State Capacity, Insurgency and Civil War: A Disaggregated Analysis*

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Abstract

Country-level indicators such as gross domestic product, bureaucratic quality, and military spending are frequently used to approximate state capacity. These factors capture the aggregate level of state capacity, but do not adequately approximate the actual distribution of capacity within states. Intra-state variations in state capacity are critical to understanding the relationship between state capacity and civil war. We offer nighttime light emissions as a measure of state capacity to differentiate its impact on civil war onset within the country from its effect at the country level. We articulate pathways linking the distribution of nighttime light with the expansion of state capacity, and validate our indicator against other measures at different levels of disaggregation across multiple contexts. Contrary to conventional wisdom, we find that civil wars are more likely to erupt where the state exercises more control. We advance three mechanisms accounting for this counterintuitive finding: rebel gravitation, elite fragmentation, and expansion reaction. In the first scenario, state presence attracts insurgent activities. In the second, insurgents emerge as a result of the fragmentation of political elites. In the third, anti-state groups react violently to the state penetrating into a given territory. Finally, we validate these mechanisms using evidence from sub-Saharan Africa.

Keywords: Civil war; insurgency; state capacity; geospatial analysis; nighttime light

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1 Introduction

State capacity is one of the most widely discussed and employed concepts in political science. Scholars frequently associate weak state capacity with a host of problems confronting contemporary states. While the resulting literature is conceptually, analytically, and theoretically rich, it is empirically lacking with significant measurement, operationalization, and validity concerns. The core element of the most widely-accepted conceptualization of state capacity is the ability of the state to penetrate society (Mann 1986) and exercise territorial control (Herbst 2000). This argument asserts that weak state capacity manifesting in poor territorial control of peripheral areas, especially those characterized by difficult terrain, can make states vulnerable to outbreaks of insurgencies and civil wars (Boulding 1962; Fearon and Laitin 2003). While this argument associates political instability with weak state capacity, an observable implication of the argument is also that civil wars are more likely to emerge in areas characterized by poor state capacity and control within a country. This implication is better tested with the use of subnational, rather than country-level, measure and data. However, the use of country-level measures of state capacity, occasionally with questionable validity, dominates the literature. Such an approach – frequently born out of necessity in the absence of readily-available cross-national, disaggregated data on state capacity – while justified in some cases, could be problematic in other instances. In the absence of a valid subnational measure of state capacity and control, the hypothesized negative association between state presence or control and civil conflict has remained largely untested empirically.

The significance of state capacity in predicting political instability is consistent with scholarly claims about the predominantly rural nature of civil wars and insurgencies. State capacity generally weakens when one moves away from urban centers towards rural areas.[1] The existing data on the spatial spread of civil wars and insurgencies between 1992 and 2008

[1] Boulding (1962), for instance, formulated the concept of the "loss-of-strength gradient" to encapsulate the challenge of projecting state power over distance, especially in the context of rough terrain and poor infrastructure. See also, Herbst (2000) and Kalyvas (2004).

(Tollefsen et al. 2012) show that the political violence associated with these episodes tends to be spatially concentrated in specific areas within affected countries (see Supplementary Information). Contrary to the field's conventional understanding, anecdotal evidence highlights a positive correlation between state presence and civil war outbreak. These geographical variations strongly suggest that the impact of state capacity on the distribution of political violence within a country is governed by mechanisms different than those operating at the country level. As such, the role of state capacity across these different levels of analysis requires a more careful and systematic analysis. This not only helps test the relevance of state capacity in determining spatial patterns of violence *within* a country, but also provides a more robust test of the role of state capacity in shaping spatial patterns of civil wars *across* countries.

As suggested above, such an empirical exercise entails moving beyond the continued reliance on the national-level measures of state capacity that hitherto dominated the field, to a disaggregated measure of state capacity that can reliably discern the spatial distribution of state capacity and control within countries. In this paper: a) we provide such a measure; b) discuss pathways linking this measure with state capacity; c) test its validity compared with a variety of frequently-used subnational measures of state capacity; d) examine whether state capacity can be reliably associated with the spatial spread of violence across the world; and, e) lay out three mechanisms that explain our counterintuitive finding that civil war onset at the subnational level is linked to *higher* levels of state capacity.

While numerous studies of civil war onset exist, this is perhaps the first study to specifically account for the effect of intrastate variation in state capacity on a *global* scale. We associate state capacity with territorial control. We contend that the average level of night-time light *within a given region* is a good approximation of state penetration, especially when global disaggregated data on other frequently-used measures of state capacity are unavailable. We demonstrate that the distribution of electricity within a country constitutes a valid and meaningful measure of state capacity. Broadly, four pathways link the provision of electricity with state penetration and capacity: a) political mobilization; b) revenue mobilization; c) economic development; and, d) national security.

This measure is validated using disaggregated data on tax efforts, the size of bureaucracy, and the provision of public goods from Brazil, Ghana, and India, respectively. These data capture state capacity at three different administrative levels within these countries, which represent the three main developing regions of the world. We then replicate Fearon and Laitin's country-level analysis with the addition of a country-level nighttime light indicator. Next, we proceed to examine the effect of intrastate variation in capacity *within the state* on civil war onset globally at a highly-disaggregated level – 55 km by 55 km degree territorial grids – using nighttime light emissions.[2] We also account for a range of socioeconomic, political, and geographic indicators frequently associated with civil wars. We find that civil war is likely to arise in countries that have lower degrees of state capacity, but also, counter-intuitively, in locations within the country where the state exercises *greater* control. These results hold when we use provinces or states – first-level administrative units – as our divisions of analysis, as well as in an exceptionally-wide range of robustness model specifications reported in the Supplementary Information file.

