or $\alpha = 0$, which both result in the same outcome. There will always be conflict in case 3b (in particular, with probability θ there will be centrist conflict, while with probability $(1 - \theta)$ there will be secessionist conflict).

To sum up, in the third case (cases 3a and 3b), where $\underline{\alpha}_s > \overline{\alpha}$, no surplus sharing can avoid conflict.

Appendix B: Additional Regression Tables

The Tables 3 and 4 display –as discussed in the main text– additional regressions at the country, resp. ethnic group level.

Appendix C: Data

This appendix describes the data used in section 3. Table 5 provides the descriptive summary statistics for all variables.

Country Level Variables

The dependent variables, civil war onset and incidence, and the main independent variable, Oil Gini, have been described above in the main text. In what follows we describe the control variables.

Oil exporter: Dummy variable taking a value of 1 if in a given country and year the fuel exports (in % of merchandise exports) is above 33%. Variable from Fearon and Laitin (2003), but updated with recent data of the variable "fuel exports (in % of merchandise exports)" from World Bank (2012).

ln GDP per capita: PPP adjusted GDP per capita at constant prices. From the Penn World Tables (Heston, Summers, and Aten, 2011).

Democracy: Polity scores ranging from -10 (strongly autocratic) to +10 (strongly democratic). From Polity IV (2012).

ln Population: Total population. From World Bank (2012).

New State: Coded as 1 when a state was created in the previous 10 years, coded as 0 otherwise.

Ethnic Fractionalization: Index of ethnic fractionalization. From Fearon and Laitin (2003).

Mountainous Terrain: Percentage of territory covered by mountains. From Collier, Hoeffler and Rohner (2009).

Noncontiguous State: Dummy taking a value of 1 if a state has noncontiguous territory. From Fearon and Laitin (2003).

Peace duration: Years since last civil war incidence.

Conflict Incidence (t-1): First lag of the civil war incidence variable.

War years during last 5 years: Count of how many civil war incidence years during last 5 years, ranging from 0 to 5.

Gold Production Dummy: Takes a value of 1 when there is gold production in a country year, and 0 otherwise. From World Bank (2010).

	Dependent variable: Civil War Onsets					
	(1)	(2)	(3)	(4)	(5)	(6)
Oil Gini	**0.069***	**0.107****	**0.067***	**0.092***	**0.155****	**0.083***
	(0.037)	**(0.053)**	**(0.037)**	**(0.053)**	**(0.067)**	**(0.049)**
Oil exporter (t-1)	0.020	0.033		0.029	0.017	-0.008
	(0.019)	(0.021)		(0.044)	(0.026)	(0.009)
ln GDP p.c.(t-1)	-0.004	0.000	-0.017*	-0.005	-0.006	-0.009
	(0.009)	(0.012)	(0.010)	(0.018)	(0.029)	(0.019)
Democ. (t-1)	-0.001	-0.001	-0.001	-0.002***	-0.001	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ln Popul.(t-1)	0.008	0.011	0.021	0.004	-0.007	-0.007
	(0.012)	(0.016)	(0.015)	(0.026)	(0.028)	(0.024)
New State	0.011	0.000	0.014*	-0.003	0.011	-0.002
	(0.008)	(0.006)	(0.007)	(0.013)	(0.013)	(0.013)
War yrs. last 5y.	0.017*					
	(0.009)					
Gold Producer		-0.024				
		(0.020)				
Diamond Producer		-0.039				
		(0.027)				
Peace duration		-0.000	-0.000	-0.001		-0.001
		(0.001)	(0.001)	(0.001)		(0.001)
Oil Prod. pc. (t-1)			0.034			
			(0.029)			
Civ. War Incid. (t-1)					0.556***	
					(0.051)	
Oil Exp. * Oil Gini						1.394***
						(0.071)
Sample	All countries			All countries without oil in 1964		
Model	OLS	OLS	OLS	OLS	OLS	OLS
Country Fixed Eff.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4949	4017	4204	1918	2035	1918
R-squared	0.117	0.137	0.125	0.125	0.521	0.141

