A Theory of Strategic Civil War Aims: Explaining the Mixed Oil-Conflict Curse

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Abstract

This paper presents a theory of strategic civil war aims and applies it to explain an empirical puzzle from the oil-conflict literature: oil wealth correlates positively with separatist civil war onset (among oil-rich ethnic minorities), but negatively with civil wars to capture the center. The model formally analyzes a bargaining interaction between a government and a regional ethnic challenger. Either actor may produce oil in their region. If the challenger fights, then it chooses civil war aims. The main explanation for the mixed empirical pattern invokes strategic selection: small ethnic groups are (1) more likely to be politically marginalized, exacerbating the government's commitment problem and (2) more likely to secede if they fight. A reinforcing consideration is that oil-funded repression more effectively deters challenges against the center than in the periphery. Examining relationships among commitment problems, ethnicity, and civil war aims yields broader implications for studying civil war.

Keywords: Civil war, formal theory, oil, resource curse

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How do rebel groups strategically choose civil war aims? Empirically, between 1946 and 2013, independent non-European countries experienced 74 major center-seeking civil wars in which rebel groups sought to capture the capital. For example, in Angola, rebel leader Joseph Savimbi of UNITA sought to overthrow the Soviet-influenced "imperial" government in Luanda, the capital city (Savimbi, 1985). Also since 1946, countries have experienced 43 major separatist civil wars to create an autonomous region or independent country. Amidst the Angolan government's war with UNITA, the rebel group FLEC sought to gain independence and end Angola's "military occupation" of Cabinda (Cabinda Free State, n.d.).[1]

Conventional civil war theories posit a diversity of explanations for civil war onset ranging from economic motivations (Collier and Hoeffler, 2004) to state weakness (Fearon and Laitin, 2003) to ethnopolitical grievances (Cederman, Gleditsch and Buhaug, 2013). However, most major theories explain *aggregate* civil war onset without analyzing how rebel groups choose civil war aims. This is problematic. Both types of civil wars occur frequently, and risk factors that induce center-seeking fighting may differ from factors that encourage challenges in the periphery—given distinct rebellion goals. Furthermore, for empirical research, if a risk factor correlates with one type of civil war and not the other—or correlates in opposing directions for different types of civil war—then aggregating civil wars can miss important relationships.

This paper presents a new theory to advance our understanding of how rebel groups strategically choose civil war aims. Although the model presented here posits general theoretical mechanisms, this paper primarily applies the model to explain the divergent relationship between oil wealth and separatist versus center-seeking civil wars.[2] There are two key findings about oil and conflict that usually are examined separately, or are overlooked in favor of aggregating all civil war types. First, oil-rich ethnic minority groups, such as the Cabindan Mayombe in Angola, fight separatist civil wars relatively *frequently* (Sorens 2011; Ross 2012, 155-6; Morelli and Rohner 2015). This trend is particularly pronounced among ethnic groups excluded from political power in the central government (Asal et al., 2016; Hunziker and Cederman, 2017). Second, oil-rich countries such as Saudi Arabia fight *fewer* center-seeking civil wars (Paine, 2016), a pattern consistent

[1] Data sources and sample described below. Empirically, Appendix B discusses how rebel groups have almost always articulated clear aims for the center or to separate, although a few countries (including Angola) have simultaneously experienced both types of rebellions fought by distinct rebel groups.

[2] Paine (2016, 2) lists foundational articles in the "conflict resource curse" literature, which have tallied over 15,000 citations. Ross (2015) provides a recent review of this vast literature.

with broader evidence rejecting a resource curse (Menaldo, 2016; Liou and Musgrave, 2014). Emphasizing this distinction between center-seeking and separatist civil wars is crucial for studying the long-debated oil-conflict relationship because many recent studies have demonstrated a null relationship between oil and *aggregate* civil war onset, as Ross (2015, 251) summarizes.

In the formal model, a governing ethnic group accrues revenues from oil production and from other economic activities in (1) the region of the country where it resides and (2) another region of the country where a different ethnic group (the "challenger") resides. The government allocates revenues to its military and offers transfers to the challenger, which can either accept, fight a center-seeking civil war, or fight a separatist civil war. In equilibrium, the government may be unable to strike a peaceful bargain because it can only imperfectly commit to transfers it offers the challenger, resembling a common mechanism in the formal war literature (Powell, 2004; Fearon, 2004; Krainin, 2017). An increase in oil production in either region exerts two countervailing effects on the equilibrium likelihood of any civil war. On the one hand, oil production is easily taxed relative to other economic outputs because it is a highly capital intensive point-source resource (Le Billon, 2005, 34). This *budget effect* diminishes equilibrium civil war prospects by increasing available funds to spend on the military and on transfers. On the other hand, larger oil revenues also create a *relative prize effect* by increasing the challenger's expected utility to fighting because, simply, more revenues exist to capture. Additional considerations are needed to determine which effect will be larger in magnitude.

Highlighting these countervailing theoretical effects enables restating the empirical puzzle for the conflict resource curse: why is the budget effect of oil stronger than the relative prize effect for center-seeking civil wars, whereas the opposite is true for separatist civil wars (if the oil is located in the challenger's region)?

Analyzing the challenger's strategically chosen civil war aims yields two mechanisms to explain the mixed empirical oil-conflict pattern. The main explanation is a strategic selection effect based on the premise that commitment ability explains why civil war occurs or not, and ethnic group size explains its aims.[3] Numerically small ethnic groups are often politically marginalized, which in the model decreases the government's ability to commit to transfers (Assumption 1). Furthermore, feasibility constraints on rebellions imply that small groups usually prefer separatist over center-seeking campaigns (Assumption 2). Consequently, for groups that optimally choose separatist over center-seeking civil wars, the relative prize effect of oil pro-

[3] Appendix Section B.5 discusses the possibility of oil production directly shaping civil war aims.

duction is large relative to the budget effect—causing aggrieved oil-rich groups to separate. By contrast, the opposite is true if the challenging group is numerically large, regardless of within-country oil location—they would seek the center rather than separate, but tend not to fight at all because their political representation enhances government commitment ability.

A secondary result follows because the relative prize effect is smaller in magnitude if the challenger fights for the center than to separate. Heightened military spending—afforded by larger oil revenues, regardless of within-country location—more strongly decreases the challenger's probability of winning if it optimally seeks the center over separating (Assumption 3). Substantively, military investments more effectively protect the capital than project power into the periphery.

Overall, both the primary and the secondary results explain why the budget effect should tend to outweigh the relative prize effect if the challenger optimally fights for the center (which itself is determined by group size), whereas the opposite is true if the challenger optimally separates. Below, Figures 7 and 8 summarize the logic.

In addition to providing a foundational theory of strategic civil war aims, the analysis also yields new empirical implications about conditional relationships. After presenting the hypotheses, the empirical section summarizes mechanisms for oil-civil war cases and presents results from simple interactive regression models. Brief case studies from Saudi Arabia and Angola provide additional evidence for central mechanisms.

The present theory improves upon existing oil research by examining how rebels strategically choose civil war aims. Existing arguments for prevalent separatist civil wars in oil-rich regions cannot explain why oil negatively correlates with center-seeking civil wars. Distribution-based grievance theories focus on considerations related to the relative prize effect by examining how regional actors seek to eliminate exploitative taxes on their oil production (Sorens 2011; Ross 2012, 155-6; Asal et al. 2016; Hunziker and Cederman 2017). This can account for conflictual properties of oil production, but not for oil's pacifying relationship with center-seeking civil wars. Why is the relative prize effect not also severe for groups trying to a get a slice of oil production in the government's region—which could be obtained by capturing the center? And why do oil revenues generated by the region not facilitate sufficient government coercion and transfers to prevent fighting?

Similarly, explanations for the rarity of center-seeking civil wars in oil-rich countries cannot explain frequent separatist civil wars in oil-rich regions. Oil and authoritarian stability theories, such as those summarized in Ross (2001), focus overwhelmingly on the budget effect—often called the "rentier effect"—and therefore can account for stabilizing properties of oil production (Paine, 2016). However, why does greater spending on patronage and on repression afforded by more oil revenues not also deter separatist civil wars? Other strands of the literature focused on oil and state weakness are also unsatisfactory because they anticipate oil production *raising* center-seeking propensity (Buhaug, 2006).

The theory also offers a new explanation for why oil location matters, an important theme in recent research (Ross, 2015, 251). In contrast to arguments that oil routinely provides a source of rebel finance, oil location matters in the present theory because the *government* easily accrues revenues. Oil production in a region with a politically excluded minority group is likely to trigger separatist conflict because the government extracts oil production but has trouble committing to provide transfers. However, within-country location should only matter for separatism. Regardless of location, groups that consider fighting for the center are likely to have better political representation, and oil revenues hinder attacks on the center. Consistent with the distinction between the present model and financing theories, the empirical analysis discusses the rarity of widespread rebel oil financing,[4] and shows that the theoretical conditions posited to cause separatist civil war also apply empirically to offshore oil—which is difficult to loot.

Regarding the broader literature, several important theories examine causes of separatist civil wars (e.g., Toft, 2005; Walter, 2009; Lacina, 2015) or the technology of rebellion (Kalyvas and Balcells, 2010), but not how rebels choose center-seeking versus separatist civil war aims. One exception is Buhaug (2006), who statistically evaluates various covariates related to state strength and their association with different types of civil wars at the country level. However, as noted, he offers the opposing hypothesis from here that oil should more strongly and positively covary with *center-seeking* rather than separatist civil wars. Among game theoretic models, Fearon (2004) contains only a single fighting option for the challenger, but the article discusses how key parameters differ depending on the rebellion's aims.[5] Morelli and Rohner (2015) model

[4]This is summarized in Appendix Table B.8. Also see Colgan (2015, 8) and Paine (2016; 2017).

[5]In other models, the aims are explicitly for the center (Powell, 2012) or to separate (Gibilisco, 2017). Other recent formal theoretic research analyzes the related topic of how governments monopolize violence (Powell, 2013; Tyson, 2017; Kenkel, 2017).

distinct types of civil war, but equilibrium bargaining failure results from the possibility of the *government* rather than rebel leaders choosing the rebels' war aims. This model therefore does not address the key question here regarding how *rebels* choose their civil war aims. Substantively, it is somewhat restrictive to assume the government can make a group fight its less-preferred type of war, for example, forcing a group to fight for the center when it would rather secede. Overall, whether examining oil or broader civil war risk factors, we lack a theoretical framework that convincingly explains how rebels strategically choose civil war aims.

After presenting empirical evidence to substantiate the motivating empirical puzzle, the paper discusses foundational model assumptions. The next two sections present and analyze a model of strategic civil war aims, followed by empirical evidence for conditional hypotheses. Finally, although most of the paper focuses on applying the theory to oil, the conclusion discusses how examining relationships among commitment problems, ethnicity, and civil war aims yields broader implications for studying civil war.

1 Oil and Civil War Onset: A Mixed Empirical Pattern

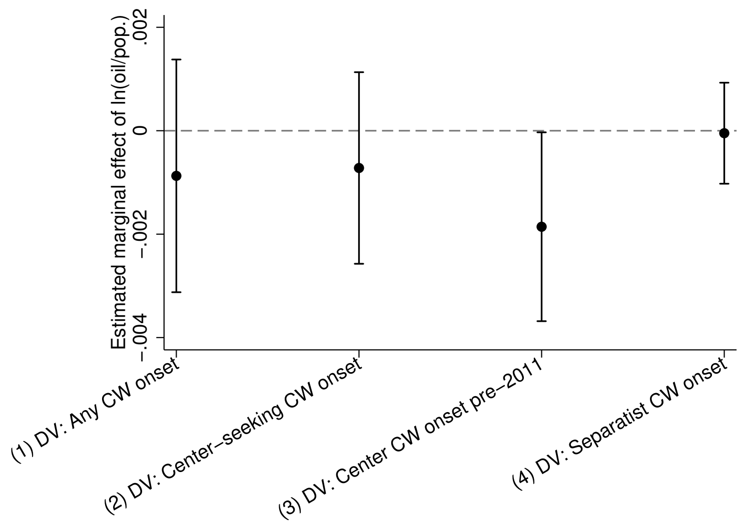
Recent empirical results have found a null relationship between oil and aggregate civil war onset (Ross, 2015, 251). However, disaggregating civil war aims reveals important patterns. Whereas country-level oil wealth strongly covaries with less frequent center-seeking civil wars (at least, before 2011), ethnic group-level oil wealth covaries with more frequent separatist civil wars. Because existing research usually examines these patterns separately, or overlooks them by aggregating civil wars, this section presents regression results that establish the pattern using a common sample and dataset.[6] A theory of strategic civil war aims is needed to explain these divergent empirical patterns.

Figure 1 summarizes a series of logit regressions with country-years as the unit of analysis between 1946 and 2013 among a broad global sample of independent non-Western European countries. The civil war onset variables draw from Fearon and Laitin's (2003) dataset on major civil war onsets (at least 1,000 battle deaths), updated through 2013 along with other alterations by the author described in Appendix B. Every specification in Figure 1 includes logged annual oil and gas production per capita, log population (the only substantive covariate in Ross' 2012 "core" specification), and peace years and cubic splines. Column 1 uses

[6] Appendix B provides additional data details.

any type of civil war onset as the dependent variable, Columns 2 and 3 center-seeking civil war onset, and Column 4 separatist civil war onset. Appendix Equation B.1 presents the logit specifications estimated with country-clustered standard errors, and Appendix Table B.1 is the corresponding regression table.

Figure 1: Country-Level Correlations



Notes: Figure 1 shows point estimates for the marginal effect estimate of logged oil production on civil war onset with 95% confidence intervals. Appendix Equation B.1 and Appendix Table B.1 provide the corresponding regression model and table. The unit of analysis is country-years.

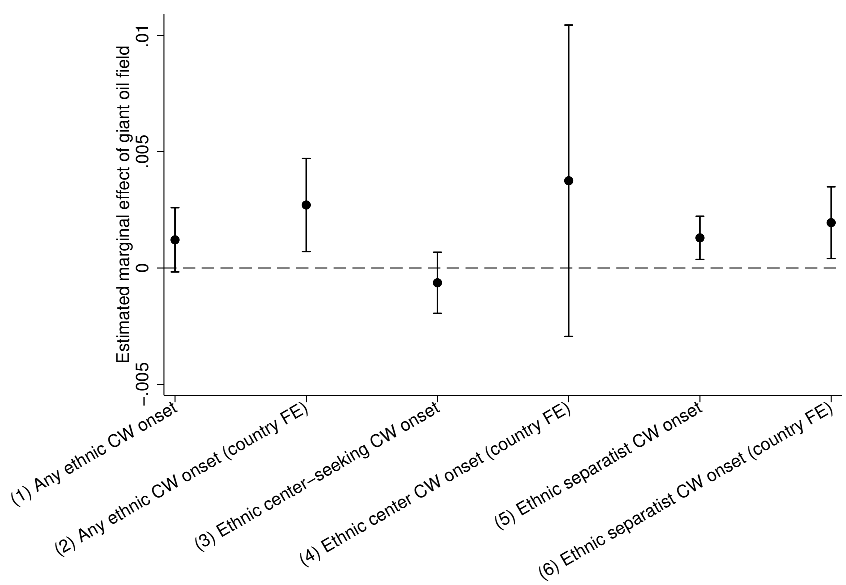
Column 1 of Figure 1 shows that the estimated marginal effect of oil production on any civil war onset is negative. Although this result is inconsistent with earlier proclamations of an oil curse, it corresponds with more recent findings that show no evidence of an unconditional oil-conflict relationship. Disaggregating civil war aims, Column 2 presents a similar estimate for center-seeking civil wars. However, until recently, oil production exhibited a relatively strong negative correlation with center-seeking civil war onset. Column 3 estimates the same model prior to the Arab Spring in 2011 and shows a large-magnitude and statistically significant negative marginal effect estimate—suggesting, perhaps, a resource blessing.[7] Holding the temporal dependence controls at their means, the predicted probability of center-seeking civil onset is 1.1% in country-years with no oil production compared to 0.5% in country-years with $1,000 in oil income per capita, a 51% decline. Finally, the correlation is essentially 0 for separatist civil wars (Column 4).

Figure 2 summarizes a similar set of logit regressions, except ethnic group-years are the unit of analysis.

[7] The theory and subsequent data analysis discuss why the Arab Spring and related events should mitigate the conflict-suppressing effects of oil production on center-seeking civil wars.

The sample is politically relevant ethnic groups drawn from the Ethnic Power Relations (EPR) dataset (Vogt et al., 2015), using a similar country sample and years as the Figure 1 regressions. The ethnic civil war data draw from Fearon and Laitin (2003), which, as Appendix B discusses, the author coded for the EPR dataset. I also matched EPR ethnic groups with giant oil and gas field location, and the oil variable is an indicator for whether the ethnic group's territory contains any giant oil or gas fields, or if there is a nearby offshore oil field. Every specification contains peace years, cubic splines, and lagged country-level civil war incidence. Even-numbered columns additionally control for country fixed effects. The dependent variable is any ethnic civil war onset in Columns 1 and 2, ethnic center-seeking in Columns 3 and 4, and ethnic separatist in Columns 5 and 6. Appendix Equation B.3 presents the logit specification estimated with ethnic group-clustered standard errors and Appendix Table B.4 is the corresponding regression table.[8]

Figure 2: Ethnic Group-Level Correlations



Notes: Figure 2 shows point estimates for the marginal effect of an indicator for giant oil/gas fields on ethnic civil war onset with 95% confidence intervals. Appendix Equation B.3 and Appendix Table B.4 provide the corresponding regression model and table. The unit of analysis is ethnic group-years.

Columns 1 and 2 of Figure 2 demonstrate a positive association between oil wealth and any ethnic civil war onset. The remaining columns demonstrate that only separatist civil wars exhibit this relationship. In the Column 5 specification, holding temporal dependence controls at their means, the predicted probability

[8]Hunziker and Cederman (2017) provide complementary statistical results to Figure 2, although use a different oil measure and civil war dataset.

of separatist civil onset is 0.6% for oil-rich ethnic groups and 0.2% for oil-poor ethnic groups, nearly a three-fold increase. Furthermore, whether or not controlling for country fixed effects, the association is statistically significant at 5%. By contrast, the marginal effect estimate for the giant oil field indicator on center-seeking civil wars is inconsistent in sign and not statistically significant in Columns 3 and 4.

2 Foundational Assumptions for Strategic Civil War Aims

This section substantively grounds three generally relevant assumptions for studying strategic civil war aims. Although only Assumptions 2 and 3 directly relate to different types of civil war, Assumption 1 is relevant because it examines an explanatory factor, ethnic group size, used to explain civil war aims. It concludes by using the assumptions to non-formally state the main intuitions of the theory, and the next section formalizes the assumptions.

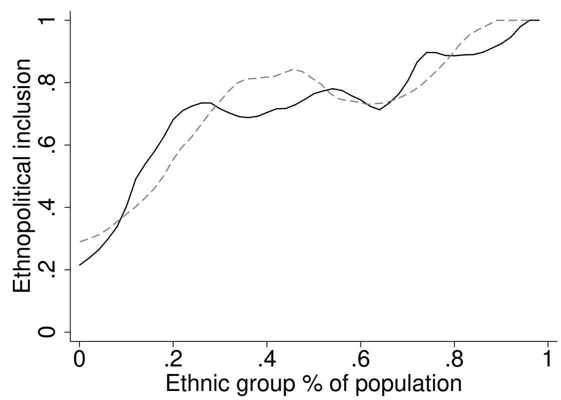
2.1 Assumption 1. Ethnic Group Size and Political Representation

The central government's ability to commit to deals with members of a different ethnic group varies depending on the challenger's access to political power. Power access can arise from cabinet positions (e.g., oil ministry) or military positions, participation in the central government via an authoritarian party or legislature, or regional autonomy deals that allow locals to profit from regional oil production.

