Strategic Civil War Aims and the Resource Curse

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Abstract

Rebel groups differ in their civil war aims, sometimes fighting to capture the central government and sometimes to secede. However, existing theories do not incorporate strategic civil war aims. This impedes explaining empirical patterns such as the mixed oil-conflict curse: oil wealth correlates positively with separatist civil war onset but negatively with civil wars to capture the central government. I develop a formal model with endogenous rebellion aims. Modes of production with a low-valued economic exit option (e.g., oil) exhibit a conflict-suppressing revenue effect and a conflict-inducing predation effect. The predation effect is larger in magnitude for regional ethnic challengers that prefer separatist over center-seeking aims, for two reasons. First, an ethnic minorities selection mechanism: governments face more severe commitment problems toward small ethnic groups—who prefer separatist over center-seeking civil war. Second, a geography of rebellion mechanism: oil-funded repression more effectively deters center-seeking challenges than peripheral insurgencies.

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

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Conventional conflict theories posit diverse 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 distinguishing rebellion aims, despite the empirical prevalence with which rebels pursue different war goals. Between 1946 and 2013, independent non-European countries experienced 74 major *center-seeking civil wars* in which rebel groups aimed 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* that aimed to create an autonomous region or independent country. Amid the Angolan government's war with UNITA, the rebel group FLEC sought to gain independence for the Cabinda province and end Angola's "military occupation" (Cabinda Free State, n.d.).

Why do rebel groups sometimes fight for the center and sometimes to separate? How does their strategic interaction with the government affect this choice? Do conflict risk factors that induce center-seeking fighting differ from factors that encourage separatist insurgencies—given distinct rebellion goals? Although several important theories in the broader literature examine causes of separatist civil wars (Walter, 2009; Lacina, 2015) or rebel tactics (Kalyvas and Balcells, 2010; Bueno de Mesquita, 2013; Wright, 2017; Leventoglu and Metternich, 2018), leading theories do not address these crucial questions about civil war aims. These questions also highlight the importance of theorizing civil war aims for conducting empirical research. If a risk factor correlates with one type of civil war and not the other—or correlates in opposing directions for different conflict types—then aggregating civil wars can miss important relationships.

The much-debated relationship between oil production and civil war onset exemplifies why these considerations are important. Using various measures, samples, and research designs, there is no clear consensus on whether the aggregate relationship is positive (Fearon and Laitin, 2003; Collier and Hoeffler, 2004; Ross, 2012; Dube and Vargas, 2013; Lei and Michaels, 2014; Bell and Wolford, 2015) or null (Cotet and Tsui, 2013; Bazzi and Blattman, 2014). One possible reason for inconsistent results is that the consequences of oil production differ depending on civil war aims. Studies at the subnational level that disaggregate civil aims consistently find a *positive relationship between oil production on separatist civil war onset*, even when accounting for exogeneity in oil discovery (Sorens, 2011; Morelli and Rohner, 2015; Hunziker and

Cederman, 2017).[1] Cases like oil-rich Cabinda in Angola exemplify this pattern. However, in countries such as the Arabian Gulf monarchies, vast oil wealth has coincided with broad societal peace—the opposite of the conventional resource curse prediction. Among a global sample of countries, higher per capita oil production *negatively covaries with center-seeking civil war onset* (Paine, 2016).[2] In Appendix B, I show that these patterns, established across various articles, do not merely reflect differences in data sources and models. Using a common sample and dataset, I replicate the mixed oil-conflict pattern by showing a positive relationship between oil and separatist civil war onset (ethnic groups as unit of analysis) and negative relationship with center-seeking civil war onset (country units).

Existing theories do not convincingly explain the mixed oil-conflict pattern. Many do not distinguish rebellion aims. Typically, scholars propose mechanisms that anticipate either a conflict-enhancing or a conflict-reducing effect, but cannot explain why the dominant mechanism would differ based on civil war aims. Among mechanisms proposed to link oil production to *elevated* conflict prospects, perhaps the most convincing is that governments create redistributive grievances by heavily taxing oil-producing regions (Sorens 2011; Ross 2012, 155-6; Asal et al. 2016; Hunziker and Cederman 2017). Oil production is particularly easy for governments to tax not only because it is immobile, but also because oil is a capital-intensive, point-source resource (Le Billon, 2005, 34). Yet, even if this mechanism helps to explain frequent separatist civil wars in oil-rich regions, it cannot account for why oil-producing countries experience fewer center-seeking civil wars than oil-poor countries. Why are grievances over the distribution of resources not also severe for groups that would like to profit from oil production in the government's region—which they could obtain by capturing the center?

Other mechanisms link oil production to *lower* conflict prospects. Theories of authoritarian stability, sum-

[1]This characterization of existing empirical findings is consistent with Ross's (2015, 252) literature summary, although he does not distinguish civil war aims: "The cross-national correlation between oil and civil conflict remains contested. Yet studies that incorporate subnational data on the location of resource deposits consistently report a strong link between oil (and sometimes other minerals) and conflict onsets."

[2]Menaldo (2016) provides a broader anti-resource curse argument. The resource curse literature is too large to cite comprehensively, but contributions beyond civil war analyze outcomes such as democracy (Ross, 2001; Liou and Musgrave, 2014), accountability (Paler, 2013), corruption (Mahdavi, 2019), and state repression (Bell, Ritter and Wolford, 2017).

marized in Ross (2001), focus overwhelmingly on rentier effects that facilitate massive patronage distribution and coercion spending. Paine (2016) argues that this mechanism helps to explain the rarity of center-seeking civil wars in oil-rich countries. But why does greater spending on patronage and armament afforded by more oil revenues not also deter separatist civil wars? Other arguments on oil and state weakness are also unsatisfactory because they anticipate oil production raising *center-seeking*, but not separatist, civil war incentives (Buhaug, 2006)—the opposite of the prevailing empirical pattern.

A convincing general theory of civil war aims must address these types of questions, which is the goal of my paper. I develop a formal model in which a government with limited commitment ability bargains with a challenger that has outside options to fighting either a center-seeking or separatist civil war. I produce new insights by (1) analyzing endogenous civil war aims, (2) deriving countervailing effects of oil production on incentives for civil war, and (3) combining these two. First, the population size of the challenging group interacts with the government's strategically chosen military spending to affect the challenger's most-preferred civil war threat. Second, modes of economic production with high capital intensity and a fixed location (e.g., oil) exhibit a conflict-suppressing revenue effect and a conflict-inducing predation effect. Third, the predation effect is larger in magnitude for regional ethnic challengers that prefer separatist over center-seeking aims, for two reasons. (a) Ethnic minorities selection mechanism: governments face more severe commitment problems toward small ethnic groups—who prefer separatist over center-seeking civil war. (b) Geography of rebellion mechanism: oil-funded repression more effectively deters center-seeking challenges than peripheral insurgencies. The next section provides a non-technical overview of the key concepts and results, followed by the formal model. Suggestive empirical results show that the theory illuminates in which cases resources should "curse" prospects for peace, and the conclusion discusses applications of the general framework beyond the oil context.

Beyond providing a new and more nuanced understanding of the conflict resource curse, this paper offers a novel formal theoretical contribution by endogenizing civil war aims. Although the theoretical properties connecting commitment problems to conflict are well known, most existing formal studies assume that an actor has a single outside option to fight for a particular prize. This includes accruing territory from a neighboring country in models of international war (Fearon, 1995; Spaniel and Bils, 2018), capturing the central government in models of regime transitions (Acemoglu and Robinson, 2006; Meng, 2019) or civil war (Powell, 2012; Bell and Wolford, 2015), and fighting to separate (Gibilisco, 2020*a*; Esteban et al., 2018). Fearon (2004) discusses how key parameters in his model differ depending on exogenously specified rebellion aims, although rebels can choose only between accepting a bargaining offer and a single fighting option. Morelli and Rohner's (2015) model contains distinct types of civil war, but war can occur along the equilibrium path only because the *government* rather than rebel leaders may get to choose the rebels' war aims. In reality, it is unclear how a government can make a group pursue less-preferred aims, for example, forcing a fight for the center if the group would rather secede. By contrast, I allow the challenger to strategically choose its civil war aims, although government military spending influences the challenger's optimal choice.

1 Summary of Key Concepts and Findings

1.1 Bargaining Interaction

The model features two players, a government and a regionally based challenger, which are most naturally conceived as distinct ethnic groups. Economic production occurs in regions occupied by each player, although the government captures some (exogenously determined) output from the challenger's region as taxes, affected by the ease of hiding the economic activity from the government. Each player seeks to maximize its share of national output. Before the strategic interaction begins in period 1, an exogenous tax transfer occurs from the challenger's region to the government. The government's strategic choices are to allocate revenues to its military and offer transfers to the challenger; who can either accept, fight a center-seeking civil war, or fight a separatist civil war. There is a shadow of the future, but all the strategic moves occur in period 1. In future periods, political institutions that affect the government's ability to commit to low taxes and high transfers determine the distribution of spoils.

If we fix the government's military spending and the challenger's civil war aims, the mechanisms are standard for conflict bargaining models: the government chooses a transfer amount that holds the challenger down to its fighting reservation value, and, in equilibrium, fighting occurs only if the government has minimal ability to commit to low taxes and high transfers in the future. The new results arise from (1) analyzing endogenous civil war aims, (2) deriving countervailing effects of oil production on incentives for civil war, and (3) combining these two.

1.2 Strategic Civil War Aims

The challenger faces the following tradeoff. Although winning a center-seeking civil war delivers a larger prize (all the country's output), winning a separatist civil war may be more feasible. The government takes this into account when choosing military spending, which also influences the challenger's optimal civil war threat. In equilibrium, the challenger's preferred civil war aims depend on the size of the challenger: separatist if small, center-seeking if large, and indifferent if intermediate. Two key assumptions about the likelihood of center-seeking victory relative to separatist victory influence this result: (a) smaller challengers have a comparative advantage in separatist insurgencies, and (b) higher government military spending is more effective against center-seeking campaigns. These assumptions are generally important for understanding strategic civil war aims. I provide more detailed substantive support for each, discussing (a) here and (b) in Section 1.5.

The most natural conception of the challenger's endowed coercive capacity in the model is the size of its ethnic group.[3] Members of small ethnic groups face difficulties to mustering sufficient support against numerically superior government forces to win control of the government. By contrast, greater knowledge of terrain and local support may enable small rebel groups to survive protracted guerrilla wars in the periphery (Jenne, Saideman and Lowe, 2007). For example, Cabinda is an enclave province of Angola, which, historically, has created difficulties for the government to control the Cabindan Mayombe (Martin, 1977), and the Cabindan Mayombe's small size inhibits them from organizing an ethnic rebellion that could feasibly capture the capital city of Luanda.

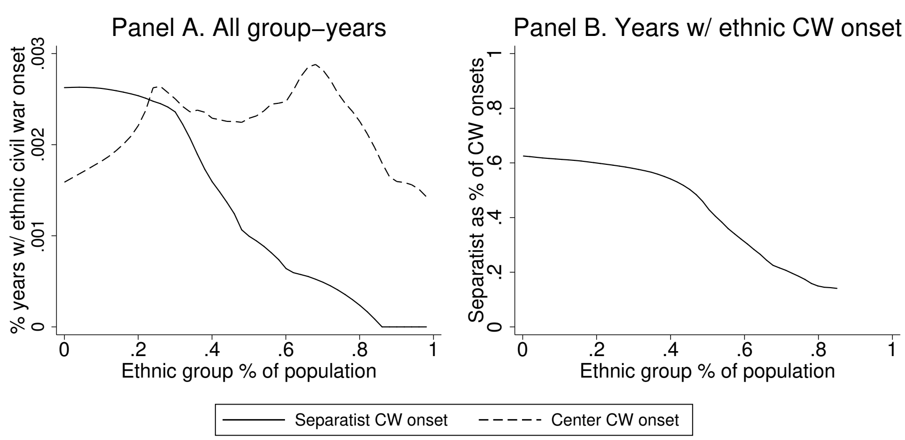
Figure 1 presents empirical patterns consistent with this assumption based on a broad global sample of ethnic groups (see Appendix B).[4] In Panel A, the unit of analysis is ethnic group-years. The vertical axis presents

[3] Although in principal the theoretical logic holds for any geographically segregated identity groups, in the real world, ethnic groups are more likely to provide the organizational basis for rebel groups—especially those that seek to separate—than groups organized by class or political ideology. Denny and Walter (2014) propose three main explanatory factors for the ethnicity-conflict nexus: grievances, opportunity, and likelihood of bargaining breakdown.

[4] Surprisingly, existing research pays little attention to the relationship between group size and civil war aims. Instead, scholars usually aggregate all civil wars, e.g., demonstrating that larger ethnic groups positively covary with *any* type of civil war onset (Buhaug et al. 2008, 544; Cederman et al. 2013, 73).

the frequency of ethnic civil war onset, disaggregating wars into center-seeking and separatist. Panel B restricts the sample to group-years with ethnic civil war onset, and the vertical axis indicates whether the new civil war is separatist. In each, the horizontal axis is the ethnic group's percentage of the country's population. Panel A demonstrates a clear trend of separatist civil war propensity decreasing in ethnic group size. The overall pattern for small-enough groups (roughly, 75% of the population or less) is that center-seeking civil war frequency increases in group size. Correspondingly, at a threshold of around 25% 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. In this sample, only two ethnic majority groups fought separatist civil wars: Bengali in Pakistan in 1971, and Southerners in Yemen in 1994.

Figure 1: Ethnic Group Size and Civil War Aims



Notes: Figure 1 summarizes the relationship between ethnic group percentage of the population and ethnic civil war onset (disaggregated by civil war aims) with local polynomial curves. Appendix B provides additional data details on the full sample used in Panel A, and the sample in Panel B contains only group-years with an ethnic civil war onset.

1.3 Effects of Oil Production

Oil production generates countervailing pressures for either type of civil war to occur in equilibrium. The ability of real-world governments to extract taxes varies across economic activities. Distinguishing features of oil production are its fixed location and high capital intensity, which enables governments to easily tax oil production. This *revenue effect* provides funds that the government can spend on the military and on transfers, which decreases incentives for the challenger to initiate either type of civil war. However, the easy-tax properties of oil production also create a *predation effects* that heighten the challenger's desire to rebel—either to eliminate predatory government taxation of its oil production or to predate oil produced in the government's region.

The following motivates assuming that oil production facilitates easy government taxation. Oil is a point-source resource because it is "exploited in small areas by a small number of capital-intensive operators" (Le Billon, 2005, 34). Ross (2012, 46) shows the capital-to-labor ratio in the oil and gas industry exceeds that in any other major industry for U.S. businesses operating overseas. Because governments can relatively easily enforce military control over oil fields—relative to output produced in a non-concentrated area—extracting this point-source resource requires minimal bureaucratic capacity (Dunning, 2008, 40). Nor, because oil fields are immobile, can local producers threaten to move their oil reserves outside the government's reach if taxed at unfavorable rates. Paine (2019*a*) compares oil production to other types of economic activities that producers can more easily hide from the government, concluding that the oil production facilitates a particularly low exit option for local producers.[5]

1.4 Mixed Oil Curse: Ethnic Minorities Selection Effect

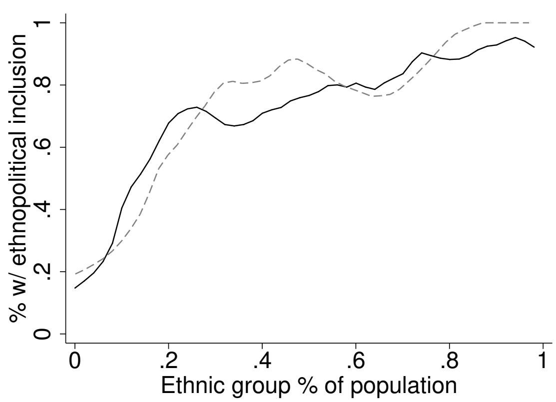
Combining endogenous rebellion aims with the countervailing oil mechanisms enables rephrasing the mixed oil-conflict relationship in terms of mechanisms. Why is the revenue effect larger in magnitude than the predation effect for challengers that prefer center-seeking aims, and vice versa for those that prefer secession? The first result highlights an ethnic minorities selection effect, which builds upon ideas in the voluminous literature on ethnicity and civil war. In the model, the government is less able to commit to low taxes and high transfers with small challengers, which raises the magnitude of the predation effect. Additionally, as discussed, small challengers prefer separatist to center-seeking civil wars. Thus, ethnic minorities are simultaneously less likely to be pacified by oil wealth and, conditional on fighting, more likely to secede. Existing research refers to this as the "redistributive grievances" effect of oil production, but the present analysis directly addresses why this should apply only to separatist civil wars.

Figure 2 presents an empirical pattern consistent with a key assumption behind this result: governments tend to exclude ethnic minority groups from positions of power. The sample of ethnic groups as well as

[5] Implicitly, this approach rejects arguments that rebel groups routinely access oil wealth to fund their insurgencies, which also explains why I model the challenger's armaments as an endowment rather than a strategic choice. Appendix Section D.2 discusses and argues against rebel finance theories.

the horizontal axis are the same as in Figure 1. Here, the vertical axis expresses the percentage of ethnic groups with political representation in the central government. Specifically, the Ethnic Power Relations dataset, described in Appendix B, codes politically relevant ethnic groups' decision-making authority within the central government based on who controls the presidency, cabinet positions, and senior posts in the administration. In Figure 2, group-years with a power access status of "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 demonstrates a positive relationship between ethnic group size and ethnopolitical inclusion.[6] The dashed gray curve shows a similar pattern among ethnic groups with a giant oil field in their territory. Substantively, these patterns likely stem from strategic concerns that large groups pose the greatest threats to overthrowing the government if excluded from power (Roessler and Ohls, 2018), and from historical advantages in which large ethnic groups were often organized as hierarchical states prior to the colonial era and, consequently, tended to dominate the post-colonial state (Paine, 2019*b*).

Figure 2: Group Size and Ethnopolitical Inclusion



Notes: Figure 2 summarizes the relationship between ethnic group percentage of the population and ethnopolitical inclusion with local polynomial functions. The black curve uses a broad global sample, 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.

1.5 Mixed Oil Curse: Geography of Rebellion Effect

The second implication from the model that helps to explain the mixed oil curse is a geography of rebellion effect. For effective governments, high military spending yields a low probability that challengers can

[6] Francois, Rainer and Trebbi (2015) and Wucherpfennig, Hunziker and Cederman (2016) demonstrate similar patterns within different country samples.

capture the center. However, when combating a separatist insurgency in the periphery, the same government will face greater impediments to efficiently translating its revenues into a low probability of the challenger winning a civil war. This enhances the predation effect for separatist civil wars relative to that for center-seeking civil wars.

The key assumption here concerns how geography affects the projection of state power, mentioned initially as point (b) in Section 1.2. 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 less effectively combat separatists in the periphery. Stated differently, 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 regimes with greater coercive strength tend to fight battles farther from the capital. Rebels stand a chance against strong regimes only 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.[7]

2 Model

This section sets up a general model of endogenous civil war aims. I introduce oil production later when I perform comparative statics exercises. Two actors, a governing group (G) and a challenger (C) with non-overlapping territorial locations, interact in an infinite-horizon game of complete information with time denoted by $t = 1, 2, \ldots$ Both players share a common exponential discount factor $\delta \in (0, 1)$. Total per-

[7]Analyzing data from Kalyvas and Balcells (2010) supports this contention. 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. Adding an indicator for separatist aims to their regressions yields a negative and statistically significant correlation between separatism and conventional conflicts, as opposed to irregular conflicts (result available upon request).

period economic production in each region equals 1.[8] Appendix Table A.1 summarizes notation.

