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The Tyranny of Supply: Natural Resources and Rebel Territorial Control in Civil Conflicts

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The logic of territorial control is central to the study of internal conflict. Existing studies consider the consequences of territorial control without answering a critical question: what motivates rebel territorial control in the first place? Territorial control requires careful explanation. While it confers important benefits it is also costly to achieve and exposes rebels to state attack. This paper argues that benefits exceed costs when territorial control provides rebels with a reliable source of organizational supply. High-value lootable natural resources—resources available in abundance that are easy to extract and transport for sale—represent key components of a rebel's supply chain. To test the theory's implications, we introduce new cross- and subnational time-series data on territorial control in sub-Saharan Africa and couple it with a new dataset of local natural resource values. We use an instrumental variable approach to address core endogeneity concerns. Results both substantiate our theoretical approach and provide evidence running contrary to existing arguments. These findings demonstrate that valuable natural resources, logistical supply constraints, and, more broadly, rebel military strategy, are critically important and need to be incorporated into work on civil war, territorial control, and rebel governance.

La lógica del control territorial es de gran importancia para el estudio del conflicto interno. Los estudios existentes consideran las consecuencias del control territorial, pero no responden una pregunta importante: ¿qué es lo que motiva el control territorial por parte rebelde en primer lugar? El control territorial requiere una explicación cuidadosa. Si bien este conlleva importantes beneficios, también es costoso de lograr y expone a los rebeldes a ataques por parte del Estado. Este artículo argumenta que los beneficios exceden a los costes cuando el control territorial proporciona a los rebeldes una fuente fiable de suministro organizacional. Los recursos naturales de alto valor que pueden ser saqueados, es decir, aquellos recursos disponibles en abundancia que son fáciles de extraer y transportar para su venta, representan componentes clave de la cadena de suministro de un grupo rebelde. Con el fin de poner a prueba las implicaciones que tiene esta teoría, presentamos nuevos datos de series temporales transnacionales y subnacionales sobre el control territorial en el África subsahariana y los combinamos con un nuevo conjunto de datos que incluye los valores de los recursos naturales locales. Utilizamos un enfoque de variable instrumental con el fin de abordar las preocupaciones principales en materia de endogeneidad. Los resultados corroboran nuestro enfoque teórico y también proporcionan evidencia contraria a los argumentos ya existentes. Estas conclusiones demuestran que los valiosos recursos naturales, así como las limitaciones logísticas en materia de suministros y, de manera más general, la estrategia militar rebelde, son de gran importancia y deben incorporarse a los trabajos sobre la guerra civil, el control territorial y la gobernanza rebelde.

La logique de contrôle territorial est déterminante dans l'étude du conflit international. Les études existantes s'intéressent aux conséquences du contrôle territorial sans répondre à une question centrale : qu'est-ce qui motive le contrôle territorial rebelle en premier lieu ? Le contrôle territorial requiert une explication méticuleuse. Bien qu'il confère des avantages importants, il est coûteux à obtenir et expose les rebelles aux attaques de l'État. Cet article affirme que les avantages dépassent les coûts quand le contrôle territorial fournit aux rebelles une source fiable d'approvisionnement organisationnel. Les ressources naturelles de haute valeur à piller—des ressources disponibles en abondance, faciles à extraire et transporter pour la vente—représentent des composants clés d'une chaîne d'approvisionnement rebelle. Pour tester les implications de la théorie, nous présentons de nouvelles données chronologiques transnationales et sous-nationales sur le contrôle territorial en Afrique subsaharienne avant de les combiner à un nouvel ensemble de données sur les valeurs de ressources naturelles locales. Nous

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employons une approche des variables instrumentales pour répondre à des inquiétudes centrales sur l'endogénéité. Les résultats étayent notre approche théorique et fournissent des éléments probants qui contredisent les arguments existants. Ces résultats démontrent que les ressources naturelles précieuses, les contraintes d'approvisionnement logistique et, plus largement, la stratégie militaire rebelle revêtent une importance décisive et doivent être intégrées aux travaux sur la guerre civile, le contrôle territorial et la gouvernance rebelle.

Introduction

Where do rebels successfully fight to establish territorial control and why? While prior work has examined the consequences of rebel territorial control (Kalyvas 2006; Arjona 2016; Stewart 2018), only rarely have its causes been studied (Kocher, Pepinsky, and Kalyvas 2011; Rubin 2020). This is a significant gap in our understanding of the internal conflict. Monopolizing the use of force in a location—overt territorial control—is one of the most consequential activities that rebels undertake. Control influences the process of conflict and its termination, the fate of civilian populations, and the nature of any post-war settlement. We provide a new explanation of rebel territorial control that we shorthand as the "supply constraint," introduce original cross- and subnational data on territorial control and natural resources, and test key observable implications using an instrumental variable approach.

Rebel fighting power, which directly influences their ability to bargain coercively with the state, is limited by the ability to equip and maintain militant forces—the supply constraint (Zhukov 2012; Shapiro 2013). From the wars of Alexander the Great to the Iraq War, most combatants have been closely tethered to available sources of supply. These tenuous umbilical lines lead back to capital cities or, more often, are foraged from the land and its populace. Territorial control is an important source of supply, but it has significant opportunity costs. To conquer and *hold* positions, rebels give up the ability to use a key military strategy: hit-and-run attacks (Fearon and Laitin 2003; Kalyvas and Balcells 2010). Assets and organizational efforts used to control territory cannot be used to achieve other important objectives such as attacks against high-value targets (Berman and Laitin 2005) or expanding influence over constituent populations (Cederman, Wimmer, and Min 2010). As a result, rebels who can control territory do so when they have pressing supply needs and when lucrative supply sources exist that require territorial control to extract.

Rebels can solve their supply constraint in several ways. The solution most widely discussed is for rebels to mobilize civilians to their side and rely on voluntary resource provision. This "activist" (Weinstein 2006) approach can sustain rebels, but it takes time to create links to civilians, and resource access may be low and inconsistent. Instead of receiving supply, rebels can also steal or "loot" supply. But such ad hoc measures are also likely to be insufficient to sustain large-scale military operations. External patrons, such as states or diaspora members, provide another supply source. External supporters, however, have interests that often differ from rebel priorities, meaning that support can be cut and can impact local legitimacy (Findley and Teo 2006; Cunningham, Gleditsch, and Salehyan 2009; Carter 2012; Salehyan, Siroky, and Wood 2014). Lastly, rebels can tax or take over existing economic activity/production, which can provide reliable access to wealth but may require significant rebel effort.

Of these strategies, we identify control over territory with substantial existing production of lootable natural resources as a main solution. Rebels are motivated to solve their supply constraint so that they can improve their conflict prospects, and to do so in a way that minimizes organizational attention and resources. Territorial control provides oversight and the ability to punish defection, increasing efficiency. Controlling a location is also costly, meaning that rebels will focus on fewer valuable locations rather than many less profitable ones. Furthermore, oversight is most effective when rebels understand a production process. Lootable natural resources produced at scale match these constraints: the production process is easier to understand and significant wealth can be produced quickly at one location.

