Hit where it hurts: City vulnerability during wartime

Bryce W Reeder [iD]
Truman School of Government and Public Affairs, University of Missouri, USA

Gary Uzonyi [iD]
Department of Government and Public Policy, University of Strathclyde, Scotland; and Vilnius University Institute of International Relations and Political Science, Lithuania

Abstract

Success in center-seeking rebellions requires rebels to oust the incumbent government. Yet not all center-seeking rebels attack the capital and those that do often take a circuitous route. We build from existing literature to integrate theories of rebel strength with a broader understanding of both the strategic and symbolic value of territory. Building a new dataset of location value and employing novel empirical techniques, we demonstrate that as a location's value increases relative to the capital city for a group, the rebels become less likely to move against the capital as they can build offensive strength, fortify their defensive position, and appease local constituents in their current geographic domain. Relative strength conditions these strategies, as stronger groups tend to take a more straight-line approach to the capital, middling groups advance in zigzag patterns, and the weakest groups move in spiral formations to maximize their defensive and symbolic positions. We find that these patterns hold across a wide range of population thresholds. Several case studies help illustrate the mechanisms central to these dynamics. By combining considerations of both rebel strength and territorial value, this article brings several strands of literature on civil war geography into the conversation and broadens our understanding of the conflict process.

Keywords

Civil war, rebel groups, spatial models, geography, political violence

Introduction

In 1948, the National Liberation Army (NLA) marched up the Pan-American Highway from Costa Rica's southern periphery towards the capital, San Jose, stopping in Cartago where the government surrendered. The Rwandan Patriotic Front took a similar course in 1994 coming from the Ugandan borderlands directly en route to Kigali. In 2011, the National Transitional Council (NTC) formed in Benghazi and moved along Libya's northern coast to Tripoli. These groups operated how observers expect center-seeking groups to behave. To oust the incumbent, a group must find a way to maximize the pain it can inflict on the government, while minimizing its own losses en route. For groups on the periphery, this typically means moving as directly as possible towards the capital to hit the government where it most hurts (e.g. Butcher, 2015; Holtermann, 2016). But consider the Convention of Patriots for Justice and Peace (CPJP) during the Central African

Corresponding author:
Bryce W Reeder, Truman School of Government and Public Affairs, University of Missouri, 615 Locust Street Building, Columbia, MO 65201 USA.
Email: reederbw@missouri.edu

Republic's (CAR) Bush War. The CPJP formed in 2008 to oust President Bozize. Rather than move on Bangui, though, the CPJP remained in CAR's rural north for several years before attacking the capital (e.g. Dobbins et al., 2019). What explains rebel movement during civil war? Why do some move directly towards the capital while others do not?

Understanding where and when rebels advance is important because these movements influence the spread of violence, the costs of fighting, and ultimately the outcome of war (e.g. Greig, 2015; Minhas and Radford, 2017; Ruhe, 2015). Typically, rebel movement towards the capital is explained by the group's strength (e.g. Holtermann, 2016), network (e.g. Uzonyi and Reeder, 2024) and goals (e.g. Kibris, 2020), or the government's uncertainty about the rebels (e.g. Butcher, 2015). These explanations have great merit in establishing a baseline understanding of why some groups challenge the capital while others do not. However, they also have trouble explaining the behavior of groups like the CPJP, which was a strong center-seeking group that hesitated in moving against the capital. Here, we endeavor to move away from focusing on how group-level factors, such as strength, influence the spread of wartime violence. We note that not all rebels, such as secessionists, wish to capture the capital (see Carter et al., 2022). Therefore, we focus on center-seeking rebellions (see Buhaug, 2006; Fearon and Laitin, 2003) and build from these previous theories by treating the group's strength as foundational to its interactions with the government. We then note that this focus leaves the group's broader wartime calculus underdeveloped as it does not account for either the larger context of the conflict or the strategic and symbolic value of targets within the war-torn area. We argue that rebels calculate the value and costs associated with striking various targets between their current location and the capital. This allows us to offer a novel contribution of integrating both the strategic and symbolic value of cities with the costliness of rebel attacks into a single theoretical framework. We demonstrate that as these non-capital locations' value increases relative to the capital for a group, the rebels become less likely to move against the capital as they can build offensive strength, fortify their defensive position and appease local constituents in their geographic domain.

This integrated understanding of rebel strategy helps make sense of three common patterns in rebel movement and bridge past explanations for rebel advances. The strongest rebels find less value in targeting non-capital locations and thus make relatively straight-line advances towards the capital (e.g. National Patriotic Front of Liberia (NPFL) or Seleka). Groups with middling power take a more zigzagged path towards the capital, as they attempt to mobilize various population groups and solidify control in their rear territories (e.g. CPJP or National Union for the Total Independence of Angola). Weaker groups often fight in spiraling patterns rather than making meaningful advances on the capital, as the costs of moving into the government's territory outweigh the advantages of moving beyond smaller targets in which they can maximize both symbolic and defensive values (e.g. Ethiopian People's Democratic Movement (EPDM) or Movement for Justice and Peace (MJP)). This broader calculation also helps connect the literature on rebel geography to the burgeoning research agenda on rebel territorial control, which highlights the additional governance costs that are associated with regulating new populations (e.g. De la Calle and Sánchez-Cuenca, 2012; Rubin, 2020).

We contribute to the study of civil war by helping to explain rebel decisionmaking and the geographic spread of war (e.g. Buhaug et al., 2011; Raleigh and De Bruijne, 2017; Reeder, 2018). We also help clarify both the value and costs of insurgency at the local level. Drawing from Cunningham et al. (2009), we recognize that a group's ability to hurt the government may differ from its ability to protect itself. We then connect these concepts to the strategic value of territorial control (e.g. Hammond, 2018) to theorize on how various locales differ in providing the rebels offensive or defensive advantages. Intertwined with a location's strategic value is its symbolic value to the group and country. Highlighting symbolic value in a systematic way allows us to understand a group's trade-offs between attacking the capital and laying claim to specific targets along the way. Considering the multifaceted value of territorial control against the practical costs of war, such as the loss-of-strength gradient (LSG; see Buhaug, 2010), helps us better understand differences in the geographic contagion of center-seeking wars. On average, groups will deviate from LSG calculations when they believe capturing a highly strategic or symbolic location is possible. Nonetheless, for the strongest and weakest of center-seeking groups, these calculations keep them focused on either pushing towards the capital or building better defensive positions.

To test these theories, we construct unique indices that capture a city's value and the costs of attacking. This approach provides a new dataset on the value and costs of each potential target city for rebels globally between 2000 and 2020 as identified by the Uppsala Conflict Data Program (UCDP) Georeferenced Event Dataset

(GED). We then explore patterns in group movement and find strong evidence that rebels target high value cities and avoid cities where attacking costs are high. Additionally, our analyses find a sharp increase in the likelihood of attacks as the cities' values begin to outweigh the costs of attacking. We present case studies to illustrate how offensive and defensive strategic value, symbolic value, and the costs of advancement interact to influence rebel movement and wartime strategy.