Empirically, small ethnic groups are more likely to be excluded from power in the central government. For example, the oil-rich Cabindan Mayombe compose 2% of Angola's population in the Ethnic Power Relations dataset (Vogt et al., 2015), which codes their central political power access as "powerless" in every year since independence. Correspondingly, as discussed with case studies following the model analysis, Cabindans have faced exploitative oil tax rates and have received few compensating benefits from the central government.

The black line in Figure 3 displays this pattern using the same ethnic group sample as in Figure 2. The horizontal axis expresses the ethnic group's national population share. The vertical axis expresses political representation in the central government. Specifically, the Ethnic Power Relations dataset provides information on whether or not a politically relevant ethnic group has any decision-making authority within the central government, based on who controls the presidency, cabinet positions, and senior posts in the administration. Groups whose power access status is "monopoly," "dominant," "senior partner," or "junior partner" are coded as included in power, whereas groups with any other power access status are coded as excluded. The black local polynomial curve summarizes the relationship and demonstrates a clear positive relationship between ethnic group size and ethnopolitical inclusion. The dashed gray curve shows that the pattern is similar among ethnic groups with a giant oil field in their territory.

Figure 3: Ethnic Group Size and Ethnopolitical Inclusion



Notes: Figure 3 summarizes the relationship between ethnic group percentage of the population and ethnopolitical inclusion with local polynomial functions. The black curve uses the same ethnic group sample and years as Figure 2, and the dashed gray curve subsets this sample to ethnic groups with a giant oil field in their territory. Appendix B provides additional data details.

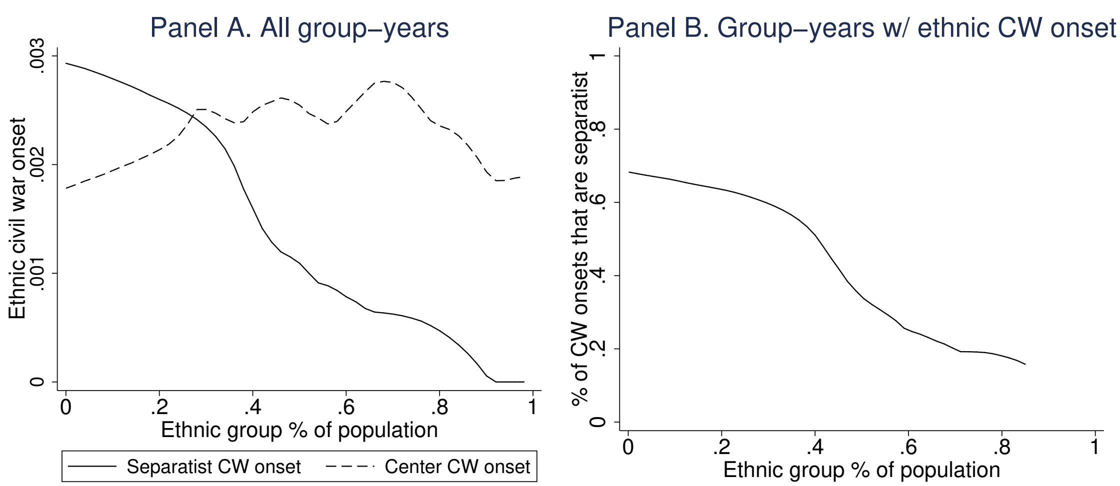
2.2 Assumption 2. Ethnic Group Size and Strategic Civil War Aims

Empirically, conditional on fighting, small ethnic groups are more likely to fight separatist civil wars than are large ethnic groups. Two reasons seem particularly important. First, small ethnic groups face difficulties mustering sufficient support against numerically superior government forces to win control of the government. By contrast, they may be able to survive protracted guerrilla wars in the periphery where they have greater knowledge of terrain and have local support. Because rebels usually tailor their demands to feasible objectives (Buhaug, 2006; Jenne, Saideman and Lowe, 2007), small groups that fight tend to pursue separatism because the probability of winning is higher. For example, Cabinda is an enclave province of Angola, which makes it harder for the government to project power over the Cabindan Mayombe, and the Cabindan Mayombe's small size inhibits conquering the capital city of Luanda. Second, conditional on winning, capturing the government tends to offer a greater prize than gaining an autonomous or independent state.

Consequently, if the probability of winning each type of civil war is the same, then rebel groups will tend to prefer center-seeking fighting. Because fighting for the center is usually viable for large ethnic groups, it usually provides higher expected utility than separating, although Appendix Section B.5 discusses the possibility that regional oil production can endogenously create separatist aims.

Figure 4 presents supportive empirical evidence for this argument using the same ethnic group sample as in Figures 2 and 3. In Panel A, the unit of analysis is ethnic group-years. The vertical axis presents ethnic civil war onset, with wars disaggregated into center-seeking and separatist. The Panel B sample is restricted to group-years with an ethnic civil war onset, and the vertical axis presents whether or not the new civil war is separatist.

Figure 4: Ethnic Group Size and Civil War Aims



Notes: Figure 4 summarizes the relationship between ethnic group percentage of the population and ethnic civil war onset (disaggregated by civil war aims) with local polynomial curves. Panel A uses the same ethnic group sample and years as Figure 2, and Panel B conditions on group-years with an ethnic civil war onset. Appendix B provides additional data details.

Panel A demonstrates a clear trend of separatist civil war propensity decreasing in ethnic group size. And, for small enough groups (roughly, 75% of the population or less), the frequency of center-seeking civil wars increases in group size. Correspondingly, at a threshold of around 30% of the population, the modal type of ethnic civil war switches from separatist to center-seeking. Panel B demonstrates this change in relative frequency even more clearly: conditional on rebelling, separatist civil wars become rarer as ethnic group size increases.

2.3 Assumption 3. Geography of Rebellion

An increase in government military capacity should weaken a challenger's incentives to attack the center by a greater amount than it decreases incentives to separate. If the government builds military strongholds, deploys tanks, and sends a large army into the field, then rebel groups should face great difficulties to defeating the government in the capital. However, these same military tools will be less effective for fighting separatists in the periphery. In other words, the marginal effect of buying a tank on diminishing the challenger's probability of winning is larger in magnitude if the government defends the capital than if it fights in the periphery. This logic relates to Buhaug's (2010) empirical finding that battles in civil wars tend to occur farther from the capital the more coercively strong is the regime because rebels only stand a chance against strong regimes by fighting in areas that minimize power differential.

Divergent military aims of center-seeking and separatist campaigns also support this logic. Whereas center-seeking rebels usually need to actively engage the government to capture specific targets, separatist rebels can use classic irregular guerrilla tactics such as hit-and-runs and ambushes to avoid direct confrontation with a larger and better equipped government military. Regression results using data from Kalyvas and Balcells (2010) support this argument. They analyze rebel tactics—but not civil war aims—and conceptualize technologies of rebellion based on rebel and government strength. This includes irregular conflicts between weak rebels and a strong government, and conventional conflicts between strong rebels and a strong government. Appendix Table B.9 in Section B.4 shows that adding an indicator for separatist aims to their regressions yields a negative and statistically significant correlation between separatism and conventional conflicts, as opposed to to irregular conflicts.

2.4 Preview of Theoretical Results

These three assumptions facilitate illustrating the core mechanics of the formal theory. Imagine a country with two regions that correspond to different ethnic or other politically relevant identity groups. The key question is how oil production—which provides additional revenues to the government—affects incentives for different types of civil war. Oil revenues are a mixed blessing for civil war incentives. On the one hand, the government has more resources to devote to buying off and to coercing the challenger (budget effect). On the other hand, there is more for the other group to grab by winning a civil war (relative prize effect).

The overall effect of these two countervailing forces depends on whether the challenging group is either numerically large or small and, in one case, on within-country oil location.

If the group is large, then its optimal civil war aims are center-seeking (Assumption 2). Two factors diminish the magnitude of the relative prize effect regardless of whether the oil is located in the government's or the challenger's region. First, large groups have greater political representation at the center (Assumption 1), enabling government commitment to patronage distribution. Furthermore, the government can effectively translate its revenues into a low probability of winning because it defends the center (Assumption 3). These considerations imply that oil production anywhere in the country makes center-seeking civil war less likely.

However, if the challenging group is small, then oil production in its region exerts a different effect. The group will prefer to separate if it fights (Assumption 2). If oil is located in the challenger's region, then two factors raise the magnitude of the relative prize effect. First, small groups have lesser political representation at the center (Assumption 1), disabling the government from committing to patronage distribution. Furthermore, defending the periphery implies the government can less effectively translate its revenues to lower the challenger's probability of winning (Assumption 3). These considerations imply that oil production in a small challenger's region makes separatist civil wars more likely. By contrast, highlighting the importance of within-country oil location for explaining separatist civil wars, oil located in the government's region does not create a relative prize effect because the small group would not capture the oil even by successfully separating.

3 Model Setup and Equilibrium Analysis

This section formally describes the model and solves for the unique equilibrium strategy profile.

3.1 Setup

Two ethnic groups, a governing group (G) and a challenger (C), that populate different regions of the country interact in a single-shot game with complete and perfect information. Total economic production in each region is normalized to 1, of which $O_l \in [0, 1)$ is from oil production, for $l \in \{G, C\}$. Specifically, oil production is O_G in G's region ("government oil") and O_C in the region in which C resides ("regional oil"). G is assumed to accrue revenues $\tau_l \in (0,1)$ from each region, yielding total revenue $\tau_G + \tau_C$. Therefore, C's after-tax income is $1-\tau_C$, and the $1-\tau_G$ remaining income in G's region is consumed by actors outside the present interaction. Because oil is a capital-intensive point-source resource (Le Billon, 2005, 34), it is easily taxed by the government. Formally, $\frac{d\tau}{dO} \equiv \frac{d\tau_C}{dO_C} = \frac{d\tau_G}{dO_G} > 0$. Therefore, although G's revenue stream is modeled as an endowment for simplicity, the revenues can be conceived as the product of a strategic tax interaction in which the outcome depends on economic possibilities for taxation.[9]

G's strategic choices. G moves first by allocating its revenues among repressive spending $r \geq 0$ and a patronage offer $x \geq 0$ that are jointly subject to the budget constraint, $r + x \leq \tau_G + \tau_C$. This sequence of moves implies that regardless of how much revenue G accrues from C's region, G can offer these revenues back to C—as well as offer revenues from its own region, or spend on the military, police, intelligence, and other repressive apparatuses. The patronage transfer captures a general decision over private transfers, welfare policies, public sector job provision, and other ways for a government to distribute benefits.

C's strategic choice. C responds to G's patronage offer by either accepting ($\gamma = 1$) or rejecting ($\gamma = 0$), in which case C chooses center-seeking or separatist civil war. By accepting, C consumes its economic activity not originally taxed by G, $1 - \tau_C$, plus $\theta \cdot x$. G consumes all revenues not spent on repression or on transfers, $\tau_G + \tau_C - \big(r + x\big)$.

The parameter $\theta \in (0,1)$ provides a reduced form expression for G's ability to translate promises into consumption for C. Higher θ corresponds with greater ability for G to "commit" to deliver x. The discussion above established that θ should be higher when C has political representation at the center, which below is formalized as Assumption 1. Related, θ can be conceived as a "patronage production function" in which money spent on patronage will be less effective at improving C's welfare if θ is low not only because of government reneging, kickbacks to unmodeled government supporters, and bureaucratic inefficiency, but also because less extensive political networks between the government's group and the challenger's group diminishes the government's knowledge of local circumstances and undermines providing targeted public goods (Roessler, 2016). In the context of oil, the extent of bureaucratic loss also depends on institutions for

[9] Paine (2017) elaborates on core properties of oil production that facilitate easy taxation in the context of a model focused only on separatist civil wars that endogenizes C's labor supply and G's tax choice, therefore providing microfoundations for an economically determined upper bound on tax yields.

oil extraction (Mahdavi, 2017).[10]

If instead C fights, then $\phi \in \left(\hat{\phi}, 1\right)$ percent of the remaining economic production and revenues are destroyed, for $\hat{\phi} \in (0,1)$ defined in Appendix A.[11] C's probability of winning function depends on its chosen civil war aims. The choice variable $\mu \in \{0,1\}$ equals 1 if C chooses center-seeking aims and 0 if C chooses separatist aims. C wins a center-seeking civil war with probability $p_c(\cdot) \in (0,1)$ and a separatist civil war with probability $p_s(\cdot) \in (0,1)$. Regardless of war aims, more military spending by G strictly decreases C's probability of winning, and this effect is strictly diminishing. These functions are indexed as $p_j(\cdot)$, for $j \in \{c,s\}$.[12] If C wins, then it consumes $(1-\phi) \cdot \left(\mu \cdot \tau_G + \tau_C\right)$ and G consumes $(1-\phi) \cdot (1-\mu) \cdot \tau_G - r$. If C loses, then it consumes $(1-\phi) \cdot \left(1-\tau_C\right)$ and G consumes $(1-\phi) \cdot \left(\tau_G + \tau_C\right) - r$.

In addition to the choice variable r, two parameters affect C's probability of winning function. First, the effectiveness of G's military spending at reducing C's probability of winning. This is denoted as β_j, for $j \in \{c,s\}$, and higher β_j indicates greater effectiveness: $\frac{\partial p_j(\cdot)}{\partial \beta_j} < 0$. Furthermore, greater military efficiency enhances the effect of military spending on decreasing C's probability of winning, i.e., β_j and r are complements: $\frac{\partial^2 p_j(\cdot)}{\partial m \partial \beta_j} < 0$. Below, Assumption 3 formalizes the relationship between β_C and β_S.

Second, the national population share of C's ethnic group. This parameter is $\alpha \in (0, \underline{\alpha}) \cup (\overline{\alpha}, 1)$, for $0 < \underline{\alpha} < \overline{\alpha} < 1$ characterized below. The size parameter also affects G's commitment ability, θ, because small groups are less likely to have political representation, which Assumption 1 states. Figure 5 presents the game tree.

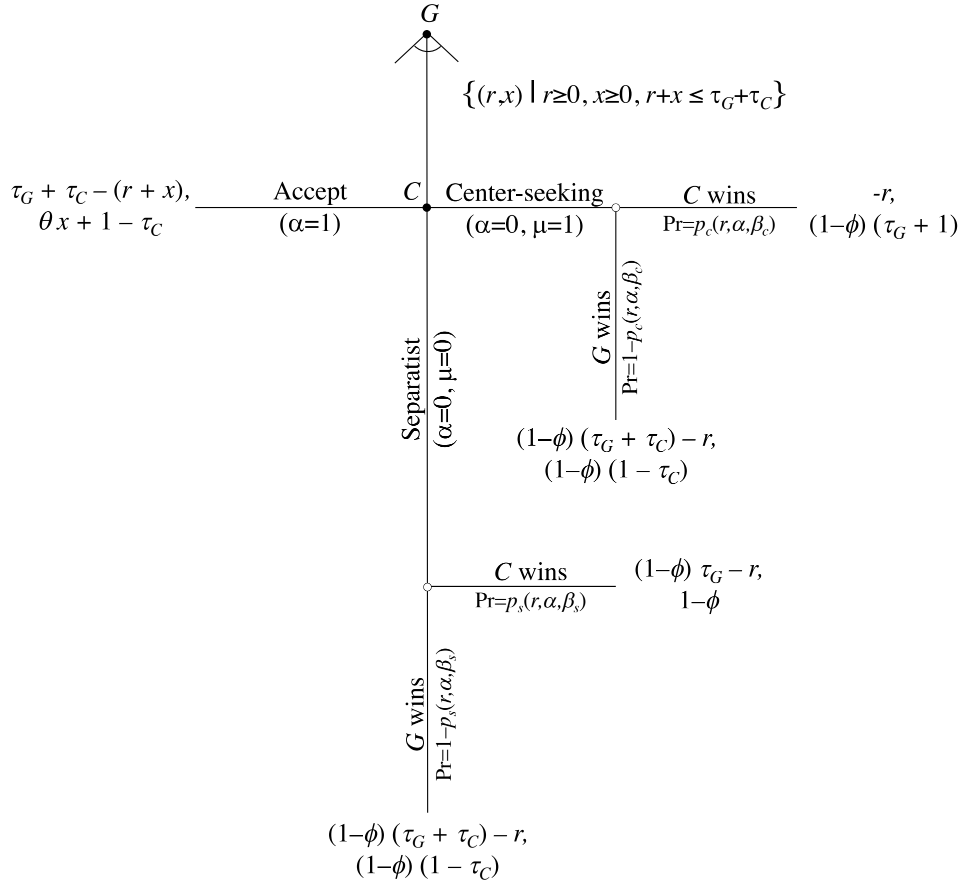
Assumption 1 (Ethnic group size and political representation)**.** *G's effectiveness at providing patronage to C strictly increases in C's share of the population. Formally,* $\theta'(\alpha) > 0$.

[10]The conclusion discusses the usefulness in future research to allow G to choose power-sharing institutions. However, the present assumption that θ is independent of strategic choices is reasonable given the present focus when considering the inherent stickiness of institutional arrangements and of commitment ability.

[11]Fighting must be sufficiently destructive to rule out "costly peace" explanations for fighting.

[12]Formally, $p_j(\cdot)$ is a smooth function that, for any $r \geq 0$, satisfies the following: $p_j(r) \in (0,1)$, $p_j'(r) < 0$, and $p_j''(r) > 0$. The appendix presents an additional technical assumption about the magnitude of diminishing returns (Assumption A.5).

Figure 5: Game Tree



3.2 Equilibrium Analysis

The analysis solves backwards to characterize the unique subgame perfect Nash equilibrium. It examines conditions in which C accepts G's offer along the equilibrium path of play, denoted as a peaceful equilibrium, before analyzing optimal actions if a civil war will occur in equilibrium. Appendix A proves all formal statements.

C's strategic choice. C accepts any offer yielding expected utility at least as high as from attempting its optimal type of civil war. Therefore, C's acceptance constraint in a peaceful strategy profile is:

$$\underbrace{\theta \cdot x + 1 - \tau_C}_{\text{accept}} \geq (1-\phi) \cdot \left[\mu^*(r) \cdot \underbrace{p_c(r, \alpha, \beta_c) \cdot (\tau_G + \tau_C)}_{\text{center-seeking}} + \left[1 - \mu^*(r)\right] \cdot \underbrace{p_s(r, \alpha, \beta_s) \cdot \tau_C}_{\text{separatist}} + 1 - \tau_C \right], \quad (1)$$

where $\mu^*(r)$ expresses C's optimal civil war choice as a function of G's repression spending:

$$\mu^*(r) = \begin{cases} 0 & \text{if } p_c(r, \alpha, \beta_C) \cdot (\tau_C + \tau_G) < p_s(r, \alpha, \beta_S) \cdot \tau_C \\ [0, 1] & \text{if } p_c(r, \alpha, \beta_C) \cdot (\tau_C + \tau_G) = p_s(r, \alpha, \beta_S) \cdot \tau_C \\ 1 & \text{if } p_c(r, \alpha, \beta_C) \cdot (\tau_C + \tau_G) > p_s(r, \alpha, \beta_S) \cdot \tau_C \end{cases}$$

The allure of initiating a separatist war is that, if C wins, it retains all economic production in its region not destroyed by fighting. A successful center-seeking civil war carries the additional benefit for C of capturing non-destroyed taxable output from G's region. Therefore, conditional on winning, C would prefer to take the center. However, if C's probability of winning a separatist civil war is sufficiently higher than of capturing the center, then C's binding fighting threat is a separatist civil war. Appendix Section B.5 discusses the alternative possibility that regional oil production can cause C to strictly prefer separatism.