2.1 Government's Choices in Period 1

In period 1, G has a revenue endowment of:

$$R \equiv 2 - e_G - e_C. \tag{1}$$

This equals total economic production in the country minus revenues lost from the "economic exit option" by (unmodeled) producers in each region. That is, different types of economic production vary in how easy they are for the government to capture. Economic activities that are easier to either hide from the government or for which actors have a viable flee option correspond with a higher value of e_i, for $i \in \{G, C\}$, which detracts from G's revenue endowment. Throughout, upper-case subscripts refer to the actors.

G allocates its revenues among military spending $m_G \geq 0$ and patronage transfers $x \geq 0$, jointly subject to the budget constraint, $m_G + x \leq R$. I omit time subscripts because G makes these choices only in period 1. This choice set 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 agency, and other repressive apparatuses. The patronage transfer captures a general decision to provide benefits such as private transfers, welfare policies, public sector job provision.

2.2 Challenger's Choices in Period 1

C decides among accepting G's offer, fighting a center-seeking civil war, and fighting to separate. If C fights in period 1, then its probability of winning depends on its chosen civil war aims: $\mu \in \{0, 1\}$ equals 1 if C chooses center-seeking aims and 0 if C chooses separatist aims. C wins a center-seeking civil war with probability $p_c(m_G, m_C) \in (0, 1)$ and a separatist civil war with probability $p_s(m_G, m_C) \in (0, 1)$. These are smooth functions indexed as $p_j(\cdot)$, for $j \in \{c, s\}$. Throughout, lower-case subscripts refer to civil war aims. The exogenous parameter $m_C > 0$ is C's coercive endowment, which I will primarily conceive as the population of C's identity group. Both functions strictly decrease in m_G and strictly increase in m_C: $\frac{\partial p_j}{\partial m_G} < 0$ and $\frac{\partial p_j}{\partial m_C} > 0$.[9] The contest functions also exhibit strictly diminishing marginal effects in each

[8] Appendix Section C.1 extends the model to parameterize total production in each region.

[9] To generate interior optimal military spending amounts, I impose additional assumptions on $\frac{\partial p_j(0,m_C)}{\partial m_G}$ and $\frac{\partial p_j(R,m_C)}{\partial m_G}$, stated Appendix Equations A.2 and A.4.

input: $\frac{\partial^2 p_j}{\partial m_G^2} > 0$ and $\frac{\partial^2 p_j}{\partial m_C^2} < 0$.[10]

The next assumptions follow from the substantive motivation about ethnic group size (Section 1.2) and the geography of rebellion (Section 1.5). The magnitude of the effect of both inputs is greater for the center-seeking contest function, and hence the functions satisfy the strict monotone likelihood ratio property in both m_C and m_G:

$$\frac{\partial}{\partial m_G}\left[\frac{p_c(m_G, m_C)}{p_s(m_G, m_C)}\right] < 0 \text{ for all } m_C > 0 \qquad \text{and} \qquad \frac{\partial}{\partial m_C}\left[\frac{p_c(m_G, m_C)}{p_s(m_G, m_C)}\right] > 0 \text{ for all } m_G \geq 0 \quad (2)$$

Additionally, the likelihood ratios at boundary values of m_C satisfy:

$$\frac{p_c(m_G, 0)}{p_s(m_G, 0)} = 0 \qquad \text{and} \qquad \lim_{m_C \to \infty} \frac{p_c(m_G, m_C)}{p_s(m_G, m_C)} = 1 \quad (3)$$

The final parameter in the contest functions is not needed to solve the model, but facilitates the comparative statics exercise in Section 4.3. Assume that each unit of military spending yields $\beta \cdot m_G$ government military units in the contest function, for $\beta \geq 1$. Thus, with slight abuse of notation, we can equate m_G in the previous functions with $\beta \cdot m_G$. Two assumptions follow directly from the construction of this military efficiency parameter and from the previous assumptions. First, higher military efficiency more greatly affects the center-seeking contest function: $-\frac{\partial p_c}{\partial \beta} > -\frac{\partial p_s}{\partial \beta}$. Second, m_G and β are complements, i.e., $-\frac{\partial^2 p_j}{\partial m_G \partial \beta} > 0$.

For example, the following functions satisfy all these assumptions:[11]

$$p_c(m_G, m_C) = \frac{m_C}{m_C + m_0 + \beta \cdot m_G}$$

$$p_s(m_G, m_C) = \frac{m_0 + \beta \cdot m_G}{m_C + m_0 + \beta \cdot m_G} \cdot p_0 + \frac{m_C}{m_C + m_0 + \beta \cdot m_G} \quad (4)$$

For center-seeking, this is a ratio-form contest function with an intercept term, $m_0 > 0$, for G's military

[10]Some results require steep-enough diminishing marginal returns on military spending (see Appendix Equations A.6, A.8, A.13, and A.14).

[11]Only $\frac{\partial^2 p_j}{\partial m_G \partial \beta} < 0$ does not hold for all parameter values, although I verify that it holds for the parameter ranges shown in Figure 6, which takes comparative statics on β.

strength. The separatist function is similar, except there is a lower bound on C's probability of winning, $p_0 \in (0,1)$.[12]

2.3 Payoffs in Period 1

Peaceful bargaining in period 1 yields contemporaneous consumption $R - x - m_G$ for G and $1 - e_C + x$ for C, and the status quo regime remains intact in periods $t \geq 2$ with future continuation values described below. If C initiates a civil war, then each player consumes economic production from its region; and in addition to the sunk cost m_G, G also pays $d > 0$ in period 1, which captures the destructiveness of fighting.[13] However, a war in period 1 does not impose costs in future periods. If C launches a war and it fails, then the status quo regime remains intact in $t \geq 2$. By contrast, success in either type of war yields future continuation values described below. Figure 3 summarizes strategic actions in period 1.

2.4 Payoffs in Future Periods

No strategic moves occur in any period $t \geq 2$. The status quo regime remains intact if either C accepts G's offer in period 1 offer or C launches but loses a war. C's and G's respective per-period future continuation values are $(1-\delta) \cdot V^C_{\text{s.q.}}$ and $(1-\delta) \cdot V^G_{\text{s.q.}}$, and multiplication by $1-\delta$ denotes the per-period average. Although C cannot fight in future periods, a political commitment parameter $\theta \in [0,1]$ dictates how much G transfers to C and constrains how much revenue G takes from C's region.[14] High commitment ability corresponds with real-world cases in which members of an outsider faction hold important cabinet positions or have membership in a powerful political party. For reasons motivated in Section 1.4, θ strictly increases in m_C, although this plays no role in the analysis until the comparative statics exercise in Section 4.2.

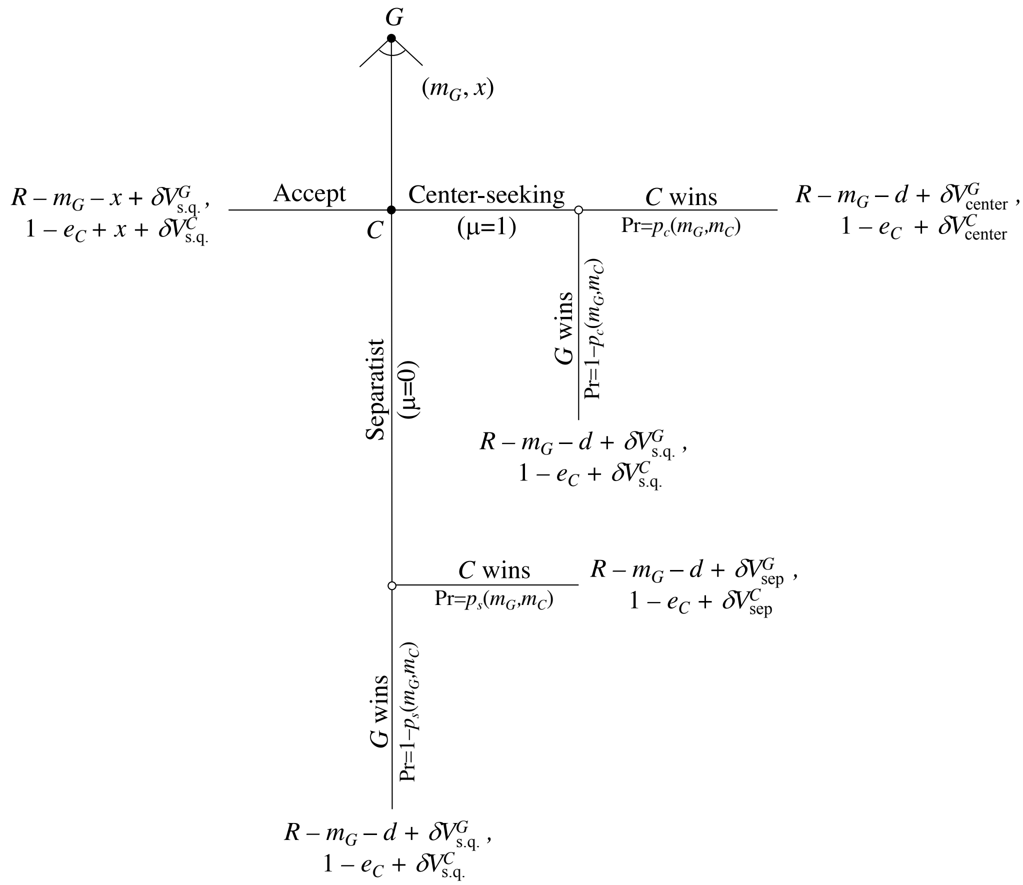
Specifically, G transfers θ percent of revenues from its region in each period, $\theta \cdot \big(1 - e_G\big)$. C retains not only the e_C percent of its production it can protect through its economic exit option, but also θ percent of its remaining production that the government would otherwise seize. Thus, if the status quo regime remains intact, in each future period G and C respectively consume:

[12] These two additional parameters appear only in these example functional forms.

[13] The results are qualitatively identical if C also pays a cost of fighting, although this necessitates an additional assumption that δ is high enough. Otherwise, C would lack a credible threat to fight, generating a trivial strategic interaction.

[14] Besley and Persson (2011) use a similar approach to modeling exogenous political institutions.

Figure 3: Strategic Actions in Period 1



$$(1-\delta)\cdot V^G_{\text{s.q.}} = \underbrace{\big(1-\theta\big)\cdot\big(1-e_G\big)}_{\text{Non-transferred w/in region revenues}} + \underbrace{\big(1-\theta\big)\cdot\big(1-e_C\big)}_{\text{Revenue from } C} = (1-\theta)\cdot(2-e_G-e_C) \qquad (5)$$

$$(1-\delta)\cdot V^C_{\text{s.q.}} = \underbrace{e_C + \theta\cdot(1-e_C)}_{C\text{'s retained income}} + \underbrace{\theta\cdot\big(1-e_G\big)}_{\text{Transfers from } G} = e_C + \theta\cdot(2-e_G-e_C) \qquad (6)$$

By construction, θ and e_C substitute for each other. This captures the intuition that a challenger with an ineffective economic exit option can still constrain government taxation given political representation in the central government, and that a viable economic exit option guards against government exploitation for groups that lack effective political representation. Perfect commitment ability ($\theta = 1$) and a perfect exit option ($e_C = 1$) are individually sufficient for G to not extract any revenues from C, whereas no commitment ability ($\theta = 0$) and no exit option ($e_C = 0$) are individually necessary and jointly sufficient for G to predate all of C's production in every future period.

Following a successful center-seeking civil war, in each period C consumes all production in its region (which equals 1) and all revenues from G's region, $1 - e_G$; and G consumes 0:

$$(1 - \delta) \cdot V^G_{\text{center}} = 0 \tag{7}$$

$$(1 - \delta) \cdot V^C_{\text{center}} = 2 - e_G \tag{8}$$

Following successful secession, C consumes all its regional production, but G retains all revenues from the "central" region:

$$(1 - \delta) \cdot V^G_{\text{sep}} = 1 - e_G \tag{9}$$

$$(1 - \delta) \cdot V^C_{\text{sep}} = 1 \tag{10}$$

2.5 Why Model an Infinite Horizon?

An important simplifying assumption is that C can initiate a war only in the first period. Although the strategic interaction ends after period 1, C's per-period consumption in future periods determines C's optimal civil war aims and whether the players will peacefully bargain in period 1. Modeling a shadow of the future is necessary to generate a key rationale for war studied in existing models: shifts in power over time coupled with limited commitment ability cause costly fighting in equilibrium. In the present model, the possibility of equilibrium bargaining failure arises because C loses its ability to fight after period 1, which creates incentives for C to initiate a civil war before the adverse power shift occurs.

Modeling a one-time shift in power eliminates technical difficulties from modeling G's arming decision in every period, which would distract from the main substantive focus. By contrast, the distribution of power is exogenous in most existing models, so I simplify on one dimension in order to incorporate endogenous arming.[15] Although reduced form, the simple way that I model a shadow of the future is sufficient to generate the key tradeoffs (for example, Fearon's 1995, 404-408 canonical model with dynamic commitment inability also exhibits a one-time shift in power after period 1). In fact, it is the limiting case of a model in which, during every period of an infinite horizon, there is a positive probability that C can challenge the government (for example, Acemoglu and Robinson's 2006 model of political regime transitions, which does not contain

[15] Paine (2016) details some technical issues that arise with modeling persistent shifting and endogenous arming over an infinite horizon.

endogenous arming). This would not be true if my model contained a finite number of periods, which motivates modeling an infinite number of periods without strategic moves.[16]

3 Equilibrium Analysis

I solve backward on the period 1 subgame to characterize the unique subgame perfect Nash equilibrium. I examine conditions in which C accepts G's offer along the equilibrium path of play, denoted as a peaceful equilibrium. Appendix A proves every formal statement.

3.1 Challenger's Preferred Civil War Aims

In period 1, C compares its expected utility from accepting x to fighting either for the center or to separate. We first need to assess its preferred outside option, a novel consideration in this model. C's expected utility to fighting each type of civil war is:

$$\mathbb{E}\big[U_C(\text{center})\big] = 1 - e_C + \delta \cdot p_c(m_G) \cdot \Big(V^C_{\text{center}} - V^C_{\text{s.q.}}\Big) \tag{11}$$

$$\mathbb{E}\big[U_C(\text{separatist})\big] = 1 - e_C + \delta \cdot p_s(m_G) \cdot \Big(V^C_{\text{sep}} - V^C_{\text{s.q.}}\Big), \tag{12}$$

for:[17]

$$V^C_{\text{center}} - V^C_{\text{s.q.}} = (1-\theta)\cdot(2 - e_G - e_C) > 0 \tag{13}$$

$$V^C_{\text{sep}} - V^C_{\text{s.q.}} = \underbrace{(1-\theta)\cdot(1-e_C)}_{\text{Secession eliminates taxes}} - \underbrace{\theta\cdot(1-e_G)}_{\text{Secession eliminates central transfers}} \tag{14}$$

To focus on substantively interesting parameter ranges, I assume that G's commitment ability is not so high that C lacks a viable threat to secede (which is possible because seceding eliminates transfers it would receive from the center under the status quo regime), i.e., Equation 14 is strictly positive.

[16] Alternatively, I could model strategically trivial moves in future periods; the only consequential assumption for periods $t \geq 2$ is that C wins either type of war with probability 0. Given this assumption, even if in every period both actors faced the same strategic options as in period 1, C would accept any offer and G would optimally set $m_t = 0$ and $x_t = \theta \cdot \big(1 - e_G\big)$ (assuming this is lower bound for transfers), yielding the same equilibrium outcomes as assumed here.

[17] See Equations 6, 8, and 10.

Assumption 1 (Credible separatist threat)**.**

$$\theta < \frac{1 - e_C}{2 - e_G - e_C} \in (0, 1)$$

Conditional on winning, C prefers to take the center, i.e., $V^C_{\text{center}} > V^C_{\text{sep}}$. Successful secession enables C to retain all future economic production in its region, but a successful center-seeking civil war carries the additional benefit for C of capturing all future taxable output from G's region.[18] Despite this additional benefit, if $p_s(m_G, m_C)$ sufficiently exceeds $p_c(m_G, m_C)$, then C's binding fighting threat is separatist. Comparing Equations 11 and 12 enables solving for C's preferred outside option, given G's military spending m_G:

$$\mu^*(m_G) = \begin{cases} 0 & \text{if} \quad \frac{p_c(m_G,m_C)}{p_s(m_G,m_C)} < \pi_s \\ \{0,1\} & \text{if} \quad \frac{p_c(m_G,m_C)}{p_s(m_G,m_C)} = \pi_s \\ 1 & \text{if} \quad \frac{p_c(m_G,m_C)}{p_s(m_G,m_C)} > \pi_s, \end{cases} \tag{15}$$

where $\pi_s \equiv \frac{(1-\theta)\cdot(1-e_C)-\theta\cdot(1-e_G)}{(1-\theta)\cdot(2-e_G-e_C)} < 1$ is the ratio of spoils that C wins from seceding rather than capturing the center.

Lemma 1 demonstrates that m_C and m_G determine the binding civil war constraint. The logic follows directly from the assumptions about likelihood ratios stated in Equations 2 and 3. Higher m_C raises $\frac{p_c(m_G,m_C)}{p_s(m_G,m_C)}$, which pushes C toward center-seeking over secession. Higher m_G decreases $\frac{p_c(m_G,m_C)}{p_s(m_G,m_C)}$, which deters C from fighting for the center. Combining these assumptions generates two regions in which C's preferred outside option is independent of G's actions—separatist if m_C is small (part a) and center-seeking if m_C is large (part c)—and an intermediate region of m_C values in which G's military spending influences the type of civil war that C prefers: center-seeking if m_G is low and separatist if m_G is high (part b).

[18] Appendix Section C.3 changes the setup so that C may strictly prefer to win a separatist rather than center-seeking civil war. In the revised setup, if C captures the center, then in future periods it shares spoils with the former governing actor.

Lemma 1 (Optimal civil war aims)**.** *There exist unique threshold values $\overline{m}_C \in \mathbb{R}_{++}$, $\underline{m}_C \in \big(0, \overline{m}_C\big)$, and $\hat{m}_G(m_C) \in (0, R)$ such that:*

Part a. *If $m_C < \underline{m}_C$, then $\mu^*(m_G) = 0$ for all $m_G \geq 0$.*

Part b. *If $m_C \in (\underline{m}_C, \overline{m}_C)$, then:*

- *If $m_G < \hat{m}_G(m_C)$, then $\mu^*(m_G) = 1$*
- *If $m_G > \hat{m}_G(m_C)$, then $\mu^*(m_G) = 0$*
- *$\hat{m}_G(m_C)$ strictly increases in m_C.*

Part c. *If $m_C > \overline{m}_C$, then $\mu^*(m_G) = 1$ for all $m_G \leq R$.* *[Go to proof]*

3.2 Challenger: Accept or Fight?

C compares its most-preferred civil war to its expected utility from accepting x:

$$\mathbb{E}\big[U_C(\text{accept})\big] = 1 - e_C + x + \delta \cdot V^C_{\text{s.q.}} \tag{16}$$

For fixed m_G, which also fixes C's preferred civil war aims (Lemma 1), the solution for C's optimal accept/fight response is standard for conflict bargaining models. C will accept if G's period 1 transfer yields lifetime expected utility at least as high as C would obtain from initiating its preferred type of civil war. C does not receive a transfer in period 1 if it fights. However, fighting increases C's expected utility for all $t \geq 2$ by creating the possibility of dictating policy in the future (and because of Assumption 1). C accepts if and only if $x \geq x^*(m_G)$, for:

$$x^*(m_G) \equiv \frac{\delta}{1-\delta} \cdot \Bigg\{ \mu^*(m_G) \cdot \underbrace{p_c(m_G) \cdot (1-\theta) \cdot (2 - e_G - e_C)}_{\text{Center-seeking}} + \big[1 - \mu^*(m_G)\big] \cdot \underbrace{p_s(m_G) \cdot \Big[(1-\theta) \cdot (1 - e_C) - \theta \cdot (1 - e_G)\Big]}_{\text{Separatist}} \Bigg\} \tag{17}$$

3.3 Government's Strategic Choices

G chooses x and m_G in period 1 to maximize its lifetime expected utility. For fixed m_G, a necessary condition is that x satisfies Equation 17 with equality, a standard condition in conflict bargaining models.