Importantly, these findings are robust to different specifications of split-population Weibull models, which allow us to adjust the survival model coefficient estimates to account for excess zero values in our sample. In doing so, we are able to better account for areas – countries as well as regions within countries – where war is unlikely to arise due to factors such as the absence of population or better social and institutional mechanisms to manage conflict. We argue that the positive relationship between state capacity and civil war onset is not attributable to population or economic activity, both of which we control for, but rather to the presence of the state in these particular regions. Accordingly, we lay out three possible causal mechanisms, which we term *rebel gravitation*, *elite fragmentation*, and *expansion reaction*. In the first scenario, the state presence attracts insurgent activities; a challenger would

[2]See Figure A1 in the Supplementary Information file for a sense of the territorial scope of our units of analysis.

gravitate towards these areas to attack state institutions. In the second situation, insurgents emerge as a result of the *fragmentation* of previously-unified political elites that prior to conflict were cooperative or competed peacefully for political power. The last mechanism suggests that civil war results when local anti-state groups *react* violently to the state and its institutions penetrating into a given territory. Building on case studies, especially from sub-Saharan Africa, we provide qualitative evidence to show how these mechanisms operate, and point to new directions in the research on state capacity and its relationship to civil war.

2 Conceptualizing and Operationalizing State Capacity

A renewed interest in the state and its institutions over the last three decades occasioned a massive body of literature on the concept of state capacity. State capacity now signifies the fundamental characteristic of the modern state and has been used to explain a range of outcomes such as economic performance, quality of governance, political violence, and so forth (Geddes 1994; Fearon and Laitin 2003; Besley and Persson 2010; Lee and Zhang 2013). Current scholarship frequently conceptualizes state capacity as a multidimensional concept (Skocpol 1985; Besley and Persson 2011). Skocpol (1985) uses the plural *state capacities* and focuses specifically on three such "capacities" that she deems critical – territorial integrity, financial resources, and administrative apparatus. Previous research highlighted a range of capacities, including the capacity to impose order, protect private property, enforce contracts, extract resources, formulate and implement policies, provide public goods, obtain and maintain legitimacy, and so forth (Skocpol 1985; Herbst 2000; Besley and Persson 2010; Hendrix 2010; Hanson and Sigman 2013). Scholars also seek to reduce these capacities into manageable dimensions. Besley and Persson (2011), for instance, conceptualizes state capacity in terms of two dimensions: fiscal (or extractive) and legal (or productive) capacity.

Common to all of these studies is the insight that a fundamental dimension of state capacity is the ability to exercise full territorial control, enabling the state to monopolize the use of force, implement its policies, and enforce its decisions within its boundaries (Skocpol 1985; Herbst 2000). According to Michael Mann, the evolution of the state entailed long-term growth in its "infrastructural power," i.e., "the capacity of the state to actually penetrate the civil society, and to implement logistically political decisions throughout the realm" (1984, 113). This work associates state capacity with the ability of the state to reach individuals and societal groups across its territorial domain, which contributes to increased salience and integrity of territorial boundaries. The first step toward greater penetration of society and increased "territorial boundedness" of the state is establishing its presence on the ground. This manifests locally as the existence of state infrastructure and institutions – government posts, offices, and personnel. The distribution of physical infrastructure such as roads, railways, post, telegraph, and electricity is therefore a reflection of state capacity.

Importantly, states demonstrate a remarkable variation in their ability to exercise 'full' territorial control – the reach of the state and its institutions varies across its territory. There are territorial 'pockets' of the population where the state's reach is at best marginal, while in other areas the citizens cannot escape its presence. This spatial dispersion of state capacity is consequential for a range of outcomes that are of interest to social scientists. It, therefore, behooves scholars interested in understanding and explaining within-country variation in a given outcome using state capacity to rely on a measure that adequately captures the *regional and local* variations in state capacity. This is also important for scholars interested in global analyses conducted at higher levels of disaggregation. The frequently-used country-level measures of state capacity are simply inadequate for such analyses.

Literature on political violence emphasizes the significance of territorial control levels in explaining the incidence and prevalence of civil was (see Boulding 1962; Fearon and Laitin 2003; Kalyvas 2004). In addition, scholars emphasize the significance of studying local context to understand conflict dynamics. Kalyvas, for instance, explains that, "[t]he study of violence in civil war cannot afford not to be 'grassroots;'" he contends that "the focus on local and regional is necessary in order to counteract misleading aggregations at the national level" (2004, 189). Similarly, Varshney argues that, "[s]ome state-centered institutional parameters can also be misleading...[t]hey did not 'go inside the state' to examine how actually economic policy is performed" (1993, 16). To study the relationship between state capacity and civil war, scholars must therefore take into account the *within* country (or intrastate) variation in the regime's ability to exercise control. This variation explains why state presence is limited in some areas and strong in others.

Current studies on civil war approximate state capacity in numerous ways. Fearon and Laitin use GDP per capita as a measure of the state's "overall financial, administrative, police, and military capabilities" (2003, 80). They also use the percentage of mountainous area within a given country to account for the state's ability to operate in tough terrain, which supposedly favors the insurgents (see also Boulding 1962). Herbst (2000) uses population densities, land tenure, and taxation data to explain political instability. From a more comparative perspective, Hendrix (2010) utilizes a variety of different political, economic, and military measures to uncover factors that can account for different degrees of state capacity. Similarly, Hanson and Sigman (2013) focus on three dimensions – coercive, extractive, and administrative – to extract a latent measure of state capacity. More in line with our theoretical framework, Lee and Zhang (2013) approximate state presence using the distribution of age groups. Common to all these studies is the finding that war-prone countries are associated with lower degrees of state capacity. These findings support the hypothesis that war is more likely to break out in countries that do not maintain effective control over their entire territorial extent. However, although these approaches are insightful, they are empirically unlikely to capture the actual penetration of the state into its peripheral regions. To understand the relationship between state capacity and civil war, we need to adequately account for actual spatial variations *within* the state.