Assumption 2 formalizes the discussion about ethnic group size and civil war aims, which in turn determines C's equilibrium civil war constraint.

Assumption 2 (Ethnic group size and civil war aims)**.** *If C composes a small percentage of the country's population, then it prefers separatist to center-seeking civil wars for any level of feasible military spending by G. If C is a large percentage of the country's population, then it prefers center-seeking to separatist civil wars for any level of feasible military spending by G. Finally, an increase in C's percentage of the population increases its probability of winning a center-seeking civil war by a greater magnitude than it increases C's probability of winning a separatist civil war, and both these effects are strictly positive. Formally, for all* $r \in [0, \tau_C + \tau_G]$:

$$\lim_{\alpha \to 0} \Big[p_c(r, \alpha, \beta_c) \cdot (\tau_G + \tau_C) - p_s(r, \alpha, \beta_s) \cdot \tau_C \Big] < 0$$

$$\lim_{\alpha \to 1} \Big[p_c(r, \alpha, \beta_c) \cdot (\tau_G + \tau_C) - p_s(r, \alpha, \beta_s) \cdot \tau_C \Big] > 0$$

$$\frac{\partial p_c}{\partial \alpha}(r, \alpha, \beta_C) > \frac{\partial p_s}{\partial \alpha}(r, \alpha, \beta_S) > 0$$

Assumption 2 yields Lemma 1, which characterizes a set of challenger types small enough to always prefer separatism, and a set of challenger types large enough to always prefer fighting for the center.

Lemma 1 (Optimal civil war aims)**.** *There exist unique threshold values of α that characterize ranges over which C has strictly dominant preferences for one type of civil war over the other. Formally, there exist $0 < \underline{\alpha} < \overline{\alpha} < 1$ such that for all $r \in [0, \tau_C + \tau_G]$:*

- *If $\alpha \in (0, \underline{\alpha})$, then $\mu^*(r) = 0$.*
- *If $\alpha \in (\overline{\alpha}, 1)$, then $\mu^*(r) = 1$.* *[Go to proof]*

G's strategic choices. Regardless of C's optimal civil war aims, G prefers to buy off C if possible because fighting generates net costs (see Appendix Assumption A.4). However, to maximize its share of revenues, G will not offer more than needed to induce C to accept. This logic enables restating Equation 1 as an equality and rearranging to yield the unique optimal offer for a given amount of repression spending.[13]

$$x^*(r) = \frac{(1-\phi)\cdot\Big[\mu^*\cdot p_c(r)\cdot(\tau_C+\tau_G)+(1-\mu^*)\cdot p_s(r)\cdot\tau_C\Big]-\phi\cdot(1-\tau_C)}{\theta} \tag{2}$$

In addition to offering C a share of the spoils, G can also affect C's calculus by spending on the military. G optimally chooses an allocation that maximizes revenues minus expenditures, which is equivalent to maximizing the parameter space in which C will accept the offer:

$$(r^*, x^*) \equiv \underset{r\geq 0, x\geq 0, r+x\leq\tau_G+\tau_C}{\arg\max} \quad \tau_G+\tau_C-r-x^*(r), \tag{3}$$

for $x^*(r)$ defined in Equation 2. The optimal military spending amount that results from Equation 3 is implicitly characterized as:[14]

$$\underbrace{\theta}_{\text{Opp. cost of patronage}} = -(1-\phi)\cdot\Big[\mu^*\cdot\underbrace{p_c'(r^*,\alpha,\beta_C)}_{\text{Decreases } C\text{'s Pr(win)}}\cdot(\tau_C+\tau_G)+(1-\mu^*)\cdot\underbrace{p_s'(r^*,\alpha,\beta_S)}_{\text{Decreases } C\text{'s Pr(win)}}\cdot\tau_C\Big] \tag{4}$$

Equation 4 highlights G's costs and benefits to military investment. The marginal cost, expressed on the left-hand side, stems from the opportunity cost of diverting resources that could have been used to meet C's no-fighting constraint in Equation 1 with patronage, and therefore depends on G's commitment ability. G also derives a benefit from military spending by lowering C's probability of winning, as the right-hand side of Equation 4 expresses.

Therefore, if a peaceful equilibrium exists, then equilibrium expenditures equal x^*+r^*, for r^* defined in Equation 4 and:

$$x^* \equiv x^*(r^*) \tag{5}$$

with $x^*(r)$ defined in Equation 2. Given the budget constraint $\tau_G+\tau_C$, bargaining will be peaceful if and

[13] Appendix Assumption A.2 is sufficient for this term to be strictly positive for all choices of r.

[14] Appendix Assumption A.3 is sufficient for r^* to have an interior solution.

only if the budget constraint is satisfied in equilibrium:

$$B^* \equiv \tau_C + \tau_G - x^* - r^* \geq 0 \tag{6}$$

The possibility of fighting in equilibrium, i.e., the possibility that Equation 6 is violated, arises because G cannot directly translate patronage spending into consumption for C. If θ is low, then it may be optimal for C to reject any offer by G. Low θ corresponds with low commitment ability, and therefore C may receive higher expected utility from initiating a civil war than from accepting—despite the costliness of fighting. To see that low θ is necessary for equilibrium fighting in the model, suppose instead $\theta = 1$. Then, G can ensure peace by spending 0 on the military because $x^*(0)$ (see Equation 2) reduces to a term strictly less than the budget constraint $\tau_G + \tau_C$, implying $B^* > 0$. By contrast, for any $\theta < 1$, Equation 6 may be violated.

Proposition 1 characterizes the unique equilibrium strategy profile. If $B^* > 0$, then there exists a unique equilibrium with no civil war characterized by the results above. If instead $B^* < 0$, then the unique equilibrium features a civil war along the equilibrium path. G offers no patronage to C and chooses the level of military spending that maximizes G's expected utility to fighting, balancing between higher r raising G's probability of winning and lower r increasing the amount of revenue left over for G to consume conditional on winning.

Proposition 1 (Equilibrium)**.**

Part a. *If $B^* > 0$, then $(r, x) = \big(r^*, x^*\big)$, for B^* defined in Equation 6, r^* defined in Equation 4, and x^* defined in Equation 5. C accepts any $x \geq x^*(r)$, for $x^*(r)$ defined in Equation 2. If $x < x^*(r)$, then (1) C initiates a separatist civil war if $\alpha \in (0, \underline{\alpha})$ and (2) initiates a center-seeking civil war if $\alpha \in (\overline{\alpha}, 1)$.*

Part b. *If $B^* < 0$, then $(r, x) = \big(r^*_{max}, 0\big)$, for:*

$$r^*_{max} = \arg\max_r \; (1-\phi)\cdot\Big\{\mu^*\cdot\big[1-p_c(r)\big]\cdot(\tau_G+\tau_C)+(1-\mu^*)\cdot\Big[\tau_G+\big[1-p_s(r)\big]\cdot\tau_C\Big]\Big\}-r.$$

If $\alpha \in (0, \underline{\alpha})$, then C initiates a separatist civil war in response to any offer. If $\alpha \in (\overline{\alpha}, 1)$, then C initiates a center-seeking civil war in response to any offer.
[Go to proof]

3.3 General Relevance of Setup

Although parsimonious, the present setup encompasses three key considerations that are generally relevant for studying civil war onset and strategic aims. First, repression and co-optation are key tools in an authoritarian ruler's kit (Escribà-Folch and Wright, 2015, 50), and therefore are crucial for understanding a government's strategic responses to rebellion threats. Second, incorporating commitment ability into the model not only draws from a large formal conflict bargaining literature (Powell, 2004; Fearon, 2004; Krainin, 2017), but also relates to key considerations about horizontal ethnic inequalities and conflict (Cederman, Gleditsch and Buhaug, 2013) because lack of political representation at the center should correspond with a lower ability for the government to commit to deals or to otherwise to effectively provide desired public goods to the region. This perhaps arises because less extensive political networks between the government's group and the challenger's group diminishes the government's knowledge of local circumstances and undermines providing targeted public goods (Roessler, 2016). Third, ethnic group size is a generally relevant consideration for affecting strategic civil war aims—especially considering that almost every major separatist civil war since 1945 has involved ethnic claims and recruitment.

Furthermore, none of these three features are specific to studying oil production. The remainder of the analysis concentrates on explaining the mixed empirical pattern from the oil-conflict literature before the conclusion elaborates on additional possible applications.

4 Divergent Implications for Center-Seeking and Separatist Civil Wars

Why does oil production positively correlate with one type of civil war but negatively with another? After explaining two key countervailing effects of oil production on conflict prospects—a budget effect and a relative prize effect—the analysis presents two mechanisms to explain the mixed empirical pattern. The main explanation is a strategic selection effect based on the premise that commitment ability explains why civil war occurs or not, and ethnic group size explains the form it will take. Ethnic groups that compose a small percentage of their country's population are often politically marginalized, which in the model decreases the government's ability to commit to a patronage deal (Assumption 1). Furthermore, feasibility constraints on rebellions imply that small groups usually prefer separatist over center-seeking campaigns (Assumption 2).

Consequently, for groups that optimally choose separatist rather than center-seeking civil wars, the relative prize effect of oil production is large relative to the budget effect—causing aggrieved oil-rich minority groups to separate. The secondary result highlights a distinct reason for differential conflict propensity: heightened military spending afforded by larger oil revenues decreases C's probability of winning a center-seeking civil war more strongly than it reduces C's secession prospects because of factors related to the geography of rebellion (Assumption 3).

4.1 Countervailing Effects of Oil Production

To highlight common mechanisms for both civil war types, this subsection treats C's civil war aims as fixed before the next two subsections show how endogenizing civil war aims yields important insights.[15] An increase in oil production exerts two countervailing effects on C's incentives to fight: a budget effect that decreases conflict prospects, and a relative prize effect that increases civil war likelihood. If C's civil war aims are center-seeking, then these effects are qualitatively identical regardless of within-country oil location. If C's aims are separatist, then the relative prize effect only exists for regional oil because even successful secession does not enable C to gain G's oil fields.

Figure 6 depicts the effects of oil as a function of θ. The gray curve is the overall effect of oil production on the equilibrium budget constraint from Equation 6. If the value of the gray curve is negative, then this implies that an increase in oil production makes civil war more likely, and the opposite is true if the gray curve is positive. The figure also disaggregates the overall effect of oil into two countervailing effects. The solid black line depicts the *budget effect*, which decreases conflict incentives. An increase in oil production is assumed to increase the amount of revenues the government has available to spend on patronage and coercion. Formally, this effect equals:

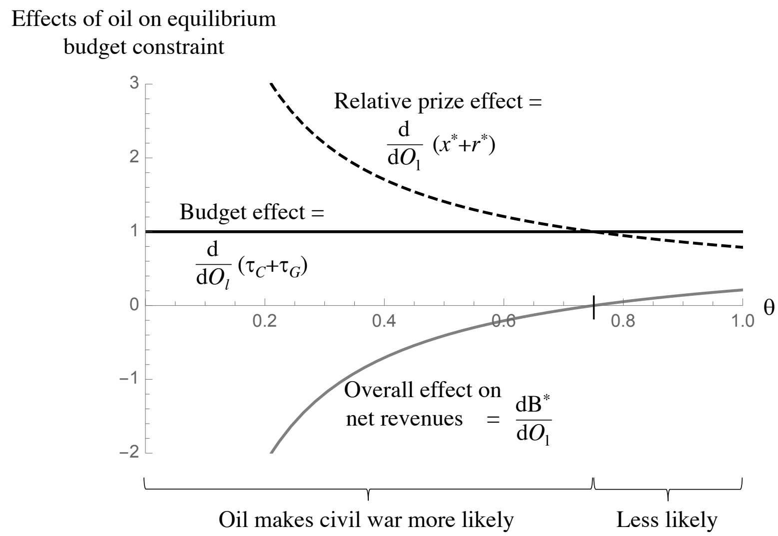
$$\textbf{Budget effect: } \frac{d}{dO_l}(\tau_G + \tau_C) = \frac{d\tau}{dO} > 0, \tag{7}$$

for $\frac{d\tau}{dO}$ defined in the model setup and $l \in \{G, C\}$. Therefore, the budget effect increases $\tau_C + \tau_G$ in G's equilibrium budget constraint.

On the other hand, oil production also creates a relative prize effect by increasing the amount that C would

[15] Formally, the civil war aims indicator $\mu \in \{0, 1\}$ is fixed at μ^* in this subsection.

Figure 6: Countervailing Effects of Oil Production



Notes: Figure 6 uses the following parameter values and functional form assumptions: $\tau_G = \tau_C = 0.3$, $\mu = 1$, $\phi = 0.5$, $\beta_c = 1$, $p_c(r) = \frac{1}{1+10\cdot\beta_c\cdot r}$, and $\frac{d\tau}{dO} = 1$.

consume by winning a civil war, which increases conflict incentives. The dashed black line in Figure 6 depicts this effect. Formally, expressing oil location by an indicator $\gamma \in \{0, 1\}$ that equals 0 for government oil and 1 for regional oil, the effect is:

$$\textbf{Relative prize effect: } \frac{d}{dO_l}(r^* + x^*) =$$

$$\Big[1 - (1-\mu^*)\cdot(1-\gamma)\Big] \cdot \frac{(1-\phi)\cdot\Big[\mu^*\cdot p_c(r^*,\alpha,\beta_C) + (1-\mu^*)\cdot p_s(r^*,\alpha,\beta_S)\Big] + \gamma\cdot\phi}{\theta} \cdot \frac{d\tau}{dO} > 0, \quad (8)$$

which can be calculated by applying the envelope theorem to Equation 3. This effect increases $r^* + x^*$ in G's equilibrium budget constraint. The relative prize effect increases the equilibrium patronage offer x^* because more oil production—and, consequently, greater government revenues—increases the amount that C will consume if it wins. Therefore, G needs to offer more to buy off C.

Equation 8 also enables differentiating the oil effect based on within-country oil location and on C's civil war aims—which, again, are treated as exogenous in this subsection. Only if C's aims are separatist does oil location matter: if government oil production increases and C's civil war aims are separatist (i.e., $\gamma = \mu = 0$), then is there no relative prize effect. By contrast, an increase in either government oil or regional oil exerts identical effects if C's aims are center-seeking.

Proposition 2 formalizes the countervailing effects from Equations 7 and 8 by taking comparative statics on B^*, defined in Equation 6. An increase in B^* implies a narrower space of parameter values in which fighting will occur, hence decreasing equilibrium civil war prospects. By contrast, a decrease in B^* corresponds with an increase in equilibrium civil war likelihood.[16]

Proposition 2 (Effect of oil production)**.** *An increase in oil production exerts both a budget effect and a relative prize effect. Formally, the overall effect of oil production on the equilibrium likelihood of fighting is:*

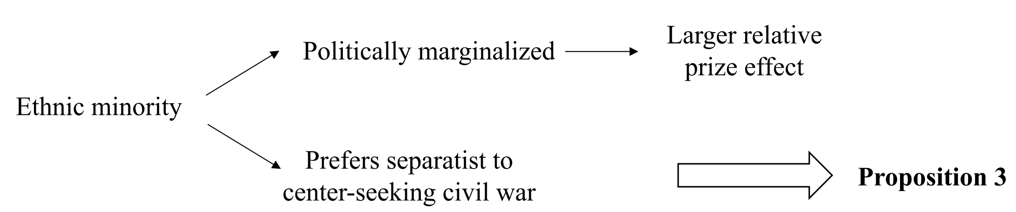
$$\frac{dB^*}{dO_l} = \underbrace{\frac{d}{dO_l}(\tau_G + \tau_C)}_{\textit{Budget effect}} - \underbrace{\frac{d}{dO_l}(r^* + x^*)}_{\textit{Relative prize effect}},$$

for the derivatives in Equations 7 and 8. [Go to proof]

4.2 Divergent Civil War Effects 1: Ethnic Minorities Selection Effect

The first explanation the model offers for the mixed empirical relationship between oil production and different types of civil wars is a selection effect that Figure 7 summarizes. Following the substantive motivation discussed above, the commitment parameter θ is relatively small if C is a minority (Assumption 1), and minority groups prefer separatist over center-seeking civil wars (Assumption 2). Therefore, the relative prize effect is large in magnitude if C's optimal civil war choice is separatist rather than center-seeking. By contrast, θ is relatively large if C is a majority group, and majority groups prefer center-seeking over separatist civil wars. The analysis also shows that formalizing this proposition requires addressing a subtle indirect substitution effect.

Figure 7: Ethnic Minorities and Strategic Civil War Aims



[16]For a given set of parameters, civil war either occurs with probability 0 or 1. The "likelihood" of war in equilibrium refers to the size of the parameter space in which a civil war occurs in equilibrium, implicitly assuming a veil of ignorance over the realized parameter values.

Equation 9 formally presents the sign of the effect of θ on $\frac{dB^*}{dO_l}$, which Proposition 2 presented. An increase in G's commitment parameter, which relates to political representation, affects the magnitude of the oil effect in two ways. The direct effect decreases the magnitude of the relative prize effect because G more efficiently translates oil revenues into patronage, which decreases G's optimal offer. However, there is also an indirect substitution effect that increases the magnitude of the relative prize effect and renders the overall effect indeterminate without additional considerations. Higher θ raises the marginal cost of arming (see Equation 4), which decreases G's equilibrium military spending r^* and therefore increases C's equilibrium probability of winning, $\mu^* \cdot p_c(r^*) + (1-\mu^*) \cdot p_s(r^*)$. Formally:

$$sgn\left(\frac{d^2 B^*}{d\theta dO_l}\right) =$$

$$\big[1-(1-\mu^*)\cdot(1-\gamma)\big]\cdot sgn\Bigg\{\underbrace{\mu^* \cdot p_c(r^*) + (1-\mu^*)\cdot p_s(r^*)}_{\text{Direct effect} > 0}\underbrace{-\theta\cdot\Big[\mu^*\cdot p_c'(r^*) + (1-\mu^*)\cdot p_s'(r^*)\Big]\cdot\frac{dr^*}{d\theta}}_{\text{Indirect substitution effect} < 0}\Bigg\} \tag{9}$$

and generically this term is non-zero if and only if $(1-\mu^*)\cdot(1-\gamma) = 0$. In words, there is no conditioning effect of θ if regional oil increases and C's optimal civil war aims are separatist.

Despite countervailing direct and indirect effects, if oil production in either region is sufficiently large, then the direct effect dominates and the total effect of increasing θ raises $\frac{dB^*}{dO_l}$.[17] If O_l is large, then even if G diverts spending away from the military, substitution exerts a relatively small effect on increasing C's probability of winning because (1) r^* will still be high as a strategic response to large O_l, and (2) $p_c(\cdot)$ and $p_s(\cdot)$ each exhibit strictly diminishing marginal returns in r^*. This implies that if O_l is large, then the overall effect of an increase in commitment ability θ modifies the oil effect to decrease equilibrium fighting likelihood. Large O_l—or, equivalently, a large increase in O_l—is the most substantively relevant part of the parameter space. Ross (2012, 27-33) lists the "exceptionally large size" of oil revenues as a central characteristic of oil production and provides supporting cross-national evidence. Oil revenues are also large even compared to rents from other natural resources. In Haber and Menaldo's (2011) dataset on oil, natural gas, coal, and metals income for a global sample of countries, oil and natural gas made up 90% of all global resource income from 1960 to 2006. Furthermore, in 76% of country-years with more than $500 in resource income per capita in this global sample, at least half the income came from oil and gas.