By contrast, strictly satisfying the inequality would entail transferring more than needed to buy peace, and below I discuss why G always prevents war if possible.

Military investment decreases C's probability of winning, yielding a direct effect that lowers C's reservation value, $x^*(m_G)$. If we fix C's preferred outside option, then G faces a straightforward optimization problem to maximize its lifetime expected utility, which is equivalent to minimizing expenditures in period 1. However, m_G also *indirectly* affects G's utility by influencing C's preferred civil war aims (see part b of Lemma 1), a novel component of my model. Equation 18 presents G's maximization problem (assuming it is possible to buy off C), which incorporates both effects. This optimization problem yields a unique optimal arming amount for each value of C's group size.[19]

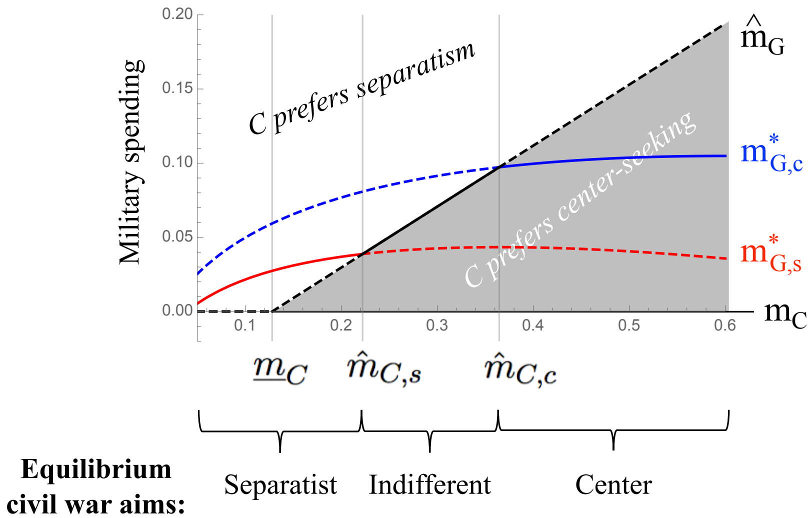
$$m_G^* \equiv \arg\max \Bigg\{ \underbrace{\max_{m_G \in [0, \hat{m}_G(m_C)]} R - m_G - x^*(\mu = 1, m_G) + \delta \cdot V_{\text{s.q.}}^G,}_{\text{Optimal arming against center-seeking constraint, } \mu=1} \\ \underbrace{\max_{m_G \geq \hat{m}_G(m_C)} R - m_G - x^*(\mu = 0, m_G) + \delta \cdot V_{\text{s.q.}}^G}_{\text{Optimal arming against separatist constraint, } \mu=0} \Bigg\} \tag{18}$$

In equilibrium, C's binding civil war threat is separatist if m_C is small, center-seeking if m_C is large, and C is indifferent if m_C is intermediate. Figure 4 visualizes the intuition, and the appendix provides supporting technical details.[20] It plots three military spending amounts as a function of m_C. The black line is $\hat{m}_G$, which Lemma 1 introduced as the military spending amount that makes C indifferent between civil war aims. The blue curve, $m_{G,c}^*$, is the optimal interior military spending amount if C's civil war aims are fixed at center-seeking (the unconstrained solution for the first term in Equation 18; see Appendix Lemma A.1). The red curve, $m_{G,s}^*$, is the equivalent term if C's civil war aims are fixed at separatism (the second term in Equation 18). Each curve is solid for parameter values at which it equals the equilibrium amount of military spending, and dashed otherwise. If (m_C, m_G) lies in the gray region, then C prefers center-seeking to separatist civil war, and vice versa in the white region.

[19] Regarding the inclusive $\hat{m}_G$ boundary for the two minimization problems, combining Equation 15 and Lemma 1 shows that $\mu^*(\hat{m}_G) \in \{0, 1\}$. C's indifference over its civil war aims at $\hat{m}_G$ implies that G's expenditures $\hat{m}_G + x^*(\mu, \hat{m}_G)$ are constant in $\mu \in [0, 1]$.

[20] Appendix Figure A.1 depicts the equilibrium offer and budget surplus for these parameter values.

Figure 4: Equilibrium Military Spending



Notes: Figure 4 uses the functional forms for the contest functions from Equation 4 and the following parameter values: $\theta = 0.3$, $e_C = 0.5$, $e_G = 0.9$, $\delta = 0.6$, $\beta = 3.8$, $m_0 = 0.2$, and $p_0 = 0.2$. For these parameter values, $\overline{m}_C = 1.22$ (not depicted).

For $m_C < \underline{m}_C$ or $m_C > \overline{m}_C$, the optimization problem is straightforward because m_G does not affect C's preferred outside option (Lemma 1). However, for $m_C \in (\underline{m}_C, \overline{m}_C)$, G considers how m_G affects C's preferred outside option. If $m_C > \underline{m}_C$ but is "close" to $\underline{m}_C$, then C prefers separatism at $m_G = m^*_{G,s}$. Hence, G spends $m^*_{G,s}$ and C's equilibrium civil war threat is separatist. The figure shows that for any $m_C < \hat{m}_{C,s}$ (see Appendix Lemma A.2), the red curve lies above the black line in the white region, where C prefers separatist.

Conversely, if $m_C < \overline{m}_C$ but is "close" to $\overline{m}_C$, then C prefers center-seeking at $m_G = m^*_{G,c}$. Hence, G spends $m^*_{G,c}$ and C's equilibrium civil war threat is center-seeking. The figure shows that for any $m_C > \hat{m}_{C,c}$ (see Appendix Lemma A.2), the blue curve lies below the black line in the gray region, where C prefers center-seeking.

Finally, in the intermediate region $m_C \in (\hat{m}_{C,s}, \hat{m}_{C,c})$, G optimally chooses $m_G = \hat{m}_G$. Here, $m^*_{G,s}$ is low enough that C prefers center-seeking at this level of m_G (red curve is below black line), and $m^*_{G,c}$ is high enough that C prefers separatist at this level of m_G (blue curve is above black line). Thus, G wants the minimum level of m_G that induces C to prefer separatist—or, equivalently, the maximum level of m_G that induces C to prefer center-seeking. This is $\hat{m}_G$, which makes C indifferent between civil war aims.

We also need to ensure that G prefers to induce peace, if possible. Comparing Equations 5 and 7 shows clearly that G is better off in the status quo than from losing a center-seeking civil war. Given Assumption

1, comparing Equations 5 and 9 shows the same for separatism. There is no "costly peace" motivation to fight in the present to prevent more armament costs in the future since G does not arm in periods $t \geq 2$. The final possibility to rule out is a contemporaneous costly peace motivation for war: even if a solution exists to Equation 18, could G prefer to spend a small amount on the military and face a war in period 1—rather than arm to the teeth to induce peace? The appendix shows that if C will not accept G's offer, then G's armament problem is an affine transformation of Equation 18, implying that G's choice of m_G is unchanged. Hence, the costs of war, $d > 0$, are sufficient to induce G to choose a pair (m_G, x) that induces peace, if possible.

3.4 EQUILIBRIUM

Despite G's *desire* to facilitate a peaceful bargain, war occurs in equilibrium if the amount needed to spend to buy off C exceeds G's budget. In equilibrium, peaceful bargaining is possible only if the period 1 budget constraint is satisfied in equilibrium, $B^* > 0$, for:

$$B^* \equiv R - m_G^* - x^*(m_G^*), \tag{19}$$

with R defined in Equation 1; m_G^* defined in Equation 18; and $x^*(m_G)$ defined in Equation 17. The possibility that C will initiate a civil war along the equilibrium path arises because of G's limited commitment to transfers and tax concessions in future periods when C cannot fight. To see that low θ is necessary for equilibrium fighting, if instead $\theta = 1$, then C ays no taxes and receives maximum transfers in every future period in the status quo regime—identical to a successful center-seeking civil war. Additionally, $m_G^* = 0$, and Equation 19 reduces to $2 - e_G + \frac{\delta}{1-\delta} \cdot (1 - \mu^*) \cdot p_s(0) \cdot (1 - e_G) > 0$. By contrast, if $\theta < 1$, then Equation 19 may be violated. Proposition 1 characterizes the subgame perfect Nash equilibrium strategy profile, which is unique with respect to payoff equivalence.

Proposition 1 (Equilibrium strategy profile)**.**

Part a. *If $B^* > 0$, then C accepts any $x \geq x^*(m_G)$. If $x < x^*(m_G)$, then C does not accept and Lemma 1 characterizes C's optimal war aims as a function of m_G. There exist unique thresholds $\hat{m}_{C,s}$ and $\hat{m}_{C,c}$ satisfying $\underline{m}_C < \hat{m}_{C,s} < \hat{m}_{C,c} < \overline{m}_C$, for $\underline{m}_C$ and $\overline{m}_C$ defined in Lemma 1, such that:*

- *If $m_C < \hat{m}_{C,s}$, then G chooses $(m_G, x) = \big(m^*_{G,s}, x^*(m^*_{G,s})\big)$, and C accepts on the equilibrium path.*
- *If $m_C \in \big(\hat{m}_{C,s}, \hat{m}_{C,c}\big)$, then G chooses $(m_G, x) = \big(\hat{m}_G, x^*(\hat{m}_G)\big)$, and C accepts on the equilibrium path.*
- *If $m_C > \hat{m}_{C,c}$, then G chooses $(m_G, x) = \big(m^*_{G,c}, x^*(m^*_{G,c})\big)$, and C accepts on the equilibrium path.*

Part b. *If $B^* < 0$, then C does not accept any offer, and Lemma 1 characterizes C's optimal war aims as a function of m_G.*

- *If $m_C < \hat{m}_{C,s}$, then G chooses $m_G = m^*_{G,s}$ and is indifferent among all $x \in \big[0, R - m^*_{G,s}\big]$. C fights a separatist civil war on the equilibrium path, $\mu^* = 0$.*
- *If $m_C \in \big(\hat{m}_{C,s}, \hat{m}_{C,c}\big)$, then G chooses $m_G = \hat{m}_G$ and is indifferent among all $x \in \big[0, R - \hat{m}_G\big]$. C fights a civil war but is indifferent among war aims, $\mu^* \in \{0, 1\}$.*
- *If $m_C > \hat{m}_{C,c}$, then G chooses $m_G = m^*_{G,c}$ and is indifferent among all $x \in \big[0, R - m^*_{G,c}\big]$. C fights a center-seeking civil war on the equilibrium path, $\mu^* = 1$.* *[Go to proof]*

3.5 Comment about Indifference Region for Civil War Aims

One surprising implication of the model is the intermediate region of m_C values in which, in equilibrium, G chooses to make C indifferent between civil war aims. Thus, there is an equilibrium strategy profile in which C randomizes over civil war aims. Although mixing regions are sometimes dismissed as uninteresting technical impediments in models, they can carry important empirical implications (Gibilisco, 2020*b*). I mostly leave this as an open question for future research on strategic civil war aims, as below I focus only on parameter ranges in which G chooses an interior optimal military spending amount. However, empirically, there are two cases in my dataset in which the same rebel group switched aims during its rebellion, EPRDF in Ethiopia and SPLA in Sudan. Appendix Section C.2 discusses these cases in the context of a model extension with multiple war periods in which the rebel group can switch aims in between periods, although these cases are also consistent with predictions of equilibrium mixing.

4 UNRAVELING THE CONFLICT RESOURCE CURSE

The rest of the formal analysis generates implications about oil production in the context of endogenous civil war aims. For the remainder of the analysis, I assume that m_C lies in parameter ranges in which G chooses an interior optimal military spending amount, $m_C \in (0, \hat{m}_{C,s}] \cup [\hat{m}_{C,c}, \infty)$.

4.1 COUNTERVAILING EFFECTS OF OIL PRODUCTION

To introduce oil production into the model, assume that oil provides $O_i \in [0, 1)$ percent of total income in each region, for $i \in \{G, C\}$. Oil production is O_G in G's region ("government oil") and O_C in the region in which C resides ("regional oil"). Another new parameter, γ, indicates regions: $\gamma = 0$ for G's region and $\gamma = 1$ for C's region. As Section 1.3 discussed, the immobility and high capital intensity of oil production undermines (unmodeled) producers' ability to exit the formal economy in reaction to high taxes—which facilitates easy government taxation. I assume that increasing oil production lowers the economic exit option parameter: $\frac{de_i}{dO_i} < 0$.

An increase in oil production exerts two effects on B^* (see Equation 19). First, a *revenue effect*. Because oil enables greater tax revenues than other types of economic activities, an increase in either government or regional oil production raises G's available revenues to spend on transfers and coercion in period 1, which Equation 1 denotes as R. This increases the range of parameter values in which G has sufficient funds to offer to C to meet the budget constraint. Formally, this effect equals:

$$\textbf{Revenue effect: } \frac{dR}{dO_i} = -\frac{de_i}{dO_i} > 0 \tag{20}$$

Second, oil production creates a *predation effect* that increases C's incentives to fight. This is the top row in Equation 21, and captures C's incentives to predate government oil production and G's ability to predate regional oil production.[21] An increase in government oil production enhances the prize of capturing the center—in which case C consumes *all* revenues from G's region in future periods—relative to future transfers that C would receive in the status quo regime, which equal $1 - \theta$ percent of revenues from G's

[21]For all $m_C \in (0, \hat{m}_{C,s}] \cup [\hat{m}_{C,c}, \infty)$, applying the envelope theorem to compute $\frac{d}{dO_i}\left(m_G^* + x^*\right)$ yields the terms stated in Equation 21. The envelope theorem is applicable in this parameter range because G chooses an interior-optimal value of m_G.

region. An increase in regional oil production increases the value to C of winning either type of civil war relative to remaining in the status quo regime because a successful war enables C to consume *all* future production from its region. By contrast, it must give some of these revenues to G if the status quo regime remains—that is, oil enables G to predate C—and the magnitude of this taxation is scaled by $1 - \theta$. The predation effect works through G's expenditures $x^* + m_G^*$ because, by increasing C's consumption following a successful war relative to the status quo, oil production raises the minimum amount of government spending on carrots and sticks that satisfies the budget constraint in Equation 19.

Predation effect:

$$\frac{d}{dO_i}(m_G^* + x^*) = \frac{\delta}{1-\delta} \cdot \left(-\frac{de_i}{dO_i} \right) \cdot \begin{cases} (1-\theta) \cdot p_j(m_G^*) & \text{if } (1-\mu^*) \cdot (1-\gamma) = 0 \\ -\theta \cdot p_s(m_G^*) & \text{if } (1-\mu^*) \cdot (1-\gamma) = 1 \end{cases} \tag{21}$$

Equation 21 highlights that an increase in oil production exerts similar effects for most combinations of oil location and C's civil war aims: if the oil is produced in C's region and/or if C's civil war aims are center-seeking. However, the bottom row in Equation 21 highlights that if C's aims are separatist, then an increase in *government* oil does not exert a predation effect because winning a separatist war would not enable C to amass these additional revenues. Instead, if C aims to separate, then an increase in government oil strictly decreases C's incentives to fight: seceding would eliminate future transfers that C would receive under the status quo regime, which equal θ of revenues from G's region in each period.

Proposition 2 formalizes the countervailing effects from Equations 20 and 21. Higher B^* implies a narrower range of parameter values in which fighting will occur, hence decreasing equilibrium civil war prospects, with the converse for lower B^*.

Proposition 2 (Effect of oil production)**.** *An increase in oil production exerts both a revenue effect and a predation effect. Formally, for all $m_C \in (0, \hat{m}_{C,s}] \cup [\hat{m}_{C,c}, \infty)$, the overall effect of oil production on the equilibrium budget constraint in period 1 is:*

$$\frac{dB^*}{dO_i} = \underbrace{\frac{dR}{dO_i}}_{\text{Revenue effect}} - \underbrace{\frac{d}{dO_i}(m_G^* + x^*)}_{\text{Predation effect}},$$

for $i \in \{G, C\}$ and for the derivatives in Equations 20 and 21.

4.2 MIXED OIL CURSE: ETHNIC MINORITIES SELECTION EFFECT

Combining endogenous rebellion aims with the countervailing oil mechanisms enables rephrasing the mixed oil-conflict relationship. Why is the revenue effect larger in magnitude than the predation effect for challengers that prefer center-seeking aims, and vice versa for those that prefer secession? The first result highlights an ethnic minorities selection effect, which builds upon ideas in the voluminous literature on ethnicity and civil war. The model analysis explains why numerically small challengers (low m_C) prefer separatist to center-seeking civil wars. Additionally, drawing on the substantive material from Section 1.4, I assume that the government's ability to commit to low taxes and high transfers, θ, strictly increases in m_C, which raises the magnitude of the predation effect (Equation 21) for smaller challengers. Thus, ethnic minorities are simultaneously less likely to be pacified by oil wealth and, conditional on fighting, more likely to secede.

Formally, showing that θ positively affects $\frac{dB^*}{dO_i}$ (defined in Proposition 2) explains why oil production tends to exert a stronger conflict-inducing effect for challengers that prefer separatist aims (because they are small and θ is low) than those that prefer to seek the center. Proposition 3 evaluates comparative statics for the substantively interesting cases in which oil production generates a predation effect.[22] An increase in G's commitment parameter affects the magnitude of the oil effect in two ways. The direct effect decreases the magnitude of the predation effect (Equation 21) because, in future periods, G can commit to transfer more government oil to C and to tax regional oil at lower levels. Therefore, greater political representation decreases the extent to which C is worse off in the status quo regime relative to winning a fight, i.e., reducing grievances created by easily taxed oil revenue.

There is also a countervailing indirect substitution effect that increases the magnitude of the predation effect. The direct effect of higher θ decreases the marginal benefit of arming by reducing C's fighting threat, which lowers equilibrium military spending m_G^* (see Appendix Equations A.1 and A.3). This substitution effect increases C's equilibrium probability of winning, $\mu^* \cdot p_c(m_G^*) + (1 - \mu^*) \cdot p_s(m_G^*)$. However, assuming that the contest functions exhibit steep-enough diminishing marginal returns (see Appendix Equation A.13) implies that the direct effect outweighs the indirect effect in magnitude—oil production does not cause G to substitute so much from military investments to counteract the negative direct effect of higher θ on the predation effect.

[22] If C's aims are separatist, then increasing O_G does not create a predation effect (see Equation 21).

Proposition 3 (Ethnic minorities selection effect mechanism)**.** *If* $(1-\mu^*)\cdot(1-\gamma)=0$*, then for* $i\in\{G,C\}$ *and* $\frac{dB^*}{dO_i}$ *defined in Proposition 2:*

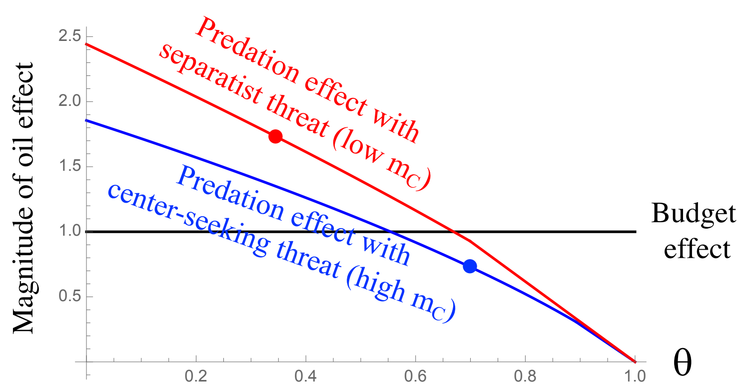
$$\frac{d^2B^*}{dO_i d\theta}=\frac{\delta}{1-\delta}\cdot\Bigg\{\underbrace{\mu^*\cdot p_c(m_G^*)+(1-\mu^*)\cdot p_s(m_G^*)}_{\textit{Direct effect}}$$

$$\underbrace{-\left[\mu^*\cdot\frac{\partial p_c(m_G^*)}{\partial m_G}\cdot\frac{dm_G^*}{d\theta}+(1-\mu^*)\cdot\frac{\partial p_s(m_G^*)}{\partial m_G}\cdot\frac{dm_G^*}{d\theta}\right]\cdot(1-\theta)}_{\textit{Indirect effect}}\Bigg\}\cdot\left(-\frac{de_i}{dO_i}\right)>0$$

[Go to proof]

Figure 5 provides visual intuition for the selection effect. Regardless of C's civil war aims, the predation effect strictly decreases in θ. However, the large m_C groups that, conditional on fighting, choose center-seeking, also have larger θ. For the dots in the figure, the budget effect of oil production exceeds in magnitude the predation effect for the center-seeking group (because it is large), whereas the opposite is true for small/separatist groups.