The experience of the Allied Democratic Forces (ADF) illustrates many of these mechanisms and outcomes. The ADF is a rebel group that originated in the mid-1990s to fight the government of Uganda (Candland et al. 2021). Sudan initially provided support for ADF troops and operations and backed an alliance between the ADF and the National Army for the Liberation of Uganda (NALU). Ugandan military offenses drove the group to abandon training camps in Uganda and relocate to the eastern Democratic Republic of the Congo (DRC) (Candland et al. 2021). Sudan settled some of its differences with Uganda in 2005, and suddenly ceased its support of the ADF and NALU. This forced the ADF to search for new sources of supply. The ADF responded by establishing territorial control over communities in the eastern DRC that contained artisanal gold, wolframite, and coltan mines, as well as timber (Thompson 2021; Candland et al. 2022). These resources became key sources of supply for the ADF, allowing it to continue to operate (Thompson 2021).[1] The ADF pledged allegiance to the Islamic State of Iraq and Syria (ISIS) in 2017, renaming itself the Islamic State's Central Africa Province (ISCAP). This provided the group with a new source of supply in the form of transnational funding, recruitment and logistics. The ADF (ISCAP) continued to maintain substantial influence in Beni and in Ituri province in the DRC, where its control over lootable resources provided a valuable source of supply and insurance against the diminishment or withdrawal of support from ISIS (Congressional Research Service 2022).

As this example suggests, the theory we propose identifies important motives for and consequences of rebel territorial control. Rebels such as the ADF are vulnerable to abandonment by external sponsors, and seek to establish sources of supply that they can manage directly. One way to do so is to focus on controlling locations with valuable and lootable resources, as the ADF did in eastern DRC. This supply strategy has also had consequences for the scope and intensity of ADF military operations. The territory it controls in eastern DRC is limited to areas around the town of Beni and southern Ituri province. This is consistent with the proposition that the presence of lootable resources, combined with a rebel group's need for supply, leads it to concentrate control on those locations that generate the most income.

[1] See also the United Nations report "Letter dated 12 October 2012 from the Group of Experts on the Democratic Republic of the Congo addressed to the Chair of the Security Council Committee established pursuant to resolution 1533 (2004) concerning the Democratic Republic of the Congo."

It is also the case that, since the ADF moved to rely heavily on lootable resources for supply, it has devoted most of its military effort to maintaining control of parts of the eastern DRC, and to fending off local rivals, rather than to launching military campaigns against its ostensible foe, the government of Uganda. In other words, the source of ADF supply has led the group to shift its military effort to expanding and defending control of territory to ensure supply, and from attacking Ugandan military forces.

Although our theory has broad implications for understanding rebel incentives and behavior in conflict, we focus on identifying the effects of lootable resources—the independent variable in our theory—on the dependent variable of territorial control. We identify the causality by using exogenous resource price shocks in the US market as an instrumental variable for local resource prices (Brückner 2012; Berman et al. 2017; Denly et al. 2022). We apply this design to our original dataset of territorial control, which contains high-resolution information for all conflict countries in sub-Saharan Africa. The data is both subnational and cross-national, allowing us to assess how characteristics of locations influence territorial control while also investigating whether these relationships hold across country contexts. We supplement this quantitative analysis with a brief examination of causal mechanisms in the case of Sendero Luminoso in Peru in the 1980s and 1990s. This generalizability is an advance compared to existing work, which relies on individual cases (Kalyvas 2006; Kocher, Pepinsky, and Kalyvas 2011). Our data is also an improvement on studies that record whether, but not where, rebels exercise control (Asal and Rethemeyer 2008).

Our work contributes to the theoretical study of internal conflict in multiple ways. Most directly, we contribute to our understanding of how conflicts spread and, potentially, escalate. The need to secure supply drives where rebels choose to operate and their ability to do so affects the violence they can produce. We also update resource mobilization explanations by providing a theory centered on logistics, which helps us to understand combatant decision-making during wartime. For instance, our findings provide new explanations for when rebel groups evolve into "stationary bandits" and even territorial statehoods while others remain "roving bandits" (Tilly 1992; Olson 1993; Wagner 2007). Our results suggest that territorial control is endogenous to rebels' supply considerations and resource endowments rather than purely a function of civilian support or a tool to increase the selectivity of violence (Kalyvas 2006; Arjona, Kasfir, and Mampilly 2015). In addition, we provide a new explanation for why territorial control occurs. To understand the *consequences* of territorial control it is necessary to understand its *causes*. Indeed, our analysis suggests that the association between territorial control and violence type becomes substantially weaker after incorporating natural resource value.

Causes of Rebel Territorial Control

Control of territory is a central goal of many civil war combatants including rebels (Kalyvas 2006). Control is one way to gain the support of civilians or prevent their defection (Skaperdas and Konrad 1998; Kalyvas 2006). Control also allows combatants to secure civilian loyalty through effective governance (Mampilly 2011; Stewart 2018) and to use selective violence (Bhavnani, Miodownik, and Choi 2011). Finally, territorial control provides secure locations that can be used to develop bases where forces can be marshaled, trained, and used to attack (Salehyan 2008; Hendrix 2011).

While territorial control brings advantages, its acquisition also entails substantial opportunity costs. To secure and maintain control, it is necessary to allocate scarce military power. Holding ground also prevents rebels from dictating the terms of battle. Instead of using hit-and-run attacks when facing strong state forces, rebels must stand and fight, which can lead to significant losses (Berman, Felter, and Shapiro 2018). Control of civilian populations itself may be a resource sink as it requires governance and policing while providing little short-term military utility. In Afghanistan, for example, the Taliban mostly ignored governance aside from Shari'a courts and often chose to fight in areas with few civilians (Farrell 2018). Indeed, according to our dataset, only 3 percent of grid cells are controlled by rebels. Given these trade-offs, then, what causes rebels to devote their scarce resources to territorial control?

Existing work has produced few findings. We know that rebels are more likely to fight in rugged—mountainous—terrain where governments have difficulty operating (Carter, Shaver, and Wright 2019). For similar reasons, groups locate near international borders so they can base in friendly/ungoverned countries (Salehyan 2008). While important, this work emphasizes the role of opportunity in where rebels operate, as opposed to explaining how control in one location over another advances rebel prospects.

An additional consideration for rebels is to control locations from which they can extract the human and material resources needed to wage war. Rebels can pursue two resource extraction approaches: activist and opportunistic (Weinstein 2006). Activist rebels seek to mobilize civilians (E. J. Wood 2003, Parkinson 2013) because support provides resources such as food, shelter, and recruits. A key insight of this now-burgeoning literature is that military force alone cannot mobilize civilians. Instead, rebels bargain with civilians—exchanging services for resources. This includes limiting indiscriminate violence against civilians (Weinstein 2006), building on pre-existing connections (Staniland 2014), advancing political objectives such as political and economic exclusion (Cederman, Wimmer, and Min 2010), and providing social services and governance (Mampilly 2011; Arjona, Kasfir, and Mampilly 2015; Stewart 2018; Cunningham and Loyle 2021). The main prediction of this work can be summarized succinctly: rebels seek control over locations with their constituents as these civilians make it easier to establish control and provide benefits. However, the direction of the causal relationship between civilian support and territorial control is debatable. Stewart (2018), for example, finds that rebels provide public goods after they control territory, making it unclear if services facilitate control or vice versa.

The second, opportunistic strategy for securing resources occurs when rebels use violence to coerce civilians to provide resources. Coercion can take many forms, including stealing civilian resources (Wood 2014) or forcibly recruiting soldiers and support personnel (Eck 2014). Much of the research on this strategy has focused on profiting from natural resources, which are an important source of fungible wealth. Natural resource price shocks, for example, lead to battles and protests (Dube and Vargas 2013; Asal et al. 2016; Christensen 2019; Denly et al. 2022) and prolong civil war (Lujala 2010). Locations with more natural resource wealth, especially "lootable" forms that can be easily seized, experience more conflict events (Gilmore et al. 2005). Although well-developed, this literature has not clearly identified how resources affect rebel territorial control. Conflict is more frequent and intense in locations

with resource wealth, but conflict is distinct from control. Furthermore, it is not obvious that rebels need to control a location to profit. For example, rebels can loot resources that have been extracted and can earn income by extorting producers in exchange for payments. Consequently, it is not clear how natural resources affect control as opposed to violence, or whether one strategy of exploiting resources is more effective than another.