Notes: Dependent variable: Civil war onset (unless in column 5 where the dependent variable is Conflict incidence). The dependent variable is coded as 1 if a conflict causing at least 1000 fatalities is starting in a given year. Sample period: 1960-2008. Number of countries for which observations are available: 157. In all columns unreported country fixed effects and annual time dummies are included, and robust standard errors are allowed to be clustered at the country level. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table 3: Additional Country Level Regressions of the Effect of Oil Gini on Conflict Onsets

Dep. Var.: Civil War	Onsets	Incid.	Onsets	Onsets	Onsets	Incid.
	(1)	(2)	(3)	(4)	(5)	(6)
R1 / R	**0.096****	**0.041**	**0.032**	**-0.035**	**-0.004**	**-0.019**
	(0.044)	**(0.034)**	**(0.023)**	**(0.026)**	**(0.008)**	**(0.014)**
(R1/R)* Group. Conc.			**0.184*****			
			(0.027)			
(R1/R) * Dist.				**0.173****		
				(0.066)		
Gr.Pop./Gov.Pop.(t-1)	0.010	0.004	0.015	0.010	-0.021	-0.052***
	(0.008)	(0.006)	(0.013)	(0.008)	(0.014)	(0.010)
Gov. Pop. (t-1)	-0.006	0.049	0.067	-0.006	-0.038	-0.118***
	(0.017)	(0.056)	(0.067)	(0.017)	(0.023)	(0.041)
Group Peace Duration	0.002		0.003**	0.002	0.000	
	(0.001)		(0.001)	(0.001)	(0.001)	
Group War Inc.(t-1)		0.845***				0.722***
		(0.032)				(0.064)
Sample	Non-gov. groups in countries without oil in 1964				Governing groups	
Model	OLS	OLS	OLS	OLS	OLS	OLS
Group fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9616	10533	3431	9616	8383	8538
R-squared	0.203	0.898	0.227	0.204	0.175	0.794

Notes: Dependent variable: Civil war onsets (unless when specified differently in row 1). Sample period: 1960-2006. Number of ethnic groups for which observations are available: max. 317 for columns 1-4; 273 for columns 5-6 . In all columns unreported group fixed effects and annual time dummies are included, and robust standard errors are allowed to be clustered at the country level. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table 4: Additional Ethnic Group Level Regressions of the Effect of Oil Unevenness on Conflict Onsets

Diamonds production dummy: Takes a value of 1 when there is diamond production in a country year, and 0 otherwise. From Lujala, Gleditsch, and Gilmore (2005).

Oil production per capita: Average amount per capita of oil extracted per day in a given year, measured in millions of barrels per day. From Humphreys (2005).

*Oil exporter * Oil Gini:* Interaction term of the variables Oil exporter and Oil Gini defined above.

4.1 Group Level Variables

The two main dependent variables, civil war onset and incidence at the group level, and the main independent variable, R_1/R, have been described above in the main text. In what follows we describe the third dependent variable and all control variables.

Separatism: Dummy taking a value of 1 when the variable Sepx from Minorities at Risk (2009) takes a value of 2 or above.

Group Population / Governing Groups' Population: From Cederman, Buhaug and Rod (2009). Note that the population estimates of each ethnic group are not time-varying, but that the composition of groups controlling the government is time varying, which makes this measure time varying.

Governing Groups' Population: In 100 Millions. From Cederman, Buhaug and Rod (2009). Note that the population estimates of each ethnic group are not time-varying, but that the composition of groups controlling the government is time varying, which makes this measure time varying.

Group Peace Duration: Years since last civil war incidence involving the given ethnic group.

Group Diamond Mines: Total number of diamond mines on the group territory (re-scaled in 100 mines). Constructed with GIS based on the group boundaries from the "Geo-referencing of ethnic groups" (GREG) dataset (Weidmann, Rod and Cederman, 2010) and the geo-referenced DIADATA dataset on the location of diamonds (from Gilmore et al., 2005).

Group co-ethnics abroad: Number of countries in which the same ethnic group also exists. Computed with GIS based on the group boundaries from the "Geo-referencing of ethnic groups" (GREG) dataset (Weidmann, Rod and Cederman, 2010).