[17] The proof for Proposition 3 formalizes this logic.

Proposition 3 formalizes this intuition.

Proposition 3 (Political representation and civil war aims)**.**

Part a. *The direct effect of an increase in commitment ability—which corresponds to majority group challengers whose optimal civil war aims are center-seeking rather than separatist—modifies the oil effect to weakly decrease equilibrium fighting likelihood. Formally:*

$$\frac{\partial}{\partial \theta}\left(\frac{dB^*}{dO_l}\right) \geq 0,$$

and the inequality is strict if $(1-\mu^*)\cdot(1-\gamma)=0$.

Part b. *If* O_l *is large enough, then the total effect of an increase in commitment ability modifies the oil effect to weakly decrease equilibrium fighting likelihood. Formally, if* $O_l > \overline{O}_l$*, then:*

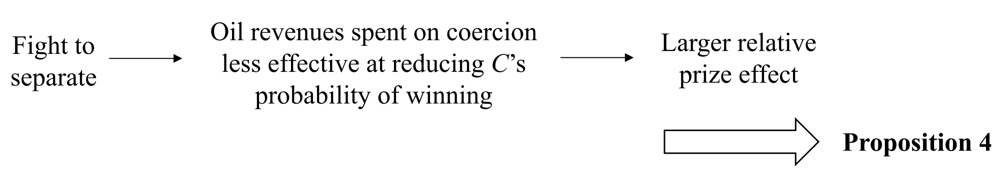
$$\frac{d^2 B^*}{d\theta dO_l} \geq 0,$$

for $\overline{O}_l \in \mathbb{R}$ *defined in the appendix. The inequality is strict if* $(1-\mu^*)\cdot(1-\gamma)=0$.
[Go to proof]

4.3 Divergent Civil War Effects 2: Coercive Effectiveness

The second explanation the model offers for the mixed empirical relationship between oil production and different types of civil wars is based on G's ability to translate revenues into coercive effectiveness, which Figure 8 summarizes. G's coercive effectiveness is greater—and therefore the relative prize effect is smaller in magnitude—if C seeks the center rather than separates.

Figure 8: Civil War Aims and Coercive Effectiveness



The coercive effectiveness result follows from formalizing the substantive discussion above as Assumption 3.

Assumption 3 (Coercive effectiveness)**.** *G's military spending is more effective at decreasing C's probability of winning a center-seeking civil war than a separatist civil war. Formally,* $\beta_c > \beta_s$.

Formally, Equation 10 presents the sign of effect of β_j on $\frac{dB^*}{dO_l}$ (see Proposition 2). The coercive effectiveness parameter β_j alters the magnitude of the oil effect in two ways. The direct effect decreases the magnitude of the gains from winning effect because G is more effective at translating its oil revenues into military capacity, which decreases G's optimal patronage offer. The indirect substitution effect reinforces the direct effect. Higher β_j increases the marginal benefit of arming (see Equation 4), which increases G's equilibrium military spending r^* and therefore decreases C's equilibrium probability of winning, $\mu^* \cdot p_c(r^*) + (1-\mu^*) \cdot p_s(r^*)$. Equation 10 is strictly positive if and only if $(1-\mu^*) \cdot (1-\gamma) = 0$. In words, there is no conditioning effect of β_j if regional oil increases and C's optimal civil war aims are separatist. This logic yields Proposition 4.

$$sgn\left(\frac{d^2 B^*}{d\beta_j dO_l}\right) = sgn\big[1-(1-\mu^*)\cdot(1-\gamma)\big]\cdot$$
$$\Bigg\{\underbrace{-\bigg[\mu^* \cdot \frac{\partial p_c(r^*)}{\partial \beta_c} + (1-\mu^*)\cdot\frac{\partial p_s(r^*)}{\partial \beta_s}\bigg]}_{\text{Direct effect} > 0}\underbrace{-\bigg[\mu^* \cdot p_c'(r^*)\cdot\frac{dr^*}{d\beta_c} + (1-\mu^*)\cdot p_s'(r^*)\cdot\frac{dr^*}{d\beta_s}\bigg]}_{\text{Indirect substitution effect} > 0}\Bigg\} \tag{10}$$

Proposition 4 (Coercive effectiveness and civil war aims)**.** *An increase in coercive effectiveness—which occurs if C fights for the center rather than separates—modifies the oil effect to weakly decrease equilibrium fighting likelihood. Formally:*

$$\frac{d^2 B^*}{d\beta_j dO_l} \geq 0,$$

and the inequality is strict if $(1-\mu^*)\cdot(1-\gamma) = 0$. *[Go to proof]*

5 Empirical Implications and Evidence

In addition to providing a foundational theory of strategic civil war aims, the analysis also provides new empirical implications. Although in broad strokes the theory can account for differences in the empirical relationship between oil and both types of civil war (Section 2.4 provides a non-formal summary of the main results), the logic of Propositions 3 and 4 is inherently conditional. After discussing key conditional hypotheses, this section summarizes oil-civil war cases and presents simple interactive regression models that support the conditional implications. Brief case studies from Saudi Arabia and Angola provide additional evidence for central mechanisms.

5.1 Conditional Empirical Implications

The first conditional hypothesis follows from Proposition 3. In the model, the independent effect of regional oil wealth ambiguously affects separatist civil war likelihood. Oil wealth has to be present in regions where groups prefer separatism and are weakly politically incorporated at the center (i.e., low commitment ability). This hypothesis relates to existing arguments that highlight the conditioning effect of ethnopolitical inclusion (Asal et al., 2016; Hunziker and Cederman, 2017), but differs in two important ways.

First, it is based on a theory of strategic civil war aims. Although Hunziker and Cederman's (2017) empirical tests disaggregate civil wars, their theoretical focus on distributional grievances—like the broader literature—does not distinguish why the effect of oil should differ for center-seeking and separatist civil wars. The theoretical idea behind distributional grievances is, in essence, the relative prize effect in the model. By this logic, actors that feel they are not getting their "fair" share of the cut from oil profits in *any* region of the country should have incentives to fight. In other words, there is nothing specific about regional oil production or about separatist civil wars in distributional grievances theories (Sorens 2011; Ross 2012, 155-6; Asal et al. 2016; Hunziker and Cederman 2017). Why does this same logic not also apply to groups that would like a greater cut of profits from the government's region, which could be obtained by capturing the center?

Second, existing ethnicity theories do not explain why ethnopolitical exclusion should complement rather than substitute for the civil war risk induced by oil production—without additional theoretical elaboration, one source of conflict risk may substitute for the other (i.e., negative interactive effect). The present theory anticipates complementarities because oil production should only exert effects that are net conflict-inducing under conditions of political marginalization and weak government commitment ability, and oil production does not exert conflict-inducing effects independent of these political conditions—in fact, this is crucial for explaining the negative oil-center relationship.

> **Hypothesis 1** (Politically excluded minorities)**.** *Only among politically excluded ethnic minorities should regional oil wealth raise separatist civil war propensity.*

H2 follows from Proposition 4 and has similar theoretical foundations as H1. In general, a coercively strong government is less effective at projecting power into the periphery to defeat a separatist rebellion than at protecting the capital. However, the oil-separatist effect should be strongest in territories that have particularly favorable geographic conditions for separatism. Similar to ethnic minorities, the complementarity between oil production and favorable separatist geography follows because oil production only exerts a net conflict-enhancing effect if the government is ineffective at using oil revenues to lower the challenger's probability of winning. By contrast, with difficult geography to separate, even a group that is dissatisfied with the status quo because they are denied profits from their region's oil production does not have strong recourse to arms.

> **Hypothesis 2** (Favorable separatist geography)**.** *Only among ethnic groups with favorable separatist geography should regional oil wealth raise separatist civil war propensity.*

Propositions 3 and 4 also suggest a conditional hypothesis for center-seeking civil wars. Even if a government is oil-rich, it may not have consolidated control over its oil revenues. If the government is newly oil-rich or if rebels face a (perhaps temporary) mobilization advantage, then large oil revenues will not strongly drive down a challenger's probability of winning a center-seeking war—resulting in a stronger relative prize effect—despite the general ease of defending the capital relative to fighting in the periphery. Similarly, governments without consolidated control over oil revenues should yield a large relative prize effect because they face difficulties to effectively dispensing patronage even to large ethnic groups that usually have political representation.

> **Hypothesis 3** (Government vulnerability)**.** *Only among countries with governments that have consolidated control over oil revenues should oil wealth diminish center-seeking civil war propensity.*

5.2 Evidence for Separatist Civil Wars

Qualitative evidence. Table 1 lists every ethnic group with at least one giant oil field in its territory that fought a major separatist civil war between 1946 and 2013. It reveals a straightforward pattern. Almost every separatist civil war over an oil-rich territory has occurred in locations for which the theory anticipates that the relative prize effect should be large in magnitude because the group is a politically excluded ethnic minority (Hypothesis 1) or faces favorable geography to separate (Hypothesis 2).

In the column for H1, "m" indicates that the ethnic group is a minority (with the group's national population share in parentheses), and "E" indicates that its members are excluded from power in the central government.

Table 1: Separatist Civil Wars in Oil-Rich Regions

Ethnic group	Country	Onset year	Politically excluded minorities (H1)	Favorable separatist geography (H2)
Bakongo*	Angola	1992	m(13%), E	-
Cabindan Mayombe*	Angola	1992	m(2%), E	N
Assamese (non-SC/ST)	India	1991	m(1.4%)	D
Acehnese	Indonesia	1989	m(1%), E	M%,N,D
Acehnese	Indonesia	1999	m(1%), E	M%,N,D
East Timorese*	Indonesia	1975	m(0.5%), E	M%,N,D
Kurds	Iran	2004	m(8%), E	M%,D
Kurds	Iraq	1961	m(17%), E	M%
Kurds	Iraq	1974	m(17%), E	M%
Igbo	Nigeria	1967	m(18%), E	-
Baluchis	Pakistan	1973	m(3%), E	M%,D
Baluchis	Pakistan	2004	m(3%), E	M%,D
Dinka	Sudan	1983	m(10%), E	D
Malay Muslims*	Thailand	2004	m(5%), E	D
Southerners	Yemen	1994	- (55%)	M%

Notes: Table 1 lists every year in which an ethnic group with a giant oil or gas field in its territory initiated a separatist civil war. The text describes the various symbols, and Appendix B discusses the data sources. *Only offshore oil.

All but two of the ethnic groups are both excluded and minorities,[18] and only Southerners in Yemen are neither. Yemen is a somewhat exceptional case because majority groups—oil-rich or not—almost never fight separatist civil wars. The war occurred four years after South Yemen merged with North Yemen. The north was the stronger partner despite having a minority of the population, and southern politicians commanded less important cabinet positions.

Not only are these cases consistent with the conditions under which the theory anticipates that oil production will trigger separatist civil war, within-case evidence also demonstrates the existence of grievances over unequal oil distribution. Rustad and Binningsbø (2012) provide information on all civil wars involving natural resources between 1946 and 2006. In all but one of the cases from Table 1 that is also in their dataset, they code evidence for distributional grievances, as Appendix Table B.8 presents in more detail. Evidence from Angola, presented below, further supports this mechanism.

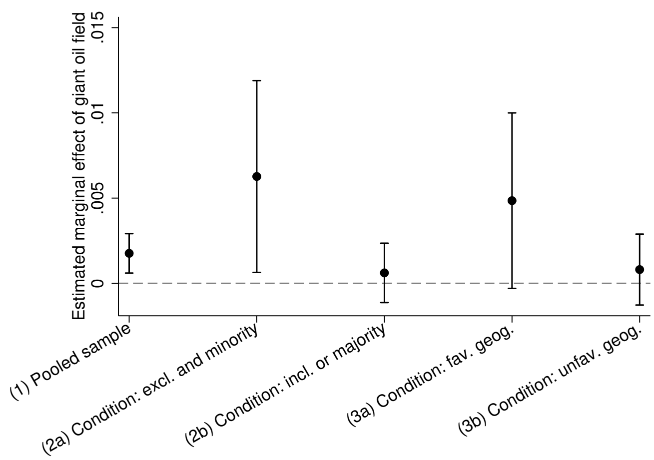
In the column for H2 in Table 1, "M%" indicates that the percentage of the ethnic group's territory with mountains is higher than the median in the sample, "N" indicates that the ethnic group's territory is noncontiguous from the territory that contains the country's capital city, and "D" indicates that the centroid of the ethnic group's territory is farther than the median distance from the capital in the sample. These variables relate to different aspects of favorable geography for rebellion discussed in the literature (Fearon and Laitin,

[18] See also Ross (2012, 155-6).

2003; Buhaug, Cederman and Rød, 2008). Thirteen of the 15 oil-separatist cases have at least one of these favorable geography conditions.

Statistical evidence. The conditional hypotheses can also be assessed quantitatively by adding interaction terms to the models used in Figure 2. Figure 9 and Appendix Table B.5 show that the estimated marginal effect of oil wealth on separatist civil war onset is at least 3 times larger than the corresponding specification in Figure 2 (Column 5) among ethnic groups that either are politically excluded minorities, or have any of the unfavorable geography conditions (p-value is 0.065 in Column 3a). By contrast, there is no relationship among groups lacking either of these conditions. Appendix Figure B.2 shows the results are similar when adding country fixed effects to the models.

Figure 9: Separatist Civil War Onset (Ethnic Groups)

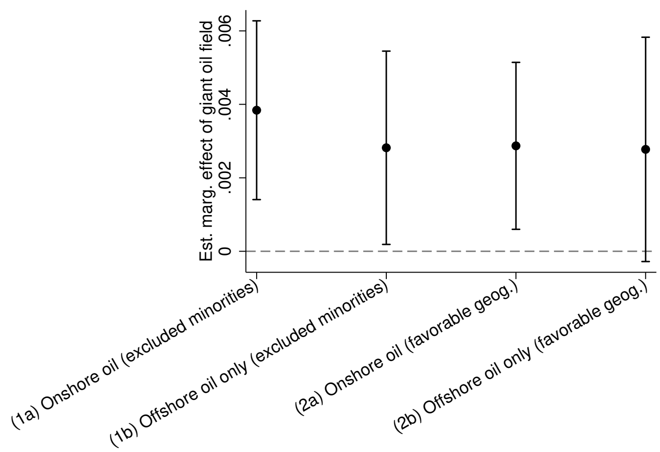


Notes: Figure 9 presents point estimates and 95% confidence intervals for a series of logit regressions described in Appendix Equation B.4 and Appendix Table B.5. The dependent variable is separatist civil war onset, and the unit of analysis is ethnic group-years.

Looting? Although within-country location of oil production matters in the theory for explaining separatist civil wars, the mechanism differs from existing arguments premised on rebels looting oil production and using it to finance insurgencies (Lujala, 2010; Ross, 2012). Appendix Table B.8 in Section B.3 shows that the model loses few empirical insights by not focusing on rebel looting. Rustad and Binningsbø's (2012) dataset on civil wars involving natural resources also contains information on rebel financing, and none of the 31 wars they code as including rebel financing occurred in oil-rich territories. This perhaps overstates the rarity of the phenomenon, considering evidence of looting in the Niger Delta in the 2000s (Ross, 2012, 170-3) and in ISIS in Iraq and Syria (outside their temporal scope), but underscores the general point that oil have very rarely financed insurgencies (see also Colgan 2015, 8; Paine 2016; 2017).

In addition to case-based evidence, one different implication between the present theory and looting theories that can be assessed statistically arises from distinguishing onshore versus offshore oil. The present theory suggests that this distinction should not matter because both should generate distributional grievances and separatist war if located near a politically excluded minority. By contrast, existing location theories anticipate no relationship between offshore oil production and separatist civil war because offshore oil is very difficult to loot. Figure 10 shows that the oil-separatist findings are largely similar for onshore and offshore oil when assessing Hypotheses 1 and 2, and evidence below from Angola provides additional evidence. However, the appendix discusses that because groups with only offshore oil production are empirically rare, the offshore correlation is based on a small number of cases.

Figure 10: Disaggregating Onshore and Offshore Oil for Separatist Civil War Onset



Notes: Figure 10 presents point estimates and 95% confidence intervals for a series of logit regressions described in Equation B.5, and Table B.7 provides the corresponding regression table. The dependent variable is separatist civil war onset, and the unit of analysis is ethnic group-years.

5.3 Evidence for Center-Seeking Civil Wars

Qualitative evidence. Table 2 lists the 16 center-seeking civil war onsets that occurred between 1946 and 2013 in a country producing at least \$100 in oil income per capita in the previous year. Many of the oil-center wars occurred in country-years for which the theory anticipates that the relative prize effect should be relatively large in magnitude because the government should be vulnerable (Hypothesis 3). Several oil-rich countries experienced defeat in warfare and/or violent political transitions within two years of their center-seeking civil war ("W" for war), which should correspond with vulnerable governments that do not have consolidated control over oil revenues. Specifically, these conditions should undermine the ability to distribute patronage and to build a strong army, especially in recent violent independence cases where a domestic war that began during foreign occupation was already ongoing (Angola 1975, Algeria 1962, Iraq 2011), or where the rebel group was already organized from a previous civil war, as with SPLA in Sudan in 2011 after South Sudan gained independence. War defeats can also create focal periods for opposition organization independent of the government's oil wealth, such as the Shi'a uprisings following Iraq's defeat in the Persian Gulf war in 1991.

Table 2: Center-Seeking Civil Wars in Oil-Rich Countries

Country	Onset year	Oil production per capita	Government vulnerability (H3)
Argentina	1973	$130	S
Algeria	1962	$161	W
Syria	1979	$455	S
Peru	1981	$467	S
Sudan	2011	$479	W
Angola	1975	$543	S,W
Yemen	2004	$592	-
Syria	2011	$651	A
Nigeria	2013	$677	-
Iraq	1959	$701	-
Algeria	1992	$708	-
Congo, Rep.	1997	$788	-
Iraq	1991	$1,814	W
Iraq	2011	$2,451	W,A
Iran	1978	$3,481	S
Libya	2011	$9,007	A

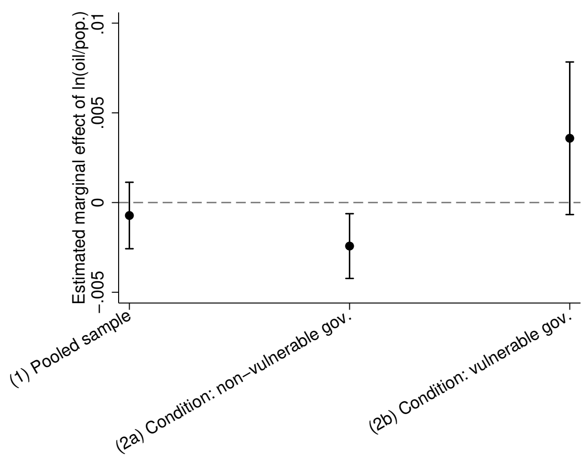
Notes: Table 2 lists every country-year with a center-seeking civil war onset and at least $100 in oil and gas income per capita in the previous year. It uses the same country sample and years as Figure 1. "W" denotes that any of the following conditions were true in the country within the past two years: defeat in international warfare, government defeat in a civil war, or independence gained amidst a domestic war (typically, a war fought to gain independence from a European power or the U.S.). "S" denotes the conflict occurred during the oil shock period between 1973 and 1982. "A" denotes Arab Spring, specifically, MENA countries in 2011.