In sum, prior work leaves fundamental questions about rebel territorial control unanswered. We know much about the consequences of territorial control, but we know less about its causes. This is a critical gap given that territorial control affects governance (Arjona, Kasfir, and Mampilly 2015; Cunningham and Loyle 2021) and the treatment of civilians (Kalyvas 2006; Oswald et al. 2020). Furthermore, factors that cause control can also impact conflict dynamics, limiting our ability to uncover territorial control's effects.

Theory

We start with four propositions. *First*, rebel ability to develop and use more effective military force is constrained by supply. Unlike industrialized armies, most rebels cannot centrally produce and distribute sufficient materiel to allow operations where and when they choose (Hazen 2013). To supply their forces rebels instead exploit existing sources of money, weapons, etc. *Second*, rebels can secure this supply through multiple sources including voluntary donations, ad-hoc looting or scavenging, regularized extortion of commercial activity, and/or external support. These sources differ in their availability, impact on rebel supply needs, and the amount of effort needed in their acquisition. *Third*, broad access to highly lethal man-portable weapons has led to "low-density" battlefields that make possible territorial control by numerically inferior combatants (Biddle 2021). *Fourth*, rebel military and organizational attention are rival and limited. Activity used to secure supply, for instance, cannot also be used to conduct armed attacks against the state. In sum, rebels face a pressing need for supply, multiple ways to acquire it—including the use of territorial control, and high opportunity costs in its acquisition.

A behavior pattern follows. Rebels first assess a country and identify available sources of supply. Territorial control is not always required to secure supply but, as we argue below, control of lucrative but simple civilian enterprise is one of the most effective ways to meet this supply need and so it may be used despite its challenge. We focus on explaining the occurrence of this costly activity. Because rebels have limited military power, effort will be directed to *fight* for control only in the highest-value locations. When a source is no longer highly profitable or if another source is found to be more promising, for example, due to price changes, forces are reallocated. Finally, once supply is acquired, activity more directly related to winning, such as attacking state assets, can increase. For this reason, incentives associated with securing war-related supply affect the timing/location of rebel territorial control.

Below, we explain why (1) among the supply activities rebels can undertake, extorting business activity provides the most benefit. We also discuss why even when voluntary and external support is available, rebels still benefit from developing local systems of extortion. Furthermore, we explain why (2) rebels focus on simple civilian enterprises and (3) undertake the challenge of establishing territorial control. This argument scopes the applicability of our study. Groups that lack the capacity to control territory or that have little ambition to grow in size will not benefit from this supply strategy. Most *rebel* but not terrorist groups fit this scope.

The Supply Constraint and Territorial Control

Supply sources are the most useful when they are consistent and when they have a high return-on-investment. Consistency means that resource availability is predictable and continuous. Consistency helps rebels to maintain their forces and sustain military activity. An inconsistent source of supply may lead to rebels being suddenly unable to pay militant salaries or provide their forces with weapons and ammunition. Large-scale defection or organizational collapse may follow—particularly when militants can defect to the government or other rebels, as happened to the Free Syrian Army in 2013 (Mahmood and Black 2013). Inconsistent supply is also a problem for states and may lead to poor military performance, as occurred to Russian forces in Ukraine in 2022 (Clark, Barros, and Stepanenko 2022). Rebels invest in military and organizational efforts. Since this investment is rival and scarce, rebels seek a high return in the form of supply acquired. Low returns may limit rebel success as a substantial portion of rebel assets are devoted to securing supply, leaving few to conduct coercive activity.

Neither voluntary civilian support nor external state provision are consistent. Both forms of support are contingent on an alignment of interests between rebels on the one hand and patrons, donors, or civilians on the other, all of whom can withdraw their support (Nielsen et al. 2011). Return-on-investment varies across these supply sources. Voluntary support is cheap to acquire but it is rarely sufficient to provide for the continued operation of militant armies. For instance, diaspora support to the Irish Republican Army provided some money and light weapons but failed to provide sufficient resources to allow the group to effectively fight British forces (Jackson 2006). Voluntary civilian support also often requires the exchange of services, which is difficult for a clandestine military organization to provide, for resources. Looting is similarly inconsistent and has the additional problem of alienating potential supporters, limiting avenues for recruitment, or making post-conflict governance more difficult (Aronson, Huth, and Walsh 2018). External support can provide significant returns but it reduces local legitimacy as foreign support implies foreign influence (Salehyan, Gleditsch, and Cunningham 2011) and its continued provision is not guaranteed. Consequently, even when support is available rebels still benefit from local supply sources, which limits foreign dependence.

By contrast, extortion of local production chains provides a consistent way to buy weapons and pay salaries (Walsh et al. 2018). Unlike voluntary or external support, rebels have agency over the occurrence of extortion, allowing the strategy to be used as needed. Unlike looting, extortion, often called "revolutionary taxes," is both predictable and sustainable. If a commercial enterprise operates, it can be extorted to provide money that can be used to pay salaries and buy weapons.

Not all forms of extortion are equally effective, leading to variation in return-on-investment. Rebels can best incorporate extortion into their supply chain when: (1) loss due to shirking by producers is minimized, (2) local production chains can be monopolized, and (3) produced resources can be transported to markets. Extortion of simple as opposed to more complex or capital-intensive forms of economic activity achieves these objectives. Simple production processes such as the extraction of alluvial dia-

monds use unskilled labor that is easy to replace and oversee. This reduces the power of local producers to bargain with rebels over working conditions or output and makes it easier for rebels to determine if workers are shirking. Sophisticated or capital-intensive production chains, by comparison, are more difficult to extort. Owners and producers of these resources can flee to other locations and have skills and implicit knowledge of the production process that are difficult for non-experts to oversee. If mistreated, skilled workers can also "shirk," slowing or interfering with production in ways that rebels cannot easily monitor. In addition, owners may defend themselves, as occurred in Colombia when rebels attempted to coerce rich businesspeople (McDermott 2002). This gives producers of sophisticated enterprises more scope to bargain with rebels, reducing output or requiring costly governance. Consequently, rebels are likely to get a higher return-on-investment when extorting simple rather than complex enterprises even if complex enterprise generates more profit.

Territorial control further provides rebels with the capacity to stifle civilian bargaining, oversee civilian production, and maximize returns from extortion. The proximity of rebel forces and the ability to threaten coercion makes it easier to punish shirking (Kalyvas 2006). In addition, territorial control allows the regularization of extortion, improving its consistency and turning it into a form of proto-taxation. When rebels control a location, it allows both parties to create the expectation of an ongoing exchange of money for protection—a pattern of behavior not available when rebel presence is unpredictable. While proximity gives rebels greater ability to dictate civilian behavior, it does not solve the information problem present in the extortion of complex production. For this reason, territorial control increases the returns from the extortion of simple but not complex economic activity.

Territorial control also allows rebels to protect commercial activity and its associated supply chain from state predation (Berman et al. 2015). Simple production chains are easier to defend against state attacks. Capital-intensive production, by its nature, requires the presence of capital such as heavy machinery that is hard to hide or defend. Whereas rebels can combine camouflage and earthworks to protect a dig site from aerial and ground attack, it is more difficult to do the same for an oil derrick or a large excavator. In Iraq, for example, the Islamic State responded to US airstrikes in controlled territory by developing makeshift and labor-intensive oil refineries that, while less productive, were nonetheless portable and easier to defend than large oil platforms (Warrick 2016). For the same reason, produced goods that can be easily transported to market are more useful. In practice, this means goods with a higher value-to-weight ratio (Fearon 2004; Krauser 2020).