Figure 5: Ethnic Minorities Selection Effect



Notes: Figure 5 uses the functional forms for the contest functions from Equation 4 and the following parameter values: $e_C=0.5$, $e_G=0.9$, $\delta=0.8$, $\beta=3.8$, $m_0=0.2$, $p_0=0.2$, and $m_C=0.5$.

4.3 Mixed Oil Curse: Geography of Rebellion Effect

The second implication from the model that helps to explain the mixed oil curse is a geography of rebellion effect. Following the motivation from Section 1.5, an effective government should be able to translate its military spending into a low probability of challengers capturing the center. However, when combating a separatist insurgency in the periphery, the same government will face greater impediments to efficiently translating its revenues into a low probability of the challenger winning a civil war. This enhances the predation effect for separatist civil wars relative to that for center-seeking civil wars.

To show this, I take comparative statics on β, the efficiency with which G translates military spending into military "units" in the contest function. Unlike the previous result, the present argument is that increasing β more strongly decreases the magnitude of the predation effect if C's civil war aims are center-seeking rather than separatist, as opposed to a selection effect whereby β simply tends to be higher if C's aims are center-seeking. Thus, rather than analyze how β affects $\frac{dB^*}{dO_i}$, we need to analyze how β affects $\frac{dB^*(m^*_{G,c},\mu=1)}{dO_i} - \frac{dB^*(m^*_{G,s},\mu=0)}{dO_i}$.

Proposition 4 shows that increasing coercive effectiveness alters the magnitude of the predation effect in two ways. Directly, β enhances G's advantage more when facing a center-seeking rather than separatist civil war, backed by the substantive motivation that the marginal effect of buying a tank more greatly helps the government to defend the center than to fight in the periphery. This mechanism decreases C's probability of winning and, consequently, decreases the transfer amount needed to buy off C. The indirect substitution effect reinforces the direct effect. Higher β increases the marginal benefit of arming (see Appendix Equations A.1 and A.3), which increases G's equilibrium military spending m^*_G and therefore decreases C's equilibrium probability of winning. This effect is greater for center-seeking civil wars because that contest function is more greatly affected by raising m_G.

Proposition 4 (Geography of rebellion mechanism). *If* $(1-\mu^*)\cdot(1-\gamma)=0$*, then for* $i \in \{G, C\}$ *and* $\frac{dB^*}{dO_i}$ *defined in Proposition 2:*

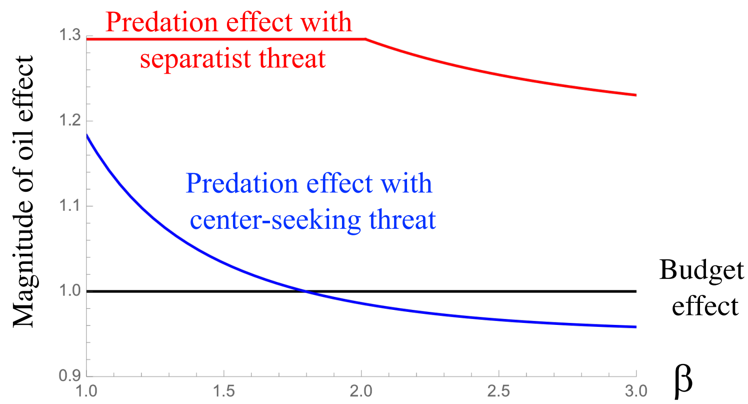
$$\frac{d^2B^*(m^*_{G,c},\mu=1)}{dO_i d\beta} - \frac{d^2B^*(m^*_{G,s},\mu=0)}{dO_i d\beta} =$$

$$\frac{\delta}{1-\delta}\cdot(1-\theta)\cdot\left[\underbrace{\frac{\partial p_s(m^*_{G,s})}{\partial\beta} - \frac{\partial p_c(m^*_{G,c})}{\partial\beta}}_{\text{Direct effect}} + \underbrace{\frac{\partial p_s(m_G)}{\partial m_G}\cdot\frac{dm^*_{G,s}}{d\beta} - \frac{\partial p_c(m_G)}{\partial m_G}\cdot\frac{dm^*_{G,c}}{d\beta}}_{\text{Indirect effect}}\right]\cdot\left(-\frac{de_i}{dO_i}\right) > 0$$

[Go to proof]

Figure 6 depicts this result. With the parameter values in the figure, high-enough β causes the magnitude of the predation effect drop below the budget effect only if C's aims are center-seeking.

Figure 6: Geography of Rebellion Effect



Notes: Figure 6 uses the functional forms for the contest functions from Equation 4 and the following parameter values: $\theta = 0.58$, $e_C = 0.5$, $e_G = 0.9$, $\delta = 0.8$, $m_0 = 0.2$, $p_0 = 0.2$, and $m_C = 0.5$. For these parameter values, $\frac{\partial^2 p_c}{\partial m_G \partial \beta} < 0$ holds for any $\beta < 3.89$ and $\frac{\partial^2 p_s}{\partial m_G \partial \beta} < 0$ holds for any $\beta < 8.06$.

5 Where Do We Find a Resource Curse?

Propositions 3 and 4 provide theoretical predictions consistent with the mixed oil-conflict pattern. However, we can look beyond aggregate patterns for center-seeking and separatist civil wars. The inherently conditional nature of these propositions yield additional empirical implications about cases in which oil wealth should "curse" prospects for peace. This section summarizes cases in which civil wars occurred in oil-rich regions or countries, and presents simple interactive regression models. This first-pass look at empirical evidence shows that the conditional implications have face validity and deserve additional consideration in future empirical research. Qualitative evidence from Saudi Arabia and Angola presented in Appendix Section D.3 provides an additional plausibility probe for the main mechanisms.

5.1 Additional Empirical Implications

Separatist civil wars. The main propositions offer important scope conditions for when regional oil production should cause separatist civil wars. The first conditional hypothesis follows from Proposition 3. This proposition shows that low m_C does not itself trigger separatist civil war in oil-rich regions; instead, it also requires low government commitment ability θ. Although small ethnic groups often lack political representation in the central government (see Figure 2), in cases where a minority group enjoys political representation, the predation effect of oil should be lower in magnitude—reducing incentives to secede. Although this prediction corresponds with existing arguments about the conditioning effect of ethnopolitical inclusion (Asal et al., 2016; Hunziker and Cederman, 2017), its theoretical basis differs. Existing theories do not address why the countervailing effects of oil should differ in magnitude based on civil war aims. By contrast, my theory explains why the redistributive grievance effects of oil should predominate for separatist civil wars, and why ethnopolitical exclusion should complement rather than substitute for the civil war risk induced by oil production. The present theory anticipates complementarities because oil production should exert net conflict-inducing effects only if government commitment ability is weak. Oil production does not exert conflict-inducing effects independent of this political condition—a crucial theoretical consideration for explaining the negative empirical relationship between oil production and *center-seeking* civil wars.

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

The second conditional hypothesis follows from Proposition 4, which explains why a coercively strong government less effectively projects power into the periphery to defeat a separatist rebellion than to protect the capital. The oil-separatist effect should be strongest in territories with particularly favorable geographic conditions for separatism, which I operationalize in the next section. Oil and bad geography should complement rather than substitute for triggering separatist civil war for the same reason as in the previous hypothesis. Oil production exerts a net conflict-enhancing effect only 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 denied profits from their region's oil production lacks a 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.*

At the extreme, groups without a concentrated territorial location cannot feasibly secede because they lack a natural territory from which to create an independent state or autonomous region. Therefore, to reduce heterogeneity, the sample for the separatist regressions excludes geographically dispersed ethnic groups. Geographic dispersion nearly perfectly predicts the absence of separatist, but not center-seeking, civil wars (my calculation using Ethnic Power Relations dataset, details available upon request).

The model also offers an intriguing *non*-implication about geography. Many existing resource curse theories focus on rebel finance and offer a prediction about the within-country location of oil reserves: *offshore* oil production should not cause separatist civil wars because it is difficult for rebels to loot. By contrast, the present model expects similar effects for offshore and onshore oil because both cause a predation effect. Appendix Section D.2 discusses existing arguments in more depth and shows empirically that both onshore and offshore oil production positively covary with separatist civil war onset.

Center-seeking civil wars. Propositions 3 and 4 also suggest a conditional hypothesis for center-seeking civil wars. In contexts where a government is vulnerable (for reasons independent of oil wealth), it may lack consolidated control over any oil produced in its country. 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, despite the general ease that governments face to defending the capital relative to fighting in the periphery. In these vulnerability cases, low β yields a large-magnitude predation effect.

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

5.2 Evidence for Separatist Civil Wars

Appendix Figure B.1 establishes that ethnic groups residing in oil-rich territories participate in separatist civil wars at elevated rates. What variation drives this correlation? Panel A of Figure 7 provides a transparent look at the data by listing every ethnic group with at least one giant oil field in its territory that fought a major separatist civil war between 1946 and 2013. Almost every separatist civil war over an oil-rich territory has occurred in locations for which the theory anticipates that the predation 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 Hypothesis 1, "m" indicates ethnic minority groups (with the group's national population share in parentheses), and "E" indicates groups excluded from power in the central government. Appendix Section B.4 describes the data sources. All but two of the ethnic groups are both excluded and minorities,[23] and only Southerners in Yemen are neither. Yemen is exceptional 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.

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

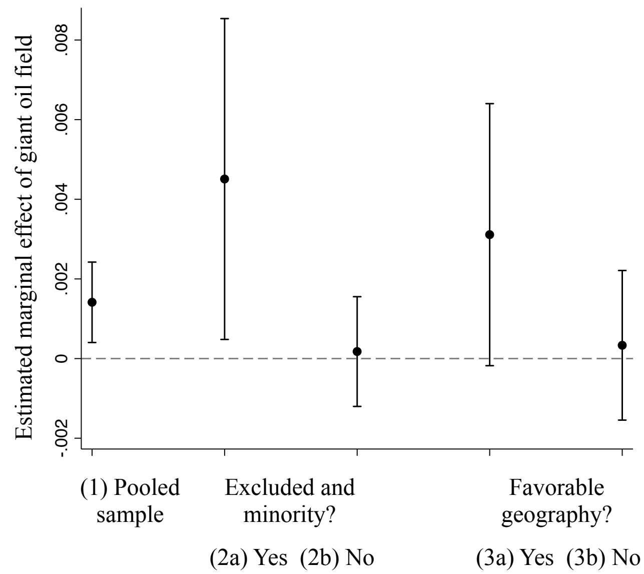
Figure 7: Oil and Separatist Civil War Onset

A. Oil-separatist civil war cases

Ethnic group	**Country**	**Onset year**	**Politically excl. minorities (H1)**	**Favorable sep. geog. (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
Chechens	Russia	1994	m(1%), E	M%,D
Chechens	Russia	1999	m(1%), E	M%,D
Dinka	Sudan	1983	m(10%), E	D
Malay Muslims*	Thailand	2004	m(5%), E	D
Southerners	Yemen	1994	- (55%)	M%

*Only offshore oil

B. Regression estimates



Notes: The figure presents point estimates and 95% confidence intervals for a series of logit regressions described in Appendix B. The dependent variable is separatist civil war onset, and the unit of analysis is ethnic group-years. The table 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 provides supporting information.

The column for Hypothesis 2 contains information on the favorability of separatist geography. "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, 2003; Buhaug, Cederman and Rød, 2008). Fifteen of the 17 oil-separatist cases exhibit at least one favorable geography condition.

Moving beyond a summary of positive-positive cases, among the full sample of ethnic group-years, the relative frequency of civil war onset varies in these conditional factors. Appendix Equation B.3 adds interaction terms to the statistical models used to establish the positive correlation between oil and separatism (see Appendix Figure B.1). Panel B of Figure 7 and Appendix Table D.3 show that the estimated marginal effect of oil on separatist civil war onset is between 2.4 and 2.9 times larger than in the baseline specification (Column 1) among politically excluded ethnic minority groups (Column 2a), or for groups with any favorable geography conditions (p-value is 0.06 in Column 3a). By contrast, there is no relationship among groups lacking either of these conditions.[24] The correlations are similar when disaggregating onshore and offshore oil production (Appendix Section D.2) or modeling country fixed effects (available upon request).

5.3 Evidence for Center-Seeking Civil Wars

Appendix Figure B.1 establishes that greater oil income per capita covaries with less frequent center-seeking civil wars at the country level. Despite the difference in relative frequencies, there are sixteen cases in which a center-seeking civil war began between 1946 and 2013 in a country producing at least $100 in oil income per capita in the previous year, which Figure 8 lists. Hypothesis 3 states that exceptions to the general pattern should arise in conditions of government vulnerability. Oil-rich governments can be vulnerable to center-seeking civil wars either because of societal organization that occurs independently of oil wealth or because the government lacks consolidated control over its oil revenues. Appendix Section B.5 details how I coded the following three vulnerability conditions.

First, recent defeat in warfare and/or violent political transitions. Several oil-rich countries experienced these conditions within two years prior to their center-seeking civil war ("W" for war). Governments should face particular difficulties to deterring rebel groups in 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 the opposition to organize independent of the government's oil wealth, such as the Shi'a uprisings following Iraq's defeat in the Persian Gulf war in 1991. Second, the Arab ("A") Spring uprisings across the Middle East and North Africa in 2011 similarly created a focal point for opposition organization even against governments whose oil revenues afforded a strong coercive apparatus, causing new center-seeking civil wars in Libya and Syria. Third, newly oil-rich governments also face difficulties consolidating their control over revenues (Bell and Wolford, 2015). Many countries experienced newfound oil wealth amid the major oil shock ("S") that lasted roughly a decade after the OPEC oil embargo of 1973. Peru crossed the $100 oil income per capita threshold the year before its war began, and Argentina and Syria (1979) within five years.

[24] Paine (2019*a*) presents additional supportive evidence: in most oil-separatist cases, rebel groups espoused concerns specifically about unfair oil redistribution.

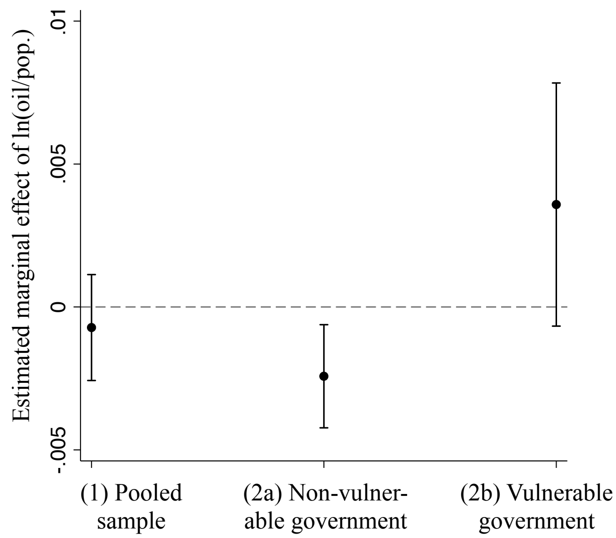
Figure 8: Oil and Center-Seeking Civil War Onset

A. Oil-center seeking civil war cases

Country	Onset year	Oil p.c.	Gov. vulner-ability (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: The table 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. The text describes the various symbols, and Appendix B provides supporting information.

B. Regression estimates



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

Moving beyond a transparent summary of the positive-positive cases, among the full sample of country-years, the relative frequency of civil war onset varies in these conditional factors. Appendix Equation B.4 adds an interaction term to the statistical models used to establish the negative correlation between oil production and center-seeking civil wars (see Appendix Figure B.1). Panel B of Figure 8 and Appendix Table D.4 show that among countries lacking any vulnerability conditions, increasing annual oil and gas income per capita from $0 to $1,000 decreases the predicted probability of center-seeking civil war onset by 67%. By contrast, there is a positive association between oil production and center-seeking civil war onset among countries that exhibit at least one of the vulnerability conditions. The results are similar when restricting to ethnic center-seeking civil wars only (available upon request).

6 Conclusion

This paper presented a general theory of strategic civil war aims. It helps 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. Beyond oil, the model draws mainly from two influential literatures on conflict—formal bargaining models, and ethnic grievances—that do not focus on civil war aims. Although many scholars propose long-term cultural explanations for contemporary ethnic grievances (Cederman et al. 2013, 30-54), existing theories contain an implicit strategic component: political exclusion exacerbates government commitment problems. The formal bargaining literature links commitment inability to conflict. One insight of the present paper is that low commitment ability not only makes fighting more likely, but also correlates with rebels' strategically chosen civil war aims. One possible implication of my framework is that Cederman et al.'s 2013 key hypothesis—politically excluded ethnic groups more frequently fight civil wars—may better explain separatist than center-seeking civil wars. Political exclusion indeed should create powerful incentives to fight, but groups that face a high risk of exclusion from power tend to prefer separatism.

This theory of strategic civil war aims also 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 heterogeneous effects on different types of civil war (although see Buhaug 2006). Strong government coercive capacity may more effectively deter center-seeking than separatist civil wars because of difficulties projecting power into the periphery, as I discussed. Therefore, for example, military aid and other types of foreign aid that funnel directly to the government may more effectively prevent center-seeking than separatist civil wars. And although oil production yields easy government revenues, other economic causes of war exhibit different properties. For example, rebel groups can more easily loot alluvial diamonds than oil. Perhaps for this and other types of natural resources, the predation effect tends to outweigh the revenue effect even for center-seeking civil wars, as examples from Liberia and Sierra Leone in the 1990s suggest. Beyond natural resources, the model may also be fruitfully extended by examining dynamic civil war aims, as Appendix Section C.2 discusses.

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

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A Proofs for Formal Results

Table A.1: Summary of Parameters and Choice Variables

Stage	Variables/description
Parameters/choices for G in period 1	• e_i: parameterizes the exit option for (unmodeled) producers in region $i \in \{G, C\}$ • R: government revenues in period 1, equal $2 - e_G - e_C$ • m_G: military spending • x: transfers • d: destructiveness of war for G
Parameters/choices for C in period 1	• m_C: C's population share • μ: C's civil war aims, 1 equals center-seeking and 0 equals separatist • $p_c(\cdot)$: C's probability of winning a center-seeking civil war • $p_s(\cdot)$: C's probability of winning a separatist civil war • j: indexes civil war aims; c for center-seeking and s for separatist • β_j: efficiency with which G's military spending decreases C's probability of winning
Payoffs for $t \geq 2$	• δ: discount factor • t: time θ: G's commitment ability; determines taxes and transfers for $t \geq 2$ in s.q. regime • $V^G_{\text{s.q.}}$ and $V^C_{\text{s.q.}}$: future continuation values in the status quo regime • V^G_{center} and V^C_{center}: continuation values following a successful center-seeking civil war • V^G_{sep} and V^C_{sep}: continuation values following a successful separatist civil war
Oil parameters	• O_i: percent of economic output in region $i \in \{G, C\}$ that is oil • γ: indicator for production in C's territory

Proof of Lemma 1.