To examine the effect of intrastate variation in state capacity on the onset of civil war, we rely on highly-disaggregated nighttime light data, which we believe effectively operationalizes the aforementioned conceptualization. The main advantage of these data, for our purpose, is their availability at a very high spatial resolution, which allows us to analyze intra- as well as interstate variation in state capacity. We integrate these data into the PRIO-Grid framework (Tollefsen et al. 2012), which apart from including civil war onset indicators, also includes time-varying measures of economic development, population density (Nordhaus 2006), and constant geographic factors such as mountains (Bontemps, Defourny and Van Bogaert 2009). Crucially, this means that our main units of analysis are measured at the PRIO-Grid *cell*-level, i.e. a "square" the size of 0.5 x 0.5 decimal degrees, which is approximately 55 km x 55 km close to the equator (Tollefsen et al. 2012).[3]

3 Nighttime Light as a Measure of State Capacity

The distribution of nighttime light is frequently used as a proxy for population, poverty, and economic output, especially in developing countries where data are usually limited or missing (Elvidge et al. 1997; Chen and Nordhaus 2011; Weidmann and Schutte Forthcoming). Nighttime light data are a highly useful control for socioeconomic factors. As Elvidge et al. (1997) write, "[n]ighttime lights provide a useful proxy for development and have great potential for recording humanity's presence on the earth's surface and for measuring important variables such as annual growth for development" (1997, 1378). Nighttime light satellite imagery are available at a very high spatial resolution, making these measures especially useful for studies that examine socioeconomic variation within countries (Chen and Nordhaus 2011; Weidmann and Schutte Forthcoming).

Numerous studies establish that the distribution of electricity is more likely in areas where the government can regulate and provide public goods (e.g. Chen and Nordhaus 2011; Min 2015). Nighttime luminosity allows us to estimate the extent of the state's territorial control and identify peripheral regions where the state exercises limited administrative control (Sarbahi 2005, 2014). Consistent with Sarbahi (2005), we contend that nighttime lights

[3]The size of these units decreases as we move away from the equator due to Mercator projection.

are reflective of the state's penetration and presence. This is especially so in the developing world where electricity is scarce and its provision is dominated by the state.[4] Locations where the state infrastructure is concentrated get preference in the supply of electricity (Min 2015). Importantly, unlike other measures of state capacity such as taxation, nighttime light is easily observable and measurable globally at a very high level of disaggregation. The challenges associated with gathering subnational-level tax data forces scholars to rely on information at the national, or at best provincial, level (see Hendrix 2010).

We do not claim that the distribution of nighttime light is a perfect measure of state capacity. These data might suffer from the problem of the comparability and consistency of data across the different versions (Huang et al. 2014). However, we believe that this measure is a good reflection of the state's *presence* in a given area, which, as we have argued above, is a prerequisite for building state capacity in that area. We show that our data are reasonably robust to the potential concerns by employing alternative nighttime light indicators in the validation and robustness sections of the Supplementary Information file. While our nighttime light indicator might not be perfect, we do expect, and show, it to correlate strongly with other commonly-used measures of state capacity. Moreover, we demonstrate that this indicator reasonably *predicts* different levels of measures of state capacity (Weidmann and Schutte Forthcoming). In this regard, we follow the lead of Besley and Persson who argued that these measures are complementary or jointly determined and demonstrate that "almost all dimensions of state development and effectiveness are positively correlated" (2011, 5).

There are four pathways of expansion when it comes to the relationship between nighttime light and state capacity. These pathways are all associated with the state's extension of its apparatus within its territory. Expansion could result from: a) political mobilization; b) revenue mobilization; c) economic development; and, d) national security. These pathways

[4] It is also important to recognize that in many developing countries, generators are important for the provision of electricity and are not provided by the state. However, considering that state electricity provision is much more likely to result with high emission levels and thus be captured by satellite imagery, we believe this issue should not have a significant impact on our analysis.

are not mutually exclusive and could even be mutually reinforcing. The need to secure revenue mobilization, for instance, could lead to the establishment of the state security apparatus in certain areas.

Moreover, the relative significance of these pathways may also change over time within a given territory. Thus, the financial need to appropriate land revenue may cause the state to penetrate a rural area in a particular time period, but the need of political support may cause the state to retain its presence in that area, even though land revenue may no longer constitute an important component of the state revenue. Regardless of the pathways taken, however, locations with more nighttime light should strongly correlate with areas into which the state has penetrated more extensively.

3.1 Political Mobilization

The political mobilization mechanism operates through the process of interaction between political actors and their potential constituents. Here, the state's penetration into a given territory is determined by the political salience of its population. State actors are influenced by the need to forge and sustain political support to develop infrastructure aimed at realizing this objective. Local-level institutions and the provision of goods and services, including electricity, are shaped by this political bargaining process, which involves the response of political actors to demands from their constituents (Min 2015). We contend that, in the context of limited resources available with the state, the distribution of nighttime light is a reasonable proxy for the distribution of political power within a country, and for ascertaining the marginality of certain subnational units (Sarbahi 2005). Nighttime light thus captures the stakes of those in control of the political system within a given territory.

For instance, Kale (2014) directly associates the variation in rural electrification across India with the variation in political mobilization and the influence of rural constituencies. In these contexts, electricity is provided to those constituencies the government seeks to mobilize in order to guarantee their political vote. Similarly, Min (2015) shows that party politics are closely related to rural nighttime light provision not only in India, but in other developing and developed countries as well. As the government is the primary provider of electricity in these regions, such examples show that electricity provision measured by nighttime light emissions reflects, at least partly, areas where the government is present because it seeks to politically mobilize the civilians in these locations. Correspondingly, police and military forces might be deployed to these regions once the required infrastructure is in place.

3.2 Revenue Mobilization

The association of taxation with the process of state formation lie at the heart of many studies on the growth of state capacity (Schumpeter 1991; Levi 1988; Herbst 2000). The state's ability to collect taxes is critically linked to effective territorial control (Herbst 2000). We expect that the quest for higher revenue flows should lead the state to widen its reach into new territories, especially into areas with higher potential for revenue mobilization. A logical corollary of this expectation is that state presence should be greater in areas with higher economic productivity. The historical association of the distribution of electricity with economic productivity (Chen and Nordhaus 2011) implies that the presence of electricity correlates with the existence of the state's extractive apparatus.