Although beneficial, establishing control is a challenge. Rebels need to defend the location where production occurs and protect the supply lines and equipment needed to transport bulkier goods to market. Even major powers such as Russia or the US, for example, had trouble protecting the movement of materiel to the front and focused instead on protecting locations where troops were quartered. As a result, rebels will devote their scarce resources to actively controlling only a few locations where they expect large and consistent returns. In symmetric conflicts, rebels can exploit locations behind the front lines without allocating scarce military resources. In more asymmetric conflicts, this is no longer the case as the state can contest (nearly) all locations.

Testable Implication

Rebels benefit from extorting commercial enterprises. Extortion provides consistent access to wealth that alleviates supply problems. Extortion is also less likely to alienate civilian support through ad-hoc violence or theft and reduces perceptions of foreign control or dependence. Not all forms of extortion lead to high return-on-investment. Sophisticated enterprises have a greater ability to shirk production and negotiate with rebels, requiring more rebel investment to secure returns. Territorial control increases the returns to extortion of simple civilian enterprise as it increases the effectiveness of rebel oversight and is easier to defend. Control does not provide similar benefits to extortion of sophisticated enterprise which requires knowledge of the production process and is difficult to protect. Finally, because rebels have limited military power, they will concentrate control in few locations with the most valuable civilian enterprises. In addition, because combatants know that supply access is important, valuable locations are likely to be contested rather than incidentally controlled. Observation of rebel control following armed conflict thus indicates rebels were willing to expend significant effort—and face high opportunity costs—to gain the benefits of control. This leads to our primary hypothesis:

> **Hypothesis**: Rebels are more likely to establish territorial control in locations that have simple, high-value civilian enterprise as compared to other locations.

Empirical Approach

To test the hypothesis, we need to operationalize the value and sophistication of civilian enterprise in a location and the occurrence of territorial control. To operationalize the distinction between simple and sophisticated/capital-intensive commercial enterprise, we focus on natural resource extraction, which is common and important throughout the world and thus serves as a key indicator. Specifically, we compare lootable to non-lootable resources and the value of these resources in a location.[2] That is, we analyze whether lootable natural resource value—relative to no resources or to the value of non-lootable resources—causes rebel territorial control.

However, identifying the causal relationship is challenging as resource *value* (price multiplied by production amount) is endogenous to rebels' territorial control. Territorial control impacts the ability of producers to extract, process, and sell resources, which affects both price and production. Rebel seizure of territory can result in capital flight or cessation of production, and hence lower value. Similarly, if producers foresee rebel control, they can relocate industry or request state protection. In addition, our theory develops an explanation for why rebels devote more effort to establishing control. Observed control is a function of effort but also other factors such as government policy. For instance, governments that are vulnerable to rebellion may preemptively deploy troops to locations with valuable natural resources to deny rebel access.

We address these challenges in several ways. First, we address reverse causality by using the US price of a natural resource as a an instrumental for the national value of that same resource (Berman et al. 2017; Denly et al. 2022).[3] Al-

[2]Lootable resources are valuable not because rebels can more easily extract them but because they can better oversee this type of civilian production.

[3]Results are robust to using world price as an instrument. See Online Appendix F.2.

though conflict within the small geographic units may influence the local production and national price of a resource, it is unlikely to have a significant impact on the US (or global) price, especially when resources are extracted in many locations or countries. The core assumption of the instrumental variable approach is the exclusion restriction. The exclusion restriction requires that a change in US prices affects subsequent rebel control in a location only through its effect on the price and production of natural resources in that location. As prior studies indicate, this assumption is plausible in our case (Brückner 2012; Berman et al. 2017; Denly et al. 2022). For instance, US price might affect territorial control through a change in resource exports, but it is unlikely that resource exports would directly affect territorial control aside from its effect through national prices. To make sure, we also conduct placebo tests and as-if randomization checks.[4]

We address measurement error by statistically filtering out the effect of variables that prevent rebel effort from translating into actual control. Following Kalyvas (2006), we view observed control as determined by a combination of rebel desire, rebel power projection, and state power projection. Rebels may choose to establish control despite low desire when they have a high relative ability to project power. Similarly, the high desire may not lead to observed control when the relative ability to project power is low. To closely align the statistical tests with our theoretical expectations, we control for state-initiated attacks, prior state control, and prior control by other non-state actors. These variables proxy state interest and rebel ability to project power not captured by fixed effects. The remaining variable in the equation—our main variable, natural resource value—absorbs variation in observed rebel control due to factors other than rebel or state power projection.

We also include location- and time-specific fixed effects, which control for unobserved static and contemporaneous confounders. The presence of a natural resource is potentially endogenous to geographic and climatic conditions that also affect the ability of rebels to establish territorial control (e.g., elevation). Similarly, resource prices in the United States may be endogenous to global events that affect rebel activity (e.g., US foreign policy changes). Rebel group fixed effects to account for any unobserved heterogeneity in baseline ability or desire to establish territorial control. Despite an efficiency loss, these fixed effects ensure the conditional independence of our instrumental variable.[5]

Finally, we take several steps to ensure our model is appropriately specified. To avoid simultaneity problems, we lag the value of lootable and non-lootable resources. We lag control variables for two time periods to avoid post-treatment biases. To minimize potential bias due to spatial dependency, we control for the value of natural resources in neighboring units.

Sample and Units

Our unit of analysis is a triplet of a rebel group, grid cell, and month. Given the data availability, we use the sample covering the period 2002 to 2013. The spatial unit (grid cell) comes from the PRIO-GRID dataset (Tollefsen, Strand, and Buhaug 2012). Each grid cell is a 0.5 × 0.5 decimal degree square. The PRIO-GRID is a standard spatial unit and is unaffected by boundary changes (e.g., merger). Because the resource data are available only at a yearly level (while the data of territorial control is available at a monthly level), we cluster our standard errors by year.[6]

We subset the data to rebels that controlled the territory at least once and countries where at least some natural resources were present, as not all groups in our data could potentially establish control and not all countries have natural resources. From 621,835 observations, we retain 358,223 group-grid-month observations across twenty state-rebel internal conflicts in nine countries: Angola, Chad, Cote d'Ivoire, the Democratic Republic of the Congo, Ethiopia, Mozambique, Nigeria, Sudan, and Uganda.[7]

Dependent Variable: Rebel Control

We collected geo-coded and time-varying data on the location of rebel control in internal armed conflicts in Africa as identified by the Uppsala Conflict Data Program (Pettersson and Öberg 2020). For each battle vent in the Georeferenced Event Dataset (Sundberg and Melander 2013), we identified the original sources and coded two additional variables to capture whether state or rebel forces controlled a location after the conflict event. Following Kalyvas (2006, 210–12), we identify an armed actor as exercising control of a location if it defended a location or it has a presence sufficient to mount a credible defense.[8]

Forces that control a location can project power nearby to influence civilians, occupy buildings, threaten expansion, or pursue opposing forces (Zhukov 2012; Tao et al. 2016; Hammond 2018). Power projection capability depends, in part, on geography. Control of a location that intersects a major road, for example, allows a combatant to project power more quickly over a longer distance. Similarly, control of a densely forested area without roads makes power projection difficult. Power projection indicates the *area* of control around a battle event.

We measure power projection using a hexagonal-fishnet, hybrid-transportation network approach (Tao et al. 2016). To identify the extent to which territorial control radiates from a point of control, we construct a hybrid transportation network using information about road and rail networks and topographical features. We assume standard speeds for motorized transport for movement on formal infrastructure as well as for off-road movement in all terrain environments. Off-network movement is simulated by assuming a dense network of artificial roads laid out on a fine-mesh hexagonal grid. The speed of off-network movements is taken to be a function of slope and land cover. The resulting hybrid network, formed from these real and artificial links, is used to calculate drive times and to delineate travel-time-based service areas. For this paper's analysis, we define control using a one-hour drive time with 35 km/h set as the maximum speed, which Tao et al. (2016) suggest is a reasonable approximation of rebel movement in sub-Saharan Africa.[9]

A territorial zone generated by this process may experience subsequent battle events. In such cases, we replace the parts of the previous territorial zone with the new territory

[4]Online Appendix E contains additional discussion.