Center-seeking rebels' movement to the capital

The stated goal of center-seeking rebels is to oust the incumbent. To oust the incumbent, the rebels must either reach the capital and capture the leader (e.g. NTC or NPLF) or inflict enough costs on the regime that the leader surrenders and seeks exile before the rebels apprehend him (e.g. NLA). Outright victory for rebels is not common, and victory for either side has been less frequent post-Cold War. Today, negotiated settlements and ongoing low activity conflicts are more common conclusions to civil war (see Kreutz, 2010). Regardless of how the war eventually ends, though, center-seeking groups share a common overarching strategy at the onset of their rebellion, which is to capture territory while pushing towards the capital (e.g. Fearon, 2004). We highlight this overarching goal to establish the scope conditions of our argument in relation to two other types of rebel groups. The first are secessionist groups who desire independence rather than regime change. This desire shapes such groups' strategies as they seek to drive the incumbent's forces from their homeland rather than seek capital control. The second are coup-initiated groups that form in the capital and thus aim to quickly remove the incumbent rather than to hold territory elsewhere in the country. Our theory does not directly address these types of groups.

With these scope conditions established, we develop a stylized model of center-seeking rebel movement out of the periphery. The model's primary assumption is that rebels prefer to move as directly to the capital as possible to minimize any loss of fighters or resources before attempting to oust the incumbent (e.g. Hirshleifer, 1989). However, as Buhaug (2010) underscores, groups begin their confrontation of the government from various geographic locations and with differing degrees of strength vis-à-vis the regime. For example, in the CAR's Bush War (2004–2007), the People's Army for the Restoration of Democracy (APRD) and Democratic Front of the Central African People (FDPC) formed in the northwest of the country, while the CPJP and Union of Democratic Forces for Unity (UFDR) formed in the northeast. Most of these groups were weaker than the regime, other than the CPJP, which fought the incumbent near parity (see Cunningham et al.'s Non-State Actor Dataset, 2009). We build from Buhaug's application of the LSG, which focused on civil war onset, to note that given these different starting locations and degrees of relative strength, not all rebels are able to move swiftly towards the capital once fighting begins (see Uzonyi and Koren, 2024).

Within our model, some groups will be able to advance directly on the capital. Others will attempt to capture key towns and cities on their way to the capital to mobilize local populations, capture resources or to establish defensive positions (e.g. Smith and Stam, 2003). To achieve their goal of ousting the incumbent, weaker groups must develop offensive strength to attack the government and defensive capacity to hold the territorial gains they make along the way, while also protecting their base of formation from which they primarily draw recruits and material support (see Cunningham et al., 2009; De la Calle and Sánchez-Cuenca, 2012). From our primary assumption, we posit that strong groups will move more immediately against the capital. Other groups, though, have a range of initial warfighting capacity. Across these secondary groups, rebels that are stronger have more freedom of movement between target cities because they have more resources to divide between forward deployment and rear-guard protection (e.g. Holtermann, 2016). While we return to the role of strength, we begin by holding it constant in developing a theory regarding the value of taking non-capital territory.

Target city evaluation

Understanding how rebels move from their initial area of formation towards the capital requires the consideration that rebels need both offensive and defensive capacity to successfully challenge the incumbent. Thus, our theory connects this need for offensive and defensive capacity to the value of potential city targets within the rebels' broader war fighting strategy. We define a city's *offensive value* as those characteristics of the locale that increase the rebels' ability to eventually launch an assault on the capital. Offensive capacity tends to revolve around the rebels' ability to mobilize supporters, arm their recruits and deploy fighters towards the capital (see Cunningham et al., 2009). Thus, the cities with higher offensive value are those that possess resources that help with these three

objectives. We define a city's *defensive value* as those characteristics of the locale that increase the rebels' ability to resist government advances into their area of territorial control. Defensive capacity tends to revolve around the rebels' ability to protect valuable resources, militarily defeat government offensives, and discourage local collaboration with the state (e.g. Buhaug et al., 2009). Thus, the cities with higher defensive value are those that possess resources that help with such objectives. Together, the offensive and defensive values of a city encompass the location's overall strategic value to the rebels. Importantly, while some resources provide a clear exclusively offensive or defensive advantage to the rebels, many resources can assist the rebels along both fronts. Marks (2019), for example, underscores how diamonds provided the Revolutionary United Front in Sierra Leone offensive capacity by providing financing for the war effort and defensive capacity through the provision of selective benefits co-opting local dissidents.

While strategic value has received primacy of place in previous theories of rebel movement (e.g. Hammond, 2018), we posit that rebels also consider the symbolic value of potential targets. Symbolic value captures those aspects of a city that may not directly establish a target's strategic offensive or defensive value but do influence morale and the perception of legitimacy around the rebels and the government. Most often, symbolic value is tied to either the historic or modern politics of the country. Historic politics link previous kingdoms (e.g. Dahomey in Benin or Zulu in South Africa) and traditional forms of governance to the modern state and form the basis of a group's understanding of its homeland and its connection to ruling the territory. Paine (2019), for example, has demonstrated that groups that controlled pre-colonial states in modern sub-Saharan Africa are more likely than others to form center-seeking movements to re-establish their governance of the land. Symbolic value, though, has also developed over time. Cities in which regional or provincial capitals have been established are also often seen as centers of modern control. Groups that control these modern political centers tend to hold sway in these geographic locations (see Raleigh and De Bruijne, 2017). For example, before the Houthis overthrew Hadi's regime in Sana'a, they controlled the politics of Northern Yemen where the group had their ancestral homeland (Thiel, 2015).

While we see the symbolic characteristics of a location as providing value that is distinct from the strategic, we do not believe that the type of value a city holds is mutually exclusive from any other. Cities may possess characteristics that increase their offensive, defensive

and symbolic value to a rebel group. We posit that rebels thus calculate the overall value of a location holistically and based on their boundedly rational understanding of these considerations. All things being equal, rebels are likely to target those cities with the highest expected cumulative value for the group.

> *Hypothesis 1:* Ceteris paribus, rebels are more likely to target cities with higher cumulative value.

However, not all things are equal. Rebels face costs in advancing on new targets (e.g. Reeder, 2018). The rebels must evaluate these costs alongside the expected value of each target. We identify two types of costs that may inhibit rebel advancement against a city. We label the first *movement costs*. Movement costs consist of the geographic and spatial elements of the target city and the terrain between the rebels' current location and that city. Movement costs are largely dictated by the roughness of the terrain, the infrastructure available to overcome these geographic hurdles, and the distance between the two locations (e.g. Bohara et al., 2006). The rougher the terrain surrounding the target or between it and the rebels' location, the harder the rebels will find it to attack the city. Rough terrain limits the speed of rebel movement and their ability to transport resources and fighters to the target. It also provides the government agents located within the locale with a better defensive position. Similarly, longer distances between two locales increases movement costs, as rebels face an LSG in spreading resources across the area (e.g. Boulding, 1962; Holtermann, 2016). As the LSG increases, the rebels' offensive capacity decreases and their ability to maintain a defensive rear guard also decreases. However, more developed road networks help the group to overcome these barriers, as they ease transit across long distances and rough terrain.

We label the second cost, *confrontation costs*. We have primarily developed our theory from the perspective of the rebel group. Within this framework, the government is a strategic actor facing asymmetric information regarding the rebels' plans. The government knows that the group exists and wishes to oust the incumbent, but it does not know the path the rebels will take to the capital or which other locations they will attack (see Butcher, 2015). Following Hammond (2018), we expect governments to confront the rebels in key cities with strategic value, such as economic, political and transportation hubs. Despite this asymmetric information, though, as rebel groups materialize and move within the country, the incumbent must decide how and where to confront

the rebels. Undersupplying military resources to key locations results in the government losing the city and better empowering the rebel for further advances (e.g. Hirshleifer, 1989).