For instance, in Ecuador, nighttime light emissions closely correlate to satisfaction with the services provided by the state in return for taxes paid (Harbers 2015). People residing in regions with more nighttime light emissions were significantly more satisfied with these services, and hence more likely to pay their taxes. Indeed, as we additionally show in the Supplementary Information file, nighttime light emissions both highly correlate with and strongly predict taxation revenue in Ecuador's different districts.

3.3 Economic Development

The imperative of economic development may motivate the state to penetrate into hitherto marginal areas. This process involves the expansion of infrastructure including roads, telecommunication, and electricity as well as an extension of state institutions into the targeted areas. Nighttime light is thus an effective indicator of changes in such 'built' environments; regions experiencing economic development will likely show significant increases in nighttime light emissions (Zhang and Seto 2011).

Again, anecdotal evidence supports this view. In China, for instance, a heavy emphasis on rural electrification accompanied by a vast expansion of government machinery across rural areas under Mao provided the basis for state-led rural industrialization and economic growth (Oi 1995). Similarly, in Pakistan, Albania, Cameroon, and Liberia (to name only a few), nighttime light emissions are strong predictors of economic wealth indexes such as water access, building material, and radio services (Weidmann and Schutte Forthcoming). These predictors are all important measures of effective economic development and infrastructure.

3.4 National Security

Modern states are frequently forced to extend their reach into territories and over rural populations to bolster their national security. The British, for instance, established a network of forts, stations and outposts along colonial India's north-west and north-east frontiers to defend against the activities of indigenous ethnic groups (Mackenzie 1884; Beattie 2002). With the extension of state machinery comes the development of infrastructure in previously-marginalized areas. The purpose is either to establish firm control over the territory, win over the 'hearts and minds' of the inhabitants, or both. In these situations, the provision of electricity is directed towards meeting security needs. It is not necessarily associated with the need for economic development or demand from the population.

Previous studies have shown that nighttime light can be used specifically to identify military bases, especially in countries where the provision of electricity by the government is heavily selective, such as North Korea (Lee 2014). In this case, the provision of power is directly associated with the establishment of the security apparatus. In Afghanistan, for instance, the bulk of the fuel supplied to the US armed forces was being used for the generation of power at military bases (Pellerin 2011).

3.5 Establishing the Validity of Nighttime Light as a Measure of State Capacity

The nighttime light data used in all stages of analysis were obtained from the Defense Meteorological Satellite Program (DMSP) Operational Linescan System (OLS) Nighttime Lights Time Series dataset.[5] These data are derived from satellite sensors with specialized low-light imaging capabilities, and are made available by the National Oceanic and Atmospheric Administration's (NOAA's) National Centers for Environmental Information (NCEI, formerly the National Geophysical Data Center). The processed data provide annual, cloud-free composite images of average stable value for the detected lights, which is filtered to remove ephemeral lights and background noise (see Elvidge et al. 1997). While the OLS started collecting data in the 1970s, the publicly-available data covers the period from 1992 to 2011.

We construct a nighttime light indicator, measured in five-year intervals starting in 1992 and ending in 2007. This indicator codes the total number of pixels – or squares of 0.008 x 0.008 decimal degrees (approximately 1 km x 1 km around the equator that decrease in size as one moves toward the poles) – within a given cell that had any nighttime light emissions. The number of luminous pixels was then aggregated to the cell, district, or country level (depending on the unit of interest in each particular analysis). This indicator was coded under the assumption that a higher number of lighten pixels corresponds to more areas where the regime *can* and *wants to* operate, all else equal.[6] Importantly, our measure is also *time varying*, which allows us to capture the effects of state capacity over time. We chose to use five-year intervals to account for the relatively-slow change in nighttime light emissions in a given cell, district, or country. We nevertheless show the robustness of our findings to

[5] These data can be accessed through: `https://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html`. The data for all indicators at the country, district/province, and cell level is also available through this article's replication file.

[6] We provide more details on coding this measure and additional tests for its validity in the Supplementary Information file.

this decision by employing an indicator that varies annually (Tollefsen et al. 2012) in the Supplementary Information file. The validation exercises reported below employ nighttime light levels for 2012.

We use subnational data to establish the validity of nighttime light as a fitting approximation of disaggregated state capacity, especially with respect to civil war. We begin by comparing the subnational distribution of nighttime light in three developing countries with previously-used proxies of state capacity measured at different subnational administrative levels: state or province, district, and subdistrict. These three countries – Brazil, Ghana, and India – are chosen to represent three of the world's main developing regions: Latin America, Sub-Saharan Africa, and South Asia.[7] The three measures of state capacity tested against our nighttime light data approximate three important dimensions of state capacity emphasized by previous country-level studies – tax collection, manpower strength, and the provision of public goods (e.g. Hendrix 2010; Hanson and Sigman 2013). We believe that the focus on these three dimensions – as well as these three developing countries – provides a good illustration to the feasibility of using nighttime light to measure state capacity in different countries and world regions, where similar data, which might provide a superior approximation of local state capacity levels, are hard to collect. Importantly, this focus allows us to directly relate nighttime light to important aspects of state capacity not yet analyzed at the *local* level on a *global* scale.

To approximate state capacity in Brazil, we use a province-level measure of tax collection coding the total contribution to federal revenue by Brazil's 26 states as well as the Federal District in 2012.[8] For Ghana, we compare district-level data on the number of people employed in government jobs in 2012 with the degree of nighttime light.[9] Finally, as a measure of provision of public goods, we employ the number of primary health centers (PHCs) within

[7] Additional analyses for Ecuador are reported in the Supplementary Information file.

[8] The subnational tax data were obtained from the *Portal da Transparencia* (available at `http://www.portaldatransparencia.gov.br/`) maintained by the Office of the Comptroller General of the Union in Brazil. Accessed on December 22, 2015

[9] These data were obtained from the Ghana Statistical Service and available at `http://www.statsghana.gov.gh/labour_stats.html`. Accessed on December 22, 2015.