[5]Online Appendix G.1 shows that our results are also robust to the use of country-fixed effects and country-clustered standard errors.

[6]Online Appendix F.1 shows that our results are also robust in aggregating our data to the year.

[7]Online Appendix F.1 shows that our findings are robust to the use of the full data and a subset that just excludes observations with no natural resources.

[8]For further details, see the codebook in the Online Appendix.

[9]The ability to project power depends on factors other than geography such as the size or equipment of units that control a location. Extensions of this data could productively focus on incorporating this location- and time-specific heterogeneity.

zone generated by the subsequent conflict event. If there are no additional events, we assume that the combatant retains control of this location until subsequent events indicate a change or until the end of the study period. After building a full-time series using the original hex data, we aggregate hexes to the larger grid cell and calculate whether a rebel group controls any part of a grid cell. Because a grid cell is larger than a hex, it may include information about control by more than one combatant. To account for this, we include control variables that capture the portions of a grid cell controlled by the state and by other rebel groups.

Our data differs from that of Haass (2021), who identifies rebel control using events from ACLED that record bases or troop movements, one-sided violence, and territorial change. Our experience coding territorial control suggests several issues with this approach: (1) non-violent transfers of territory are systematically missed due to a lack of news coverage in areas where rebels occupy instead of fight for territory, (2) battle events can provide information about territorial control without referencing territory transfer, and (3) one-sided violence occurs often in the absence of territorial control. Our measure reliably identifies situations where a combatant monopolizes force in a location following the occurrence of any type of conflict. This measure excludes situations where a group incidentally occupies a town or camps in an area where the state is absent (e.g., far behind frontlines in more symmetric conflicts). This means we identify only situations where rebels *fought* to take or hold territory.

This measure also contains no information about what a combatant does in a location after control is established. While not a valid measure of all forms of territorial control, this data fits our theory which seeks to explain consequential rebel decision-making under conditions of resource constraint. This approach resembles definitions of negative and positive peace (Galtung 1996). Negative control measures monopolization of force. Subsequent activities, such as providing services, taxing a population, or digging trenches, are analogous to positive measures of peace. In this conceptualization, negative control is analytically prior to positive control. Before a combatant can reliably tax a population, it needs to make sure that an opponent is not firing on its tax collectors. By conceptualizing and recording control in this way, we can separate the occurrence of control from its potential causes and consequences. Because of this, our measure is also useful to understand the consequences of control.

Independent Variable: Natural Resource Value

Our independent variables are the values of lootable and non-lootable natural resource production in a location-time. Production of lootable resources is labor- rather than capital-intensive as it requires less human- or technological capital to extract and process (Snyder and Bhavnani 2005; Dube and Vargas 2013). Examples include alluvial diamonds, coltan mining, and timber. Lootable resources also have a high-value-to-weight ratio making them easier to transport. Examples of high value-to-weight resources include most gemstones and precious minerals, such as gold; resources with lower value-to-weight resources include pumice, sand, or natural gas (Roy 2018). Non-lootable resources are more capital-intensive. Examples include primary diamonds, iron, or oil that require the use of large-scale machinery to extract and process for sale. Large-scale oil production requires substantial expertise in drilling, extraction, refining, and transportation equipment as well as skilled workers. Rebels, who know little about the extraction process, have difficulty monitoring the production process. Capital-intensive extraction is also harder to protect from state attack. Together, this means that lootable natural resource production has the relevant characteristics of simple commercial activity while non-lootable natural resource production has the relevant characteristics of complex commercial activity. Lootable resources matter not because *rebels* can easily extract them but because rebels can more effectively monitor and tax—extort—their production process.

The log-transformed values of lootable and non-lootable resources in a grid-month are derived from the Global Resources Dataset (GRD), which contains geo-coded and time-varying information on the value of almost two hundred different natural resources (Denly et al. 2022).[10] We use GRD's classification of lootable and non-lootable resources.

Control Variables

To address measurement and inferential problems, we include additional variables: the portion of a grid cell controlled by the state, the portion controlled by another non-state armed group, and the number of battle events initiated by the state.[11] These variables are lagged by two time periods to avoid post-treatment bias since our independent variable is lagged by one period. We also include variables capturing the presence of co-ethic and civilian wealth and external support to allow the effect of our variable to be compared. As necessary, covariates are logged to increase normality and reduce the effect of outlying values.

Specification

Our resource data contains information on multiple resources in a given grid and contains information at the grid-year level whereas our other data is at the group-grid-month level. We use a two-step procedure to generate exogenous resource values with corrected standard errors in the second stage.[12] For each grid cell j, month t, and resource k, we first regress its national resource value X_{jtk} on its US value Z_{jtk}, fixed effects and we also demonstrate that our results are robust to including covariates W_{jt-1}, which are also included in the second stage;[13]

$$X_{jtk} = \alpha_k Z_{jtk} + \mu_{jk} + \nu_{tk} + \varepsilon_{jtk}. \quad (1)$$

Using the fitted values of the model, we calculate the maximum values of lootable and non-lootable resources in each grid cell separately: $\hat{X}^L_{jt} = \max_{k \in L} \hat{X}_{jtk}$ and $\hat{X}^N_{jt} = \max_{k \in N} \hat{X}_{jtk}$,

[10]The value is standardized across production units and dollars. See Online Appendix B for an additional discussion of how natural resources are measured as well as alternative operationalizations of lootable and non-lootable.

[11]We also collected information about which armed actor initiated each conflict event; see codebook.

[12]The two-step procedure uses a larger sample in the first stage. This makes the instrument stronger and makes the second-stage estimate robust to minor violations of the IV assumptions. This two-step procedure is not unconventional. The 2SLS with a zero-stage regression, for instance, uses a similar two-step procedure (Sequeira, Nunn, and Qian 2020). Our analysis is robust to the use of a conventional 2SLS.

[13]Group-level covariates are aggregated to the level of grid cell, month, and resource by taking their averages (control and neighboring control by actors other than the rebel) or sum (state-initiated attacks, and neighboring state-initiated attacks and resources). Our results are robust to a second stage model with no covariates (Online Appendix G1).

where L and N are sets of lootable and non-lootable resources respectively.[14]

We then incorporate the aggregated values of lootable and non-lootable resources into our group-grid-month dataset and estimate the following second-stage logistic regression.[15]

$$\mathrm{P}\left(Y_{ijt+1}\right) = \mathrm{logit}\left(\beta_L \hat{X}^L_{jt} + \beta_N \hat{X}^N_{jt} + \gamma W_{ijt-1} + a_i + u_j + v_t\right). \quad (2)$$

The dependent variable Y_{ijt+1} takes a value of 1 if rebel group i controls any part of grid cell j in month t. The coefficients β_L and β_N represent the effects of our main independent variables $\hat{X}^L_{jt}$ and $\hat{X}^N_{jt}$. The model also includes control variables W_{ijt-1} and fixed effects by group, grid cell, and month.[16] As discussed above, the three-way fixed effects account for unobserved confounders that may exist at distinct levels of analysis. With these fixed effects, our estimand pertains to the variation within a grid cell and month. A positive coefficient for β_L, for example, indicates that the higher the value of a lootable natural resource in the current month relative to its mean value for that grid cell and month (a positive deviation), the more likely it is that rebels will establish territorial control in the subsequent month.