Regarding other conditions that correspond with government vulnerability, Peru crossed the $100 oil income per capita threshold the year before its war began, and Argentina and Syria (1979) within five years, which gave the government little time to consolidate control over oil revenues. These countries' newfound oil wealth occurred in the context of the major oil shock ("S") that lasted roughly a decade after the OPEC oil embargo of 1973, a time in which many countries became (at least temporarily) major per capita oil producers. Finally, although oil-rich countries tended to fare better during the Arab Spring of 2011 ("A") than oil-poor countries (Gause III, 2013), Libya and Syria experienced new civil wars despite oil wealth as demonstrations that began in Tunisia proved focal for opposition movements across the Middle East and

North Africa (MENA) even in the face of repressive and coercively strong governments.

Statistical evidence. Once again, the conditional hypotheses can be assessed quantitatively by adding interaction terms to the models used in Figure 1. Figure 11 and Appendix Table B.2 show that the predicted probability of center-seeking civil war onset drops by 67% if hypothetically increasing annual oil and gas income per capita from $0 to $1,000 among countries lacking any of the vulnerability conditions listed in Table 2. This is larger in magnitude than the difference after subsetting the sample to pre-2011 years, as in Column 3 of Figure 1. By contrast, there is a positive association between oil production and center-seeking civil war onset among countries that have at least one of the vulnerability conditions. Appendix Figure B.1 shows these results are similar when only analyzing center-seeking civil wars with ethnic aims.

Figure 11: Center-Seeking Civil War Onset (Countries)



Notes: Figure 11 presents point estimates and 95% confidence intervals for a series of logit regressions described in Appendix Equation B.2 and Appendix Table B.2. The dependent variable is center-seeking civil war onset, and the unit of analysis is country-years.

5.4 Case Evidence from Saudi Arabia and Angola

Evidence from Saudi Arabia and Angola provides additional support for key mechanisms from the theory. Two aspects of these cases provide opportunities to examine mechanisms in "typical" cases: oil-rich Saudi Arabia has not experienced any major center-seeking civil wars, and Angola's oil-rich Cabinda province has fought a major separatist civil war. However, there are also "deviant" aspects of these cases that the theory can help to explain: oil-rich Angola's major center-seeking civil war, and no major separatist civil wars by oil-rich Saudi Shi'a.

Saudi Arabia provides clear evidence of oil-rich rulers using patronage and coercion—key tools from the formal model—to prevent challenges, and has not experienced any major center-seeking civil wars since becoming oil-rich. Oil companies made their first discovery in 1938, and the country has produced at least $1,000 in oil income per capita in every year since 1951 (Haber and Menaldo, 2011). This initial period coincided with favorable conditions for consolidating control over oil revenues (Hypothesis 3). Ibn Saud had recently conquered the modern territory of the Saudi state across much of the Arabian peninsula. This included capturing eastern Arabia in 1913, which has produced the bulk of the country's oil (Jones, 2010, 90-92). Furthermore, in the interim period between initial discoveries and the onset of major exports, British and U.S. oil companies provided concessionary payments and assistance. King Saud used payments from oil concessions in the 1930s to start building a modern army (Khatani, 1992, 52). Over time, the size of and expenditures on the military have grown considerably (Gause, 1994, 66-8), and the kingdom has employed large percentages of citizens in the public sector (roughly half in the 1990s) to buy their loyalty (59). Overall, Saudi Arabia has experienced a dramatic transformation from pre-oil periods in which the government relied on tribal leaders for resources and faced occasional tribal revolts (12-14, 24).

Providing another typical case, Angola's Cabinda province exemplifies coercive separation by an exploited oil-rich minority with favorable geography, which Hypotheses 1 and 2 anticipate. Cabinda produces the majority of Angola's oil, and Cabinda's oil revenues have provided roughly half the country's budget since independence (Martin 1977, 57; Porto 2003, 3). The Cabindan Mayombe are a small minority group that, since independence, has never enjoyed political representation in Angola's government (Vogt et al., 2015). Despite experiencing heavy taxation, residents have received few compensating benefits from the central government. Cabinda "remains one of the poorest provinces in Angola. An agreement in 1996 between the national and provincial governments stipulated that 10% of Cabinda's taxes on oil revenues should be given back to the province, but Cabindans often feel that these revenues are not benefiting the population as a whole, largely because of corruption" (Porto, 2003, 3). Failed promises are consistent with assuming that a lack of political representation undermines government commitment ability. Oil exploitation features prominently in separatists' narrative: the words "oil" and "petroleum" appear 62 times on the main page of the Cabinda Free State's website (Cabinda Free State, n.d.). This evidence supports Hypothesis 1.

Cabinda also features favorable geography for rebellion due to territorial separation from mainland Angola, and was governed in essence as a distinct colony (Martin, 1977, 54-55). Even during Angola's decolonization struggle, the eventual-government MPLA failed to establish a strong presence in Cabinda (58). This evidence supports Hypothesis 2. In 1992, following low-intensity fighting since independence, the Cabindan rebel group FLEC launched major separatist operations. Also supportive of favorable conditions for fighting, FLEC escalated their activities in response to intensification of the government's center-seeking war fought in a different part of the country (Porto, 2003, 5), i.e., attacking when the government was coercively weak.

Cabinda is also an intriguing case because nearly all its oil is produced offshore (Le Billon 2007, 106; Porto 2003, 4), consistent with the findings in Figure 10. In fact, the offshore location of Angola's oil may have been crucial for facilitating government control, given the country's major center-seeking civil war between independence in 1975 and 2002, by "insulat[ing] the industry from local communities and hostilities" (Le Billon, 2007, 106).

Angola and Saudi Arabia also represent seemingly deviant patterns that the theory can help to reconcile. Angola was relatively oil-rich at independence, at $543 in oil income per capita, but experienced a center-seeking war. However, considering vulnerable governments' difficulties to accruing oil revenues to deter and buy off challengers (Hypotheses 3), the theory expects that oil will be ineffective at preventing attacks on the center. Various Angolan rebel groups fought Portugal for independence between 1961 and 1974. Although these groups struck a brief truce at independence, the opposition group UNITA never disarmed (Warner, 1991, 38-9), and major hostilities resumed after independence in 1975—in essence, continuing the decolonization struggle. Further contributing to government vulnerability, UNITA received considerable support from neighboring countries, including South Africa.

The theory also provides insight into the absence of major separatist civil wars in Saudi Arabia's eastern province, which has produced the overwhelming majority of the country's oil wealth since discovery in the 1930s (Jones, 2010, 91-92). Although the region lacks any of the favorable geography conditions from Table 1—suggesting inherent difficulties to organizing a rebellion—the Shi'a are a politically excluded minority, which should encourage separatism. Despite theoretically ambiguous predictions—because Hypothesis 1 anticipates fighting but Hypothesis 2 does not—a closer look reveals considerable support for key model mechanisms. Failed labor strikes in the 1950s preceded widespread protests and demonstrations in 1979 and 2011 (Matthiesen, 2012). Jones (2010, 138-216) details how the unequal distribution of the country's oil wealth provided a central catalyst. For example, "Both before and after the [1979] uprising, oil and the Shiites' exclusion from oil wealth dominated the political discourse" (185). However, despite these grievances—as anticipated by political exclusion—the central government commanded considerable coercive ability in the region that dampened prospects for a broader rebellion, as anticipated by unfavorable geography for rebellion. "Although it is unlikely that local anxieties about the dislocations and failures of modernization had faded" during the peaceful period between the 1950s and 1979, "[t]he Saudi state became increasingly proficient at rooting out and oppressing dissenters" (176), including arresting and exiling many Shi'a political activists. Similarly, in 1979, the government used "overwhelming force to crush the Shiites" and responded by bolstering its police and intelligence forces—causing dozens of deaths among the thousands of protesters (218-9). Although the Iranian revolution in 1979 (led by Iranian Shi'a) and the Arab Spring in 2011 provided coordination devices that enabled temporary mobilization by Saudi Arabia's Shi'a to protest their frustrations over oil, repressive strength afforded by extracting oil revenues from the region enabled the government to prevent a major war.

6 Conclusion

This paper presents a theory of strategic civil war aims and applies it to explain an empirical puzzle from the oil-conflict literature: oil wealth correlates positively with separatist civil war onset (among oil-rich ethnic minorities), but negatively with civil wars to capture the center. The model formally analyzes a bargaining interaction between a government and a regional ethnic challenger. Either actor may produce oil in their region. If the challenger fights, then it chooses civil war aims. The main explanation for the mixed empirical pattern invokes strategic selection: small ethnic groups are (1) more likely to be politically marginalized, exacerbating the government's commitment problem and (2) more likely to secede if they fight. A reinforcing consideration is that oil-funded repression more effectively deters challenges against the center than in the periphery.

Although the paper applies the model to explain the effect of oil production on conflict, examining relationships among commitment problems, ethnicity, and civil war aims yields broader implications for studying conflict. Even without scrutinizing civil war aims, the model relates to two hugely influential literatures in international relations and comparative politics: bargaining models of war (Powell, 2004; Fearon, 2004; Krainin, 2017) and ethnopolitical representation and civil war (Cederman, Gleditsch and Buhaug, 2013).

Although ethnic grievance theories are framed primarily in terms of long-term cultural explanations for horizontal ethnic inequalities (30-54), they implicitly contain a crucial strategic component that bargaining models capture: political exclusion exacerbates government commitment problems. This not only makes fighting more likely, but also may affect rebels' strategically chosen civil war aims. One possible implication of the present framework is that Cederman, Gleditsch and Buhaug's (2013) key hypothesis—politically excluded ethnic groups are more likely to fight civil wars—may better explain separatist than center-seeking civil wars because smaller groups tend to be excluded. The present model may also provide a useful baseline for examining how governments strategically choose levels of ethnopolitical representation, i.e., endogenizing their commitment ability.

The theory of strategic civil war aims relates to additional mechanisms from the broader civil war literature, including government coercive capacity and economic incentives to fight (Fearon and Laitin, 2003; Collier and Hoeffler, 2004). Despite extensive debates regarding the importance of these explanatory factors for civil war, scholars have devoted little attention to their specific effects on different types of civil war (although see Buhaug 2006). Strong government coercive capacity may tend to be more important for deterring center-seeking rather than separatist civil wars because of difficulties projecting power into the periphery, as discussed here. Therefore, for example, military aid and other types of foreign aid that funnel directly to the government may be more effective at preventing center-seeking than separatist civil wars. And whereas a key property of oil production is that it produces easy revenues for the government, other economic causes of war exhibit different properties. For example, alluvial diamonds are more easily looted by rebel groups than oil. Perhaps for this and other types of natural resources, the relative prize effect often outweighs the budget effect even for center-seeking civil wars, as suggested by examples from Liberia and Sierra Leone in the 1990s.[19]

Overall, the common implicit assumption in much existing civil war research that risk factors equally affect center-seeking and separatist civil wars may limit the usefulness of some theories as well as generate uninformative empirical estimates given underlying causal heterogeneity. Extensions of the present framework should help to guide future theorizing and empirical evaluations of strategic civil war aims.

[19] Ross (2006) notes that the empirical relationship between alluvial diamond production and civil war onset is dependent on a handful of cases, but this is in part due to the relatively few developing countries that have an abundance of alluvial diamond reserves.

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Online Appendix

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A Proofs for Formal Results

Assumption A.1 follows from identical substantive considerations as Assumption 3, and will be used to prove Lemma 1.

Assumption A.1 (Variant of Assumption 3)**.**

$$\left|\frac{\partial p_c}{\partial r}\right| > \left|\frac{\partial p_s}{\partial r}\right|$$

Proof of Lemma 1. The proof proceeds in four steps.

1. Assumption A.1 can easily be used to show two preliminary results. First, a group that prefers separatist to center-seeking at the lowest repression spending amount has these same preferences for any possible repression spending amount. Second, a group that prefers center-seeking to separatist at the highest repression spending amount has these same preferences for any possible repression spending amount.
   - If $p_c(0, \alpha, \beta_c) \cdot (\tau_C + \tau_G) - p_s(0, \alpha, \beta_s) \cdot \tau_C < 0$, then $p_c(r, \alpha, \beta_c) \cdot (\tau_C + \tau_G) - p_s(r, \alpha, \beta_s) \cdot \tau_C < 0$ for all $r \geq 0$.
   - If $p_c(\tau_C + \tau_G, \alpha, \beta_c) \cdot (\tau_C + \tau_G) - p_s(\tau_C + \tau_G, \alpha, \beta_s) \cdot \tau_C > 0$, then $p_c(r, \alpha, \beta_c) \cdot (\tau_C + \tau_G) - p_s(r, \alpha, \beta_s) \cdot \tau_C > 0$ for all $r \leq \tau_G + \tau_C$.
2. Applying the intermediate value theorem demonstrates at least one $\underline{\alpha} \in (0, 1)$ such that:

   $$p_c(0, \underline{\alpha}, \beta_c) \cdot (\tau_C + \tau_G) - p_s(0, \underline{\alpha}, \beta_s) \cdot \tau_C = 0$$

   - Assumption 2 yields $p_c(0, 0, \beta_c) \cdot (\tau_C + \tau_G) - p_s(0, 0, \beta_s) \cdot \tau_C < 0$.
   - Assumption 2 yields $p_c(0, 1, \beta_c) \cdot (\tau_C + \tau_G) - p_s(0, 1, \beta_s) \cdot \tau_C > 0$.
   - $p_c(\cdot)$ and $p_s(\cdot)$ are each assumed to be continuous in α.

   Assumption 2 also implies that $p_c(0, \alpha, \beta_c) \cdot (\tau_C + \tau_G) - p_s(0, \alpha, \beta_s) \cdot \tau_C$ strictly increases in α, which generates the unique threshold claim.
3. Applying the intermediate value theorem demonstrates at least one $\overline{\alpha} \in (0, 1)$ such that:

   $$p_c(\tau_C + \tau_G, \overline{\alpha}, \beta_c) \cdot (\tau_C + \tau_G) - p_s(\tau_C + \tau_G, \overline{\alpha}, \beta_s) \cdot \tau_C = 0$$

   - Assumption 2 states $p_c(\tau_C + \tau_G, 0, \beta_c) \cdot (\tau_C + \tau_G) - p_s(\tau_C + \tau_G, 0, \beta_s) \cdot \tau_C < 0$.
   - Assumption 2 states $p_c(\tau_C + \tau_G, 1, \beta_c) \cdot (\tau_C + \tau_G) - p_s(\tau_C + \tau_G, 1, \beta_s) \cdot \tau_C > 0$.
   - $p_c(\cdot)$ and $p_s(\cdot)$ are each assumed to be continuous in α.

   Assumption 2 implies that $p_c(\tau_C + \tau_G, \alpha, \beta_c) \cdot (\tau_C + \tau_G) - p_s(\tau_C + \tau_G, \alpha, \beta_s) \cdot \tau_C$ strictly increases in α, which generates the unique threshold claim.
4. Combining the previous two steps and defining $f(r, \alpha) \equiv p_c(r, \alpha, \beta_c) - p_s(r, \alpha, \beta_s)$ yields:

   $$\left[f(0, \underline{\alpha}) - f(\tau_C + \tau_G, \overline{\alpha})\right] \cdot \tau_C + \left[p_c(0, \underline{\alpha}, \beta_c) - p_c(\tau_C + \tau_G, \overline{\alpha}, \beta_c)\right] \cdot \tau_G = 0 \tag{A.1}$$

To prove $\underline{\alpha} < \overline{\alpha}$, suppose instead $\underline{\alpha} \geq \overline{\alpha}$. Given this premise, Assumptions 2 and A.1 imply that $f(0, \underline{\alpha}) > f(\tau_C + \tau_G, \overline{\alpha})$ and $p_c(0, \underline{\alpha}, \beta_c) > p_c(\tau_C + \tau_G, \overline{\alpha}, \beta_c)$. This generates a contradiction because then the left-hand side of Equation A.1 is strictly positive. ■

Assumption A.2 presents a sufficient condition for $x^*(r)$ defined in Equation 2 to be strictly positive for any amount of military spending by G, which the proof for Proposition 1 shows. Substantively, it states that the net expected gains of winning are positive. Note that G's highest possible feasible military spending amount is $\tau_C + \tau_G$. (To reduce notation, the probability of winning functions are written solely as a function of r when the other parameters to not affect the argument.)

Assumption A.2.

$$\min\Big\{(1-\phi)\cdot p_c(\tau_C+\tau_G)\cdot(\tau_C+\tau_G), (1-\phi)\cdot p_s(\tau_C+\tau_G)\cdot\tau_C\Big\} > \phi\cdot(1-\tau_C)$$

Assumption A.3 presents a sufficient condition for G's optimal military spending choice (see Equations 3 and 4) to be interior, which the proof for Proposition 1 shows. These resemble standard Inada conditions in which marginal returns are high at 0 and low at higher values of the choice variable.

Assumption A.3.

$$\max\Big\{-(1-\phi)\cdot p_c'(\tau_C+\tau_G)\cdot(\tau_C+\tau_G), -(1-\phi)\cdot p_s'(\tau_C+\tau_G)\cdot\tau_C\Big\} < \theta <$$
$$\min\Big\{-(1-\phi)\cdot p_c'(0)\cdot(\tau_C+\tau_G), -(1-\phi)\cdot p_s'(0)\cdot\tau_C\Big\}$$

Assumption A.4 presents a sufficient condition for total consumption to be greater under the optimal peaceful settlement than under the optimal fighting equilibrium for G. This assumption rules out "costly peace" explanations for fighting. Therefore, with this assumption, the model recovers the core tenet of the formal war literature that fighting is costlier than peace. The bounds $\hat{\phi} \in (0,1)$ follow because both the numerator and denominator in $\hat{\phi}$ are strictly positive, and $\tau_C < 1$.

Assumption A.4.

$$\phi > \hat{\phi} \equiv \frac{\tau_C+\tau_G}{1+\tau_G}$$

Proof of Proposition 1.

Part a. Characterize G's unique optimal choice if $B^* > 0$ (assuming G will buy off C if possible; this is proven below). Define the Lagrangian:

$$\max_{r,x,\lambda_1,\lambda_2,\lambda_3,\lambda_4} \tau_C+\tau_G-r-x+\lambda_1\cdot r+\lambda_2\cdot x+\lambda_3\cdot\big[x-x^*(r)\big]+\lambda_4\cdot(\tau_C+\tau_G-r-x),$$

for $x^*(r)$ defined in Equation 2. The associated KKT conditions are:

$$\frac{\partial\mathcal{L}}{\partial r} = -1+\lambda_1-\lambda_3\cdot\frac{\partial x^*(r)}{\partial r}-\lambda_4=0,\ \frac{\partial\mathcal{L}}{\partial x} = -1+\lambda_2+\lambda_3-\lambda_4=0,$$

$$r \geq 0, \;\; x \geq 0, \;\; x \geq x^*(r), \;\; \tau_C + \tau_G - x - r \geq 0,$$

$$\lambda_1 \geq 0, \;\; \lambda_2 \geq 0, \;\; \lambda_3 \geq 0, \;\; \lambda_4 \geq 0,$$

$$\lambda_1 \cdot r = 0, \;\; \lambda_2 \cdot x = 0, \;\; \lambda_3 \cdot \left[x - x^*(r)\right] = 0, \;\; \lambda_4 \cdot (\tau_C + \tau_G - x - r) = 0$$

The pair posited in the statement of Proposition 1, $(r, x) = (r^*, x^*)$, is a solution with associated multipliers $\lambda_1 = \lambda_2 = \lambda_4 = 0$ and $\lambda_3 = 1$. There are three non-trivial conditions to assess.