0.1 x 0.1 degree grids (approximately 11 km x 11 km in size) in the Indian state of Andhra Pradesh in 2011.[10] This enables us to compare nighttime light and the provision of public goods at the highly-localized, subdistrict level.

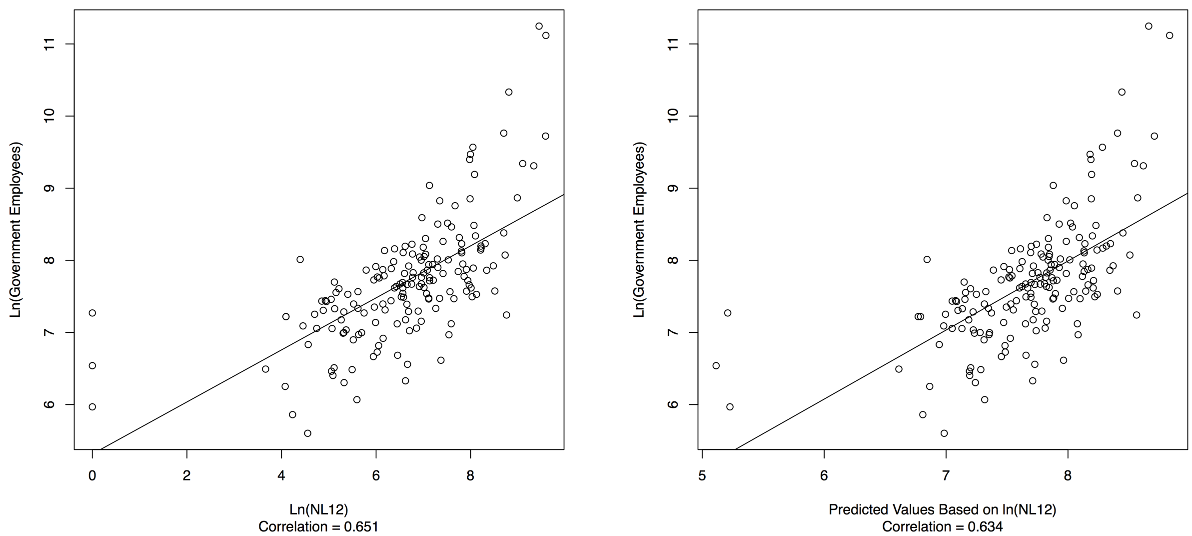
Importantly, and given the importance of prediction to the study of civil war (Ward, Greenhill and Bakke 2010), nighttime light should also reasonably *predict* these related measures for the different countries examined here (Weidmann and Schutte Forthcoming). To test if nighttime light is a reasonably-strong *predictive* indicator of state capacity, we use out-of-sample data generated using k-fold cross validation (Ward, Greenhill and Bakke 2010). Here, the data is divided into 10 segments, nine of which are used to predict tax data by state for Brazil, the number of people employed in government jobs by district for Ghana, and the number of primary health centers by 0.1 grid in Andhra Pradesh, India. This process is repeated 10 times, and the resulting predictions are plotted against these different state capacity indicators to show that nighttime light is a fairly-good predictor of these different state capacity measures.

As Figures 1–3 show, nighttime light measures have a medium to high correlation with these different proxies of state capacity at different subnational levels. These correlations, again, highlight the validity of nighttime light emissions as a *global* measure of *disaggregated* state capacity. Moreover, the size and direction of these correlations hold when the predicted values of each state capacity measure – generated based on nighttime light levels – are plotted against their real values. This suggests that nighttime light can also be used to *predict* localized state capacity levels globally.

Finally, to further illustrate the validity of nighttime light as a measure of state capacity, we compare the geographically-contiguous provinces of Chin State (Myanmar) and Mizoram (India) in Figure 4. These two states, situated on the opposite sides of the India-Myanmar border, are inhabited by ethnically-related Mizo-Kuki-Chin people, and constituted one ter-

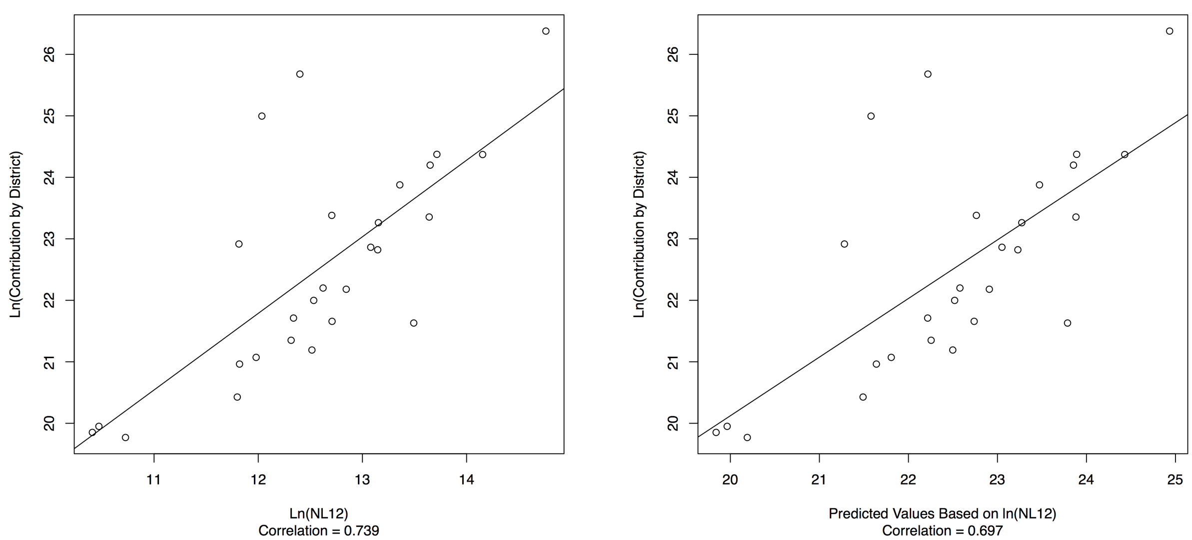
[10]The locational data of the PHCs in Andhra Pradesh were obtained from the National Population Stabilization Fund of India, available at `http://www.jsk.gov.in/`, and were geocoded by the authors. We also compare the effect of the number of health centers to that of nighttime light on civil war in Andhra Pradesh in the Supplementary Information file.