Some governments may deploy troops to the rebels' homeland to confront them before they cause disruption elsewhere. Other governments may wait and draw the rebels out of their strongholds before confronting them, as the group suffers that LSG. A government's preference for where and when to confront the rebels is based on its military capacity and preferences. However, we posit that while these preferences may shape this decision, observationally, the average government is likely to calculate the value of confrontation similarly to how rebels calculate the value of attacking – governments attempt to defend cities to varying degrees depending on the location's strategic and symbolic value, adjusted by the regime's capacity in the area. Thus, rebels are likely to face higher confrontation costs against regimes in cities with higher strategic and symbolic value, as well as those cities in which the government's capacity is highest.

As with the rebels' evaluation of a city's expected value to their overall war plans, groups attempt to calculate the costs of a potential target based on their boundedly rational understanding of both an area's movement and confrontation costs. As with a city's offensive and defensive value, we do not treat movement and confrontation costs as mutually exclusive. As the rebels' combined estimate of these costs mounts, the group becomes less likely to target a given location.

Hypothesis 2: Ceteris paribus, rebels are less likely to target cities with higher cumulative costs.

The role of rebel strength

As we noted in the introduction, our goal in this article is to highlight features of the conflict environment – rather than those of the group (e.g. strength, ideology, foreign support) – that influence the geographic spread of wartime violence. However, a group's features are likely to influence how it calculates the costs and benefits of attacking locations relative to the capital. Thus, in this section, we integrate our primary hypotheses (Hypotheses 1 and 2) with an understanding of group strength to help illustrate this connection.[1]

We began with the assumption that a center-seeking group's ideal strategy would be to move directly against the capital to avoid loss of fighters and resources before this confrontation. This assumption highlights that in evaluating the value/costs of non-capital targets, rebels

must weigh these potential offensive and defensive gains against attacking the capital. That is, a non-capital target is truly only adding value if it situates the center-seeking rebels to better confront the government despite any losses they experience taking this city as compared to fighting for the capital. It is in the juxtaposition between attacking the capital versus a non-capital city that the group's strength becomes important to our model of rebel movement.

Stronger groups are better able to attack the capital (e.g. Holtermann, 2016). They possess more fighters, supporters and resources than other groups. This military advantage means that stronger groups will weigh any additional potential value gained from attacking non-capital cities as being of less relative value to them compared to the same calculation made by weaker groups. This relative weighting of potential value from non-capital cities conditions the relationship between a non-capital city's cumulative value and the likelihood that a group will attack it. Dividing rebels into those that are stronger than the government, near parity, and weaker than the government, we expect three patterns. First, stronger groups are more likely to bypass non-capital cities than other groups because they have less need to further increase their offensive or defensive strength relative to the government before assaulting the capital. Visually, we conceptualize a stronger group as moving in more of a straight-line path from their formation location to the capital. Second, groups that are near parity with the government are more likely to follow a zigzag pattern towards the capital, as they attack and capture non-capital cities that help them build their offensive capacity vis-à-vis the regime while also continuing to protect their rearguard areas of support. Lastly, we expect groups that are weaker than the government to experience the costs of advancement more weightily than the other groups. Concerned that the government will breach their defenses and cut off their support, weaker groups are likely to follow patterns that slowly spiral out from their main base of support.

Hypothesis 3: Conditional on high relative strength, rebels are less likely to target a given non-capital city.

Hypothesis 4: Conditional on parity, rebels are more likely to target a given non-capital city.

Hypothesis 5: Conditional on low relative strength, rebels are more likely to target nearby non-capital cities and less likely to target further non-capital cities.

Research design and analysis

To test Hypotheses 1 and 2, we construct a city-level dataset consisting of 3,940 cities in 29 countries around the world. To be included, the city must have a population of at least 10,000 and be in a country with an ongoing civil conflict, defined by UCDP GED v.21.1 (Sundberg and Melander, 2013). A 'conflict' is ongoing when a dyad (government–rebel) crosses 25 deaths in a year. Some years are included with fewer deaths if the dyad continues to engage one another in battles (see Hogbladh, 2021: 5). Additionally, the non-state actor must be formally organized with an accepted name and clear leadership structure (see Hogbladh, 2021: 4). The presence of an organized, active rebel movement implies that there is at least some probability that a city is targeted. Furthermore, we drop all secessionist conflicts and coups to focus solely on center-seeking wars.

Temporally, our dataset is yearly, encompassing the years 2000–2020, producing 23,881 observations (city-years). Importantly, we lose some observations due to data availability issues, particularly when investigating the role of costs in influencing city attacks, as a vital component of our cost measure is only available up to 2016 (as discussed further below).

Dependent variable

We want to understand the likelihood of rebel assaults on city centers. To capture this, we create a dichotomous variable that equals 1 if a battle with government forces occurred within 10 km of a city center; 0 otherwise. The 10-km threshold is to ensure we are capturing city attacks. The spatial point uses the center of the city and thus, some buffer was necessary to capture violence occurring in other city locations. In the sample, city attacks are observed in 8.58% of city-years ($N = 2,050$).

Independent variables

We posit that rebels are more likely to target cities with higher cumulative value (Hypothesis 1). We proxy strategic value through cities in proximity (10 km or less) to oil and natural gas deposits,[2] mineral resources,[3] and active airports.[4] Additionally, cities that are closer to the capital in terms of driving time are more desirable,[5] as are cities with symbolic value, such as those containing religious sites and historical monuments, among other features.[6] For each city, we rescale these variables to fall between 0 and 1 and then take the sum (for a value ranging between 0 and 5). We then rescale this index to fall between 0 and 1, with 0 representing no value, and

1 maximum value. Finally, because a capital is valuable for strategic and symbolic reasons, we set all capitals to 1. The index, when constructed, ranges from 0 to 1 and has a mean value of 0.101, a standard deviation of 0.158 and a median value of 0.044.

While we expect rebels to target cities with higher value, they are also less likely to choose to fight in cities when the cost of doing so is greater (Hypothesis 2). Cost is calculated by accounting for city-level factors, such as the ability of the government to deploy forces[7] and the level of fighting observed in the city during the prior period.[8] Cost, however, also includes those imposed by logistical complexities, such as moving rebel forces across geographic space, which is often characterized by rough terrain and a lack of transportation infrastructure. To capture this cost, we use the location of the nearest battle and estimate the distance using least-cost-path analysis (see White, 2015). A path becomes costlier as terrain roughness increases, forests become denser, and transportation networks (roads) become sparse.[9] We assume that given this, rebels choose the least cost paths (easily traversable terrain and transportation networks) and thus we use this path to calculate distance. Like the value index, we rescale each of the cost factors to fall between 0 and 1 and then take the sum. This value is rescaled to fall between 0 and 1, with 0 representing no cost and 1 maximum cost.[10] Once constructed, the cost index ranges from 0.003 to 0.950, has a mean value of 0.366, a standard deviation of 0.227 and a median value of 0.411.

Accounting for both value and cost, we anticipate rebels choosing to attack cities when the value of those cities exceeds the expected costs. This measure is calculated by subtracting the cost index from the value index, producing a variable ranging from –1 to 1. Positive values indicate a city where the value exceeds costs, whereas negative values indicate a city where costs exceed value, and thus an attack is unlikely. Figure 1 presents the distribution of this variable, revealing that for most cities in civil conflict countries, costs exceed value, thus making city assaults less likely. There are, however, a notable number of instances where value does exceed costs, making a city attack more probable.