1. *Establish $\underline{m}_C$ and $\overline{m}_C$.* Show that for any $m_G > 0$, there exists a unique $\tilde{m}_C \in \mathbb{R}_{++}$ such that:

$$\frac{p_c(m_G, \tilde{m}_C)}{p_s(m_G, \tilde{m}_C)} = \pi_s,$$

for $\pi_s \in (0, 1)$ defined in Equation 15. Satisfying the intermediate value theorem conditions implies there exists at least one such $\tilde{m}_C$: Equation 3 provides the needed boundary conditions, and $p_c(\cdot)$ and $p_s(\cdot)$ are each continuous in m_C. Equation 2 implies the unique threshold claim for $\tilde{m}_C$. Thus, we can implicitly define the thresholds $\underline{m}_C$ and $\overline{m}_C$ stated in the lemma:

$$\frac{p_c(0, \underline{m}_C)}{p_s(0, \underline{m}_C)} = \pi_s \quad \text{and} \quad \frac{p_c(R, \overline{m}_C)}{p_s(R, \overline{m}_C)} = \pi_s$$

Applying the implicit function theorem yields:

$$\frac{d\tilde{m}_C}{dm_G} = -\frac{\partial}{\partial m_G}\left[\frac{p_c(m_G)}{p_s(m_G)}\right] \Big/ \frac{\partial}{\partial m_C}\left[\frac{p_c(m_G)}{p_s(m_G)}\right] > 0,$$

and the sign follows directly from Equation 2. This proves $\underline{m}_C < \overline{m}_C$.

2. *Establish $\hat{m}_G$.* Show that for any $m_C \in \left(\underline{m}_C, \overline{m}_C\right)$, there exists a unique $\hat{m}_G \in (0, R)$ such that:

$$\frac{p_c(\hat{m}_G, m_C)}{p_s(\hat{m}_G, m_C)} = \pi_s$$

Satisfying the intermediate value theorem conditions implies there exists at least one such $\hat{m}_G$:

- $\frac{p_c(0,m_C)}{p_s(0,m_C)} > \pi_s$ follows from assuming $m_C > \underline{m}_C$.
- $\frac{p_c(R,m_C)}{p_s(R,m_C)} < \pi_s$ follows from assuming $m_C < \overline{m}_C$.
- $p_c(\cdot)$ and $p_s(\cdot)$ are each continuous in m_C.

Because $\underline{m}_C > 0$, Equation 2 yields the unique threshold claim for $\hat{m}_G$. Applying the implicit function theorem yields:

$$\frac{d\hat{m}_G}{dm_C} = -\frac{\partial}{\partial m_C}\left[\frac{p_c(m_G)}{p_s(m_G)}\right] \Bigg/ \frac{\partial}{\partial m_G}\left[\frac{p_c(m_G)}{p_s(m_G)}\right] > 0,$$

and the sign follows directly from Equation 2, which completes the proof. ∎

To generate interior solutions, the following result about optimal military expenditures requires assumptions about the magnitude of the marginal benefits of military spending at the boundaries. I impose these assumptions for the remainder of the analysis, which are denoted as Equations A.2 and A.4 in the proof.

Lemma A.1 (Military expenditures)**.**

Part a. *There exists a unique interior optimizer* $m^*_{G,c} \in (0, R)$ *to G's maximization problem (Equation 18) subject to* $\mu = 1$.

Part b. *There exists a unique interior optimizer* $m^*_{G,s} \in (0, R)$ *to G's maximization problem (Equation 18) subject to* $\mu = 0$.

Part c. $m^*_{G,s} < m^*_{G,c}$

Proof of part a. If $\mu = 1$, then G's unconstrained lifetime utility maximization problem is:

$$\max_{m_G} \; R - m_G - x^*(\mu = 1, m_G) + \delta \cdot V^G_{\text{s.q.}}$$

The first order condition implicitly characterizes $m^*_{G,c}$:

$$\underbrace{\frac{\delta}{1-\delta} \cdot \overbrace{\left(-\frac{\partial p_c(m^*_{G,c}, m_C)}{\partial m_G} \right)}^{>0} \cdot (1-\theta) \cdot (2 - e_G - e_C)}_{\text{MB}} = \underbrace{1}_{\text{MC}} \tag{A.1}$$

which is the unique maximizer because the second-order condition is:

$$-\frac{\delta}{1-\delta} \cdot \underbrace{\frac{\partial^2 p_c(m_G, m_C)}{\partial m_G^2}}_{>0} \cdot (1-\theta) \cdot (2 - e_G - e_C) < 0$$

An interior solution requires:

$$-\frac{\partial p_c(R, m_C)}{\partial m_G} < \frac{1-\delta}{\delta \cdot (1-\theta) \cdot (2 - e_G - e_C)} < -\frac{\partial p_c(0, m_C)}{\partial m_G} \tag{A.2}$$

Proof of part b. Proof is identical to part a, yielding the implicit characterization of $m^*_{G,s}$:

$$\underbrace{\frac{\delta}{1-\delta} \cdot \overbrace{\left(-\frac{\partial p_s(m^*_{G,s}, m_C)}{\partial m_G}\right)}^{>0} \cdot \overbrace{\big[(1-\theta)\cdot(1-e_c) - \theta \cdot (1-e_G)\big]}^{>0 \text{ by Assumption 1}}}_{\text{MB}} = \underbrace{1}_{\text{MC}} \tag{A.3}$$

An interior solution requires:

$$-\frac{\partial p_s(R, m_C)}{\partial m_G} < \frac{1-\delta}{\delta \cdot \big[(1-\theta)\cdot(1-e_c) - \theta\cdot(1-e_G)\big]} < -\frac{\partial p_s(0, m_C)}{\partial m_G} \tag{A.4}$$

Proof of part c. Combining Equations A.1 and A.3 yields:

$$-\frac{\partial p_c(m^*_{G,c}, m_C)}{\partial m_G} = -\frac{\partial p_s(m^*_{G,s}, m_C)}{\partial m_G} \cdot \pi_s,$$

for $\pi_s \in (0,1)$ defined in Equation 15. Because $\pi_s < 1$, we have:

$$-\frac{\partial p_c(m^*_{G,c}, m_C)}{\partial m_G} < -\frac{\partial p_s(m^*_{G,s}, m_C)}{\partial m_G}$$

Combining this with the assumption in Equation 2 implies:

$$-\frac{\partial p_c(m^*_{G,c}, m_C)}{\partial m_G} < -\frac{\partial p_c(m^*_{G,s}, m_C)}{\partial m_G}$$

The result follows because $-\frac{\partial p_c}{\partial m_G}(m_G)$ strictly decreases in m_G. ■

To derive monotonic relationships, the following result about threshold values of m_C requires assumptions about the steepness of marginal returns to military spending. I impose these assumptions for the remainder of the analysis, which are denoted as Equations A.6 and A.8 in the proof. For all parameter values, the functional forms from Equation 4 satisfy both inequalities.

Lemma A.2 (Population size thresholds)**.**

Part a. *There exists a unique value* $\hat{m}_{C,c} \in (\underline{m}_C, \overline{m}_C)$ *such that:*

- *If* $m_C < \hat{m}_{C,c}$*, then* $\hat{m}_G < m^*_{G,c}$
- *If* $m_C > \hat{m}_{C,c}$*, then* $\hat{m}_G > m^*_{G,c}$

Part b. *There exists a unique value* $\hat{m}_{C,s} \in (\underline{m}_C, \overline{m}_C)$ *such that:*

- *If* $m_C < \hat{m}_{C,s}$*, then* $\hat{m}_G < m^*_{G,s}$
- *If* $m_C > \hat{m}_{C,s}$*, then* $\hat{m}_G > m^*_{G,s}$

Part c. $\hat{m}_{C,s} < \hat{m}_{C,c}$

Proof of part a. Define $\hat{m}_{C,c}$ implicitly as:

$$\hat{m}_G(\hat{m}_{C,c}) - m^*_{G,c}(\hat{m}_{C,c}) = 0 \tag{A.5}$$

Satisfying the intermediate value theorem conditions implies there exists a least one such $\hat{m}_{C,c} \in (\underline{m}_C, \overline{m}_C)$:

- $\hat{m}_G(\underline{m}_C) - m^*_{G,c}(\underline{m}_C) < 0$ follows from $\hat{m}_G(\underline{m}_C) = 0$ (see the proof for Lemma 1), and part a of Lemma A.1 shows $m^*_{G,c} > 0$.
- $\hat{m}_G(\overline{m}_C) - m^*_{G,c}(\overline{m}_C) > 0$ follows from $\hat{m}_G(\overline{m}_C) = R$ (see the proof for Lemma 1), and part a of Lemma A.1 shows $m^*_{G,c} < R$.
- These functions are continuous in m_C because each constituent function is continuous in m_C.

The unique threshold claim follows from showing the following term is strictly positive:

$$\frac{d}{dm_C}\Big[\hat{m}_G(m_C) - m^*_{G,c}(m_C)\Big] = \frac{d\hat{m}_G}{dm_C} - \frac{dm^*_{G,c}}{dm_C}$$

$$= -\left[\frac{\partial p_c(\hat{m}_G)}{\partial m_C} - \frac{\partial p_s(\hat{m}_G)}{\partial m_C}\cdot\pi_s\right]\Bigg/\left[\frac{\partial p_c(\hat{m}_G)}{\partial m_G} - \frac{\partial p_s(\hat{m}_G)}{\partial m_G}\cdot\pi_s\right] + \frac{\partial^2 p_c(m^*_{G,c})}{\partial m_G \partial m_C}\Bigg/\frac{\partial^2 p_c(m^*_{G,c})}{\partial m_G^2}$$

The proof for Lemma 1 proves that the first term is strictly positive, whereas the second term is ambiguous in sign because $\frac{\partial^2 p_c(m^*_{G,c})}{\partial m_G \partial m_C}$ is ambiguous in sign. Thus, we need steep-enough diminishing marginal returns to m_G:

$$\frac{\partial^2 p_c}{\partial m_G^2} > \frac{\partial^2 p_c}{\partial m_G \partial m_C}\Bigg/\left\{\left[\frac{\partial p_c}{\partial m_C} - \frac{\partial p_s}{\partial m_C}\cdot\pi_s\right]\Bigg/\left[\frac{\partial p_c}{\partial m_G} - \frac{\partial p_s}{\partial m_G}\cdot\pi_s\right]\right\} \tag{A.6}$$

Proof of part b. Define $\hat{m}_{C,s}$ implicitly as:

$$\hat{m}_G(\hat{m}_{C,s}) - m^*_{G,s}(\hat{m}_{C,s}) = 0 \tag{A.7}$$

The structure of the proof is identical to that in part a. The condition for steep-enough diminishing marginal returns to m_G is:

$$\frac{\partial^2 p_s}{\partial m_G^2} > \frac{\partial^2 p_s}{\partial m_G \partial m_C}\Bigg/\left\{\left[\frac{\partial p_c}{\partial m_C} - \frac{\partial p_s}{\partial m_C}\cdot\pi_s\right]\Bigg/\left[\frac{\partial p_c}{\partial m_G} - \frac{\partial p_s}{\partial m_G}\cdot\pi_s\right]\right\} \tag{A.8}$$

Proof of part c. Combining Equations A.5 and A.7 yields:

$$\hat{m}_G(\hat{m}_{C,c}) - m^*_{G,c}(\hat{m}_{C,c}) = \hat{m}_G(\hat{m}_{C,s}) - m^*_{G,s}(\hat{m}_{C,s})$$

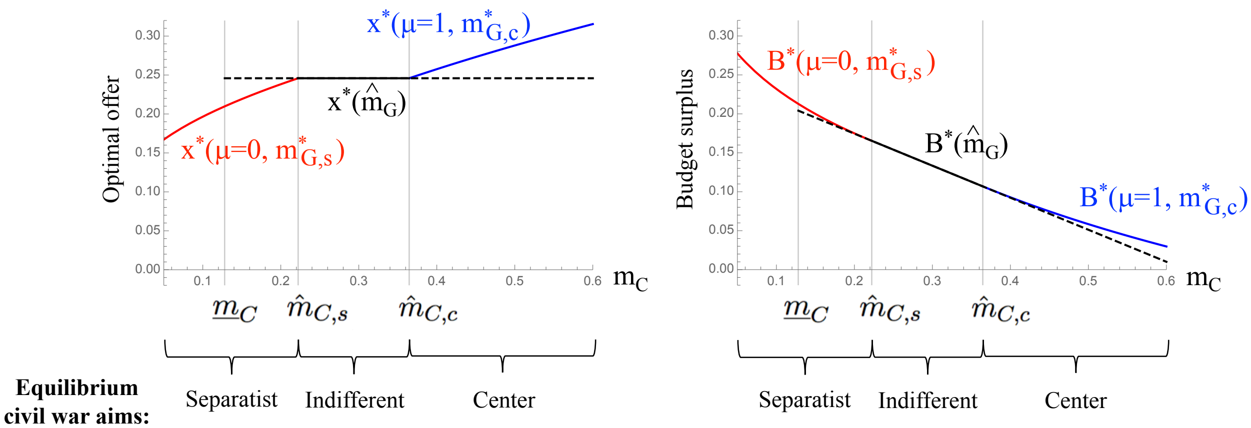
Because $m^*_{G,c} > m^*_{G,s}$ (part c of Lemma A.1), this implies:

$$\hat{m}_G(\hat{m}_{C,c}) - m^*_{G,c}(\hat{m}_{C,c}) > \hat{m}_G(\hat{m}_{C,s}) - m^*_{G,c}(\hat{m}_{C,s})$$

The result follows because Equation A.6 implies that $\hat{m}_G(m_C) - m^*_{G,c}(m_C)$ strictly increases in m_C. ■

Figure A.1 depicts the equilibrium offer and equilibrium budget surplus for the same parameter values as used in Figure 4 to illustrate equilibrium military spending.

Figure A.1: Equilibrium Offer and Budget Surplus



Notes: Figure A.1 uses the same functional form assumptions and parameter values as Figure 4.

Proof of Proposition 1, part a. The proof proceeds in four steps.

1. Solve G's constrained optimization problem (Equation 18) in the center-seeking range. Define the Lagrangian:

$$\mathcal{L}(m_G, \lambda_1, \lambda_2) \equiv \max_{m_G, \lambda_1, \lambda_2} R - \left[m_G + x^*(\mu = 1, m_G)\right] + \delta \cdot V^G_{\text{s.q.}} + \lambda_1 \cdot m_G + \lambda_2 \cdot \left(\hat{m}_G - m_G\right)$$

The associated KKT conditions are:

$$\frac{\partial \mathcal{L}}{\partial m_G} = -\left\{1 + \frac{\delta}{1-\delta} \cdot \left[\frac{\partial p_c(m_G)}{\partial m_G} \cdot (1-\theta) \cdot (2 - e_G - e_C)\right]\right\} + \lambda_1 - \lambda_2 = 0,$$

$$m_G \geq 0, m_G \leq \hat{m}_G, \lambda_1 \geq 0, \lambda_2 \geq 0, \lambda_1 \cdot m_G = 0, \lambda_2 \cdot \left(\hat{m}_G - m_G\right) = 0$$

   - If $m_C < \hat{m}_{C,c}$, then one solution is $m_G = \hat{m}_G$ with associated multipliers $\lambda_1 = 0$ and $\lambda_2 = -\left\{1 + \frac{\delta}{1-\delta} \cdot \left[\frac{\partial p_c(\hat{m}_G)}{\partial m_G} \cdot (1-\theta) \cdot (2 - e_G - e_C)\right]\right\}$. Part a of Lemma A.2 implies that $\hat{m}_G < m^*_{G,c}$ in this parameter range, and part a of Lemma A.1 establishes that $1 + \frac{\delta}{1-\delta} \cdot \left[\frac{\partial p_c(m_G)}{\partial m_G} \cdot (1-\theta) \cdot (2 - e_G - e_C)\right] < 0$ for any $m_G < m^*_{G,c}$. This implies that the second non-negative multiplier constraint is met, and it is straightforward to verify that this vector satisfies every other KKT condition.

The following steps prove uniqueness. Setting $m_G < \hat{m}_G$ requires $\lambda_2 = 0$ to satisfy the second complementary slackness condition. Then, for any $\lambda_1 \geq 0$, the first-order condition is violated because $m_G + \frac{\delta}{1-\delta} \cdot \left[\frac{\partial p_c(m_G)}{\partial m_G} \cdot (1-\theta) \cdot (2 - e_G - e_C)\right] < 0$ for any $m_G < m^*_{G,c}$ (and we already established that $\hat{m}_G < m^*_{G,c}$ in this parameter range).

- If $m_C > \hat{m}_{C,c}$, then one solution is $m_G = m^*_{G,c}$ (see Lemma A.1) with associated multipliers $\lambda_1 = 0$ and $\lambda_2 = 0$. Because part a of Lemma A.2 implies that $\hat{m}_G > m^*_{G,c}$ in this parameter range, it is straightforward to verify that this vector satisfies every KKT condition.

  The following steps prove uniqueness.

  - We have established that $m^*_{G,c} < \hat{m}_G$ in this parameter range. Therefore, any $m_G < m^*_{G,c}$ requires $\lambda_2 = 0$ to satisfy the second complementary slackness condition. However, for any $\lambda_1 \geq 0$, this violates the first-order condition because $1 + \frac{\delta}{1-\delta} \cdot \left[\frac{\partial p_c(m_G)}{\partial m_G} \cdot (1-\theta) \cdot (2 - e_G - e_C)\right] < 0$ for any $m_G < m^*_{G,c}$.
  - Part a of Lemma A.2 establishes that $m^*_{G,c} > 0$. Therefore, any $m_G > m^*_{G,c}$ requires $\lambda_1 = 0$ to satisfy the first complementary slackness condition. However, for any $\lambda_2 \geq 0$, this violates the first-order condition because part a of Lemma A.1 establishes that $1 + \frac{\delta}{1-\delta} \cdot \left[\frac{\partial p_c(m_G)}{\partial m_G} \cdot (1-\theta) \cdot (2 - e_G - e_C)\right] > 0$ for any $m_G > m^*_{G,c}$.

2. Solve G's constrained optimization problem (Equation 18) in the separatist range. Define the Lagrangian:

$$\mathcal{L}(m_G, \lambda) \equiv \max_{m_G,\lambda} \quad R - \left[m_G + x^*(\mu = 0, m_G)\right] + \delta \cdot V^G_{\text{s.q.}} + \lambda \cdot \left(m_G - \hat{m}_G\right)$$

The associated KKT conditions are:

$$\frac{\partial \mathcal{L}}{\partial m_G} = -\left\{1 + \frac{\delta}{1-\delta} \cdot \left[\frac{\partial p_s(m_G)}{\partial m_G} \cdot \left[(1-\theta) \cdot (1-e_c) - \theta \cdot (1-e_G)\right]\right]\right\} + \lambda = 0,$$

$$m_G \geq \hat{m}_G, \lambda \geq 0, \lambda \cdot \left(m_G - \hat{m}_G\right) = 0$$

- If $m_C < \hat{m}_{C,s}$, then one solution is $m_G = m^*_{G,s}$ (see Lemma A.1) with associated multiplier $\lambda = 0$. Because part b of Lemma A.2 implies that $\hat{m}_G < m^*_{G,s}$ in this parameter range, it is straightforward to verify that this vector satisfies every KKT condition.

  The following steps prove uniqueness.