1. The multiplier $\lambda_3 > 0$ implies $x = x^*(r)$ is needed to satisfy the third complementary slackness condition. Assumption A.2 implies this satisfies $x > 0$ regardless of G's military spending.

2. Substituting the multipliers into the first-order condition for r, substituting in for $x^*(r)$ using Equation 2, and rearranging yields:

$$\Psi(r^*) \equiv \theta + (1-\phi) \cdot \Big[\mu^* \cdot p_c'(r^*) \cdot (\tau_C + \tau_G) + (1-\mu^*) \cdot p_s'(r^*) \cdot \tau_C\Big] = 0 \qquad \text{(A.2)}$$

   Equation A.2 is identical to Equation 4. Applying the intermediate value theorem establishes that this equation has (at least one) solution $r^* \in (0, \tau_C + \tau_G)$: Assumption A.3 implies $\Psi(0) > 0$ and $\Psi(\tau_C + \tau_G) < 0$, and both $p_c(\cdot)$ and $p_s(\cdot)$ are assumed to be continuous in r.

3. $B^* > 0$ implies that (x^*, r^*) preserves the fourth inequality condition.

To establish uniqueness, show that no other (x, r) pair can satisfy all the KKT conditions. Assumptions A.2 and A.3 imply that any solution features $r > 0$ and $x > 0$, which implies the multiplier values $\lambda_1 = \lambda_2 = 0$. Additionally, assuming $B^* > 0$ implies the multiplier value $\lambda_4 = 0$. This implies that $\lambda_3 = 1$ is necessary to satisfy the first-order condition for x. These are the same multiplier values as in the posited solution. The strict monotonicity of both $p_c(\cdot)$ and $p_s(\cdot)$ in r implies that r^* defined in Equation 4 is the unique solution to Equation A.2. The strict monotonicity of $x^*(r)$ in r additionally implies that $x^* \equiv x^*(r^*)$ is unique.

Finally, need to show that G cannot profitably deviate to a choice that violates $x \geq x^*(r)$, i.e., G will not choose an allocation that C will reject with probability 1. See part b.

Part b. Characterize G's unique optimal choice for $B^* < 0$. Define the Lagrangian:

$$\arg \max_{r, x, \lambda_1, \lambda_2, \lambda_4} \; (1-\phi) \cdot \Big\{\mu^* \cdot \big[1 - p_c(r)\big] \cdot (\tau_G + \tau_C) + (1-\mu^*) \cdot \Big[\tau_G + \big[1 - p_s(r)\big] \cdot \tau_C\Big]\Big\} - r - x$$

$$+ \lambda_1 \cdot r + \lambda_2 \cdot x + \lambda_4 \cdot (\tau_C + \tau_G - r - x)$$

The third constraint from part a is omitted because, by definition of $B^* < 0$, G does not meet C's no-fighting constraint. The associated KKT conditions are:

$$\frac{\partial \mathcal{L}}{\partial r} = -(1-\phi)\Big[\mu^* \cdot p_c'(r) \cdot (\tau_G + \tau_C) + (1-\mu^*) \cdot p_s'(r) \cdot \tau_C\Big] - 1 + \lambda_1 - \lambda_4 = 0, \;\; \frac{\partial \mathcal{L}}{\partial x} = -1 + \lambda_2 - \lambda_4 = 0$$

$$r \geq 0, \;\; x \geq 0, \;\; \tau_C + \tau_G - x - r \geq 0,$$

$$\lambda_1 \geq 0, \;\; \lambda_2 \geq 0, \;\; \lambda_4 \geq 0,$$

$$\lambda_1 \cdot r = 0, \;\; \lambda_2 \cdot x = 0, \;\; \lambda_4 \cdot (\tau_C + \tau_G - x - r) = 0$$

The pair posited in the statement of Proposition 1, $(r, x) = \big(r^*_{\text{max}}, 0\big)$, is a solution with associated multipliers $\lambda_1 = \lambda_4 = 0$ and $\lambda_2 = 1$. There are two non-trivial conditions to assess.

1. Substituting the multipliers into the first-order condition for r and rearranging yields:

$$\Psi_{\text{max}}(r^*_{\text{max}}) \equiv 1 + (1-\phi) \cdot \Big[\mu^* \cdot p'_c(r^*_{\text{max}}) \cdot (\tau_C + \tau_G) + (1-\mu^*) \cdot p'_s(r^*_{\text{max}}) \cdot \tau_C\Big] = 0 \quad \text{(A.3)}$$

   Applying the intermediate value theorem establishes that this equation has (at least one) interior solution $r^*_{\text{max}} \in (0, \tau_C + \tau_G)$: Assumption A.3 implies $\Psi_{\text{max}}(0) > 0$ and $\Psi_{\text{max}}(\tau_C + \tau_G) < 0$, and both $p_c(\cdot)$ and $p_s(\cdot)$ are assumed to be continuous in r.

2. Define:

$$\Omega_{\text{max}}(r) \equiv (1-\phi) \cdot \Big\{\mu^* \cdot \big[1 - p_c(r)\big] \cdot (\tau_G + \tau_C) + (1-\mu^*) \cdot \Big[\tau_G + \big[1 - p_s(r)\big] \cdot \tau_C\Big]\Big\} - r$$

   To prove that the budget constraint inequality holds strictly, it suffices to show $\Omega_{\text{max}}(0) > 0$. Because $r^*_{\text{max}} = \arg\max_r \Omega_{\text{max}}(r)$, if there exists any r such that $\Omega_{\text{max}}(r) > 0$, then it is true for $r = r^*_{\text{max}}$.

$$\Omega_{\text{max}}(0) \equiv (1-\phi) \cdot \Big\{\mu^* \cdot \big[1 - p_c(0)\big] \cdot (\tau_G + \tau_C) + (1-\mu^*) \cdot \Big[\tau_G + \big[1 - p_s(0)\big] \cdot \tau_C\Big]\Big\} > 0,$$

   which follows from $p_c(\cdot) < 1$, $p_s(\cdot) < 1$, and $\mu^* \in \{0, 1\}$.

Finally, need to prove G does not have a profitable deviation from (r^*, x^*) to $(r^*_{\text{max}}, 0)$ if $B^* > 0$:

$$U_G(r^*, x^*) - U_G(r^*_{\text{max}}, 0) > 0$$

The proof proceeds in two steps.

1. Show that total consumption if $(r, x) = (r^*, x^*)$ strictly exceeds total consumption if $(r, x) = (r^*_{\text{max}}, 0)$. This is equivalent to $\tau_G + 1 - r^* - (1-\theta) \cdot x^* > (1-\phi) \cdot (\tau_G + 1) - r^*_{\text{max}}$, which solves to:

$$\phi \cdot (\tau_G + 1) > r^* + x^* - r^*_{\text{max}} - \theta \cdot x^*$$

   The right-hand side is strictly less than $\tau_C + \tau_G$, which follows because $\tau_G + \tau_C > r^* + x^*$ if $B^* > 0$, $r^*_{\text{max}} \geq 0$, and $x^* > 0$. Therefore, Assumption A.4 is sufficient for the inequality to hold, which implies:

$$U_G(r^*, x^*) + U_C(r^*, x^*) > U_G(r^*_{\text{max}}, 0) + U_C(r^*_{\text{max}}, 0) \quad \text{(A.4)}$$

2. Equation A.4 can be restated as:

$$U_G(r^*, x^*) - U_G(r^*_{\text{max}}, 0) > U_C(r^*_{\text{max}}, 0) - U_C(r^*, x^*)$$

   Given the need to show $U_G(r^*, x^*) - U_G(r^*_{\text{max}}, 0) > 0$, proving $U_C(r^*_{\text{max}}, 0) - U_C(r^*, x^*) > 0$ establishes the claim. C's equilibrium consumption equals its expected utility to fighting:

$$U_C\big(r, x^*(r)\big) = (1-\phi) \cdot \Big[\mu^* \cdot p_c(r) \cdot (\tau_C + \tau_G) + (1-\mu^*) \cdot p_s(r) \cdot \tau_C + 1 - \tau_C\Big]$$

Because $p_c'(r) < 0$ and $p_s'(r) < 0$, this term strictly decreases in r. Therefore, establishing $r^* > r^*_{\text{max}}$ finishes the claim. Comparing the first-order conditions for the military spending amounts (see Equation 4 and Proposition 1) establishes after some rearranging that $p_j'(r^*) > p_j'(r^*_{\text{max}})$ for both $\mu^* = 0$ and $\mu^* = 1$, for $j \in \{c, s\}$. Combining this inequality with $p_c''(\cdot) > 0$ and $p_s''(\cdot) > 0$ yields $r^* > r^*_{\text{max}}$. ■

Two facts provide intuition for the last part of the proof of Proposition 1.

1. To explain $r^* > r^*_{\text{max}}$, G's marginal benefit of military spending is the same regardless of whether C will accept the offer or fight. The only difference between the two cases is G's marginal cost, which is 1 if a fight will occur and $\theta < 1$ if C will accept. The lower marginal cost to repression spending if C will accept implies that G spends more on repression in that case.
2. Because G sets the bargaining offer to keep C indifferent between accepting and fighting, the only difference in utility for C between the two cases depends on G's level of military spending. Higher military spending decreases C's expected utility to fighting, and therefore lowers its equilibrium bargaining offer. G spends more on the military if C will accept (see the previous point), which implies that C's expected utility is lower in that case.

Proof of Proposition 2. Applying the envelope theorem to B^* defined in Equation 6 yields:

$$\frac{dB^*}{dO_l} = \left[1 - \left[1 - (1-\mu^*) \cdot (1-\gamma)\right] \cdot \frac{(1-\phi) \cdot \left[\mu^* \cdot p_c(r^*) + (1-\mu^*) \cdot p_s(r^*)\right] + \gamma \cdot \phi}{\theta}\right] \cdot \frac{d\tau}{dO},$$

which is equivalent to combining the terms in Equations 7 and 8. ■

The text discusses how this term differs based on within-country oil location. There is also a slight difference in the relative prize effect term depending on whether government oil or regional oil increases (i.e., if $\gamma = 0$ or $\gamma = 1$). An increase in regional oil production decreases C's opportunity cost of fighting by diminishing the percentage of its production that it retains independently of fighting, $1 - \tau_C$, whereas government oil does not trigger this effect.

Several additional technical assumptions for the probability of winning function are needed to prove Propositions 3 and 4. Substantively, these are sufficient conditions for the equilibrium probability of winning term to exhibit strictly decreasing marginal returns, and to go to 0 as military spending diverges to infinity. An example of a function that satisfies Assumption A.5 is a simple contest function, $p(r) = \frac{1}{1+r}$.

Assumption A.5. *For $j \in \{c, s\}$:*

Part a. $2 \cdot \left[p_j''(r)\right]^2 > p_j'(r) \cdot p_j'''(r)$

Part b. $\lim_{r \to \infty} p_j'(r) = 0$

Part c. $\left[p_j'(r)\right]^2 < p_j''(r)$

Proof of Proposition 3.

$$\frac{d^2B^*}{d\theta dO_l} = \frac{d}{d\theta}\left[1 - \left[1-(1-\mu^*)\cdot(1-\gamma)\right]\cdot\frac{(1-\phi)\cdot\left[\mu^*\cdot p_c(r^*) + (1-\mu^*)\cdot p_s(r^*)\right] + \gamma\cdot\phi}{\theta}\right]\cdot\frac{d\tau}{dO} =$$

$$\left[1-(1-\mu^*)\cdot(1-\gamma)\right]\cdot(1-\phi)\cdot\frac{1}{\theta^2}\cdot\frac{d\tau}{dO}\cdot$$

$$\Bigg\{\underbrace{\mu^*\cdot p_c(r^*) + (1-\mu^*)\cdot p_s(r^*)}_{\text{Direct effect}}\underbrace{-\theta\cdot\left[\mu^*\cdot p_c'(r^*) + (1-\mu^*)\cdot p_s'(r^*)\right]\cdot\frac{dr^*}{d\theta}}_{\text{Indirect substitution effect}}\Bigg\}$$

If $\mu^* = \gamma = 0$, then the overall effect and the constituent effects equal 0. If $(1-\mu^*)\cdot(1-\gamma) = 0$, then the direct effect is strictly positive because $\mu^*\cdot p_c(r^*) + (1-\mu^*)\cdot p_s(r^*) > 0$, which establishes part a. To establish part b, applying the implicit function theorem yields:

$$\frac{dr^*}{d\theta} = -\frac{1}{(1-\phi)\cdot\left[\mu^*\cdot p_c''(r^*)\cdot(\tau_G+\tau_C) + (1-\mu^*)\cdot p_s''(r^*)\cdot\tau_C\right]}$$

Substituting in terms from Equation A.2 enables writing:

$$\frac{dr^*}{d\theta} = \frac{p_j'(r^*)}{\theta\cdot p_j''(r^*)},$$

where $j \in \{c, s\}$ corresponds to C's optimal type of civil war. This yields the sign of the overall term:

$$\left[1-(1-\mu^*)\cdot(1-\gamma)\right]\cdot sgn\left\{\mu^*\cdot p_c(r^*) + (1-\mu^*)\cdot p_s(r^*) - \theta\cdot\left[\mu^*\cdot\frac{[p_c'(r^*)]^2}{p_c''(r^*)} + (1-\mu^*)\cdot\frac{[p_s'(r^*)]^2}{p_s''(r^*)}\right]\right\}$$

To generate a threshold value such that this term is strictly positive for all $O_l > \overline{O}_l$ if $(1-\mu^*)\cdot(1-\gamma) = 0$, it suffices to demonstrate the magnitude of the indirect effect (1) strictly declines in oil production and (2) goes to 0 as oil production goes to infinity.

Result 1.
$$\frac{d}{dO_l}\left(\frac{\left[p_j'(r^*)\right]^2}{p_j''(r^*)}\right) < 0$$

For $l \in \{G, C\}$, this solves to:

$$\frac{d}{dO_l}\left(\frac{\left[p_j'(r^*)\right]^2}{p_j''(r^*)}\right) = \underbrace{\frac{p_j'(r^*)}{\left[p_j''(r^*)\right]^2}}_{①}\cdot\underbrace{\frac{dr^*}{d\tau_l}}_{②}\cdot\underbrace{\left[2\cdot\left[p_j''(r^*)\right]^2 - p_j'(r^*)\cdot p_j'''(r^*)\right]}_{③}\cdot\underbrace{\frac{d\tau}{dO}}_{④}$$

The first term is strictly negative because $p_j'(r) < 0$ for all $r > 0$. For the second term, applying the implicit function theorem demonstrates:

$$\frac{dr^*}{d\tau_l} = -\frac{\mu^*\cdot p_c'(r^*) + (1-\mu^*)\cdot p_s'(r^*)}{\mu^*\cdot p_c''(r^*)\cdot(\tau_C+\tau_G) + (1-\mu^*)\cdot p_s''(r^*)\cdot\tau_C} > 0$$

Part a of Assumption A.5 implies the third term is strictly positive, and the assumption that oil production increases revenues implies the fourth term is positive. Therefore, the entire term is strictly negative.

Result 2.

$$\lim_{O_l \to \infty} \frac{\left[p_j'(r^*)\right]^2}{p_j''(r^*)} = 0$$

Using the implicit definition of r^* from Equation 4, it is easy to show that $\lim_{O_l \to \infty} r^* = \infty$, for $l \in \{c, s\}$. Therefore, it is equivalent to demonstrate:

$$\lim_{r \to \infty} \frac{\left[p_j'(r)\right]^2}{p_j''(r)} = 0$$

The limit stated in part b of Assumption A.5 can equivalently be stated as: For all $\epsilon > 0$, there exists $c \in \mathbb{R}$ s.t. if $x > c$, then $\left|p_j'(r)\right| < \epsilon$. With slight abuse of notation for ϵ, can get an equivalent inequality for the squared term: $\left[p_j'(r)\right]^2 < \epsilon$. Because $p_j''(r) > 0$ and part c of Assumption A.5, this implies $\left|\frac{[p_j'(r)]^2}{p_j''(r)}\right| < \epsilon$. This meets the definition of a limit needed for $\lim_{r \to \infty} \frac{[p_j'(r)]^2}{p_j''(r)} = 0$: For all $\epsilon > 0$, there exists $c \in \mathbb{R}$ s.t. if $x > c$, then $\left|\frac{[p_j'(r)]^2}{p_j''(r)}\right| < \epsilon$. ■

Proof of Proposition 4.

$$\frac{d^2 B^*}{d\beta_j dO_l} = \frac{d}{d\beta_j}\left[1 - \left[1 - (1-\mu^*)\cdot(1-\gamma)\right]\cdot \frac{(1-\phi)\cdot\left[\mu^*\cdot p_c(r^*) + (1-\mu^*)\cdot p_s(r^*)\right] + \gamma\cdot\phi}{\theta}\right]\cdot\frac{d\tau}{dO} =$$

$$\left[1 - (1-\mu^*)\cdot(1-\gamma)\right]\cdot(1-\phi)\cdot\frac{1}{\theta}\cdot\frac{d\tau}{dO}\cdot$$

$$\left\{\underbrace{-\left[\mu^*\cdot\frac{\partial p_c(r^*)}{\partial\beta_c} + (1-\mu^*)\cdot\frac{\partial p_s(r^*)}{\partial\beta_s}\right]}_{\text{Direct effect}}\underbrace{-\left[\mu^*\cdot p_c'(r^*)\cdot\frac{dr^*}{d\beta_c} + (1-\mu^*)\cdot p_s'(r^*)\cdot\frac{dr^*}{d\beta_s}\right]}_{\text{Indirect substitution effect}}\right\}$$

If $\mu^* = \gamma = 0$, then the overall effect and the constituent effects equal 0. If $(1-\mu^*)\cdot(1-\gamma) = 0$, then $\left[1 - (1-\mu^*)\cdot(1-\gamma)\right]\cdot(1-\phi)\cdot\frac{1}{\theta}\cdot\frac{d\tau}{dO} > 0$. The direct effect is strictly positive because $\frac{\partial p_j}{\beta_j} < 0$ by assumption. The indirect effect is also strictly positive, which follows from signing two terms. First, $p_j' < 0$ by assumption. Second, applying the implicit function theorem shows that:

$$\frac{\partial r^*}{\partial\beta_j} = -\frac{\frac{\partial^2 p_j(r^*)}{\partial r\partial\beta_j}}{p_j''(r^*)} > 0,$$

■

B Empirical Appendix

B.1 Country-Level Correlations

B.1.1 Data

Sample. The unit of analysis is country-years. Among countries with a population of at least 200,000 in the year 2000, the sample contains annual data for all independent non-Western European countries between the later of 1946 and their year of independence, and 2013. Western European countries and their four New World offshoots are excluded because they do not meet a key scope condition of conflict resource curse theories: weakly institutionalized states in which civil war may occur with a non-trivial probability. The 2013 end year corresponds with the last year of ethnic group data (see below). The population threshold for country size is the same as Ross and Mahdavi (2015) use in their oil data. Their population threshold is sensible because it is low enough to include small but substantively important oil producers, such as Qatar and Brunei. Finally, the independent country criterion excludes countries under Western European colonization. This criterion additionally excludes before 1990 all of Eastern Europe (plus Mongolia) besides Russia/Soviet Union, Serbia/Yugoslavia, and Albania because of foreign occupation. Similarly, all country-years under other foreign occupation—such as Iraq under U.S. occupation between 2003 and 2011—are excluded, coded based off Geddes, Wright and Frantz (2014). In foreign occupation cases, wars almost always focus on overthrowing the colonizer rather than a local government, the focus of the formal model.