To account for confounding factors, we control for a combination of state-level conflict (conflict intensity, multiple rebel groups), city (conflict history, population, distance to borders, roughness of terrain), and local-level factors (the density of cities). Given space constraints, we discuss these variables further in Online Appendix A and also provide a detailed table of descriptive statistics in Online Appendix B. Given that our
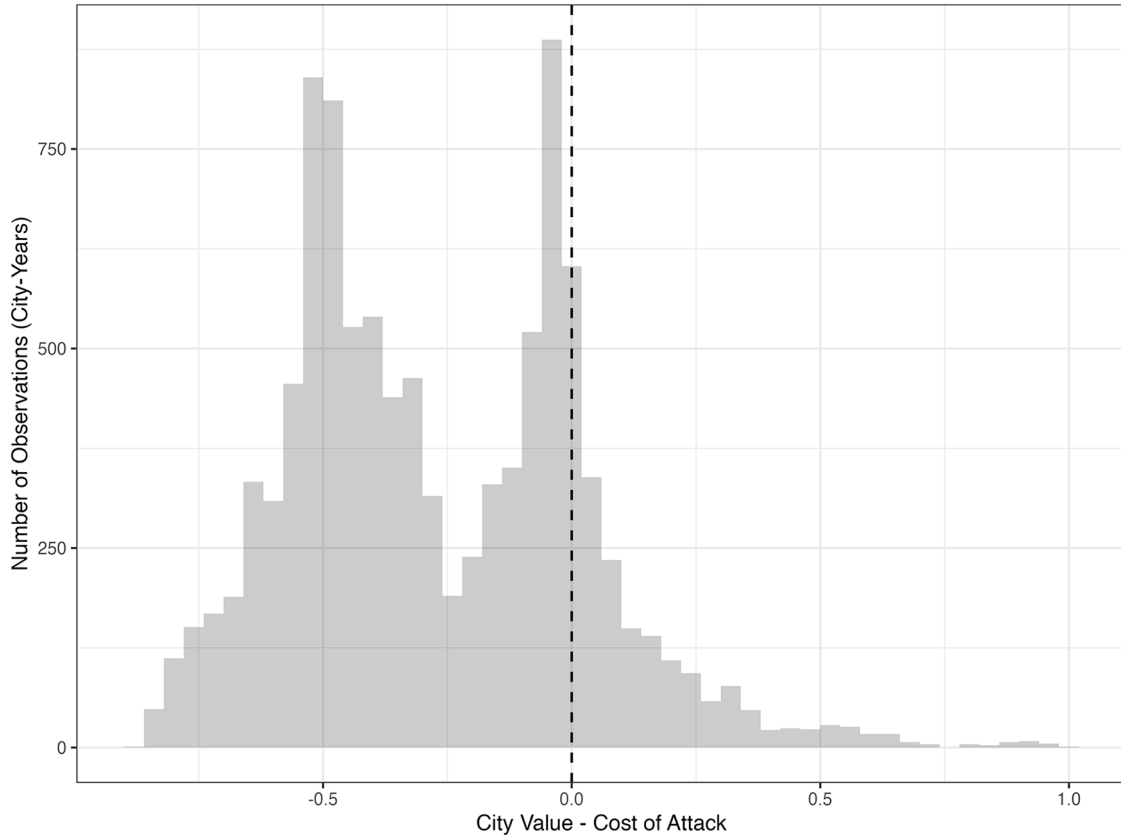
Figure 1. The difference between city value and the cost of attack.

theory and analysis are at the city level, we do not include group-level variables in this analysis testing Hypotheses 1 and 2.

Method of analysis

Logistic regression models are employed because of our dichotomous dependent variable. We acknowledge that given the time-series dataset that our observations are not independent, and time dependence may be an issue. To account for this, we report robust standard errors clustered on the city. We also estimate a series of alternative model specifications to assess robustness, which are discussed in the following section. As we are not estimating causal inference models, we discuss our results in terms of how the variables influence the risk of the rebels attacking a city.

Empirical findings

The results from the logistic regression models are presented in Table 1. Column 1 estimates the model focusing on cost of attack (Hypothesis 2) and Column 2 on the value of the city in question (Hypothesis 1). Column

3 uses the difference between value and cost, with positive values indicating instances when value exceeds cost, and negative values cases when cost exceeds value. Thus, in this specification, we anticipate a positive relationship, whereby cities are more prone to being targeted as the difference between value and cost increases. This specification is also noteworthy, as it captures both cost and value in a single model.

Across all three models, Hypotheses 1 and 2 are strongly supported. A positive relationship is revealed between the value of a city and the probability of attack when considering the index in isolation (Column 2) and in combination with cost (Column 3). Meanwhile, a negative and statistically significant relationship is uncovered when exploring the influence of the costs of attack on the probability of a rebel assault. This is true both in isolation (Column 1) and in the model looking at the difference between value and costs (Column 3).

One concern about our approach is the fact we chose a population threshold of 10,000 inhabitants. To assess whether this decision is influencing our findings, we estimate our third specification where we capture the difference between city value and the cost of attack on four other threshold values: 25,000, 50,000, 75,000,

Table 1. The determinants of city attacks.

	City attack (dichotomous)		
	(1)	(2)	(3)
Cost of attack	–3.256* (0.325)	–	–
City value	–	1.303* (0.241)	–
City value – cost of attack	–	–	2.424* (0.265)
Country-level battles	0.0003 (0.0002)	0.001* (0.0002)	0.002* (0.0003)
Number of rebel groups	–0.066 (0.117)	–0.142 (0.134)	–0.599* (0.157)
City conflict history	2.220* (0.069)	2.205* (0.084)	2.069* (0.079)
Local city density	0.002 (0.003)	0.006* (0.001)	0.015* (0.003)
ln city population	–0.004 (0.048)	–0.036 (0.039)	–0.058 (0.069)
ln city distance to border	–0.137* (0.042)	–0.262* (0.030)	–0.153* (0.054)
ln city terrain roughness	0.210* (0.032)	0.342* (0.031)	0.305* (0.043)
Constant	–3.217* (0.621)	–4.159* (0.482)	–3.883* (0.880)
N	12,682	17,223	10,266
R^2	0.704	0.675	0.743
Chi^2 (df = 8)	5,367.94*	5,669.05*	4,396.44*

Robust SEs clustered on city in parentheses.
The line (–) in the table indicates covariates not included in the model.
*$p < 0.05$.

Table 2. The determinants of city attacks across different city population thresholds.

	City attack (dichotomous)			
	(1)	(2)	(3)	(4)
	25,000 +	50,000 +	75,000 +	100,000 +
City value – cost of attack	2.416*** (0.339)	2.327*** (0.393)	2.414*** (0.458)	2.363*** (0.544)
Country-level battles	0.002*** (0.0003)	0.002*** (0.0004)	0.002*** (0.0005)	0.002*** (0.0005)
Number of rebel groups	–0.712*** (0.201)	–0.849* (0.285)	–0.521 (0.340)	–0.352 (0.385)
City conflict history	2.051*** (0.092)	1.993*** (0.119)	1.850*** (0.120)	1.758*** (0.127)
Local city density	0.016*** (0.004)	0.009† (0.005)	0.007 (0.006)	0.010 (0.008)
ln city population	–0.039 (0.097)	–0.067 (0.126)	–0.076 (0.152)	–0.020 (0.178)
ln city distance to border	–0.134† (0.070)	–0.185* (0.080)	–0.164† (0.098)	–0.184† (0.110)
ln city terrain roughness	0.327*** (0.055)	0.395*** (0.075)	0.337*** (0.092)	0.367*** (0.105)
Constant	–4.124*** (1.203)	–3.308*** (1.632)	–3.317 (2.077)	–4.281† (2.454)
N	8,468	6,735	4,354	3,249
R^2	0.762	0.757	0.753	0.775
Chi^2 (df = 8)	3,478.75***	2,311.82***	1,575.43***	1,285.03***

Robust SEs clustered on city
†$p \leq 0.10$; *$p < 0.05$; ***$p < 0.001$.

and 100,000. The results, presented in Table 2, reveal no change in the relationship between our independent variable of interest and the likelihood of a rebel group attacking a city. Indeed, the substantive effects are statistically identical, as evident in the predicted probabilities and associated 95% confidence intervals presented in Figure 2. While holding all control variables at the mean, we see a sharp increase as the difference between value and cost decreases and shifts positively, moving from 0% to at least 15% in each model.