Group's share of mountainous terrain: From Cederman, Buhaug and Rod (2009).

ln group's distance to capital: From Cederman, Buhaug and Rod (2009).

Group's soil quality: Part of the group's territory with high-quality fertile soil. Constructed based on the Harmonized World Soil Database (Fischer et al., 2008). Their complete global grid of

nutrient availability is ranked from 1 ("no or slight constraints") to 4 ("very severe constraints"), and also including categories 5 ("mainly non-soil"), 6 ("permafrost area") and 7 ("water bodies"). Our dummy takes a value of 1 for categories 1 and 2, categories 3 to 6 get value 0, and category 7 is set to missing.

Group Population Density: Average population density, re-scaled in 1000, constructed with GIS based on the on the group boundaries from the "Geo-referencing of ethnic groups" (GREG) dataset (Weidmann, Rod and Cederman, 2010) and the geo-referenced population density data from the Socioeconomic Data and Applications Center at Columbia University (Sedac, 2012).

Group War Incidence (t-1): First lag of the group level civil war incidence variable.

*(R1/R) * Group Concentration:* Interaction term between the (R1/R) variable and the following group concentration measure. The group concentration variable corresponds to the ratio of the "ethnic group's population living in areas where this ethnic group is the largest group" divided by the "total population of an ethnic group" in a given country. This time-invariant variable has been constructed using raw data from Alesina and Zhuravskaya (2011).

*(R1/R) * Distance:* Interaction term between the (R1/R) variable and a dummy variable taking a value of 1 if the value of the group distance from capital variable described above is larger than its median.

Country Level Variables	Obs	Avg	Sd	Min	Max
Conflict Onset	8071	0.015	0.123	0	1
Conflict Incidence	8494	0.050	0.219	0	1
Oil Gini	7983	0.167	0.258	0	0.977
Oil Exp. * Oil Gini	7464	0.038	0.145	0	0.888
Oil exporter (t-1)	7775	0.139	0.346	0	1
Gold Producer	6277	0.389	0.488	0	1
Diamond Producer	7921	0.186	0.389	0	1
Oil Prod. pc. (t-1)	5237	0.045	0.270	0	4.923
ln GDP p.c.(t-1)	7074	8.249	1.287	4.767	11.722
Democ. (t-1)	7662	0	7.666	-10	10
ln Popul.(t-1)	7059	15.747	1.680	11.578	21.000
New State	8494	0.126	0.332	0	1
Ethnic Fraction.	7921	0.392	0.284	0.001	0.925
Mountainous Terr.	7559	0.176	0.209	0	0.943
Noncontig. State	7921	0.169	0.375	0	1
Peace duration	8428	29.452	18.781	0	62
Conflict Incid. (t-1)	8428	0.050	0.218	0	1
Conflict yrs. last 5y.	7613	0.257	0.920	0	5

Group Level Variables	Obs	Avg	Sd	Min	Max
Group Conflict Onset	63869	0.003	0.059	0	1
Group Conflict Incid.	65934	0.035	0.183	0	1
Group Separatism	19313	0.336	0.472	0	1
R1 / R	69596	0.065	0.210	0	1
(R1/R)* Group. Conc.	28987	0.059	0.210	0	1
(R1/R) * Dist.	65934	0.018	0.102	0	1
Gr.Pop./Gov.Pop.(t-1)	55884	0.165	0.441	7.80E-08	8.918
Gov. Pop. (t-1)	55884	0.686	1.564	0.001	8.673
Group Peace Duration	63869	25.610	16.330	0	59
Group Diamond Mines	69596	0.006	0.061	0	1.790
Group Co-Ethnics	69596	2.781	2.329	1	15
Group Mount. Terr.	65934	0.369	0.352	0	1
ln Group Dist. Cap.	65934	6.154	1.090	1.609	8.782
Group Soil Quality	69596	0.699	0.333	0	1
Group Pop. Dens.	69596	0.069	0.153	0	4.354
Group Conflict Inc.(t-1)	65880	0.035	0.183	0	1

Table 5: Descriptive Statistics