Civil war data. The civil war data draw from Fearon and Laitin (2003). Their 2009 update provides the base civil war list. I then updated their list through 2013 using data from Correlates of War (COW; Dixon and Sarkees 2015) and the UCDP/PRIO Armed Conflict Database (ACD; Gleditsch et al. 2002). I included every "intra-state war" that COW—which uses a 1,000 battle death threshold for wars—codes as beginning between 2010 and 2013 that ACD also codes as reaching 1,000 battle deaths, one of Fearon and Laitin's key coding rules. I also consulted COW and ACD for conflict termination years for any civil wars that Fearon and Laitin coded as ongoing in 2009. Additionally, Ross and Mahdavi (2015) use a lower population threshold than Fearon and Laitin (2003), which necessitates coding civil wars for smaller countries. ACD does not use a population threshold for deciding which countries to include (see pg. 14 of Version 7.1 of their codebook), therefore providing the needed information—although no civil wars were added through this procedure (Comoros had two conflicts but neither reached 1,000 battle deaths). Also, note that every country-level regression controls for log population.

Finally, Fearon and Laitin code whether the civil war was center-seeking or separatist. I verified their coding of civil war aims with both COW and ACD, and additional secondary sources when necessary. This enabled assigning aims to the wars that Fearon and Laitin code as mixed or ambiguous. Unlike in COW or ACD, in the present dataset, a war can be coded as both center-seeking and separatist, although few cases are coded as both. Two cases feature rebel groups with both aims: SPLA in Sudan in 1983, and several groups adopted center-seeking in addition to separatist aims in 1989 during Ethiopia's ongoing civil war (specifically, they formed an alliance to take over the center, agglomerating previously disparate center-seeking and separatist rebel groups). In Burma, largely distinct center-seeking and separatist rebellions broke out in 1948, and several other countries such as Angola and India have featured center-seeking civil wars and separatist civil wars at the same time despite not beginning in the same year.

Therefore, complicated cases like ISIS in Iraq and Syria with a rebel group operating in several countries with various aims (see Section B.3 for more infomation) are empirically rare, and instead categorizing war aims tends to yield clear codings.

Advantages of Fearon and Laitin's coding scheme. The major advantage of using data based off Fearon and Laitin's (2003) coding procedure rather than ACD is that ACD does not provide a coherent scheme for coding distinct civil wars, and hence civil war *onsets*. Scholars use a lapse rule, typically two years, for translating ACD's incidence data into distinct conflict onsets. If the 25 or 1,000 death threshold (ACD codes both thresholds) is not met for at least two years after being met in the past, then any future year that meets the death threshold is coded as a new civil war. Problematically, such a procedure often leads to either undercounting or (more likely) overcounting a country's civil war onsets, as Fearon and Laitin (2013, 25) summarize:

> "They apply a criterion of one year (or two, or ten, for different codings) with no conflict above their 25 death threshold. This has the advantage of being relatively definite, but the disadvantage of making many long-running, low level conflicts that flit above and below the 25 dead threshold look like many distinct civil wars. In our view they often are more naturally seen as a single, long-running but low level civil conflict, that happens often by chance to get above or below the threshold in some years" (25). (Also see Sambanis 2004, 818-9.)

Exemplifying the conceptual problems posed by using short lapse rules for low-intensity periodic conflicts, Kreutz's (2010) dataset that splits ACD incidence years into distinct wars using a one-year lapse rule codes five distinct civil wars between Iran and the rebel group MEK (1979-82, 1986-88, 1991-93, 1997, 1999-2001). Throughout this entire period, however, the conflict consisted of hit-and-run bombings by MEK and repressive retaliation by the government. In some years, MEK successfully struck big targets, and in other years they failed to do so (Global Security, 2014). Coding 1986, 1991, 1997, and 1999 as onset years for new civil wars conflates conceptual considerations about civil war onset and civil war continuation. Fighting lapse rules can also undercount civil war onsets. For example, consider the UCDP/PRIO Conflict Encyclopedia's description of civil wars in the Democratic Republic of the Congo in the 1990s: "In 1996-1997 an armed rebellion led by AFDL and supported by Rwanda and Uganda managed to topple President Mobutu in May 1997. However the new regime was soon at war again [in 1998], this time against RCD and MLC." Although the violence involved with toppling Mobutu and subsequently to remove Kabila are usually considered two distinct civil wars, using a two-year lapse rule does not yield a new onset in 1998 because of conflict incidence in the previous year.

Two of Fearon and Laitin's (2003) coding rules help to guard against these issues. First, "War ends are coded by observation of a victory, wholesale demobilization, truce, or peace agreement followed by at least two years of peace" (Fearon and Laitin 2003, 76, fn. 4; see this page and footnote for their full set of rules). This directly addresses the concern about overcounting onsets for periodic conflicts because war ends are marked by clear signals of intent to end the current episode of fighting. Importantly, this rule still allows for the possibility of repeated civil wars with the same rebel group. Second, "If a main party to the conflict drops out, we code a new war start if the fighting continues (e.g., Somalia gets a new civil war after Siad Barre is defeated in 1991)." This addresses the problem of undercounting onsets in cases such as the Democratic Republic of the Congo in the 1990s.

Oil and population data. Ross and Mahdavi (2015) provide annual data between 1932 and 2014 on the total value of oil and natural gas production at the country level, measured in 2014 dollars. The variable has consistent coverage, especially since 1960 (before which many countries in the sample were under colonial rule). For countries with missing data, which in all cases is some period before the first data point, I used the following procedure. If there was less than \$2 in oil and gas income per capita in the first year of data, I imputed all previous years as \$0. If oil and gas income per capita exceeded this amount in the first year, I used corresponding data from Haber and Menaldo (2011). Ross and Mahdavi (2015) also provide population data, drawn mostly from World Bank (2017) and from Maddison (2008). This was used to create a per capita oil variable, and, following Ross (2012), is also used as a separate covariate in every country-level regression specification. For country-years in the sample during the 1940s, the country's 1950 population data point is used because both of Ross and Mahdavi's (2015) source datasets have sparse coverage before 1950 (only Afghanistan had missing population data for a later point among country-years in the sample, and their 1961 population figure is used for all previous years). Finally, both oil and gas income per capita and population are logged and lagged one year in the regressions. If the country has missing data in their first year in the dataset (because of the lagging), they are assigned the next year's oil and/or population data. Overall, no country-years are dropped because of missing data that meet the sample criteria discussed above. These variables each lagged one year in every specification.

B.1.2 Additional Information for Figure 1

Regression equation. For country index j and year index t, the regression equation for Figure 1 and its corresponding regression table, Table B.1, is:

$$\ln\left(\frac{Y_{jt}}{1-Y_{jt}}\right) = \beta_0 + \beta_O \cdot ln(oil/pop)_{jt} + \beta_P \cdot ln(pop)_{jt} + \boldsymbol{T}'_{jt} \cdot \beta_T + \epsilon_{jt}, \tag{B.1}$$

where Y_{jt} is an indicator variable for either all civil war onset, center-seeking civil war onset, or separatist civil war onset, and $\boldsymbol{T}'_{jt}$ is a vector of peace years and cubic splines since the last year in a which a conflict of the specified type ended.

Table B.1: Regression Table for Figure 1

Dependent variable:	All CW onset	Center CW onset	Center CW onset	Sep CW onset
	(1)	(2)	(3)	(4)
ln(Oil & gas/cap)	-0.0455	-0.0445	-0.109**	-0.0199
	(0.0429)	(0.0483)	(0.0530)	(0.0657)
ln(Pop.)	0.327***	0.187***	0.182***	0.556***
	(0.0613)	(0.0540)	(0.0569)	(0.0960)
Country-years	6,425	6,837	6,417	6,968
Time controls?	YES	YES	YES	YES
Sample	Full	Full	Pre-2011	Full

Notes: Table B.1 estimates Equation B.1. It summarizes a series of logit regressions by presenting the coefficient estimates for the substantive variables, with country-clustered standard errors in parentheses. The dependent variable in each column is civil war onset (either all civil wars, center-seeking, or separatist), and ongoing years are set to missing. Every regression contains peace years and cubic splines generated from the last year in which a war of the specified type was ongoing for each country. The unit of analysis is country-years. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

B.1.3 Conditional Effects

The government vulnerability variable used in Figure 11 is coded as follows.

Government vulnerability variable. A country-year is scored as 1 on the government vulnerability variable if any of the following three conditions are true, and 0 otherwise:

- *Lost war or violent independence.* This variable equals 1 if any of the following are true within the previous two years: defeat in international war (Correlates of War; Dixon and Sarkees (2015)); executive turnover caused by government defeat in a center-seeking civil war (coded by author drawing from the list of civil wars used throughout the paper); government defeat in a separatist civil war, meaning rebels get significant autonomy concessions, de facto autonomy, or an independent state (coded from

Fearon and Laitin's (2003) dataset); or independence from foreign occupation in which an internal war (i.e., war fought within the country's territory) occurred in the lead-up to independence.

- *Oil shock decade.* Any year between 1973 and 1982, inclusive.
- *Arab Spring.* Any country in the Middle East and North Africa in 2011.

Regression equation. The regression equation for Column 2 in Table B.2 is:

$$\ln\left(\frac{Y_{jt}}{1-Y_{jt}}\right) = \beta_0 + \beta_O \cdot ln(oil/pop)_{jt} + \beta_V \cdot V_{jt} + \beta_{OV} \cdot ln(oil/pop)_{jt} \cdot V_{jt} + \beta_P \cdot ln(pop)_{jt} + \boldsymbol{T}'_{jt} \cdot \beta_T + \epsilon_{jt}, \tag{B.2}$$

where V_{jt} is an indicator variable for government vulnerability.

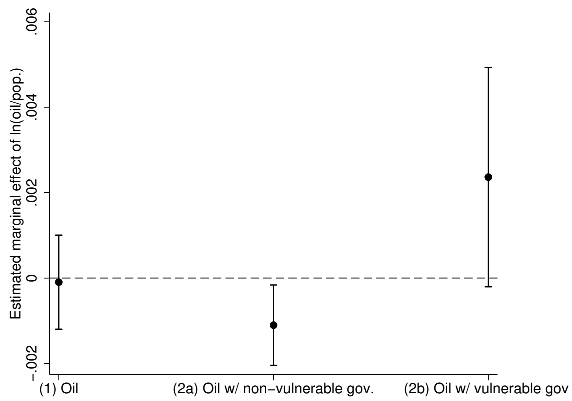
Table B.2: Regression Table for Figure 11

	DV: Center-seeking CW onset	
	(1)	(2)
ln(Oil & gas/cap)	-0.0345	-0.161**
	(0.0457)	(0.0673)
Vulnerable		0.387
		(0.366)
ln(Oil & gas/cap)*Vulnerable		0.255***
		(0.0890)
ln(Pop.)	0.187***	0.209***
	(0.0536)	(0.0561)
Country-years	6,828	6,828
Time controls?	YES	YES
	Marginal effects	
Oil | Vulnerable=0		-0.00108***
		(0.000406)
Oil | Vulnerable=1		0.00162*
		(0.000929)

Notes: Table B.2 estimates Equation B.2. It summarizes a series of logit regressions by presenting the coefficient estimates for the substantive variables, with country-clustered standard errors in parentheses. Every regression contains peace years and cubic splines generated from the last year in which a center-seeking civil war was ongoing. The unit of analysis is country-years. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

The center-seeking civil war measure used in Figure 11 includes both ethnic—i.e., the rebel group made claims for and selectively recruited from a particular ethnic group—and non-ethnic center-seeking civil wars. Although the theoretical framework concentrates mainly on identity-based rebellions, the country-level implications are similar even for rebellions not organized around ethnicity: greater oil wealth provides the government with revenues it can use to spend on coercion and patronage. However, Appendix Figure B.1 shows that the marginal effect estimates are similar to those in Figure 11 when only analyzing ethnic center-seeking civil wars. The regression equation for Figure B.1 and Table B.3 is identical to Equation B.2, except the dependent variable is ethnic center-seeking civil war onset, and the peace years and cubic splines are generated from this variable.

Figure B.1: Ethnic Center-Seeking Civil War Onset



Notes: Figure B.1 presents point estimates and 95% confidence intervals for a series of logit regressions. Table B.3 is the corresponding regression table.

Table B.3: Regression Table for Figure B.1

	DV: Ethnic center CW onset	
	(1)	(2)
ln(Oil & gas/cap)	-0.0121	-0.160
	(0.0719)	(0.0987)
Vulnerable		0.307
		(0.492)
ln(Oil & gas/cap)*Vulnerable		0.292**
		(0.142)
ln(Pop.)	0.173**	0.203**
	(0.0841)	(0.0923)
Country-years	7,271	7,271
Time controls?	YES	YES
	Marginal effects	
Oil | Vulnerable=0		-0.000386*
		(0.000223)
Oil | Vulnerable=1		0.000838
		(0.000577)

Notes: Table B.3 estimates Equation B.2 with the dependent variable changed to ethnic center-seeking civil war onset. It summarizes a series of logit regressions by presenting the coefficient estimate for the substantive variables, with country-clustered standard errors in parentheses. Every regression contains peace years and cubic splines generated from the last year in which an ethnic center-seeking civil war was ongoing for each country. The unit of analysis is country-years. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

B.2 Ethnic Group-Level Correlations

B.2.1 Data

Sample. The unit of analysis is ethnic group-years. The sample contains every politically relevant ethnic group with a location polygon in the Ethnic Power Relations (EPR; Vogt et al. 2015) dataset for all non-Western European countries and offshoots between the later of 1946 and their year of independence, and 2013. The start and end years correspond with the start and end years of the EPR dataset. The previous section discusses additional sample restrictions that are also used for this sample.

Civil war data. Using the list of civil wars described above, I assigned wars to EPR ethnic groups using the following procedure. To my knowledge, this is the first attempt to integrate a different civil war dataset than UCDP/PRIO with EPR ethnic groups. First, I matched each Fearon and Laitin (2003) conflict and each post-2009 conflict to the corresponding conflict in the UCDP/PRIO Armed Conflict Database (ACD; Gleditsch et al. 2002). Because Fearon and Laitin use a higher death threshold, the ACD contains almost all their civil wars. (Fortunately, the non-ACD cases were almost all straightforward to code.) This facilitated using the ACD2EPR dataset (Vogt et al., 2015), which links rebel groups in the ACD to EPR groups and codes whether the rebel group made ethnic claims and recruited within an ethnic group. Ethnic claims and recruitment are individually necessary and jointly sufficient conditions for ACD2EPR to code the ethnic group as involved in an "ethnic" conflict. In Fearon and Laitin conflicts with only a single corresponding rebel group and ethnic group in ACD2EPR, that ethnic group was coded as participating in a civil war during the years coded by Fearon and Laitin.

Assigning Fearon and Laitin civil wars to EPR ethnic groups was more complicated for conflicts involving multiple rebel groups and/or ethnic groups. In most cases with multiple ethnic groups participating in the same conflict, I used the PRIO Battle Deaths dataset (Lacina and Gleditsch, 2005) to assess whether that ethnic group was responsible for at least 1,000 battle deaths. This was not possible, however, for center-seeking conflicts featuring multiple ethnic groups because all rebel groups participating in a center-seeking civil war are coded as part of the same conflict in ACD and the PRIO Battle Deaths dataset. (By contrast, in countries with multiple separatist civil wars, such as Burma, the dataset provide battle death estimates for each distinct territorial conflict.) For these center-seeking conflicts, any participating EPR group coded by ACD2EPR as having ethnic claims and recruitment was coded as involved in a conflict. I use the years that ACD2EPR code the rebel group as in conflict rather than Fearon and Laitin's years because in some conflicts featuring multiple ethnic groups, individual ethnic groups only participated in a subset of the years of the overall conflict.

Finally, as discussed above for the country-level data, rebelling ethnic groups have almost always articulated clear aims for either the center or to separate, as opposed to many rebellions featuring joint aims.

Advantages of Fearon and Laitin's coding scheme. Similar to the concerns discussed with country-level data, ACD does not provide a scheme for distinguishing civil war episodes. Many separatist conflicts in oil-rich regions are coded as numerous onsets using conventional codings of UCDP/PRIO (e.g., Angola vs. FLEC/FAC in Cabinda, Iraq vs. PUK in Kurdistan). Although in principle ACD could be recoded into distinct episodes, in practice, this is particularly hard to do at the ethnic group level. From examining ACD2EPR data, there are frequent gaps in fighting for individual ethnic groups. To focus on individual conflict episodes, it is more sensible to start with a dataset like FL that distinguishes civil wars and code ethnic affiliation from there, rather than starting with the ACD and trying to group fighting years into unique civil wars.

Oil data. The oil variable is an indicator for whether the EPR ethnic group has any onshore giant oil or gas fields in its territory, or any giant oil/gas fields located offshore within 250 kilometers of a segment of the group's location polygon that touches a coast and within its country's maritime boundaries. GeoEPR provides the EPR spatial data (Vogt et al., 2015) and Flanders Marine Institute (2016) provides the maritime boundary spatial data. A giant oil field contains ultimate recoverable reserves of at least 500 million barrels of oil equivalent before extraction began. An updated version of Horn's (2003) dataset provides coordinates for every major oil field discovered in the world between 1868 and 2010 (Horn, 2015). Because the source provides data on when the field was initially discovered (with no missing data on this variable), the oil variable can vary over time for ethnic groups.

I use Horn's data, which has been used in recent oil-civil war publications such as Lei and Michaels (2014), rather than an alternative sometimes used in the literature, PETRODATA (Lujala, Rod and Thieme, 2007), for two reasons. First, PETRODATA includes all oil fields, giant or not. Coding groups as oil-rich or not based on giant oil fields ensures that any group coded as oil-rich has (at least potentially) an economically important well, as opposed to a minor oil field that is not of high enough economic value to make the mechanisms posited in the model empirically relevant. Second, PETRODATA has considerable missing data for the year of discovery (38% of its oil fields), which makes it difficult to use this data to code a time-varying variable for oil-richness. Furthermore, although a binary oil-rich variable is somewhat coarse, given data limitations it appears to provide the best option. Annual production data at the oil field level does not exist—in fact, there are many difficulties estimating the value of oil production even at the country level, as Ross and Mahdavi's (2015) codebook discusses. Additionally, as noted, even having a single giant oil field should be sufficient to trigger to oil mechanisms posited in the theory.

B.2.2 Additional Information for Figure 2

Regression equation. For ethnic group index i, country index j, and year index t, the regression equation for Figure 2 and the corresponding regression table, Table B.4, is:

$$\ln\left(\frac{Y_{it}}{1-Y_{it}}\right) = \beta_0 + \beta_O \cdot Oil_{it} + \boldsymbol{T}'_{it} \cdot \beta_T + \beta_j + \epsilon_{it}, \tag{B.3}$$

where Y_{it} is an indicator variable for either all civil war onset, center-seeking civil war onset, or separatist civil war onset, and $\boldsymbol{T}'_{it}$ is a vector of peace years and cubic splines since the last year in a which a conflict of the specified ended as well as a lagged country-level civil war incidence variable. The even-numbered specifications include country-level intercepts β_j.