Figure 1: Correlations between Nighttime Light and Number of Government Employees by District in Ghana, 2012



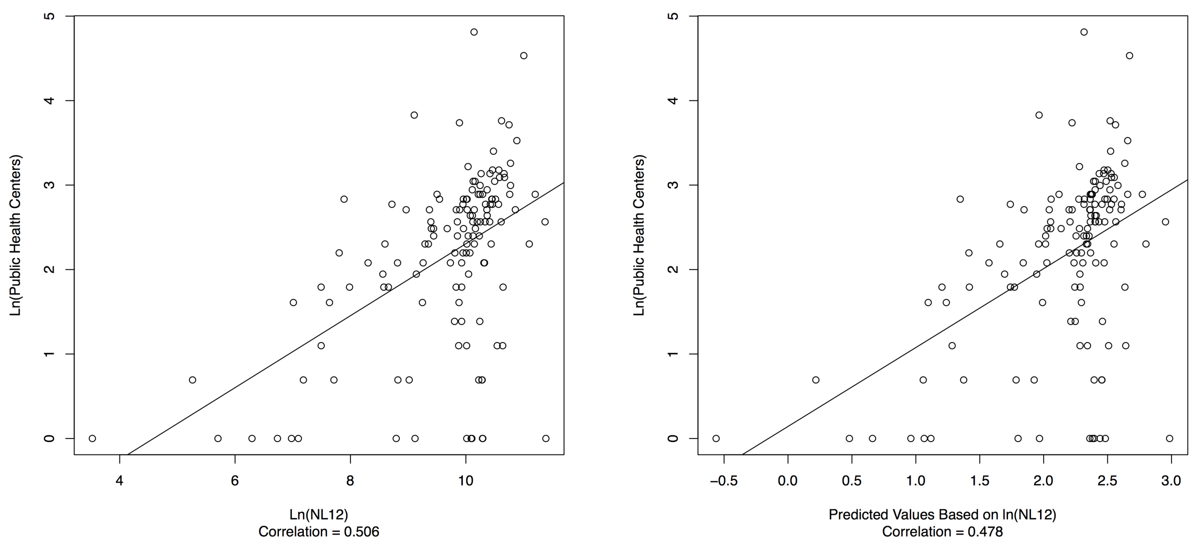
Real nighttime light values | Predicted values based on nighttime light

Figure 2: Correlations between Nighttime Light and Taxation by State in Brazil, 2012



Real nighttime light values | Predicted values based on nighttime light

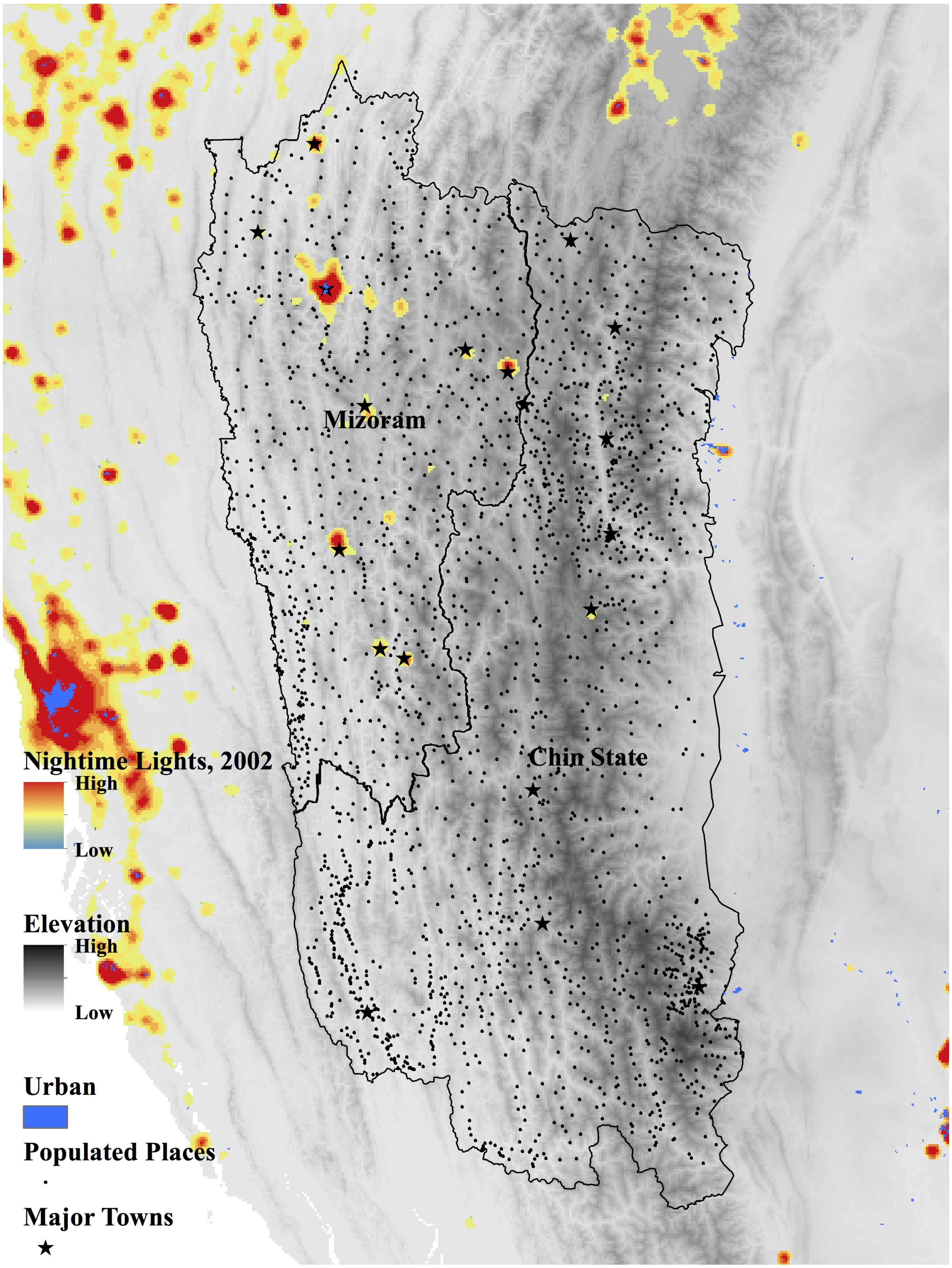
Figure 3: Correlations between Nighttime Light and Number of Health Centers by Subdistrict in Andhra Pradesh, India, 2012