We estimate the second-stage logistic regression by maximum likelihood. In total, our dataset contains more than 300,000 observations and more than 3,700 fixed effects, which makes conventional computation challenging. To address this, we use the method of alternating projections (Stammann 2017), which both corrects for the incidental parameters problem when fixed effects are used in binomial models (Greene 2004) and provides a fast way to analyze large datasets. The standard errors are two-way clustered by group and grid cell, and, as noted, corrected using the standard method for IV analysis.[17]

Results

Table 1 shows the estimated effect of the value of lootable and non-lootable natural resources with and without the instrumental variable using ordinary least squares (OLS) regression.[18] The positive and statistically significant coefficient for lootable resources for the instrumented specification indicates that an increase in the value of lootable resources makes subsequent rebel territorial control more likely. The negative and significant coefficient for non-lootable resources indicates that no similar effect is present for this resource type. This suggests that rebels are more likely to establish control in locations where it is possible to extort simple, high-value commercial activity, but not other types of commercial activity. These results for lootable resources are present only with the instrumented variable. This implies that the resource value is endogenous to local conflict dynamics and that the naïve estimates are biased.

Figure 1 displays the results for the effect of moving from low (10th percentile) to high (90th percentile) resource values. The horizontal axis identifies the value of the natural resources in a location and the vertical axis shows the change

Table 1. The estimated effects of Natural Resource Values on rebels' territorial control

	No instrument	*Instrument*
Lootable resource value β_L	0.262	0.949*
	(−0.253 to 0.778)	(0.543 to 1.355)
Nonlootable resource value β_N	−0.306	−0.871*
	(−0.866 to 0.253)	(−1.664 to −0.078)
Lootable (neighbor)	0.470*	0.472*
	(0.146 to 0.794)	(0.136 to 0.809)
Nonlootable (neighbor)	0.027	0.021
	(−0.503 to 0.556)	(−0.533 to 0.575)
Control (state)	6.657*	6.838*
	(2.290 to 11.024)	(2.352 to 11.325)
Control (other)	−4.012	−4.019
	(−9.219 to 1.194)	(−9.131 to 1.094)
Control (state, neighbor)	0.931	0.992
	(−1.606 to 3.469)	(−1.495 to 3.480)
Control (other, neighbor)	2.235	2.434
	(−2.320 to 6.789)	(−2.228 to 7.097)
State attacks	0.136	0.137
	(−0.148 to 0.420)	(−0.167 to 0.441)
State attacks (neighbor)	−0.113	−0.113
	(−0.472 to 0.246)	(−0.476 to 0.251)
Dyad fixed effects	Yes	Yes
Grid fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Observations	352,160	350,003
Adj. Pseudo R^2	0.596	0.597
S.E.	Dyad, Grid	Dyad, Grid
Log-likelihood	−7,667.377	−7,528.186

Notes: Standard errors are clustered by rebel group and grid cell. An asterisk indicates significance at conventional levels (95 percent). Both models include three-way fixed effects and all controls (but not alternative explanations).

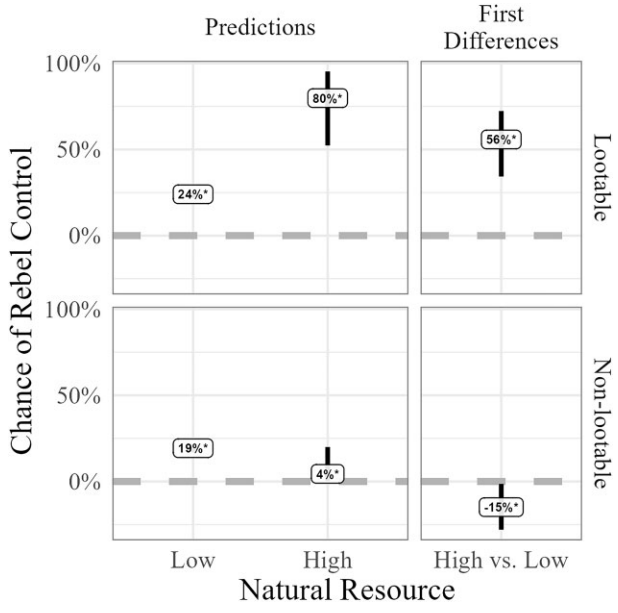

Figure 1. The effects of Natural Resource Values on rebels' territorial control.
Predictions show expected rebel territorial control for the 10th (low) and 90th (high) percentile of resource value. The first difference shows the chance of expected rebel territorial control following an increase from the 10th to 90th percentile in resource value.

[14]Grid cells almost always have only one resource of value. The maximum and summed variables are collinear (the correlation coefficient is over 0.99), meaning that the choice between these operationalizations does not matter.

[15]The grid years used in both the first and the second stages are identical.

[16]We do not include a lagged dependent variable in a fixed effects model as it may bias the result (Wilkins 2018).

[17]Summary statistics are available in Online Appendix C.

[18]The coefficients of the control variables are reported in Online Appendix D.1.

in the probability of observing subsequent rebel territorial control. The left column presents the predicted probability of rebel territorial control at low and high resource values. The right column shows the effect of moving from low to high resource value.[19]

The left column of figure 1 indicates that the likelihood of rebel territorial control is higher in locations that have higher values of lootable resources (upper) relative to non-lootable resources (lower). When a location has a low value of lootable resources, the predicted chance of rebel control is 24 percent.[20] When a location has high-value lootable resources, the predicted chance of rebel control increases to 82 percent. The first differences shown in the right column confirm that the increase is statistically significant for lootable resources (57.6 percentage points with a confidence interval of 35.8 to 73.7 percentage-points; $p = 0.000$). High-value non-lootable resources, by contrast, reduce the probability of rebel territorial control. The differences are not large but are statistically significant (−14.9 percentage point with a confidence interval of −26.7 to −2.8 percentage-points; $p = 0.016$).[21]

To give a sense of the relative importance of lootable resource value, we re-estimate our model with additional variables capturing competing explanations. Figure 2 compares our main effect to the effect of moving from the 10th to 90th percentile of values in (1) the local economy as measured by cell-GDP product and (2) proximity to government control, which proxy for rebel potential to loot; (3) the presence of pro-rebel ethnic groups, which captures the likelihood of receiving voluntary support; and (4) external support. In each panel of figure 2, we show the effect of lootable resources in the model with the additional covariates included.[22] Across all models, our variable has a large and significant effect similar to or exceeding the effect of the alternative explanation. Only *wealthy* co-ethnics has a similar effect. Rebel control in these locations likely provides benefits analogous to high-value lootable resources: consistent and meaningful taxation enabled by rebel oversight and defense. The reduced effect of co-ethnics regardless of wealth also suggests that labor, by itself, is not as important to control overtly. Although additional work is necessary to assess this relationship, this finding (and the other results in figure 2) is consistent with our theory about the extortion of simple production processes, its facilitation through territorial control, and its utility as a source of supply.[23]

Disaggregated Lootable Resource Value

We next disaggregate resource values into their component indicators of price and amount produced. This allows us to determine whether rebels selectively control only areas that combine high price and amount ("high-value") or whether one of these two components drives rebel behavior. If the combination drives rebel control, it is likely that rebels choose to control locations based on their ability to use resources as supply. If, instead, only one component drives rebel control, it is possible that an alternative explanation links lootable resource value to territorial control. For instance, if rebels seek to control areas with high amounts regardless of price this could indicate that rebels are more interested in the laborers working at the location—or another variable correlated with production—than the value they produce. Conversely, control of locations with high prices regardless of amount could indicate corruption: a small amount of high-priced lootable resources is sufficient to line a leader's pockets (and their personal forces) but not to consistently contribute to the supply needs of the rebel organization.