  - For any $\lambda \geq 0$, any $m_G < m^*_{G,s}$ violates the first-order condition because part b of Lemma A.1 establishes that $1 + \frac{\delta}{1-\delta} \cdot \left[\frac{\partial p_s(m_G)}{\partial m_G} \cdot \left[(1-\theta) \cdot (1-e_c) - \theta \cdot (1-e_G)\right]\right] < 0$ for all $m_G < m^*_{G,s}$.
  - We have established that $\hat{m}_G < m^*_{G,s}$ in this parameter range. Therefore, any $m_G > m^*_{G,s}$ requires $\lambda = 0$ to satisfy the complementary slackness condition. However,

this violates the first-order condition because part b of Lemma A.1 establishes that $1+\frac{\delta}{1-\delta}\cdot\Big[\frac{\partial p_s(m_G)}{\partial m_G}\cdot\big[(1-\theta)\cdot(1-e_c)-\theta\cdot(1-e_G)\big]\Big]>0$ for any $m_G>m^*_{G,s}$.

- If $m_C>\hat{m}_{C,s}$, then one solution is $m_G=\hat{m}_G$ with associated multiplier $\lambda=1+\frac{\delta}{1-\delta}\cdot\Big[\frac{\partial p_s(m_G)}{\partial m_G}\cdot\big[(1-\theta)\cdot(1-e_c)-\theta\cdot(1-e_G)\big]\Big]$. Part b of Lemma A.2 implies that $\hat{m}_G>m^*_{G,s}$ in this parameter range, and part b of Lemma A.1 establishes that $1+\frac{\delta}{1-\delta}\cdot\Big[\frac{\partial p_s(m_G)}{m_G}\cdot\big[(1-\theta)\cdot(1-e_c)-\theta\cdot(1-e_G)\big]\Big]>0$ for any $m_G>m^*_{G,s}$. This implies that the non-negative multiplier constraint is met, and it is straightforward to verify that this vector also satisfies every other KKT condition.

  The following proves uniqueness. Setting $m_G>\hat{m}_G$ requires $\lambda=0$ to satisfy the complementary slackness condition. Then, the first-order condition is violated because $1+\frac{\delta}{1-\delta}\cdot\Big[\frac{\partial p_s(m_G)}{\partial m_G}\cdot\big[(1-\theta)\cdot(1-e_c)-\theta\cdot(1-e_G)\big]\Big]>0$ for any $m_G>m^*_{G,s}$ (and we already established that $\hat{m}>m^*_{G,s}$ in this parameter range).

3. To solve the full maximization problem stated in Equation 18, part c of Lemma A.2 implies the need to examine three non-trivial parameter ranges: $m_C\in\big(\underline{m}_C,\hat{m}_{C,s}\big)$, $m_C\in\big(\hat{m}_{C,s},\hat{m}_{C,c}\big)$, and $m_C\in\big(\hat{m}_{C,c},\overline{m}_C\big)$.

   - If $m_C\in\big(\underline{m}_C,\hat{m}_{C,s}\big)$, then part 1 of this proof shows that $m_G=\hat{m}_G$ is the unique optimal solution conditional on facing a center-seeking civil war and part 2 shows that $m_G=m^*_{G,s}$ is the unique optimal solution conditional on facing a separatist civil war. By construction, $\hat{m}_G+x^*\big(\mu=1,\hat{m}_G\big)=\hat{m}_G+x^*\big(\mu=0,\hat{m}_G\big)$. Part 2 of this proof shows that $m^*_{G,s}+x^*\big(\mu=0,m^*_{G,s}\big)<\hat{m}_G+x^*\big(\mu=0,\hat{m}_G\big)$, which implies $m^*_{G,s}$ is the unique optimal solution.

   - If $m_C\in\big(\hat{m}_{C,s},\hat{m}_{C,c}\big)$, then parts 1 and 2 of this proof show that $m_G=\hat{m}_G$ is the unique optimizer.

   - If $m_C\in\big(\hat{m}_{C,c},\overline{m}_C\big)$, then part 1 of this proof shows that $m_G=m^*_{G,c}$ is the unique optimal solution conditional on facing a center-seeking civil war and part 2 shows that $m_G=\hat{m}_G$ is the unique optimal solution conditional on facing a separatist civil war. By construction, $\hat{m}_G+x^*\big(\mu=1,\hat{m}_G\big)=\hat{m}_G+x^*\big(\mu=0,\hat{m}_G\big)$. Part 1 of this proof shows that $m^*_{G,c}+x^*\big(\mu=1,m^*_{G,c}\big)<\hat{m}_G+x^*\big(\mu=1,\hat{m}_G\big)$, which implies $m^*_{G,c}$ is the unique optimal solution.

4. Show that G cannot profitably deviate to (x,m_G) such that $R-m_G-x<0$. Using the future-period utility terms from the model setup yields the following expression for G's lifetime expected utility if C initiates a civil war in period 1:

$$1-e_G+(1-\theta)\cdot(1-e_C)-m_G-d+\frac{\delta}{1-\delta}\cdot\Bigg\{\mu^*(m_G)\cdot\big[1-p_c(m_G)\big]\cdot\big[(1-\theta)\cdot(1-e_C)+(1-\theta)\cdot(1-e_G)\big]$$

$$+\big[1-\mu^*(m_G)\big]\cdot\Big[p_s(m_G)\cdot(1-e_G)+\big[1-p_s(m_G)\big]\cdot\big[(1-\theta)\cdot(1-e_C)+(1-\theta)\cdot(1-e_G)\big]\Big]\Bigg\}$$

Split the term in braces into the following:

$$\mu^*(m_G) \cdot \big[(1-\theta)\cdot(1-e_C) + (1-\theta)\cdot(1-e_G)\big]$$
$$-\mu^*(m_G)\cdot p_c(m_G) \cdot \big[(1-\theta)\cdot(1-e_C) + (1-\theta)\cdot(1-e_G)\big]$$
$$+\big[1-\mu^*(m_G)\big] \cdot \big[(1-\theta)\cdot(1-e_C) + (1-\theta)\cdot(1-e_G)\big]$$
$$-\big[1-\mu^*(m_G)\big]\cdot p_s(m_G) \cdot \big[(1-\theta)\cdot(1-e_C) - \theta\cdot(1-e_G)\big]$$

Combining the first and third lines, simplifying those terms, and simplifying the term on the second line yields:

$$(1-\theta)\cdot(2-e_C-e_G)$$
$$-\mu^*(m_G)\cdot p_c(m_G)\cdot(1-\theta)\cdot(2-e_C-e_G)$$
$$-\big[1-\mu^*(m_G)\big]\cdot p_s(m_G) \cdot \big[(1-\theta)\cdot(1-e_C) - \theta\cdot(1-e_G)\big]$$

Therefore, the overall expression is:

$$1 - e_G + (1-\theta)\cdot(1-e_C) - 1 - d$$
$$\underbrace{-\frac{\delta}{1-\delta}\cdot\Big\{\mu^*(m_G)\cdot p_c(m_G)\cdot(1-\theta)\cdot(2-e_C-e_G) + \big[1-\mu^*(m_G)\big]\cdot p_s(m_G)\cdot\big[(1-\theta)\cdot(1-e_C)-\theta\cdot(1-e_G)\big]\Big\}}_{x^*(m_G)}$$
$$+\underbrace{\frac{\delta}{1-\delta}\cdot(1-\theta)\cdot(2-e_C-e_G)}_{\delta\cdot V^G_{s.q.}} \quad \text{(A.9)}$$

Subtracting this term from G's lifetime expected utility to buying off C with G's most-preferred transfer that satisfies Equation 17, $R - 1 - x^*(m_G) + \delta \cdot V^G_{s.q.}$, equals $d > 0$.

Part b. Equation A.9 shows that G's objective function if $B^* < 0$ is an affine transformation of its objective function if $B^* > 0$, therefore yielding identical solutions. By definition of B^* and by construction of G's optimization problem, assuming $B^* < 0$ implies that C rejects any feasible offer by G, which also implies that G cannot profitably deviate from any transfer proposal that satisfies the budget constraint (given optimal military expenditures). ■

To establish monotonicity, each of the next two proofs require conditions about the steepness of diminishing marginal returns to m_G, which Equations A.13 and A.14 state. I assume these inequalities are true. Note that with the functional forms from Equation 4, for all parameter values, Equation A.13 holds strictly and Equation A.14 holds weakly because $\frac{dm^*_{G,c}}{d\beta} = \frac{dm^*_{G,s}}{d\beta}$.

Proof of Proposition 3. A sufficient condition for $\frac{d^2B^*}{dO_i d\theta} > 0$ is:

$$p_j(m_G^*) > \frac{\partial p_j(m_G^*)}{\partial m_G} \cdot \frac{dm_G^*}{d\theta} \cdot (1-\theta), \tag{A.10}$$

for $j \in \{c, s\}$. Need to solve for $\frac{dm_G^*}{d\theta}$. Using the generic probability of winning function $p_j(\cdot)$ and setting $(1-\mu^*)\cdot(1-\gamma) = 0$ enables rewriting either Equation A.1 or A.3 as:

$$\frac{\delta}{1-\delta} \cdot \left[-\frac{\partial p_j(m_G^*)}{\partial m_G} \right] \cdot (1-\theta) \cdot (1-e_i) = 1 \tag{A.11}$$

Applying the implicit function theorem to Equation A.11 yields:

$$\frac{dm_G^*}{d\theta} = \frac{\frac{\partial p_j(m_G^*)}{\partial m_G}}{\frac{\partial^2 p_j(m_G^*)}{\partial m_G^2} \cdot (1-\theta)} \tag{A.12}$$

Substituting Equation A.12 into Equation A.10 and rearranging yields:

$$\frac{\partial^2 p_j(m_G^*)}{\partial m_G^2} > \left[\frac{\partial p_j(m_G^*)}{\partial m_G} \right]^2 \Big/ p_j(m_G^*)$$

This follows if:

$$\frac{\partial^2 p_j}{\partial m_G^2} > \left[\frac{\partial p_j}{\partial m_G} \right]^2 \Big/ p_j \tag{A.13}$$

■

Proof of Proposition 4.

$$\frac{d}{d\beta}\left\{ \left[1 - \frac{\delta}{1-\delta} \cdot (1-\theta) \cdot p_c(m_{G,c}^*)\right] - \left[1 - \frac{\delta}{1-\delta} \cdot (1-\theta) \cdot p_s(m_{G,s}^*)\right] \right\} \cdot \left(-\frac{de_i}{dO_i} \right)$$

$$= \frac{\delta}{1-\delta} \cdot (1-\theta) \cdot \left[\underbrace{\frac{\partial p_s(m_{G,s}^*)}{\partial \beta}}_{<0} - \underbrace{\frac{\partial p_c(m_{G,c}^*)}{\partial \beta}}_{<0} + \underbrace{\frac{\partial p_s(m_G)}{\partial m_G}}_{<0} \cdot \underbrace{\frac{dm_{G,s}^*}{d\beta}}_{>0} - \underbrace{\frac{\partial p_c(m_G)}{\partial m_G}}_{<0} \cdot \underbrace{\frac{dm_{G,c}^*}{d\beta}}_{>0} \right] \cdot \left(-\frac{de_i}{dO_i} \right)$$

It suffices to establish the following three inequalities. First:

$$-\frac{\partial p_c(m_{G,c}^*)}{\partial \beta} > -\frac{\partial p_s(m_{G,s}^*)}{\partial \beta}$$

The following two facts establish this claim. a. For fixed m_G, we assume $-\frac{\partial p_c(m_G)}{\partial \beta} > -\frac{\partial p_s(m_G)}{\partial \beta}$. b. Because $-\frac{\partial^2 p_j}{\partial m_G \partial \beta} > 0$, the claim follows from $m_{G,c}^* > m_{G,s}^*$ (part c of Lemma A.1).

The second inequality follows directly from Equation 2:

$$-\frac{\partial p_c(m_G)}{\partial m_G} > -\frac{\partial p_s(m_G)}{\partial m_G}$$

Third:
$$\frac{dm^*_{G,c}}{d\beta} \geq \frac{dm^*_{G,s}}{d\beta}$$
Differentiating the implicit definition of $m^*_{G,c}$ from Equation A.1 and of $m^*_{G,s}$ from Equation A.3 implies that we need:
$$\frac{\partial^2 p_s}{m_G^2} \Bigg/ \frac{\partial^2 p_c}{\partial m_G^2} \geq -\frac{\partial^2 p_s}{\partial m_G \partial \beta} \Bigg/ \left(-\frac{\partial^2 p_c}{\partial m_G \partial \beta} \right) \tag{A.14}$$
■

B Main Empirical Appendix

The following presents the main supporting information for empirically establishing the mixed oil-conflict relationship and for Figures 7 and 8. Appendix D presents additional information, including the regression tables that accompany each figure.

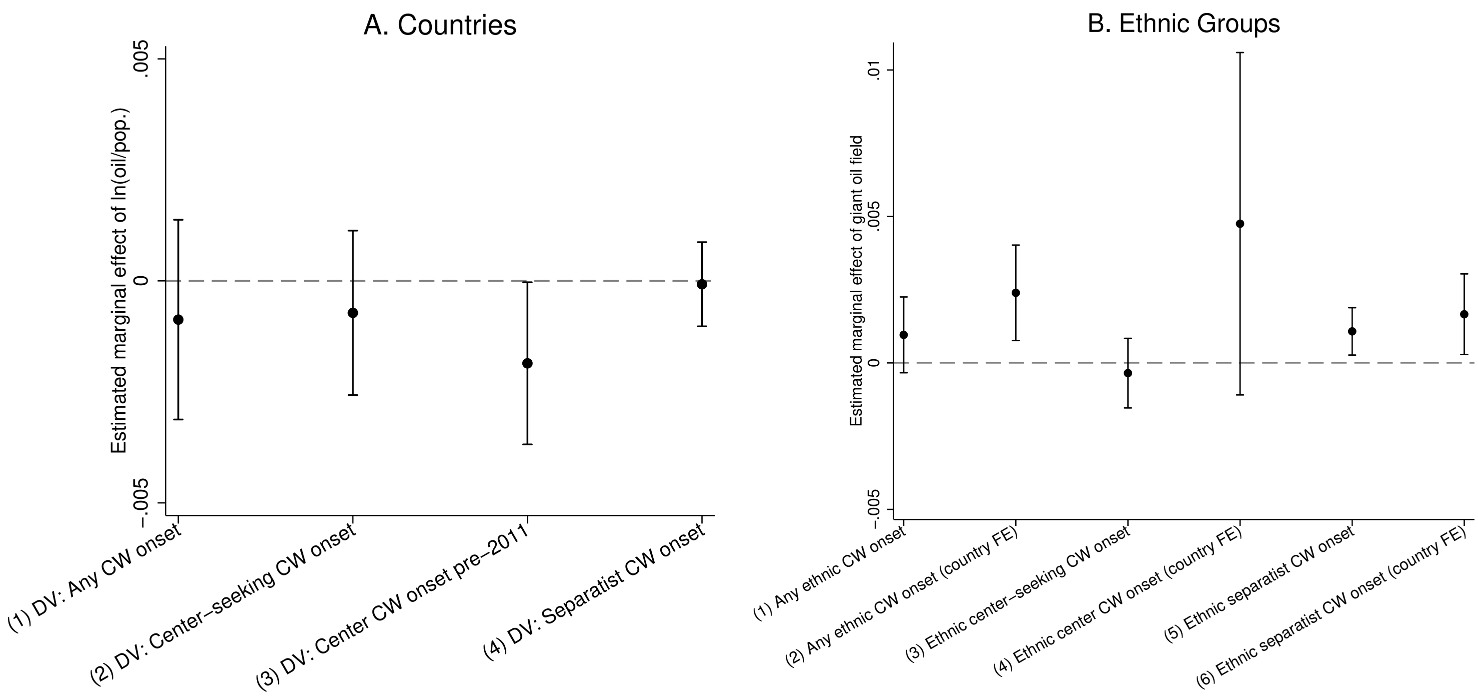
B.1 Evidence on the Mixed Oil-Conflict Relationship

Considerable research analyzes the relationship between oil production and civil war onset, producing a diversity of findings and an emerging consensus that the *aggregate* relationship is null (Ross, 2015, 251). However, studying oil highlights the importance of disaggregating civil war aims. Whereas countries with greater oil wealth tend to experience relatively few center-seeking civil wars (at least, before 2011), oil-rich ethnic groups fight separatist civil wars at elevated rates. Because existing research usually examines these patterns independently, or overlooks them by aggregating civil wars, here I present regression results that establish the motivating empirical puzzle using a common sample and dataset. The country-level specifications relate most closely to those in Paine (2016), and the ethnic group-level specifications to those in Morelli and Rohner (2015) and Hunziker and Cederman (2017). As discussed below, the civil war onset variable that I use here—which draws from Fearon and Laitin's (2003) measure—has advantages over UCDP/PRIO conflict data (used in Hunziker and Cederman 2017 and many related publications) because it uses rigorous criteria for coding civil war "onset" as well as excludes minor conflicts.

Panel A of Figure B.1 summarizes a series of logit regressions with country-years as the unit of analysis between 1946 and 2013 among 150 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; often denoted "major" civil wars), updated through 2013 along with other alterations described below. Every specification in Panel A 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. The dependent variable is any type of civil war onset in model 1, center-seeking civil war onset in models 2 and 3, and separatist civil war onset in model 4.

Empirically, almost all post-1945 civil wars enable relatively unambiguous codings about center-seeking versus separatist goals. For the present civil war variables, I combined information from Fearon and Laitin (2003) and other conflict datasets to code war aims. Only two cases yielded codings of multiple war aims for the same rebel group: the SPLM/A in Sudan, and the EPRDF and constituent groups in Ethiopia. More frequently, center-seeking and separatist civil wars occur simultaneously within the same *country*—including Angola, Burma, and India—but each *rebel group* in these conflicts pursued either center-seeking or separatist aims but not both. Below I detail how I coded civil war aims, and Section C.2 examines Sudan and Ethiopia in more depth.

Figure B.1: Correlations for Oil and Civil War



Notes: Panel A shows point estimates for the marginal effect of logged oil production on civil war onset in logit models with 95% confidence intervals. The unit of analysis is country-years. Panel B shows point estimates for the marginal effect of an indicator for giant oil/gas fields on ethnic civil war onset with 95% confidence intervals. The unit of analysis is ethnic group-years. Below I present the corresponding regression models and tables.

Model 1 of Panel A 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, model 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. Model 3 estimates the same specification prior to the Arab Spring in 2011 and shows a large-magnitude and statistically significant negative marginal effect estimate—suggesting, perhaps, a resource blessing.[25] Holding the temporal dependence controls at their means in model 3, the predicted probability of center-seeking civil onset is 1.09% in country-years with no oil production compared to 0.57% in country-years with $1,000 in oil income per capita, a 48% decline. Finally, model 4 shows no correlation for separatist civil wars.

Panel B of Figure B.1 summarizes a similar set of logit regressions, except the unit of analysis is ethnic group-years. The sample contains 763 politically relevant ethnic groups from the Ethnic Power Relations (EPR) dataset (Vogt et al., 2015), using similar country and year restrictions as Panel B. I coded the ethnic civil war data by merging Fearon and Laitin's (2003) civil war list with the EPR dataset, therefore coding "major" civil wars at the ethnic group level. I also matched EPR ethnic groups with giant oil and gas field locations, and the oil variable indicates whether the ethnic group's territory contains any giant oil or gas

[25] The theory and subsequent data analysis discuss why the Arab Spring and related events should weaken the negative relationship between oil production on center-seeking civil wars (see the empirical evaluation of Hypothesis 3). Unreported specifications show that no other estimates in Figure B.1 qualitatively differ when truncating the sample to pre-2011.

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 models 1 and 2, ethnic center-seeking onset in models 3 and 4, and ethnic separatist onset in models 5 and 6.