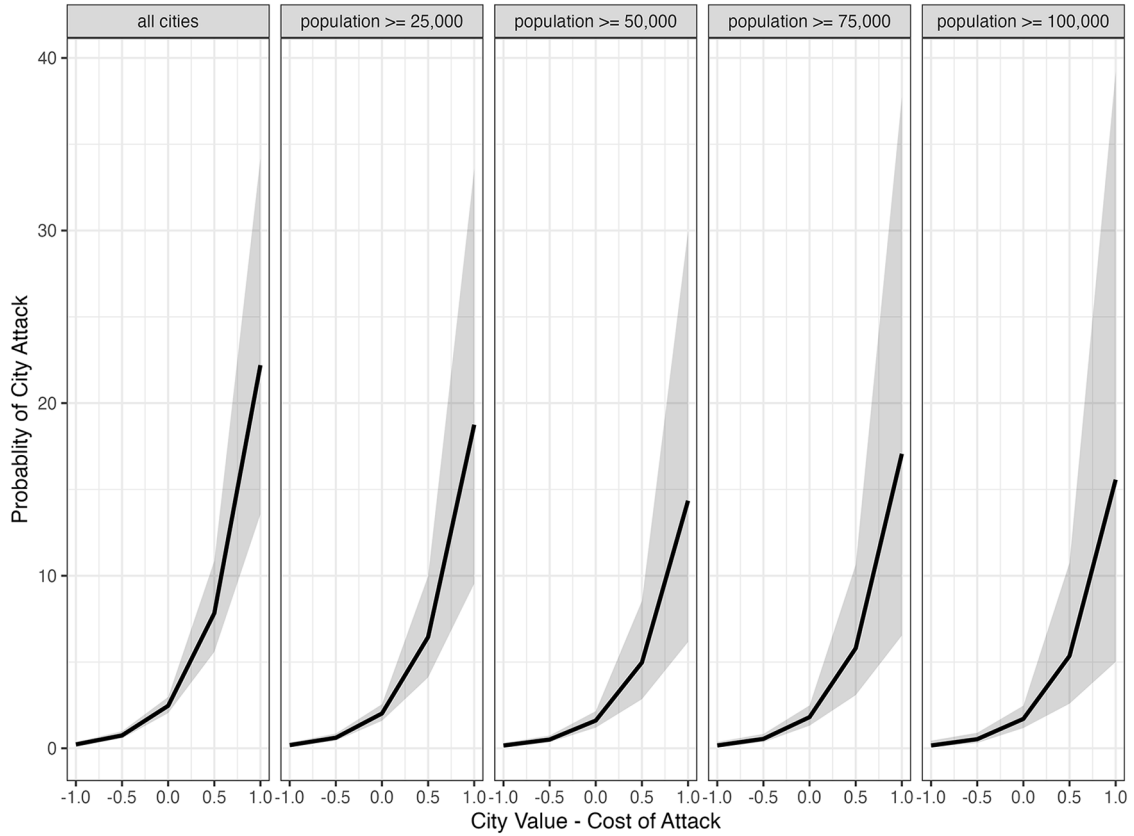In sum, our empirical models uncover strong evidence that city value and the expected cost of attack

Figure 2. Substantive effects across city population thresholds.

strongly influences whether a city is victimized during wartime. To assess the robustness of these models, we also estimate a rare event logit (Online Appendix D.1), linear probability model (Online Appendix D.2), linear probability model with panel fixed-effects (Online Appendix D.3), linear probability model with panel and time fixed-effects (Online Appendix D.4) and linear probability model with random effects (Online Appendix D.5). In each model specification, the findings reported in this manuscript hold.

Assessing the role of relative strength

While our theory primarily focuses on the evaluation of specific targets, we acknowledge that rebels may weigh these locations differently based on their group characteristics, such as strength (see Hypotheses 3–5). Specifically, weak center-seeking movements will reside on the periphery near their base of operations and exhibit spiral patterns in terms of their city attacks. Groups at parity with the government will zigzag, moving towards the capital as they begin to consolidate power, while targeting cities of value to increase their relative strength. Finally, strong center-seeking rebels

have less need to attack cities as they advance on the capital. Thus, we anticipate a straighter path to the capital.

Given the differing unit of analyses between city value and rebel strength, investigating this interaction is not easily done through standard statistical analysis. Thus, to begin our investigation into these patterns, we use data from the Non-State Actor Dataset (see Cunningham et al., 2009) to measure rebel strength.[11] We then create two figures: one that looks at distance to the capital city relative to the number of months center-seeking rebels have been active, and another that looks at the number of total city attacks. We then fit loess curves with 95% confidence intervals to ease interpretation. We want to emphasize that this is a preliminary analysis of these patterns, which warrant future research in studies that leverage the rebel group as the primary unit of analysis, something we are unable to do here.

Figure 3 contains the results from this process, revealing strong patterns. First, while weaker and parity groups begin at around the same distance from the capital, weaker groups tend to move closer at a quicker pace and then retreat, implying increased pressure from the government. At war onset, groups at parity with government
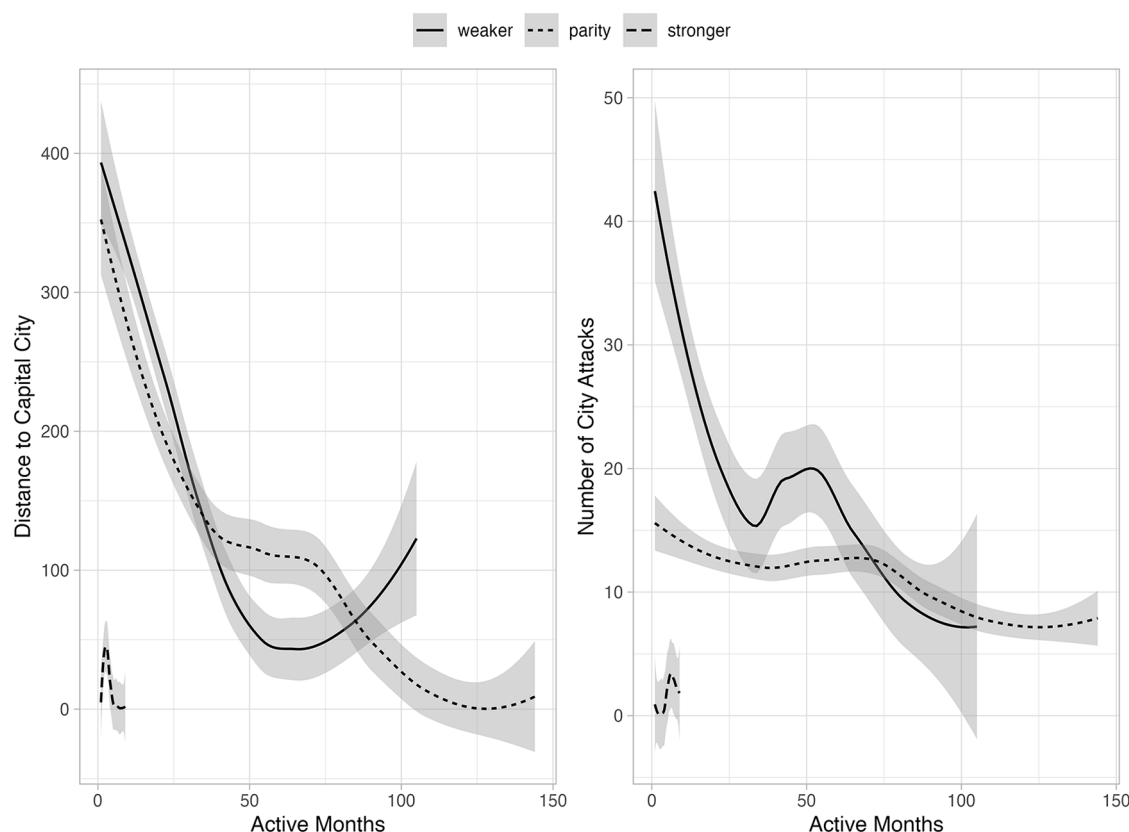
Figure 3. The number of city attacks and distance to capital across differing relative strengths.