The model is specified in the same way as identified in Eq. 1 except for the inclusion of two separate interactions between price and amount produced for lootable and non-lootable resources. Figure 3 indicates that neither locations with high production but low prices nor locations with high prices but low production lead to territorial control.[24] High price and production, however, do lead to territorial control. This finding supports our theoretical explanation. Rebels seek control over locations that are best able to ease their supply constraint and not over locations that line individual pockets or provide access to labor.

Taken together, the results are consistent with our theoretical argument. Monopolizing force in a location allows rebels to realize more fully the contribution of high-value lootable resources to their supply chain. When state forces are kept at bay, it is easier to maximize production and benefit from resources that can be simply extracted and moved to market. Monopolization of force does not confer a similar advantage for non-lootable resources: the more complex supply and production chains needed to profit from non-lootable resources require more advanced administrative capabilities, greater expertise, and longer time horizons than those available to most rebels. These types of goods are also often harder to move to market, making it difficult to convert production into war material. Capital-intensive production is also more vulnerable to attack, which limits the benefit of having established control. Furthermore, rebels gravitate toward locations with the most valuable production chains, suggesting that an attempt to control territory will be undertaken only when it provides significant and consistent returns.

Additional Analyses

Finally, we conduct an array of additional analyses, which are summarized in table 2 and detailed in the Online Appendix. The randomization check indicates that only one variable, co-ethnic wealth, is correlated with the instrumental variable, which is not surprising given that local wealth is likely related to resource value.[25] Our models are robust to the inclusion of this variable (second panel of figure 3). We also conduct a placebo test using lagged territorial control as the outcome. Lootable resource value has no statistically significant effect on the past outcome.[26] Our main findings

[19]Predicted probabilities and first differences are generated using the observed values approach (Hanmer and Kalkan 2013) and shown with 95 percent confidence intervals.

[20]The 10th percentile of lootable resource value is small so the standard error is concealed by the label. See Online Appendix D.1 for coefficients, and additional predictions.

[21]Online Appendix D.3 shows the results of the first-stage regression. The US price of natural resources is a strong predictor of national prices. The F-statistic of the first-stage regression is 100.56, which far exceeds the conventional threshold of 10 (Olea and Pflueger 2013; Andrews, Stock and Sun 2019). The strong predictive capacity of the instrument suggest that our findings are robust to minor violations of the assumptions of instrumental variable analysis.

[22]We do not include these covariates in the main analyses because they can potentially be affected by our explanatory or instrumental variables, inducing post-treatment bias.

[23]See Online Appendix H for additional discussion.

[24]Coefficient tables are available in Online Appendix D.2.

[25]See: Online Appendix E.1.

[26]See: Online Appendix E.2.

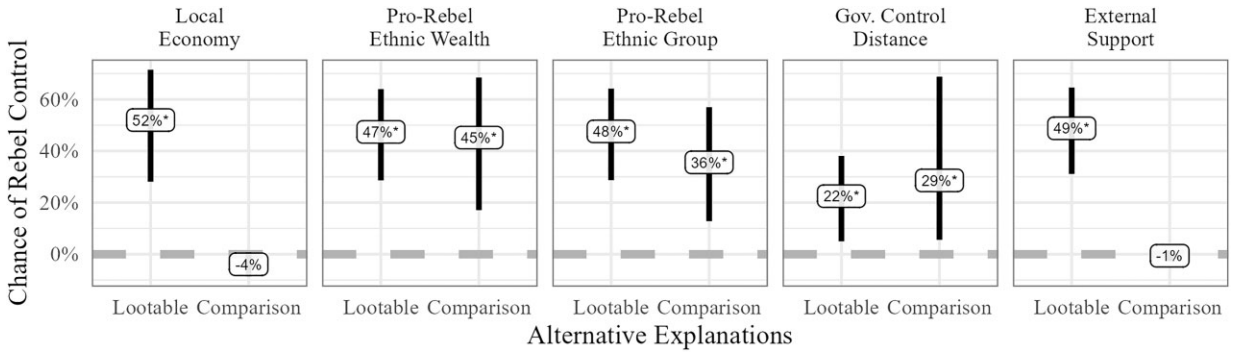

Figure 2. Comparing the effect of Natural Resource Values to the coefficients of covariates.
The figure shows the chance iof expected rebel territorial control following an increase from the 10th to 90th percentile in covariates.

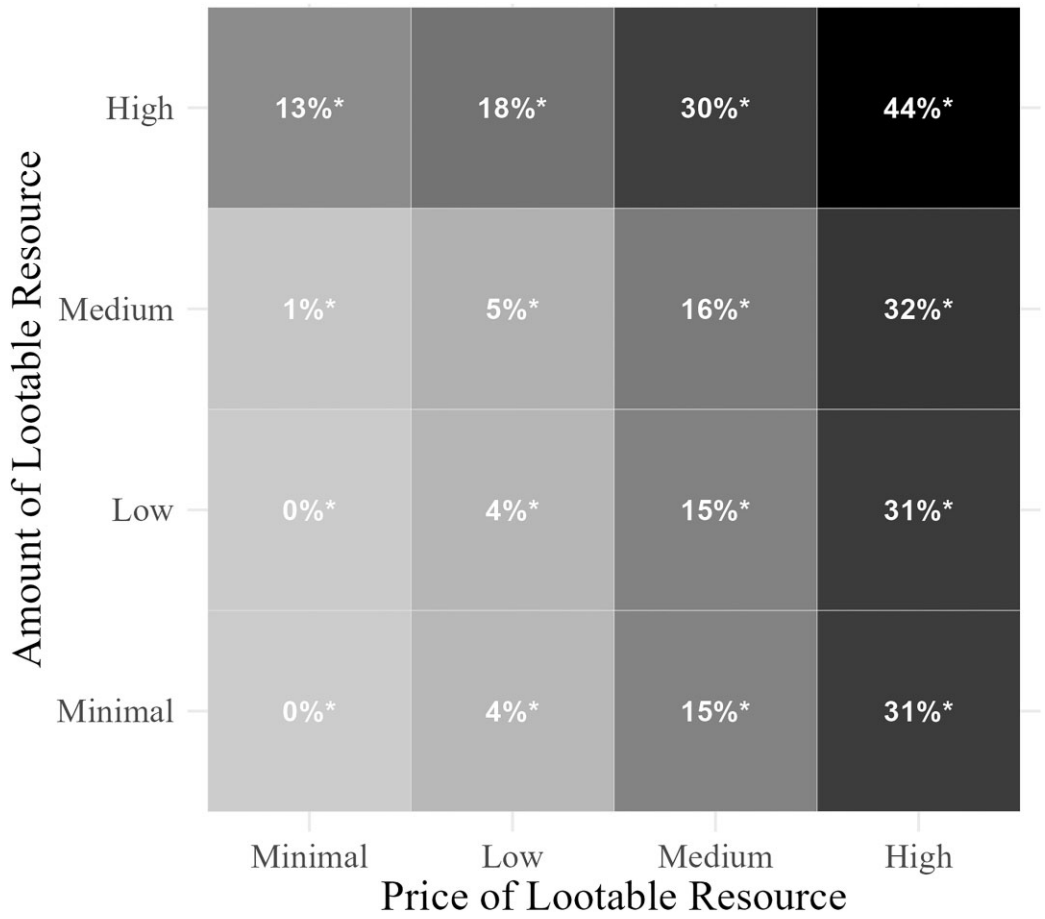

Figure 3. The dffect of lootable resource price and amount.
Expected value of rebel territorial control for various quartile combinations of lootable resource price and amount. Resources prices use the US price, so they are exogenous. Results related to resource amounts may be endogenous and should be interpreted with caution.

are also robust to changes in data configuration, clustering, measurement, and model specifications. Results are also robust to a measure of our independent variables interpolated across space using inverse distance weighting. This shows that our findings do not depend on the spatial unit chosen (grid cell) and are likely robust to alternate methods for calculating power projection.