Table B.4: Regression Table for Figure 2

Dependent variable:	All civil war		Center civil war		Separatist civil war	
	(1)	(2)	(3)	(4)	(5)	(6)
Giant oil/gas field	0.583**	0.623**	-0.304	0.731	1.000***	0.699**
	(0.274)	(0.312)	(0.476)	(0.676)	(0.334)	(0.352)
Group-years	17,709	8,683	18,417	3,487	17,903	7,250
Country FE?	NO	YES	NO	YES	NO	YES
Time controls?	YES	YES	YES	YES	YES	YES

Notes: Table B.4 estimates Equation B.3. It summarizes a series of logit regressions by presenting the coefficient estimate for the giant oil field indicator, and ethnic group-clustered standard errors in parentheses. The dependent variable in each column is civil war onset (all types, center-seeking, or separatist), and ongoing years are set to missing. Every regression contains peace years and cubic splines generated from the last year in which a war of the specified type was ongoing for each ethnic group, and a lagged country-level civil war incidence variable. The unit of analysis is ethnic group-years. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

B.2.3 Conditional Results

Sample. The sample differs slightly from that in Figure 2. Because Figure 9 focuses only on separatist civil wars, it excludes ethnic groups without a concentrated territory to minimize heterogeneity in the estimates. Empirically, since 1946, no ethnic group lacking a concentrated territory has initiated a separatist civil war.

The conditioning factors examined in Figure 9 are measured as follows.

Excluded minorities. Minorities are groups that EPR (Vogt et al., 2015) codes as composing less than 50% of their country's population. An ethnic group-year is coded as politically excluded if it is politically relevant and does not score any of the following on EPR's ethnopolitical inclusion variable: "MONOPOLY," "DOMINANT," "SENIOR PARTNER," or "JUNIOR PARTNER." Figure 3 uses the same political representation variable.

Favorable separatist geography. An ethnic group scores 1 on the favorable separatist geography variable if any of the following are true, and 0 otherwise: distance from the capital exceeding the median in the sample, mountainous percentage of territory higher than the median in the sample, and/or noncontiguous territory from the capital. Distance from capital calculated by author by combining GeoEPR with the CShapes dataset (Weidmann, Kuse and Gleditsch, 2010), and is measured using the distance from the ethnic group's centroid to the capital city. Percent mountainous is from Hunziker and Cederman (2017), who used Blyth (2002) for the source mountain data. Noncontiguous territory from the country's capital coded by author.

Regression equation. For ethnic group index i, country index j, and year index t, the regression equation for Columns 2 and 3 of Table B.5 is:

$$\ln\left(\frac{Y_{it}}{1-Y_{it}}\right) = \beta_0 + \beta_O \cdot Oil_{it} + \beta_C \cdot Cond_{it} + \beta_{OC} \cdot Oil_{it} \cdot Cond_{it} + \boldsymbol{T}'_{it} \cdot \beta_T + \epsilon_{it}, \tag{B.4}$$

where $Cond_{it}$ is a conditioning variable that differs by column.

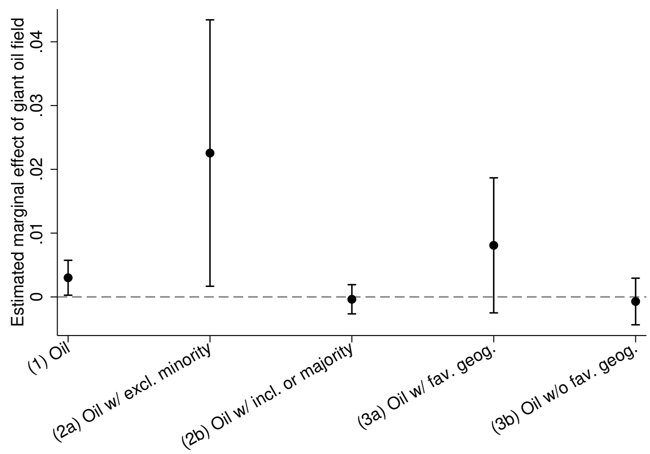
Table B.5: Regression Table for Figure 9

	DV: Separatist civil war onset		
	(1)	(2)	(3)
Giant oil/gas field	1.000***	0.708	0.751
	(0.334)	(0.834)	(0.777)
Excluded minority		1.515***	
		(0.468)	
Oil*Excluded minority		0.497	
		(0.891)	
Favorable geog.			1.361***
			(0.421)
Oil*Fav. geog.			0.256
			(0.844)
Group-years	17,903	17,903	17,903
Country FE?	NO	NO	NO
Time controls?	YES	YES	YES
		Marginal effects	
Oil | Excluded minority		0.00627**	
		(0.00287)	
Oil | Included and/or majority		0.000613	
		(0.000889)	
Oil | Favorable geography			0.00485*
			(0.00263)
Oil | Unfavorable geography			0.000807
			(0.00106)

Notes: Table B.5 estimates Equation B.4. It summarizes a series of logit regressions by presenting the coefficient estimate for the substantive variables, and ethnic group-clustered standard errors in parentheses. Every regression contains peace years and cubic splines generated from the last year in which a separatist civil war was ongoing for each ethnic group, and a lagged country-level civil war incidence variable. The unit of analysis is ethnic group-years. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Figure B.2 and Table B.6 estimate a regression equation identical to Equation B.4 except it adds a country-level intercept β_j. The marginal effect estimate for oil conditional on favorable separatist geography is 2.7 times larger than the marginal effect estimate in Column 1, although the confidence interval is somewhat wider (p-value is 0.134).

Figure B.2: Figure 9 with Country Fixed Effects



Notes: Figure B.2 presents point estimates and 95% confidence intervals for a series of logit regressions described in Equation B.4 with an country-level intercept added, and Table B.6 provides the corresponding regression table.

Table B.6: Regression Table for Figure B.2

	DV: Separatist civil war onset		
	(1)	(2)	(3)
Giant oil/gas field	0.699**	-0.255	-0.297
	(0.352)	(0.799)	(0.840)
Excluded minority		1.263**	
		(0.607)	
Oil*Excluded minority		1.862**	
		(0.822)	
Favorable geography			0.891*
			(0.483)
Oil*Favorable geog.			1.087
			(0.913)
Group-years	7,250	7,250	7,250
Country FE?	YES	YES	YES
Time controls?	YES	YES	YES
	Marginal effects		
Oil | Excluded minority		0.0226**	
		(0.0107)	
Oil | Included and/or majority		-0.000372	
		(0.00117)	
Oil | Favorable geography			0.00808
			(0.00540)
Oil | Unfavorable geography			-0.000719
			(0.00186)

Notes: Table B.6 estimates Equation B.4 with a country-level intercept added. It summarizes a series of logit regressions by presenting the coefficient estimate for the substantive variables, and ethnic group-clustered standard errors in parentheses. Every regression contains peace years and cubic splines generated from the last year in which a separatist civil war was ongoing for each ethnic group, and a lagged country-level civil war incidence variable. The unit of analysis is ethnic group-years. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

The results to this point have used a group-level oil indicator that codes a group as oil rich if it contains either an onshore oil field in its territory or a nearby offshore field. Figure 10 disaggregates the oil variable into onshore oil and offshore oil. An ethnic group is coded as 1 on the offshore oil (only) variable if it contains at least one giant oil or gas field within 250 kilometers of a segment of the group's location polygon that touches the coast, and the group's territory contains no onshore giant oil or gas fields; and 0 otherwise. Giant oil and gas field data from Horn (2003; 2015) and GeoEPR data from Vogt et al. (2015). An ethnic group is coded as 1 on the onshore oil variable if it contains at least one giant onshore oil or gas field in its territory, and 0 otherwise. The regression equation for Figure 10 and Table B.7 is:

$$\ln\left(\frac{Y_{it}}{1-Y_{it}}\right) = \beta_0 + \beta_N \cdot Onshore_{it} + \beta_F \cdot Offshore_{it} + \boldsymbol{T}'_{it} \cdot \beta_T + \epsilon_{it}, \tag{B.5}$$

where β_N is the coefficient estimate for o<u>n</u>shore oil and β_F is the coefficient estimate for o<u>f</u>fshore oil.

To test Hypotheses 1 and 2, in Figure 10 and Table B.7, Column 1 subsets the Figure 9 sample to excluded minorities, and Column 2 subsets the Figure 9 sample to groups with favorable separatist geography. The figure shows that, among either excluded minorities or favorable separatist geography groups, onshore oil and offshore oil each positively and significantly covary with separatist civil war onset (p-value for offshore oil is 0.060 in Column 2). The positive correlation for offshore oil goes against existing theories positing that it should not trigger separatism because offshore oil is difficult for rebels to loot (Lujala, 2010; Ross, 2012). However, the positive offshore oil correlation is consistent with the present framework based on governments rather than rebel groups controlling oil revenues because the taxability of oil production does not depend greatly on whether it is onshore or offshore.

An important caveat for interpreting the results in Figure 10 is that separatist civil war in oil-rich territories is itself a rare phenomenon, and separatist civil wars in territories rich only in offshore oil are even rarer: Bakongo in Angola, Cabindan Mayombe in Angola, East Timorese in Indonesia, and Malay Muslims in Thailand (see Table 1). Therefore, although civil wars have occurred relatively more frequently in offshore oil-rich territories than oil-poor territories (0.9% of group-years compared to 0.4%), the offshore oil correlation is based on a small number of onset cases.

Table B.7: Regression Table for Figure 10

	DV: Separatist civil war onset	
	(1)	(2)
Giant onshore oil field	1.334***	1.022**
	(0.401)	(0.403)
Giant offshore oil field (only)	0.979**	0.988*
	(0.451)	(0.525)
Group-years	9,802	9,365
Time controls?	YES	YES
Sample	Excluded minorities	Favorable geography

Notes: Table B.7 estimates Equation B.5. It summarizes a series of logit regressions by presenting the coefficient estimate for the substantive variables, and ethnic group-clustered standard errors in parentheses. Every regression contains peace years and cubic splines generated from the last year in which a separatist civil war was ongoing for each ethnic group, and a lagged country-level civil war incidence variable. The unit of analysis is ethnic group-years. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

B.3 Evidence for Mechanisms in Oil-Separatist Cases

For every civil war between 1946 and 2006 involving natural resources, Rustad and Binningsbø (2012) provide two variables that are relevant for the present discussion. As their codebook describes:

- **Distribution.** "A dummy variable recording whether the conflict episode had a natural resource distribution mechanism. Two types of distributional issues are considered: distribution of the natural resource itself such as land, water or agricultural products, and conflicts over the distribution of natural resource revenues."
- **Financing.** "A dummy variable recording whether the conflict episode had a natural resource financing mechanism. All types of natural resources may finance rebel groups, including illegal commodities such as drugs. However, cases where natural resources provided income for the government side are not included."

Table B.8 summarizes these variables for all the cases from Table 1. There is a clear trend toward these oil-separatist cases featuring evidence of distributional grievances. In two cases, East Timor and South Sudan, civil war broke out before production began in the region, which is presumably why Rustad and Binningsbø 2012 do not code Sudan 1983 as a civil war involving natural resources. This disables providing evidence of whether unequal distribution would have occurred. However, both cases suggest fear of expected future exploitation. In Sudan, the government redrew the boundaries of the southern areas to remove their oil after it was discovered, clearly indicating that oil revenues would not be shared with the south (Ofcansky, 1992). Similarly, in Indonesia, the government attempted to forcibly take over the former Portuguese colony of East Timor without any pretense of regional autonomy (Lawless, 1976).

Table B.8 also shows that Rustad and Binningsbø (2012) do not code the financing mechanism for any of the oil-separatist cases. Several cases suggest that coding *no* financing cases overstates the rarity of

Table B.8: Evidence for Mechanisms in Oil-Separatist Cases

Ethnic group	Country	Onset year	Evidence of distribution?	Evidence of financing?
Bakongo	Angola	1992	YES	NO
Cabindan Mayombe	Angola	1992	YES	NO
Assamese (non-SC/ST)	India	1991	YES	NO
Acehnese	Indonesia	1989	YES	NO
Acehnese	Indonesia	1999	YES	NO
East Timorese†	Indonesia	1975	NO	NO
Kurds	Iran	2004	NO	NO
Kurds	Iraq	1961	n.a.	n.a.
Kurds	Iraq	1974	YES	NO
Igbo	Nigeria	1967	YES	NO
Baluchis	Pakistan	1973	YES	NO
Baluchis	Pakistan	2004	n.a.	n.a.
Dinka†	Sudan	1983	n.a.	n.a.
Malay Muslims	Thailand	2004	n.a.	n.a.
Southerners	Yemen	1994	NO	NO

Notes: Table B.8 contains the same cases as in Table 1. For each case, it states whether or not Rustad and Binningsbø (2012) code evidence of either distribution or finance (a case can be coded as both, although no cases are among those in Table B.8). Cases excluded from Rustad and Binningsbø's (2012) dataset are marked by "n.a."

† Oil production began after war onset.

this phenomenon, although do not alter the main point that it has rarely occurred. Ross (2012) discusses the separatist civil war in the Niger Delta in the 2000s, which caused less than 1,000 battle deaths and therefore is not included in Table 1, and demonstrates evidence of rebel financing. However, Colgan (2015, 6) discusses how even in this "exceptional case ... the government's oil revenue is larger than the rebels."' Another possible example is southern Sudanese rebels that blew up pipelines and disrupted oil production during Sudan's second civil war, although this is somewhat distinct from gaining control of and profiting from oil production. Finally, there is clear evidence of rebels earning huge profits from oil sales during the post-2011 ISIS conflict in Iraq and Syria (Dilanian, 2014). However, there is considerable ambiguity regarding how to code ISIS' civil war aims, who have proclaimed to establish an Islamic Caliphate in territory captured from Iraq and Syria. The Armed Conflict Database (Gleditsch et al., 2002) codes ISIS as participating in a center-seeking civil in Iraq and a separatist civil war in Syria. Correlates of War (Dixon and Sarkees, 2015) codes ISIS as participating in center-seeking civil war in Iraq and an intercommunal conflict in Syria. However, regardless of how ISIS' civil war aims are coded, it is an exception to the general trend that rebel groups have rarely gained significant looting profits from oil to fund separatist insurgencies. (The phenomenon is also rare in center-seeking insurgencies, with Colombia in the 1980s and Libya in 2011 providing additional examples. There is also evidence in Iraq in the 2000s, although this is better categorized as an anti-colonial war than a center-seeking civil war.)

B.4 Evidence for Assumption 3

Kalyvas and Balcells (2010) provide a series of multinominal logit estimates that examine correlates of civil war tactics (Table 3 on pg. 425 of their article). They do not, however, examine civil war aims, and the interest here is to see if civil war aims correlate with civil war tactics. To do so, I coded civil war aims for each conflict in their list (which is similar to the civil war list used in Figure 1; their years span from 1944 to 2004) and added a separatist civil war indicator to the specifications in their Table 3, which includes a handful of control variables listed below in Table B.9. They run multinomial logit models and compare the outcomes "conventional tactics" and "symmetric non-conventional wars"—their third category of civil war aims, in which both the rebels and government are weak—to the basis category of irregular tactics. Here, I estimate standard logit models with conventional tactics equaling 1 on the dichotomous outcome variable and irregular tactics equaling 0, thus ignoring symmetric non-conventional wars. The unit of analysis in Table B.9 is civil wars. The table shows that separatist civil wars covary negatively and significantly with conventional tactics—indicating that separatism and irregular tactics tend to coincide. Using a multinomial logit model that additionally compares symmetric non-conventional wars to the basis category of irregular wars (not shown) yields a null correlation for separatist civil wars, as should be expected because both symmetric non-conventional wars and irregular wars involve guerrilla tactics.

Table B.9: Adding Separatist Aims Indicator to Kalyvas and Balcells (2010)

	DV: Civil war fought with conventional tactics					
	(1)	(2)	(3)	(4)	(5)	(6)
Separatist aims	-1.147**	-1.574***	-1.457***	-1.398**	-1.598***	-1.636***
	(0.498)	(0.525)	(0.510)	(0.568)	(0.569)	(0.589)
Rough terrain	0.00306	0.00224	0.00710	0.00184	0.00210	0.00271
	(0.00750)	(0.00383)	(0.00910)	(0.00383)	(0.00348)	(0.00567)
Ethnic war	0.596	0.746	0.135	0.491	0.612	0.125
	(0.493)	(0.477)	(0.540)	(0.510)	(0.496)	(0.555)
GDP/capita	0.104	0.0227	0.347**	0.113	0.0930	0.271
	(0.154)	(0.162)	(0.157)	(0.169)	(0.174)	(0.172)
Post-1990	1.381***			0.947*		
	(0.512)			(0.539)		
New post-communist country		3.255***			1.871	
		(1.211)			(1.394)	
Marxist rebels			-1.873***			-1.499**
			(0.593)			(0.591)
Military personnel				9.12e-05	6.22e-05	4.56e-05
				(0.000192)	(0.000193)	(0.000195)
# of civil wars	120	120	120	108	108	108

Notes: Table B.9 summarizes a series of logit models in which the dependent variable equals 1 if the civil war is fought using conventional tactics and 0 if fought with irregular tactics. The unit of analysis is civil wars, and the sample is all civil wars in Kalyvas and Balcells's (2010) dataset between 1944 and 2004, except symmetric non-conventional wars. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

B.5 Are Civil War Aims Endogenous to Oil Production?

Table 1 provides suggestive evidence that another possible cause of the heterogeneous oil-conflict relationship—regional oil causes groups to substitute separatist for center-seeking civil wars—is empirically unlikely. In the model, a challenger with identical probabilities of winning a center-seeking and a separatist civil war would prefer to seek the center because that strategy may yield the government's endowment in addition to all production from the challenger's region. An alternative reasonable setup is to assume that if the challenger takes the center, then it will have to share some percentage of revenues from its region with other groups in the country after coming to power, whereas this will not be true for separating. Specifically, assume a victorious center-seeking challenger keeps $\sigma \in [0, 1]$ percent of total revenues. It is now possible that for large enough regional oil, the challenger will strictly prefer separatist to center-seeking civil wars. Formally, this is true if $\tau_C > \frac{p_c(r^*)\cdot\sigma\cdot\tau_G}{p_s(r^*)-p_c(r^*)\cdot\sigma}$.

A different mechanism for generating the same argument is that civil war aims can be endogenous to government strength, which is relevant because oil enables greater revenues to spend on the military. A group might seek the center if facing a weak government, but instead fights to separate against a strong state because of the logic of Assumption 3. If this is true, then oil production could in fact raise incentives for both separatist and center-seeking civil wars relative to peace, but empirically we observe separatist civil wars because of this substitution effect. Although the logic of this argument is consistent with the present theory, if generally true, it does highlight difficult issues about empirically studying both types of civil war relative to the baseline category of peace.

However, examining the national population shares of oil-rich groups that have fought separatist civil wars suggests that they were unlikely to have sought the center in the absence of oil wealth. Of the 15 wars in Table 1, only six have been fought by groups with at least 10% of their national population share, and all but one are below the rough threshold in Figure 4 of 30% below which groups are more likely to secede than to seek the center. Furthermore, anecdotal considerations about the three largest groups in Table 1 suggest that center-seeking was not a viable option—or, at least, secession had historical precedent. In addition to Yemen's southerners, discussed in the text, Nigeria's southeast region (Igbo) was governed as a separate territory from the north (who controlled the state at independence) for much of the colonial era, and Mosul (Kurds) composed a separate Ottoman province from Baghdad prior to British colonization and creation of Iraq. Also important for limiting the possibility of seeking the center, Igbo had recently been purged from inclusion in the central government in Nigeria after a military counter-coup led by northerners in 1966, and the historical difficulty that Iraq's Kurds faced organizing politically suggests the relative ease of fighting in the mountains rather than organizing an attack on the capital—especially given Baghdad's oil wealth derived from southern Iraq.

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