forces are far removed from the capital city. As duration increases, however, we see a dramatic negative slope emerge as they move towards capital cities, which continues as time progresses. This fits our expectation that center-seeking rebels take time to consolidate power, and then strategically move to the capital. Finally, rebels stronger than the government target the capital early, with little need to capture other cities, a clear pattern found in the data. Notably, however, there is only one rebel organization deemed stronger than the government (Rwandan Patriot Front 1990–1994), so while our findings are consistent with our argument, the fact that our findings regarding strong groups relies on one armed non-state movement leads us to interpret this with caution.

Our argument is not solely about reaching the capital, however. In addition, Hypotheses 3–5 expect weaker and groups at parity to target smaller, non-capital cities in an attempt to consolidate power. Here, we find strong patterns, as well. Weaker rebels target cities at greater distances from the capital far more often than others, particularly early in a rebellion. Groups at parity, however, exhibit a much more constant pattern of city attacks. There is a marginal decrease as they move towards the capital city, however. Finally, strong groups

focus almost exclusively on targeting the capital, consistent with our logic.

To further illustrate these patterns highlighting the role of relative strength in city targeting decisions, a visualization is included in Online Appendix C for each center-seeking rebel movement included in the sample, to allow readers to see how this process evolves in each case included in our study.

Caveats and limitations

Before proceeding, we acknowledge several limitations of our large-N empirical approach. First, we evaluated Hypotheses 3–5 using a visual analysis rather than a conventional regression-based test. This choice was driven by our unit of analysis (individual cities), which makes it difficult to test these hypotheses in a regression framework without fundamentally changing the unit of analysis. While the visualization offers support for our predictions, this evidence should be interpreted with caution. Our findings here are preliminary and invite further investigation by other researchers. Future studies, for example, could incorporate additional factors such as the spatial distribution of cities or the

infrastructure networks connecting them to see whether these influence the patterns we observed. We also emphasize caution given the rarity of rebel groups that are stronger than the national government – in our sample, only one such group exists, and its case is highly context-specific. This uniqueness means that any findings related to exceptionally strong rebels may not be widely generalizable.

Second, our analysis assumes a uniform interpretation of city value and attack cost across rebel groups, an oversimplification that may overlook important variations. In reality, what one opposition movement deems valuable territory can differ greatly from another's assessment due to intragroup priorities, intergroup rivalries and other contextual factors. Likewise, the perceived cost or risk of attacking a given city varies between rebel organizations – shaped by their logistics, capabilities and local knowledge – which our large-*N* approach cannot fully account for. For instance, some groups may suffer a steep loss of strength as they extend their reach (a concept akin to the LSG in warfare), whereas others might mitigate such costs through better supply lines or local support. Although our illustrative case studies provide insight into how these dynamics play out for specific groups, further research is needed to disentangle how center-seeking rebels evaluate targets' value versus cost. Future work could examine, for example, differences in rebel leadership structures, historical experiences, regional contexts or country-specific factors that influence these perceptions of value and cost.

Finally, our large-*N* framework simplifies the rebel targeting process in ways that may overlook complex on-the-ground realities. We focused on geographic distance, essentially assuming that rebels must travel from their current location to attack a target city. In practice, however, insurgent organizations might have fighters or supporters already dispersed across multiple locations. An attack on a city could therefore be less about moving troops over long distances and more about activating local cells or units that are already in place. Our use of the rebels' closest known location to a city captures some of this possibility, but it may miss scenarios where insurgents were covertly present inside a city before open hostilities began. Additionally, the spatial context of a conflict can shape targeting opportunities. The interaction between a country's size and the number and density of its cities is likely to influence how rebels choose their targets. In our analysis, a higher density of nearby cities is associated with more frequent targeting of those cities, but broader country-level patterns (such as a nation's overall urban distribution) might also be at work. This is especially plausible in conflicts where multiple rebel movements operate concurrently, as the availability and spacing of cities could constrain or facilitate different rebel strategies

Brief illustrative case studies

We argue that center-seeking rebels prefer to move as quickly to the capital city as possible to reduce the costs and risks to their campaign before being able to confront the regime and its forces directly. However, rebels also understand that they must protect their rear guard and continue to mobilize fighters as they push forward. This means that many groups must detour en route to the capital to take or defend key strategic and symbolic locations. For the weakest groups, this trade-off often requires them to spend much time building local support and security rather than moving forward. Groups near parity are better able to advance the frontlines of the conflict but take care to protect themselves against possible losses by targeting key locations between their place of formation and the capital. Only the strongest groups can move most directly on the capital. The large-*N* analysis supports these hypotheses. We find strong evidence that city value and the expected cost of attack influence the decision to target cities. However, the analysis relies on proxies for strategic or symbolic value and the costs of targeting a location. It is unable to directly capture the mechanisms on which we theorize. Therefore, we now provide brief case studies that help highlight our mechanisms.[12]

These cases are not meant to be a direct test of our theory. Instead, they are meant only to illustrate our mechanisms. Importantly, they each also highlight the nuance in these dynamics. First, while we largely treat the strength of the rebels as fixed, group strength can shift during war and alter the rebels' movement along the lines we expect. When groups are weak, they spiral. When they gain strength, they move towards the capital. Second, while we focus primarily on dyadic strength, third parties and other non-state groups can alter the relative strength and calculations of the rebels in moving during the conflict. Strong third parties can keep strong rebels from attacking the capital. Lastly, we tend to treat rebel strength as known to both sides. Yet, estimates of rebel strength are difficult during the fog of war. In the cases below, we see that uncertainty about relative strength can alter movement.

National Patriotic Front of Liberia

On Christmas Eve 1989, the NPFL crossed into Liberia from the Ivory Coast to begin its campaign against Samuel Doe's government. The group was small – numbering only 168 fighters to Doe's 6,000-man army (Pham, 2004: 99). After crossing the border into Nimba County, the NPFL spiraled throughout the county capturing key towns from Butuo to Loguatuo to Karnplay to Bhan and Tapeta (e.g. Pettersson et al., 2021). The spiraling was strategic. Nimba County was home to the top NPFL commanders and was a hotbed of anti-Doe sentiment. The NPFL sought to push government agents out of the territory, as they attempted to lock up sources of arms, ammunition and fighters until their reinforcements from the Ivory Coast and Burkina Faso could arrive. Soon these foreign fighters arrived along with volunteers from the Liberian exile and refugee communities in Gambia, Ghana and Sierra Leone (Waugh, 2011: 124).