Real nighttime light values | Predicted values based on nighttime light

ritory until British colonizers divided the region in the late nineteenth century (see Mackenzie 1884). The two states are similarly rugged, mountainous, densely-forested, urbanized, and bereft of viable natural resources. There is little difference in the spatial distribution of populated locations within the two states. However, the significant difference in the distribution of nighttime light in these two territories, which directly correlates with state penetration and capacity, is noticeable. In Mizoram, major towns, which are also administrative centers, are brightly lit at night. In contrast, the only major town with a noticeable level of nighttime light emissions in Chin State is the administrative capital, Hakha. This difference is the result of the dissimilar post-colonial trajectories of India and Myanmar (Burma). While India instituted its state apparatus across most of Mizoram, Myanmar established little control over Chin State, especially in areas inhabited by ethnic minorities (see Callahan 2004). Importantly, as Figure 4 illustrates, nighttime light is not associated with either urbanization or the distribution of the population, especially in the Chin State. Instead, it reflects the presence of each state's administrative apparatus.

Figure 4: A Comparison of Mizoram, India, and Chin State, Myanmar



4 Empirical Framework

In this section, we use highly-disaggregated *global* data to examine whether our measure of localized state capacity has a systematic effect on the likelihood of civil war. Like Fearon and Laitin, we focus specifically on civil war *onset*, not its duration or distribution, which might exhibit different relationships with state capacity at the subnational level. To approximate state capacity, we employ a *grid cell*-level indicator of nighttime light, which was coded according to the guidelines discussed in the previous section. Due to space limitations, a detailed discussion and summary statistics of all variables used in the different stages of analysis are reported in the Supplementary Information file.

Taking Fearon and Laitin's (2003) analysis as our starting point, we first replicate Models 1, 2 and 3 in their study at the *country* level for the years 1992-1999, with and without the inclusion of a country-level measure of nighttime light.[11] We then repeat this analysis at the *subnational* level for the years 1992-2008, using the 55km x 55km grid-cell as our unit of analysis (Tollefsen et al. 2012).[12] Lastly, although the use of such detailed, highly-disaggregated data allows us to identify significant patterns of civil war onset at the subnational level, these data are also likely to have a disproportionately-high number of instances in which civil war was unlikely to erupt in the region. To account for this potential bias, we use split population Weibull (SPW) models (see Box-Steffensmeier and Jones 2004) in the third stage. This method accounts for the possibility that some cells are inherently "immune" to war due to factors such as a lack of population, better institutional mechanisms, etc. The different SPW models thus highlight the robustness of our results to rare event bias concerns.[13]

Table 1 reports the estimates obtained from logistic regression (logit) Models 1, 2, and 3 in Fearon and Laitin's (2003) analysis for the years 1992 to 1999. We then repeat this analysis with the addition of an aggregate indicator of nighttime light measured at the

[11] This stage of analysis covers a temporal period starting in 1992, the first year for which nighttime light data were available, and ending at 1999, the final year in Fearon and Laitin's (2003) dataset.

[12] The temporal period for which both nighttime light data and PRIO-Grid conflict data were available.

[13] See the Supplementary Information file for more details on this methodology.

country level (Models 1L-3L in Table 1). Models 1L-3L suggest a *negative* and statistically-significant relationship between state capacity and civil war onset. While this finding is in line with Fearon and Laitin's (2003) argument that lower levels of state capacity are associated with civil war onset, even more interesting is the fact that this indicator performs better than widely-used state capacity measures. GDP per capita drops out of significance when nighttime light is included, and mountainous areas have no noticeable effect. The new state variable was the only other variables significant across all models. Substantively, lower levels of nighttime light correspond to an average increase in the risk of civil war onset of approximately 20-40%, which is relatively similar to Fearon and Laitin's (2003) results with respect to the role of GDP per capita (30%) (see Supplementary Information).[14]

Next, we estimate if a systematic relationship between state capacity and civil war exists at the *subnational* level. To do so, we specify three logit models corresponding to Models 1, 2, and 3 from the previous stage of analysis for the years 1992-2008. This time, however, we focus on the grid cell level, which constitute a grid covering the entire terrestrial globe, as our unit of analysis.[15] Importantly, these highly-disaggregated longitudinal data allow us to evaluate the variation in intrastate capacity not only over time, as in Fearon and Laitin's (2003) analysis, but also and specifically across different regions within the same country. We additionally employ a *cell*-level variable corresponding to civil war onset, derived from Tollefsen et al. (2012), to code whether civil war with at least 25 combatant casualties erupted in a given cell during a given year.[16] This dependent variable thus accounts for intrastate variation in the frequency of civil war. To obtain this variable we relied on the UCDP/PRIO (Uppsala Conflict Data Program/Peace Research Institute Oslo) Armed Conflict Dataset. This dataset provides some of the most widely-used civil conflict data, which also employees the lowest battle-related deaths threshold for identifying civil war onset.[17]

[14]For a similar exercise that replicates the same analysis using an alternative indicator of state capacity (conceptualized using the Myers' Index) see Lee and Zhang 2013.