Cases

We supplement our large-N analysis with a brief case study of Sendero Luminoso (SL). The full case is in Online Appendix J.

This partially addresses issues of external validity and potential reporting bias raised by our main analysis. SL

Table 2. Additional analyses

Robustness check	*Result*	*Online Appendix*
Validity checks		
Randomization check	✓	E.1
Placebo test with past territorial control	✓	E.2
Reporting bias	✓	K
Sample		
Aggregation to group-grid-year level	✓	F.1
Inclusion of first stage aggregated control variables	✓	F.1
Inclusion of rebels that never control territory	✓	F.1
Inclusion of countries with no natural resources	✓	F.1
Interaction with type of conflict	✓	L
Measurement		
World price instrument	✓	F.2
Resource value using US price	✓	F.2
Resource value using world price	✓	F.2
Resource value weighted by distance	✓	F.3
Specification		
No control variables	✓	G.1
Control for latitudes and longitudes (spatial dependency)	✓	G.1
Control for group-specific time trends	✓	G.1
Clustered SE by year	✓	G.1
Two-Stage least squares (2SLS)	✓	G.2
Two-Stage least squares (2SLS) with control for latitude, longitude, and group-specific time trends	✓	G.2
Standard errors clustered by country	✓	G.2

Notes: This table summarizes the results of our robustness checks. The last column shows the corresponding section in the Online Appendix.

is outside of our temporal and spatial domain—sub-Saharan Africa. Our analysis focuses on lootable mineral resources, but our theory suggests that any resource that meets our definition of high-value but simple production creates incentives for rebel territorial control. Sendero Luminoso profited from a resource, coca, that is lootable but not a mineral. The case allows us to investigate whether the mechanisms identified in our theory travel to other settings, time periods, and resources. Moreover, our dataset relies on media reports. Media reports might systematically exclude certain events because of difficulty accessing conflict zones, editorial decisions, or limitations on press freedom. The case studies rely on sources less likely to be subject to systematic missingness. For SL, the sources include the Final Report of the Peruvian Truth and Reconciliation Commission, which is based on primary sources, testimonials by witnesses and perpetrators, and public hearings.

SL began a violent campaign against the government in 1980 and sought to expand beyond its initial center of gravity in Ayacucho. We compare four locations where the group sought to establish itself: the Upper and Lower Huallaga Valleys, both of which were centers of coca cultivation and processing, and the capital city of Lima and the southeastern province of Puno, neither of which contained many lootable resources. SL largely abandoned efforts on Puno once it was challenged by the government but, consistent with our theory, established multiple bases and fought repeatedly with government forces to maintain its presence in the Upper Huallaga Valley. It also established an armed presence in Lima not to profit from lootable resources, but to attract recruits and to launch attacks. This is consistent with our theory—supply as an important, but not the only, motive for rebels to establish territorial control. SL failed to establish a durable presence in the Central Huallaga Valley because it faced competition from both government forces and a rival rebel. This outcome highlights the importance of accounting for capability in addition to desire when studying control as we do.

Conclusion

Our theory emphasizes the role of rebel armies as economic entities who view a country's terrain through the lens of supply as well as military strategy. The two are, by necessity, intertwined. Most civil conflicts are long-term affairs that involve both spasms of high-intensity violence and prolonged military activity (Balcells and Kalyvas 2014). To support sustained coercion against the state, necessary for the pursuit of objectives such as political change (Arjona 2016; Huang 2016; Jo 2016), rebels must first make sure that their troops are consistently and properly supplied. This is best accomplished by territorial control over locations where simple but high-value commercial activity can be extorted. It is easier to extort simple enterprises as rebel oversight can prevent shirking and interruption by state attacks. This allows the regularization of extortion as a form of proto-taxation. Territorial control, however, has high opportunity costs. Rebels are often overmatched by state forces and as a result cannot defend many locations at the same time. This leads rebels to focus on control of fewer but more lucrative locations. When the value increases, control follows. When the value drops, control dissipates.

This topic has long been of interest in the theoretical and case-based literature but rarely examined systematically

because cross-national data on territorial control was unavailable. To assess our argument, we introduced new data on territorial control and utilized the most comprehensive data on natural resources, which allowed us to operationalize simple and complex commercial activity. Results support the theory and hypothesis. In addition, the utility of this strategy persists even when other options are available, such as voluntary civilian support or external patronage. That rebels are willing to pay the costs of overtly conquering and defending territory—even when state forces are very strong—demonstrates that high-value resource control is crucial to the process of rebellion.

We expect that our theory and results have broad applicability across settings, treatments, outcomes, units, and time (Findley, Kikuta and Denly 2021). Few combatants can project and maintain forces in combat without running into supply issues, as recent Russian difficulties in Ukraine demonstrate (Berkowitz and Galocha 2022). When such problems occur, combatants make calculations like those outlined here: identify locations whose control will help to mitigate supply difficulties, allocate combat power to securing control, and fight to monopolize territory so that resources can be secured and used to support other activity. Although this pattern is likely to hold across conflict situations, the *resources* that combatants focus on may change based on context. We identify lootable natural resources as an appropriate proxy for conflicts in Africa, but other simple, high-value production processes—including extortion of wealth co-ethnics—may be chosen elsewhere.[27] War-making material must be sourced somehow. We show that one reliable method is to focus scarce militant resources on controlling a few high-value locations.

This work has important policy and academic implications. A theory of where resource-constrained combatants seek territorial control promises insight into predicting where rebels will deploy their military power and stand their ground, leading to intense fighting and a greater potential for collateral damage. Anticipating where rebels seek to project power also provides the state with the ability to counter these efforts. Identifying locations that can meet rebel supply needs may help commanders better understand rebels' source of strength. Pre-empting or displacing rebel control from high-value resource locations can have a disproportionate impact, potentially shortening conflict and saving lives.

Understanding the origins of territorial control improves our understanding of rebels' activities once they establish control. Rebels seek control of territory for many reasons, which has implications for what rebels will do once control is established; ignoring this endogeneity can result in misleading theory and biased estimates. Territorial control has been theorized to influence violence against civilians (Kalyvas 2006). But lootable resources also incentivize rebels to control territory. Consequently, the presence of these resources may explain both control and violence. Before it is possible to understand variation in what a rebel does following the establishment of territorial control, as is becoming increasingly common in literature on rebel governance, it is necessary to understand the causes of control.

More broadly, this paper shows how security threats and the resultant need for resources can shape the formation of territorial governance (Tilly 1992; Wagner 2007). The need for stable supply can transform "roving bandits" into "stationary bandits" and even into independent territorial statehoods over time. By assuming exogenously given territorial control, previous studies narrowly focus on the consequences of territorial control, dismissing the broader processes of political development. This study thus fills a critical gap by endogenizing territorial control and proposing resource endowment as a cause.

Finally, we suggest that military activity follows logistics; rebels (and states) first secure supply, which then enables coercion. One untested implication of this theory is that combatants match how they deploy and use their forces to their available supply chain. A mismatch between force deployment and supply can have important consequences for the trajectory of conflict. When a supply chain is inadequate, deployed forces and operations must be scaled back or military collapse may follow quickly. A recent example of this is the Afgan National Army, which had difficulty supplying its many forward bases following the US exit. An expanded supply chain, by contrast, allows combatants to contest more territory and conduct more attacks, which can increase the intensity and scope of fighting and improve their chance of winning. Interfering with the ability of an opponent to adapt its force deployment to a new supply reality may provide an important military strategy. Future scholarship could advance our understanding of the link between rebel supply strategies and offensive activity.

[27] See Online Appendix I for more discussion of external validity.

Supplementary Information

Supplementary information is available in the *International Studies Quarterly* data archive.

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