With their armory swollen and 10,000+ fighters (e.g. Pham, 2004), the NPFL was then ready to march towards the capital, Monrovia. From this point, barely 3 months into the conflict, the rebels' forces now greatly outnumbered those of the government and the group pushed quickly forward. As Taylor remarked, 'Now we had arms to take the next garrison. General Varney and Prince Johnson, seasoned military men, joined our cause. Suddenly we'd become formidable!' (quoted in Waugh, 2011: 124). From Nimba County, the rebels moved linearly to Monrovia: taking Ganta in April, Buchanan in May, Paynesville in July and Monrovia by August – moving nearly 400 km from the northeast to the southwest in roughly five months (Pettersson et al., 2021). The speed of this conquest is even more impressive given that the NPFL fighters walked from target to target. Importantly, while the backend of this conflict supports the theory of a strong group – advancing quickly and near linearly on the capital – the overall case of the NPFL also supports our understanding of weaker groups. In its initial stage, until its reinforcements arrived and it could mobilize local antiregime support, the NPFL had to survive by spiraling around Nimba County in the far east of the country rather than advancing towards the capital. Thus, this case illustrates the nuance of how shifts in rebel capacity influence shifts in their movements.

This case also highlights the importance of target selection. For example, the rebels entered Liberia in Nimba County, which held both strategic and symbolic value for the group. Nimba was strategic for two reasons. First, this northeast county bordered the Ivory Coast, which backed the rebels, and thus allowed the group's leader, Charles Taylor, to easily commute between the two countries as needed early in the war (e.g. Waugh, 2011: 123). Nimba, though, is not the only Liberian county to border the Ivory Coast. South of Nimba, Grand Jide, River Gee and Maryland each also form the border. However, unlike these other counties, Nimba had further strategic value in that it was home to the Gio and Mano tribes who opposed Doe and were quick to aid the NPFL (e.g. Waugh, 2011: 128). Nimba also held symbolic value for the NPFL, as it was the home of Taylor's mentor, General Thomas Quiwonkpa, who was previously executed for plotting a coup against Doe. Similarly, once the NPFL moved out of Nimba, they headed directly to Buchanan, which was 250 km south. Buchanan was key to the rebels. As Waugh (2011: 130) summarizes, 'The capture of Buchanan in May 1990 was a milestone in the campaign – giving the NPFL a major port and confirming that they had effectively now split the AFL forces in two. The remnants of the AFL in east of Liberia were cut off and the NPFL could set about taking economic and administrative control of the countryside'. From there, the rebels moved west to Paynesville, which was a key strategic target in that it is the eastern-most suburb of Monrovia, from which the rebels cut off the capital's water and electric supplies before beginning their siege (Pham, 2004: 101).

Patriotic Movement of Ivory Coast vs. Movement for Justice and Peace

Following controversial elections in 2000 and President Gbagbo's failure to implement promised reforms as part of a unity government in 2002, the Ivory Coast descended into civil war when the opposition party's armed wing, the Patriotic Movement of Ivory Coast (MPCI), launched a rebellion against Gbagbo. The MPCI drew from the party's northern support base and was strong, fighting the government near parity with roughly 9000 soldiers, as many of the country's northern troops joined the rebellion (see Cunningham et al.'s 2009 non-state actor data). Initially, though, the MPCI did not move directly on the capital, Yamoussoukro. Instead, the rebels targeted key non-capital cities to better position themselves for a future attack on Yamoussoukro. Specifically, the rebels targeted the country's largest city, Abidjan, for strategic and symbolic reasons. Strategically, Abidjan is the country's economic hub and major port city. Capturing

Abidjan would help the MPCI strangle Yamoussoukro from the south, cutting off the centrally placed capital from key resources. Symbolically, Abidjan was important because in addition to being the Ivory Coast's largest population center, it had also served as the country's capital from independence to 1983 and held great cultural importance. For a northern-based group, controlling Abidjan would demonstrate its viability to the rest of the country. As Hazen (2013: 143) summarized, a quick success in Abidjan would have led to the immediate fall of Gbagbo.

However, Gbagbo's forces, backed by French troops, were able to repel the attack on Abidjan. The loss revealed to the MPCI that a direct attack on Gbagbo's core forces in Yamoussoukro would most likely end in defeat. They thus revised their strategy and moved north to consolidate key strategic and symbolic territory around their support base. As expected by our theory, groups who are unable to target the capital move to capturing key towns and cities to mobilize local populations, capture necessary resources, or to establish defensive positions. This logic helps to explain the MPCI's post-Abidjan strategy. The group's ability to capture these key northern cites allowed it to consolidate power around the country's second largest city and northern stronghold, Bouaké (Human Rights Watch, 2005). However, here we also see the important role third parties play. With the MPCI's revised strategy effectively partitioning the country, France used the rebels' move north to keep the parties separated while forcing negotiation. With French forces outpowering the rebels, and maintaining a buffer zone around Yamoussoukro, the MPCI was unable to target the capital (Hazen, 2013).

The MPCI was not the only group to challenge Gbagbo in 2002. The MJP represented one of the weakest rebel groups to challenge the regime at this time. With MPCI drawing French and Ivorian attention to the north, the MJP appeared in the western Ivorian city of Man to depose Gbagbo. However, the group only possessed 300 fighters. With little firepower, the MJP largely spiraled within the western regions of the country (Pettersson et al., 2021) and failed to launch any attack on Yamoussoukro. Here, we largely see the importance of group strength as the MJP made little headway towards Yamoussoukro. Indeed, the MJP was so weak that many observers treated the group as an extension of the MPCI with whom the group coordinated (see International Crisis Group [ICG], 2003). Yet, even with such a small group, we see the importance of target selection. The MJP emerged in Man, which was of

symbolic value as the birthplace of General Robert Guéï, who was ousted – and possibly later assassinated – by Gbagbo. Within a month of forming, the MJP attacked Daloa which is a major cross-roads city in the western regions in which the MJP operated. Daloa had strategic value in occupying a key transportation junction en route to the capital. It also briefly distracted the French peacekeeping troops by drawing them away from Yamoussoukro, which had the rebels been more successful could have created space for MPCI to advance to the capital (ICG, 2003). However, these rebels failed to move any closer to the capital. As hypothesized, weaker rebels are likely to target non-capital cities near their area of formation and are unlikely to move much beyond those environs.

Discussion and conclusion

Rebel movements during civil war are key to a broader understanding of political violence because they underpin the spread of violence, the costs of fighting, and the outcome of war (e.g. Greig, 2015; Minhas and Radford, 2017; Ruhe, 2015). Scholars primarily explain rebel movement through the group's strength (e.g. Holtermann, 2016). Yet, while strength is crucial to this process, it is not sufficient to explain where violence occurs. We build from this literature by incorporating insights from those scholars highlighting the importance of both physical and political geography in this process (e.g. Bohara et al., 2006). We broaden this perspective to consider how a group's relative strength vis-à-vis the government influences its calculation of both the strategic and symbolic value of targets throughout the country. Considering the multifaceted value of territorial control against the practical costs of war helps us better understand the wide variance in the geographic contagion of center-seeking rebellions.