Models 1 and 2 of Panel B demonstrate a positive association between oil wealth and any ethnic civil war onset. The remaining columns demonstrate that only separatist civil wars robustly exhibit this relationship. In the model 5 specification, holding temporal dependence controls at their means, the annual predicted probability of separatist civil onset is 2.2 times greater for oil-rich than oil-poor groups: 0.30% versus 0.13%. 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 models 3 and 4.[26]

B.2 COUNTRY-LEVEL DATA AND REGRESSIONS (PANEL A OF FIGURE B.1)

The following details the data used to produce Panel A of Figure B.1. For countries j and years t, the regression equation for Panel A of Figure B.1 and its corresponding regression table, Table D.1, is:

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

where Y_{jt} indicates 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 calculated since the last year in a which a conflict of the specified type ended.

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).

Civil war data. The civil war data draw from Fearon and Laitin's (2003), updated through 2013. Fearon and Laitin code whether the civil war was center-seeking or separatist. I verified their coding of civil war aims with two other civil war datasets, Correlates of War (COW) and the UCDP/PRIO Armed Conflict Dataset (ACD), and additional secondary sources when necessary. This enabled assigning aims to the wars that Fearon and Laitin code as mixed or ambiguous. Most cases that they code as mixed are aggregated rebellions that contain distinct rebel groups fighting center-seeking and separatist civil wars (see, for example, the Angola example in the first paragraph of the paper), whereas I further distinguish each case by war aims. By contrast, COW or ACD code each war as *either* center-seeking or separatist, but never both. My coding scheme allows for the possibility of coding a rebellion as exhibiting both aims. However, after disaggregating Fearon and Laitin's civil war entries that contain multiple distinct rebel groups, I only coded two cases as exhibiting both aims (Ethiopia and Sudan, cases that Section C.2 describes). By contrast, in countries such as Burma (coded as mixed war aims by Fearon and Laitin), 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.

[26] Model 4 is imprecisely estimated because adding country fixed effects to the logit models drops many ethnic groups (see Table D.2). Unreported estimates from linear models do not alter the statistical significance or lack thereof in any model, but decrease the standard error estimates in model 4.

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, which often leads scholars to code the same long-running, low-intensity civil wars as multiple onsets. Paine (2016, 2019*b*) provides more details on these issues and how Fearon and Laitin's (2003) dataset improves upon these problems.

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 inputted 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). I used their data to create a per capita oil variable, and, following Ross (2012), also control for population 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, the regressions lag each of oil and gas income per capita and population by one year. 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 that meet the sample criteria discussed above are dropped because of missing data.

B.3 Ethnic Group-Level Data and Regressions (Panel B of Figure B.1)

The following details the data used to produce Panel B of Figure B.1. For ethnic groups i, countries j, and years t, the regression equation for Panel B of Figure B.1 and the corresponding regression table, Appendix Table D.2, is:

$$\ln\left(\frac{Y_{it}}{1-Y_{it}}\right) = \beta_j + \beta_O \cdot Oil_{it} + \boldsymbol{T}'_{it} \cdot \beta_T + \epsilon_{it}, \quad \text{(B.2)}$$

where Y_{it} indicates 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 calculated 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, and the odd-numbered columns contain a constant intercept.

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 2014 EPR (Update 2) dataset. The previous section discusses additional sample restrictions that are also used for the ethnic group regressions.

Civil war data. Paine (2019*b*) assigns civil wars from Fearon and Laitin's (2003) dataset to EPR ethnic groups in Sub-Saharan Africa, and discusses the advantages of this procedure over existing codings of civil war at the ethnic group level based on translating the ACD's incidence data into onsets. I extended Paine's

(2019*b*) coding for the global sample used here. As discussed above for the country-level data, rebelling ethnic groups have almost always articulated clear aims for either the center or to separate, with Ethiopia and Sudan providing the only exceptions.

Oil data. The oil variable indicates whether the EPR ethnic group has any onshore or offshore giant oil/gas fields. Onshore means that the giant oil field lies with the group's spatial location polygon, and offshore means that the giant oil field is in water within 250 kilometers of a segment of the group's location polygon (assuming the polygon touches the relevant coast) and is within the maritime boundaries for the country in which the group resides. 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). A giant oil field contains ultimate recoverable reserves of at least 500 million barrels of oil equivalent before extraction began. Because the source provides data on when the field was initially discovered (with no missing data), the oil variable can vary over time for ethnic groups. To calculate the variable, I combined the giant oilfield variable with EPR spatial data from GeoEPR (Vogt et al., 2015) and maritime boundary spatial data from Flanders Marine Institute (2016). Section D.2 discusses differences between onshore and offshore oil.

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, having even a single giant oil field should be sufficient to trigger the oil mechanisms posited in the theory.

B.4 Conditional Results for Separatist Civil Wars (Figure 7)

Sample. The sample differs slightly from that in Panel A of Figure B.1. Because Figure 7 focuses only on separatist civil wars, it excludes ethnic groups without a concentrated territory to minimize heterogeneity in the estimates. The absence of geographic concentration nearly perfectly predicts the absence of separatist, but not center-seeking, civil wars (author's calculation using Ethnic Power Relations dataset, details available upon request).

The conditioning factors examined in Figure 7 are measured as follows.

Excluded minorities. Minorities are groups that EPR codes as composing less than 50% of their country's population. An ethnic group is coded as excluded from political power in a particular year 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 2 uses the same ethnopolitical 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. I coded an indicator for EPR ethnic groups that reside in territory that is noncontiguous from the country's capital.

Regression equation. For ethnic groups i, countries j, and years t, the regression equation for Columns 2 and 3 of Table D.3 is:

$$\ln\left(\frac{Y_{it}}{1-Y_{it}}\right) = \beta_0 + \beta_O \cdot Oil_{it} + \beta_C \cdot Cond_{it} + \beta_{OC} \cdot Oil_{it} \cdot Cond_{it} + \boldsymbol{T}'_{it} \cdot \beta_T + \epsilon_{it}, \qquad \text{(B.3)}$$

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

B.5 Conditional Results for Center-Seeking Civil Wars (Figure 8)

The government vulnerability variable used in Figure 8 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 condition 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 (coded by author).
- *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 D.4 is:

$$\ln\left(\frac{Y_{jt}}{1-Y_{jt}}\right) = \beta_0 + \beta_O \cdot ln(oil/pop)_{jt} + \beta_V \cdot V_{jt} + \beta_{OV} \cdot ln(oil/pop)_{jt} \cdot V_{jt} + \beta_P \cdot ln(pop)_{jt} + \boldsymbol{T}'_{jt} \cdot \beta_T + \epsilon_{jt}, \qquad \text{(B.4)}$$

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

C Extensions to Formal Model

C.1 Large Prize of Winning

Another argument from the literature is that oil production contributes to civil war by creating a *large prize of winning*. For example, Collier and Hoeffler (2005, 44) proclaim that one of two major reasons that natural resources might be a powerful risk factor for civil wars is "the lure of capturing resource ownership permanently if the rebellion is victorious." Laitin (2007, 22) proclaims: "If there is an economic motive for civil war in the past half-century, it is in the expectation of collecting the revenues that ownership of the state avails, and thus the statistical association between oil (which provides unimaginably high rents to owners of states) and civil war." Contest function models such as Garfinkel and Skaperdas (2006) and Besley and Persson (2011, ch. 4) also show that larger spoils increase equilibrium fighting likelihood.

I can easily assess these claims with a simple alteration of the model. Assume economic production in each region is $Y_i > 0$, for $i \in \{G, C\}$, replacing the assumption from the core model that production equals 1. Also assume that an increase in oil production O_i strictly increases Y_i. This extension produces mechanisms identical to the revenue effect and predation effect from the core model—implying that, contrary to existing arguments, a larger prize does not unambiguously raise prospects for equilibrium conflict.

In this extension, the equilibrium budget constraint changes from Equation 19 to:

$$B^*(Y_i) \equiv \underbrace{(1-e_G)\cdot Y_G + (1-e_C)\cdot Y_C}_{\approx \text{ Revenue effect}} - m_G^* - x^* \geq 0, \tag{C.1}$$

with the corresponding equilibrium interior transfer amount changing from Equation 17 to:

$$x^*(m_G^*, Y_i) \equiv \frac{\delta}{1-\delta}\cdot\Bigg[\mu^*\cdot\underbrace{p_c(m_G^*)\cdot(1-\theta)\cdot\Big[(1-e_G)\cdot Y_G + (1-e_C)\cdot Y_C\Big]}_{\text{Predation effect (center-seeking)}}$$
$$+ (1-\mu^*)\cdot\underbrace{p_s(m_G^*)\cdot\Big[(1-\theta)\cdot(1-e_C)\cdot Y_C - \theta\cdot(1-e_G)\cdot Y_G\Big]}_{\text{Predation effect (separatist)}}\Bigg] \tag{C.2}$$

It is straightforward to see from these two equations that taking the derivative with respect to Y_i would produce mechanisms identical to the revenue effect and to the predation effect in the core model. Therefore, parameterizing production yields the same insights as the core model, contrary to existing arguments that the spoils of predation effect of oil should unambiguously cause civil war.

C.2 Evolving Civil War Aims

For simplicity, the model assumes that civil wars last a single period and that civil war aims are fixed throughout this one-period conflict. However, it is also of interest to understand why rebels might change civil war aims during a conflict. Considering how the model could account for this phenomenon (which has occurred in Ethiopia and Sudan) while also acknowledging its empirical rarity may provide deeper insights into civil war aims and open new questions for future research.

C.2.1 Setup

Consider a setup with the following alterations from the core model:

- If C initiates either type of civil war in period 1, then with probability $\kappa \in (0,1)$, the war stalemates after the first period. If this occurs, then C chooses civil war aims in period 2. This is the only strategic move in period 2 if a non-decisive war occurs in period 1, and no negotiated settlement is possible if the war stalemates. The possible war outcomes in period 2 are identical to those in the baseline model, that is, the war necessarily ends after period 2.
- C's group size $m_{C,t}$ is a function of time. It begins the game with $m_{C,1} > 0$. If C does not fight in period 1 or if the war is decisive after period 1, then $m_{C,t} = m_{C,1}$ for all t. If instead C fights and the war stalemates, then Nature chooses $m_{C,2}$ from a Bernoulli distribution: $m_{C,\text{low}} > 0$ with probability $q \in (0,1)$ and $m_{C,\text{high}} > m_{C,\text{low}}$ with probability $1-q$. This parameter cannot change again in any future period, that is, for any period $z > 2$, $m_{C,z} = m_{C,2}$. The Ethiopia and Sudan cases below interpret changes in group size as alliances formed (or not formed) among multiple ethnic groups during a war to try to capture the center.
- The probability of C winning either type of civil war is a function only of $m_{C,t}$, and G does not make an arming choice. Therefore, I will denote C's contest functions as $p_c(m_{C,t})$ and $p_s(m_{C,t})$. The following logic does not depend on G's arming decision, and therefore this simplification enables focusing on the core mechanism of interest.

C.2.2 Analysis

Lemma C.1 restates Lemma 1 for the special case considered here in which G's military capacity is exogenous.

> **Lemma C.1.** *Small groups' optimal civil war aims are separatist and large groups' optimal civil war aims are center-seeking. Formally, there exists a unique threshold $\tilde{m}_C \in (0,1)$ such that:*
>
> ***Part a.*** *If $m_C < \tilde{m}_C$, then C's preferred civil war aims are separatist.*
>
> ***Part b.*** *If $m_C > \tilde{m}_C$, then C's preferred civil war aims are center-seeking.*
>
> *This threshold is implicitly defined as:*
>
> $$p_c(\tilde{m}_C) = \pi_s \cdot p_s(\tilde{m}_C)$$

If a war occurs and stalemates after period 1, then C chooses civil war aims in period 2. Its expected utility functions are:

$$E\big[U_C(\text{center}, m_{C,2})\big] = 1 - e_C + \delta \cdot \Big[p_c(m_{C,2}) \cdot V^C_{\text{center}} + \big[1 - p_c(m_{C,2})\big] \cdot V^C_{\text{s.q.}}\Big] \tag{C.3}$$

$$E\big[U_C(\text{separatist}, m_{C,2})\big] = 1 - e_C + \delta \cdot \Big[p_s(m_{C,2}) \cdot V^C_{\text{sep}} + \big[1 - p_s(m_{C,2})\big] \cdot V^C_{\text{s.q.}}\Big], \tag{C.4}$$

for the future utility values presented in the setup for the baseline model (recall for this extension that fighting is necessarily decisive in period 2). The only necessary alteration is to rewrite m_C as $m_{C,t}$ in those functions. Because this structure is identical to that in the core model, Lemma C.1 characterizes C's optimal civil war aims. Assumption C.1 focuses the analysis on the substantively interesting parameter range in which there is a positive probability of C proclaiming either center-seeking $\big(\text{if } m_{C,2} = m_{C,\text{high}}\big)$ or separatist civil war aims $\big(\text{if } m_{C,2} = m_{C,\text{low}}\big)$ following a stalemate in period 1.

Assumption C.1. $m_{C,low} < \tilde{m}_C < m_{C,high}$

Given the Nature draw of $m_{C,2}$, C's expected continuation value if the war stalemates is:

$$V^C_{\text{stale}} = 1 - e_C + \delta \cdot \Big\{ q \cdot \Big[p_c(m_{C,\text{high}}) \cdot V^C_{\text{center}} + \big[1 - p_c(m_{C,\text{high}})\big] \cdot V^C_{\text{s.q.}} \Big] + (1-q) \cdot \Big[p_s(m_{C,\text{low}}) \cdot V^C_{\text{sep}} + \big[1 - p_s(m_{C,\text{low}})\big] \cdot V^C_{\text{s.q.}} \Big] \Big\} \tag{C.5}$$

This, in turn, enables writing C's expected utility to its three choices in period 1. Note that its utility to accepting is unchanged from the core model.

$$E\big[U_C(\text{accept } x; m_{C,1}, \theta)\big] = 1 - e_C + x + \delta \cdot V^C_{s.q.} \tag{C.6}$$

$$E\big[U_C(\text{center}; m_{C,1}, \theta)\big] = 1 - e_C + \delta \cdot \Big\{ \kappa \cdot \Big[p_c(m_{C,1}) \cdot V^C_{\text{center}} + \big[1 - p_c(m_{C,1})\big] \cdot V^C_{\text{s.q.}} \Big] + (1-\kappa) \cdot V^C_{\text{stale}} \Big\} \tag{C.7}$$

$$E\big[U_C(\text{separatist}; m_{C,1}, \theta)\big] = 1 - e_C + \delta \cdot \Big\{ \kappa \cdot \Big[p_s(m_{C,1}) \cdot V^C_{\text{sep}} + \big[1 - p_s(m_{C,1})\big] \cdot V^C_{\text{s.q.}} \Big] + (1-\kappa) \cdot V^C_{\text{stale}} \Big\} \tag{C.8}$$

Combining Equations C.7 and C.8 shows that the possibility of stalemates does not alter C's calculus for preferring center-seeking over separatist because V^C_{stale} and κ cancel out. Therefore, Lemma C.1 characterizes C's optimal civil war aims in period 1, with $m_C = m_{C,1}$.

Equation C.9 implicitly defines the equilibrium transfer proposal, $x^*(\theta)$. This expression can be algebraically rearranged to resemble Equation 17, with the difference that it contains additional terms for the possibility of a stalemate.

$$E\big[U_C(\text{accept } x^*(\theta); m_{C,1}, \theta)\big] = \max\Big\{ E\big[U_C(\text{center}; m_{C,1}, \theta)\big], E\big[U_C(\text{separatist}; m_{C,1}, \theta)\big] \Big\} \tag{C.9}$$

Rather than analyze all possible cases, I highlight the two cases in which C switches civil war aims in equilibrium. As in the baseline model, low θ is necessary to cause C to initiate either type of war.

Proposition C.1. *There exists a unique threshold $\tilde{\theta} < 1$ such that if $\theta > \tilde{\theta}$, then $x^*(\tilde{\theta}) < R$. If $\theta < \tilde{\theta}$, then:*

> ***Switch from separatist to center-seeking.*** *Assume $m_{C,1} < \tilde{m}_C$, and that Nature chooses the war to stalemate after period 1 and chooses $m_{C,2} = m_{C,high}$. Then C initiates a separatist civil war in period 1 and switches to center-seeking aims in period 2.*

Switch from center-seeking to separatist. *Assume $m_{C,1} > \tilde{m}_C$, and that Nature chooses the war to stalemate after period 1 and chooses $m_{C,2} = m_{C,low}$. Then C initiates a center-seeking civil war in period 1 and switches to center-seeking aims in period 2.*

C.2.3 Application to Empirical Cases

In Ethiopia, rebel groups switched from separatist to center-seeking aims several years before the conflict ended. Between the 1960s and 1980s, Ethiopia experienced separatist rebellions over seven different regions. Four of these generated at least 1,000 battle deaths before 1991: Tigray, Eritrea, Ogaden (Somali), and Oromiya (Oromo). According to the Armed Conflict Database, various rebel groups also harbored center-seeking aims in the 1980s. After over a decade of fighting in various regions, the wars changed decisively in 1989 when TPLF (a rebel group that proclaimed ethnic aims and primarily recruited from ethnic Tigray, 6% of population) joined forces with EPDM (Amhara, 28%) and OPDO (Oromo, 29%) to form the Ethiopian People's Revolutionary Democratic Front (EPRDF) that sought to overthrow the government.[27] The EPRDF also launched joint operations with EPLF (Eritrea, 6%), which retained separatist aims. EPRDF captured Addis Ababa in 1991, and EPLF gained territorial control over Eritrea and voted to secede in 1993.

The model does not attempt to explain how these disparate groups achieved unified organization. However, merging together distinct separatist movements to create a large center-seeking movement corresponds with an increase in $m_{C,t}$ between periods 1 and 2, assuming that actions during the war (in Ethiopia, major government losses in 1988; Dixon and Sarkees 2015, 638) engendered a coalition that was not possible at the outset of the war, and also substantiating the relevance of having Nature draw $m_{C,2}$. These major government losses also could have presumably facilitated various regions to gain autonomy or independence, but the larger prize of capturing the center assumed in the model explains why groups would take the center if feasible.

Sudan's second civil war provides an opposite case of switching war aims: a center-seeking rebel group accepted a peace agreement that called for regional autonomy. Prior to the beginning of the second civil war in 1983, Sudan experienced a separatist conflict between 1963 and 1972 in which several different southern ethnic groups participated. Despite this legacy of separatism, when conflict began in the 1980s, war aims differed. John Garang formed the largest rebel group, SPLM/A, and a quote from the 1980s articulates his clear aims for the center: "I would like to reiterate that the SPLA/SPLM is a genuine Sudanese movement that is not interested in concessions for the south, but a movement that is open to all people of the Sudan to join and participate in the building of a new and democratic Sudan" (quoted in Roessler, 2016, 115-116). Early phases of the second civil war can be conceived as period 1 in the model. Yet despite these clear center-seeking aims, SPLM-Garang signed a peace agreement with the Sudanese government in 2005 (period 2) that yielded self-determination for the African south, with a distinct Arab and Muslim government in the north. South Sudan gained independence in 2011 following an earlier referendum.[28]

A plausible explanation for changed civil war aims is that in period 1, Garang expected his appeal to broad Sudanese aims to correspond with an increase in $m_{C,t}$ during the conflict, but instead the realization of $m_{C,2}$ was $m_{C,\text{low}}$ rather than $m_{C,\text{high}}$. Why was Garang's expectation at the outset of the war reasonable?

[27] Note that other members of Amhara controlled the government, and the Armed Conflict Database codes EPDM as center-seeking in the 1980s.

[28] This case also features further complications in war aims, as competing rebel groups or SPLM/A factions articulated separatist aims. Dixon and Sarkees (2015, 390-394) provide additional details.