This approach allows us to speak to key patterns in the conflict process. For instance, others have noted that not all center-seeking groups take a direct path to the capital. The focus of this work has been in highlighting the importance of traditional governance structures that undergird the state (see Raleigh and De Bruijne, 2017). These studies have great merit in noting how the symbolic value of territory may be tied to these traditional structures. Yet, we broaden our understanding of both the symbolic value of territory and the movement of rebels by integrating these processes found in societies possessing traditional governance with those that do not. As our analyses indicate, our logic holds across time and space. Similarly, others have demonstrated that

rebels tend to fight in geographic clusters rather than advancing on the capital (e.g. O'Loughlin and Witmer, 2011). Previous scholars explain these patterns through analysis of the rebels' goals, especially in secessionist wars (e.g. Kibris, 2020). However, our theory speaks to these patterns in a general sense. Since most rebels are weaker or much weaker than the government (see Cunningham et al., 2009), our theory helps explain why many groups spiral geographically rather than push forward. Thus, by combining considerations of both rebel strength and territorial value, our theory brings these previous works into the conversation and broadens our understanding of the conflict process.

Our theory also opens up other avenues for future research. Here, we focus on five. First, as highlighted in both the case of Afghanistan and the Ivory Coast,[13] third parties can alter the balance of power between the rebels and incumbent. How do rebels react to third-party intervention? Do they process the shift in opportunity caused by the third party's entrance or withdrawal from the war or does it take time for these forces to alter the conflict? Do they move in anticipation of the intervention (see Kuperman, 2008)? Does it matter if the third party is biased or neutral (e.g. Kathman and Wood, 2011), armed or unarmed (Hultman et al., 2013)? Second, as illustrated in the case of Afghanistan, how does uncertainty influence these dynamics? Does uncertainty cause the actors to act hesitantly, as with the Taliban, or do they rush into combat as predicted in general theories of war (e.g. Fearon, 1995; Reed, 2003)? Does the uncertainty cause more variance in these movements? How long does it take the parties to learn about their true position vis-à-vis the other? Third, our focus is on rebel attacks against the regime's forces: battles over territory. Yet, both government and rebel actors engaged in a wide range of tactics, including terrorism and the victimization of civilians during war (e.g. Balcells, 2017; Polo and González, 2020; Uzonyi and Demir, 2020). How do rebel movements map onto these tactics? Does rebel strength and territorial value help explain these atrocities, as well? Fourth, we only consider how strength modifies the relationship between city value and rebel movement, but other features of the group and the broader conflict should also influence which locations a group targets. For example, do multiparty wars lead to competition and thus geographic restriction for groups or, conversely, distract governments thus providing rebels space to move (e.g. Butcher, 2015; Uzonyi and Reeder, 2024)? Are more cohesive groups better able to move directly to the capital, while less cohesive groups spiral or zigzag in disagreement over target selection (e.g. Staniland, 2014; Tamm,

2016)? Lastly, our focus is on center-seeking wars. We believe that our logic can speak to the secessionist process as well, since it helps to explain geographic clustering of violence. However, we encourage future scholars to unpack the similarities and differences between types of wars, as some secessionists push towards the capital (e.g. Biafra) while others remain largely localized (e.g. Ogaden National Liberation Front).

Replication data

The dataset, codebook and do-files for the empirical analysis in this article, along with the Online Appendix, are available at https://www.prio.org/jpr/datasets/.

ORCID iDs

Bryce W Reeder ⓘD https://orcid.org/0000-0002-1782-6605
Gary Uzonyi ⓘD https://orcid.org/0000-0001-6006-993X

Notes

1. Given space concerns, we leave analysis of other group characteristics to future research.
2. The number of oil and natural gas deposits within 10 km of the city (Lujala et al., 2007) ranges from 0 to 1 and has a mean of 0.004. The more of these resources, the more attractive a city is to a rebel movement.
3. The number of mineral deposits within 10 km of the city, per United States Geological Survey (Schulz and Briskey, 2005). Minerals include nickel, iron, aluminum, copper, lead-zinc, PGEs (platinum, palladium, rhodium, ruthenium, iridium, and osmium) gold, rare earth, diamond, clays and potash. This variable ranges from 0 to 3 and

has a mean of 0.034. More mineral deposits make a city more attractive to rebels.

4. The number of active airports within 10 km of the city using the *airportr* package in R (Shkolnik, 2019), which extracts data from the OpenFlights Aiport Database, an open-source data source. The variable ranges from 0 to 2 and has a mean of 0.136. Because airports are of strategic importance, higher numbers make a city more attractive to rebels.

5. The driving distance to the capital city, measured in minutes. Created using driving directions from Google Maps (Google, n.d.). The range of this variable (natural log) is 0 to 12.744 and has a mean value of 10.329. The closer a city is to the capital, the more attractive it is. This is because it puts the group in a better position to move on the capital, which is the end goal for center-seeking rebel movements. We are able to use driving distance because capital cities are well-documented and easily coded via Google's application programming interface.

6. The number of World Heritage Sites (cultural or natural) within 10 km of the city taken from the United Nations Educational, Scientific, and Cultural Organization (UNESCO World Heritage Centre, n.d.). This variable ranges from 0 to 3 and has a mean of 0.021. We expect more sites of historical/cultural significance to attract rebels. We acknowledge that this is merely a proxy of symbolic value (that is inherently political), as there are other factors that are likely to matter here. We perform a sensitivity test excluding this factor and find that it is indeed important for our index (see Online Appendix C.3).

7. The number of government military personnel (natural log) divided by the number of cities of 10,000 inhabitants, using information from version 6 of the National Material Capabilities dataset (Singer et al., 1972). This variable ranges from 0.007 to 0.355 and has a mean of 0.024. Higher values indicate higher costs of attack.

8. The natural log of the number of battles between rebels and government forces within 10 km of the city during the prior period using version 21.1 of the UCDP GED (Sundberg and Melander, 2013). This variable ranges from 0 to 4.754 and has a mean of 0.016. More battles indicate a confirmed government presence and willingness to fight, thus raising the costs of attack.

9. We use the *leastcostpath* package in R (Lewis, 2020) to calculate the least cost path between the nearest battle and the city under consideration. Least cost analysis constructs potential routes between two points and chooses the path with the least cost, as defined by the factors incorporated into the 'cost surface'. Our cost surface increases with sharper changes in elevation (NASA/METI/AIST/Japan Spacesystems and U.S./Japan ASTER Science Team, 2019) and denser forests (Townshend, 2016), and decreases with the presence of transportation networks (Meijer et al., 2018). We chose this method over using Google's API for driving distance because some cities,

particularly smaller cities, are more difficult to identify, leading to missing values.

10. Like the city value index, we acknowledge that the sources of 'cost' are likely to vary across rebel movements. But without having inside information about each movement we cannot account for this in our empirical model.

11. These data code the strength of rebels relative to the government they are fighting. While the data code varying levels of weak and strong, we aggregate them into single categories.

12. An additional case, the Afghan Taliban, can be found in Online Appendix F.

13. The Afghanistan case can be found in Online Appendix F.

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BRYCE W REEDER, b. 1983, PhD in Political Science (University of Illinois, 2015) is an Associate Professor of Political Science in the Truman School of Government and Public Affairs at the University of Missouri (2016-present). His research focuses on the causes, consequences and local-level dynamics of political violence.

GARY UZONYI, b. 1986, PhD in Political Science (University of Michigan, 2013) is a Senior Lecturer/Associate Professor in the University of Strathclyde's Department of Government and Public Policy (2024-present) and a Research Associate at Vilnius University's Institute of International Relations and Political Science. His research focuses on political violence and how the international community responds to such threats to peace and security.