Not only did the mostly African south broadly harbor sharp distaste toward the Arab-dominated Khartoum government, but "[i]n terms of marginalization, Arab groups outside of the Nile River Valley are more similar in terms of their material conditions to non-Arab groups in the periphery than riverain Arabs [the ruling group]" (Roessler, 2016, 117)—creating reasonable expectations that a broadly based rebellion could attract widespread support. However, Roessler (2016, 117) states that "since the war was nationalized in the 1980s, almost all of Sudan's rebel movements have come predominantly from 'African groups' ... In contrast, members of 'Arab groups' have tended to stay on the sidelines or have pre-dominantly fought in pro-government militias." He states that SPLM failed to overcome the government's relatively dense information networks among Arab groups, despite seemingly similar economic incentives to rebel as the south. In-fighting among southern groups further exacerbated organizational difficulties.[29] After two decades of deadly fighting with complicated coalitions among different rebel groups and fluctuating international support, Garang may have concluded that he would not be able to muster significant support to capture the capital, and instead settled for regional concessions. In fact, Garang proclaimed that the comprehensive peace agreement of 2005 yielded a "New Sudan," but the agreement lacked provisions that could have generated true national integration (Young, 2005).

Ethiopia and Sudan are exceptional cases. No other intra-state war in my dataset is classified as containing dual civil war aims. Although some countries feature simultaneous center-seeking and separatist conflicts, distinct rebel groups proclaim different rebellion aims. Other civil wars also involve complicated alliances among disparate rebel groups—for example, see Christia's (2012) discussion of alliance formation in Afghanistan—but few of these alliances mix groups with center-seeking and separatist aims.

This model extension provides insight into why rebel groups rarely either switch war aims or harbor both. Ethiopia combined two rare conditions. First, multiple regions experienced both the motivation and opportunity for rebellion, creating numerous separatist groups, as opposed more typical separatist cases in which only a single separatist movement exists. Second, these separatist groups were able to overcome organizational hurdles to combine forces, as opposed to cases like India where the geographical challenges of coordinating disparate rebel movements alone would seem to be insurmountable. Sudan also featured a relatively large coalition of different ethnic groups (36% of the population, as footnote 29 states) that, through shared pre-colonial and colonial history, composed a politically coherent region (South Sudan). John Garang and rebel factions could draw on the legacy of the earlier separatist movement, while Garang could also plausibly gamble that he could muster enough support to take the center. By contrast, most groups that constitute a geographically concentrated territory are too small to contemplate taking the center. Conversely, many center-seeking rebel groups lack a coherent territory that could form the basis for a new state (either in terms of ethnic geographic concentration or historical roots) as a fall-back option if their campaign to take the capital stagnates.

C.3 Does Oil Production Influence Civil War Aims?

In the baseline model, C prefers to win a center-seeking rather than separatist civil war because it gains perpetual revenues from the central region in addition to protecting all the spoils from its own region. The following alteration to the setup creates the possibility that an oil-rich C would prefer to win a separatist rather than center-seeking civil war. Now, a victorious C needs to transfer spoils to the deposed governing actor. This is a relevant consideration not only for thinking more deeply about strategic causes of civil war aims, but also for addressing a possible alternative explanation for the mixed oil-conflict pattern: separatist civil wars in oil-rich regions substitute for center-seeking civil wars that would have occurred if secession

[29] Collectively, the six ethnic groups that ACD2EPR codes as involved in SPLM composed 36% of the population: 6% Beja, 10% Dinka, 5% Nuba, 5% Nuer, 9% Other Southern groups, and 1% Shilluk.

was not possible. However, combining the theoretical logic with empirical evidence casts doubt on this possibility.

C.3.1 Setup

Consider a setup with the following alterations to the baseline model:

- In the baseline model, C ends any interaction with the former governing actor if it wins either type of civil war. I continue to assume this is true for victorious secession, but not for winning a center-seeking civil war. Instead, I assume that a successful center-seeking war simply increases share of spoils that C retains from its own region and that it collects from G's region in every period. Denote θ from the baseline model as $\theta_{\text{s.q.}}$, and assume that winning a center-seeking civil war increases this parameter to $\theta_{\text{center}} \in \big(\theta_{\text{s.q.}}, 1\big)$. Implicitly, the baseline model assumes $\theta_{\text{center}} = 1$, whereas now I assume that C must provide some spoils to the former governing actor if they remain together in the same country.
- For simplicity, I assume that the probability that C wins either type of civil war is fixed at $p \in (0, 1)$. Correspondingly, G's only strategic choice is a transfer amount, and it does not invest in the military. This simplification enables isolating the main finding that arises from changing the structure of C's consumption following a center-seeking victory.

C.3.2 Analysis

C's expected utility to each of its three options has the same structure as Equations 11, 12, and 16. The continuation values $V^C_{\text{s.q.}}$ and V^C_{sep} are also the same as in the baseline model, except replacing θ with $\theta_{\text{s.q.}}$. The only different term is:

$$(1-\delta) \cdot V^C_{\text{center}} = 1 - \big(1 - \theta_{\text{center}}\big) \cdot \big(1 - e_C\big) + \theta_{\text{center}} \cdot \big(1 - e_G\big), \tag{C.10}$$

whereas previously this amount was $2 - e_G - e_C$. Given the motivating substantive question I want to address in this extension—does oil production cause separatist civil wars to substitute for center-seeking civil wars?—I focus on parameter values in which C prefers to fight either type of civil war rather than accept G's offer in period 1. That is, a civil war will occur in equilibrium, and the question is what its aims will be. Hence, I impose the following condition:

$$\frac{\delta}{1-\delta} \cdot p \cdot \min\left\{ \big(\theta_{\text{center}} - \theta_{\text{s.q.}}\big) \cdot (2 - e_C - e_G),\ \ (1 - \theta_{\text{s.q.}}) \cdot (1 - e_C) - \theta_{\text{s.q.}} \cdot (1 - e_G) \right\} > 2 - e_G \tag{C.11}$$

In the baseline model, if C faces the same probability of winning for center-seeking and separatist civil wars, then it prefers center-seeking. However, this may not be true in the present extension. Separating enables C to consume all production from its territory, whereas it has to share some of these resources with G if it captures the center (unlike in the baseline model). C prefers separatism to center-seeking if and only if production in its region is sufficiently easy to tax, which increases the opportunity cost of remaining in the same country as G. The preceding equations show that the inequality is:

$$e_C < 1 - \frac{\theta_{\text{center}}}{1 - \theta_{\text{center}}} \cdot \big(1 - e_G\big) \tag{C.12}$$

High regional oil production corresponds with parameter values in which Equation C.12 holds because of the assumption from the baseline model that e_C strictly decreases in O_C. Proposition C.2 presents the main result.

Proposition C.2. *Assume that Equation C.11 holds. There exists a unique threshold $\tilde{e}_C$ such that if $e_C < \tilde{e}_C$, then a separatist civil war occurs in equilibrium; if and if $e_C > \tilde{e}_C$, then a center-seeking civil war occurs in equilibrium.*

Under the conditions stated in Proposition C.2, oil production causes separatist civil wars to substitute for center-seeking civil wars. If C's region does not produce oil, then we would observe a center-seeking civil war in equilibrium; but if it produces oil, we would instead observe a separatist civil war.

C.3.3 Application to Empirical Cases

Can Proposition C.2 explain empirical cases? This seems unlikely. Based on the national population shares of oil-rich groups that have fought separatist civil wars, they were unlikely to have sought the center in the absence of oil wealth. Of the seventeen wars listed in Panel A of Figure 7, only six involve fighting by groups with at least 10% of their national population share, and all but one are below the rough threshold in Figure 1 of 25% below which groups are more likely to secede than to seek the center. Furthermore, anecdotal considerations about the three largest groups in Panel A of Figure 7 suggest that seeking the center was not a viable option—or, at least, historical precedents favored secession. In addition to Yemen's southerners, discussed in the text, Nigeria's southeast region (Igbo) was governed as a separate territory from the north (which controlled the state at independence) for much of the colonial era, and Mosul (Kurds) composed a separate Ottoman province from Baghdad prior to Britain colonizing and creating Iraq. Also important for limiting center-seeking possibilities, 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 to constructing durable political organizations suggests that they could more easily fight in the mountains rather than organize an attack on the capital.

D SUPPLEMENTAL EMPIRICAL APPENDIX

D.1 REGRESSION TABLES FOR APPENDIX B

Table D.1: Regression Table for Panel A of Figure B.1

Dependent variable:	All CW onset	Center CW onset	Center CW onset	Sep CW onset
	(1)	(2)	(3)	(4)
ln(Oil & gas p.c.)	-0.000873	-0.000721	-0.00186**	-7.65e-05
	(0.00115)	(0.000945)	(0.000932)	(0.000483)
ln(Population)	0.0630***	0.0268***	0.0249***	0.0290***
	(0.0126)	(0.00801)	(0.00801)	(0.00588)
Country-years	6,416	6,828	6,411	6,906
Countries	150	150	149	150
Time controls?	YES	YES	YES	YES
Sample	Full	Full	Pre-2011	Full

Notes: Table D.1 estimates Equation B.1. It summarizes a series of logit regressions with country-clustered standard error estimates. The coefficient estimates are semi-elasticity marginal effects (because oil is logged) evaluated at coefficient means. 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. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table D.2: Regression Table for Panel B of Figure B.1

Dependent variable:	All CW onset		Center CW onset		Separatist CW onset	
	(1)	(2)	(3)	(4)	(5)	(6)
Giant oil/gas field	0.000957	0.00239***	-0.000349	0.00475	0.00108***	0.00166**
	(0.000660)	(0.000832)	(0.000606)	(0.00298)	(0.000412)	(0.000703)
Ethnic group-years	30,741	16,965	31,519	6,035	30,984	13,817
Ethnic groups	762	398	763	168	762	293
Country FE?	NO	YES	NO	YES	NO	YES
Time controls?	YES	YES	YES	YES	YES	YES

Notes: Table D.2 estimates Equation B.2. It summarizes a series of logit regressions with ethnic group-clustered standard error estimates. The coefficient estimates are the marginal effects evaluated at coefficient means. The dependent variable in each column is ethnic 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 ethnic group, and a lagged country-level civil war incidence variable. The unit of analysis is ethnic group-years. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table D.3: Regression Table for Figure 7

	DV: Separatist civil war onset		
	(1)	(2)	(3)
Giant oil/gas field	0.821***	0.208	0.280
	(0.304)	(0.775)	(0.727)
Excluded minority		1.114***	
		(0.367)	
Giant oil/gas field*Excluded minority		0.875	
		(0.828)	
Favorable geography			0.781**
			(0.328)
Giant oil/gas field*Favorable geography			0.591
			(0.794)
Ethnic group-years	24,552	24,552	24,552
Ethnic groups	599	599	599
Country FE?	NO	NO	NO
Time controls?	YES	YES	YES
	Marginal effects		
Giant oil/gas field, unconditional	0.00161**		
	(0.000654)		
Giant oil/gas field| Excluded minority		0.00451**	
		(0.00206)	
Giant oil/gas field | Included and/or majority		0.000176	
		(0.000703)	
Giant oil/gas field | Favorable geography			0.00311*
			(0.00168)
Giant oil/gas field | Unfavorable geography			0.000333
			(0.000958)

Notes: Table D.3 estimates Equation B.3. It summarizes a series of logit regressions by presenting the coefficient estimates for the substantive variables, with 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. The bottom of the table reports marginal effect estimates for different values of the conditioning variables, evaluated at coefficient means $***p < 0.01$, $**p < 0.05$, $*p < 0.1$.

Table D.4: Regression Table for Figure 8

	DV: Center-seeking CW onset	
	(1)	(2)
ln(Oil & gas p.c.)	-0.0345	-0.163**
	(0.0457)	(0.0691)
Vulnerable		0.465
		(0.363)
ln(Oil & gas p.c.)*Vulnerable		0.250***
		(0.0894)
ln(Population)	0.187***	0.209***
	(0.0536)	(0.0560)
Country-years	6,828	6,828
Countries	150	150
Time controls?	YES	YES
	Marginal effects	
ln(Oil & gas p.c.), unconditional	-0.000721	
	(0.000945)	
ln(Oil & gas p.c.) | Vulnerable=0		-0.00242***
		(0.000921)
ln(Oil & gas p.c.) | Vulnerable=1		0.00358*
		(0.00217)

Notes: Table D.4 estimates Equation B.4. 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. The bottom of the table reports semi-elasticity marginal effects (because oil is logged) for different values of the conditioning variables, evaluated at coefficient means (note that the marginal effect estimate in Column 1 is identical to that in Column 2 of Table D.1).***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

D.2 Rebel Finance Theories and Evidence for Onshore/Offshore Oil

One important theme in recent research on the resource curse is that the within-country location of oil production affects prospects for conflict (Ross, 2015, 251). My theory offers a nuanced implication for the importance of oil location: oil production is likely to trigger separatist conflict if located in a region with a politically excluded minority group. However, oil production is unlikely to trigger center-seeking civil wars, regardless of within-country location. Groups that prefer center-seeking over separatist aims usually have political representation in the central government, which reduces the magnitude of the predation effect of oil production.

By contrast, existing research on the geography of oil wars posits a distinct mechanism about rebel finance. Many argue that oil located near potential rebel groups makes conflict likely by providing rebels with an opportunity to steal oil production to finance their rebellion (Lujala, 2010; Ross, 2012). There are indeed some cases, such as ISIS in Iraq and Syria, and the Niger Delta in the 2000s, in which this occurred. However, these exceptional cases aside, rebel groups have rarely engaged in large-scale looting of oil production to finance an insurgency (Paine, 2016, 2019*a*). Instead, my theory incorporates the better substantively grounded premise that governments control the preponderance of oil revenues (Colgan, 2015, 8), which follows from the core properties of oil production such as high capital-intensity and fixed location that facilitate easy taxation (Le Billon, 2005, 34).

One observable implication that distinguishes mine from existing theories is based on distinguishing onshore and offshore oil production. The present theory suggests that this distinction should not matter. If a politically excluded minority group could claim certain oil fields conditional on seceding, then the existence of this oil—regardless of whether the fields are onshore or offshore—makes separatist civil war more likely by creating distributional grievances. By contrast, existing location theories anticipate that groups with offshore oil production only should not rebel more frequently than oil-poor groups because offshore oil is very difficult to loot (Lujala, 2010; Ross, 2012).

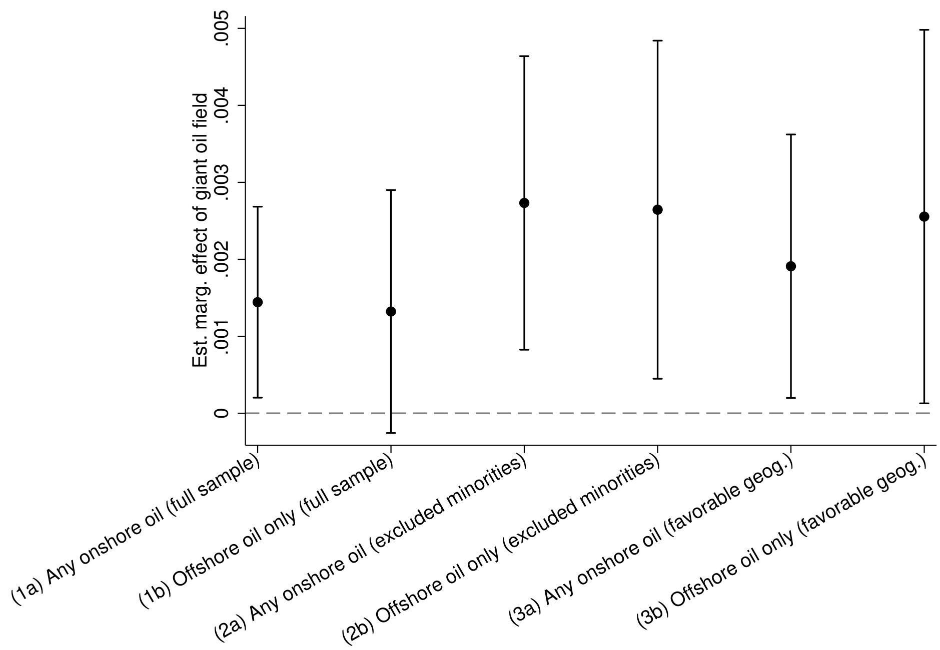
Here, I show empirically that offshore oil production is indeed positively correlated with separatist civil war onset—in fact, the estimates are very similar to those for onshore oil. Specifically, I re-run the specifications used to assess Hypotheses 1 and 2 while distinguishing ethnic groups with offshore oil production only from those with onshore or mixed production (Section B.3 describes how I coded onshore and offshore oil). However, because there are few groups with only offshore oil production, the offshore correlation is based on a small number of cases. The discussion below of Angola provides a plausibility probe using a specific case (Section D.3).

The regression equation for Figure D.1 and Table D.5 is:

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

where β_N is the coefficient estimate for onshore oil and β_F is the coefficient estimate for offshore oil.

Figure D.1: Figure 7 with Disaggregated Onshore and Offshore Oil



Notes: Figure D.1 presents point estimates and 95% confidence intervals for a series of logit regressions described in Equation D.1, and Table D.5 provides the corresponding regression table. The dependent variable is separatist civil war onset, and the unit of analysis is ethnic group-years.

In Figure D.1 and Table D.5, Column 1 uses the same sample as in Figure 7, and Columns 2 and 3 consider more theoretically relevant samples by subsetting the data, respectively, to either excluded minorities (Hypothesis 1) or favorable separatist geography (Hypothesis 2). 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, and in the full sample-specification (Column 1) the p-value for offshore oil is 0.101. However, an important caveat for interpreting the results in Figure D.1 is that separatist civil war in oil-rich territories (onshore or offshore) is itself a rare event, 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 Figure 7). Therefore, although civil wars have occurred relatively more frequently in offshore oil-rich territories than in oil-poor territories (0.7% of group-years compared to 0.3% among excluded minorities), the offshore oil correlation is based on a small number of "positive-positive" cases.

Table D.5: Regression Table for Figure D.1

	DV: Separatist civil war onset		
	(1)	(2)	(3)
Giant onshore oil field	0.00144**	0.00273***	0.00191**
	(0.000633)	(0.000973)	(0.000873)
Giant offshore oil field (only)	0.00132	0.00264**	0.00255**
	(0.000805)	(0.00112)	(0.00124)
Ethnic group-years	24,552	14,824	14,692
Ethnic groups	488	355	280
Time controls?	YES	YES	YES
Sample	Full	Excluded minorities	Favorable geography

Notes: Table D.5 estimates Equation D.1. 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. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

D.3 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. Yet 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 asserted military dominance over the modern territory of the Saudi state that spans the Arabian peninsula. This included capturing eastern Arabia in 1913, which produces the bulk of the country's oil. 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 a large percentage 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).

The theory also provides insight into a deviant aspect of Saudi Arabia: no major separatist civil wars in its 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

Figure 7—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 created 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.

Angola's Cabinda province is another typical case in which an exploited oil-rich minority group with favorable geography launched a separatist civil war. This is consistent with Hypotheses 1 and 2. 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), supporting Hypothesis 1. 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). These failed promises support the presumption 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.).

Cabinda also features favorable geography for rebellion (Hypothesis 2) due to its territorial separation from mainland Angola, and Portugal governed Cabinda as a largely 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). 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 its activities in response to intensification of the government's center-seeking war fought in a different part of the country (Porto, 2003, 5), therefore attacking a vulnerable government.

Another intriguing aspect of the Cabinda case is that nearly all its oil is produced offshore (Le Billon 2007, 106; Porto 2003, 4), consistent with the findings in Figure D.1. 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).

Regarding a deviant aspect of the case, Angola was relatively oil-rich at independence, at $543 in oil income per capita, but experienced a center-seeking war. Hypothesis 3 anticipates this outcome because Angola met one of the government vulnerability conditions at independence. 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. Thus, although by convention Angola is coded as experiencing a civil war "onset" in 1975, it was really a continuation of an ongoing decolonization war that the government, despite its oil wealth, was largely powerless to stop.

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