[15]Excluding Antarctica and the Arctic.

[16]This threshold corresponding to whether *the entire conflict* involved 25 or more casualties, and not just the number of combatants killed in a given cell.

[17]There were 113 civil war onset events in this subnational sample.

Table 1: Civil War Onset – State Level Analysis

	Without Night Light			**With Night Light**		
	Civil War (1)	"Ethnic War" (2)	Civil War (3)	Civil War (1L)	"Ethnic War" (2L)	Civil War (3L)
Nighttime light (country)[2]	–	–	–	−1.034* (0.435)	−1.184* (0.494)	−0.912* (0.434)
Civil war[1]	−2.472 (1.379)	−2.472 (1.379)	−2.527 (1.433)	−1.241 (0.685)	−0.844 (0.719)	−1.283 (0.674)
Population[1,2,3]	0.196 (0.217)	−0.077 (0.257)	0.231 (0.223)	1.176* (0.487)	1.068 (0.561)	1.102* (0.490)
Per capita income[1,2,3]	−1.069* (0.429)	−1.340* (0.548)	−0.940* (0.423)	0.145 (0.617)	0.063 (0.728)	0.129 (0.612)
Mountainous (%)[2]	0.325 (0.197)	0.394 (0.203)	0.206 (0.191)	0.225 (0.209)	0.314 (0.219)	0.128 (0.204)
Noncontiguous	0.977 (0.829)	−0.197 (1.413)	1.120 (0.835)	1.614 (0.898)	1.313 (1.435)	1.656 (0.900)
Oil exporter	1.057 (0.735)	0.947 (0.938)	0.586 (0.704)	2.077* (0.859)	1.951 (1.014)	1.548 (0.839)
New state	4.293* (0.838)	4.583* (1.007)	4.106* (0.877)	5.028* (1.007)	5.563* (1.201)	4.751* (1.041)
Instability	0.979 (0.629)	0.934 (0.669)	0.742 (0.639)	0.999 (0.627)	0.908 (0.662)	0.800 (0.649)
Ethnic fractionalization	1.476 (1.274)	2.338 (1.530)	0.594 (1.267)	1.903 (1.233)	2.662 (1.437)	1.026 (1.244)
Religious fractionalization	−0.124 (1.396)	−0.811 (1.599)	−0.296 (1.477)	−0.840 (1.419)	−1.917 (1.622)	−0.861 (1.467)
Polity 2[1]	0.017 (0.053)	0.020 (0.057)	–	0.025 (0.054)	0.027 (0.058)	–
Anocracy[1]	–	–	0.849 (0.731)	–	–	0.739 (0.733)
Polity (binary)[1]	–	–	−0.870 (1.028)	–	–	−0.761 (1.031)
Constant	−0.266 (3.835)	3.670 (4.941)	−0.698 (3.824)	−5.662 (4.401)	−2.623 (5.341)	−5.578 (4.410)
Observations	1,098	934	1,098	1,073	917	1,073
Akaike Information Criterion.	171.558	151.588	168.549	167.075	147.006	165.624

Note: *p<0.05; [1] lagged; [2] natural log; [3] in 1000s

We also include in our models grid cell-level approximations of a number of the variables used in Fearon and Laitin's (2003) analysis. These are: population densities and gross cell product (GCP) in billion US dollars within a given cell during a given year (both from Nordhaus 2006); and the proportion of the cell area coded as mountainous (from Bontemps, Defourny and Van Bogaert 2009). We account for a number of geographical variables that might influence the likelihood of war onset. These include: the distance from each cell to the nearest border, the distance from each cell to the nearest city with at least 50,000 inhabitants, and the area of a given grid cell, used to account for the effect of the Mercator Projection (all from Bontemps, Defourny and Van Bogaert 2009). We also include a variable accounting for whether a given cell experienced civil conflict in the previous year.

Additionally, we include some salient country-level measures in our analysis. Of these variables, new state, political instability, anocracy, and democracy (Polity 2) are similar to the variables used in Fearon and Latin's (2003) study, while oil production data were obtained from Ross (2004). Country fixed effects were included to account for random and nonrandom country-related factors that are time invariant, and our use of country level variables alongside cell level indicators.[18] Year fixed effects were also included to account for duration dependencies. Due to space constraints, neither country nor year fixed effects are reported here. To show that our findings are robust to the inclusion of country level or GCP and population cell level indicators, we report a set of baseline specifications where no country-level variables are included, and where our GCP and population indicators are introduced sequentially, in the Supplementary Information file.

Table 2 reports the logit estimates corresponding to Models 1, 2, and 3 in Fearon and Laitin's (2003) analysis adapted to the cell-level as to better account for intrastate regional variations. Most importantly, the coefficient of nighttime light is *positive* and significant. Simply put, civil war arises in localities that have, on average, *higher* levels of state capacity. This finding is robust to the inclusion of numerous cell and country-level controls, in addition

[18]This means that Fearon and Laitin's (2003) ethnic fractionalization and religious fractionalization indicators are dropped, as they are time invariant for each country.

to country and year fixed effects.[19] Moreover, this relationship is the opposite of what we observe at the country level, where – as we show in Table 1 – countries with more nighttime light are *less* likely to experience civil war, all else equal. Importantly, the positive and significant relationship between nighttime light and civil war onset at the subnational level holds after we account for possible alternative explanations, such as the effects of local population density or economic productivity, which might have otherwise suggested that civil war is simply likely to break out in these regions because more targets or profitable rents are available. In other words, civil war is more likely to arise in regions where the state is present, all else equal.

In addition to nighttime light, proportion mountainous area, measured as percentage of total area, is also positive and significant, suggesting that civil war is more likely to arise in mountainous areas *as one moves to the subnational level*, but *not necessarily* because these regions are likely to be characterized by "limited administrative control" (Fearon and Laitin 2003, 88). In other words, mountainous terrain is acting as a proxy for some other, unobserved variable (see Sarbahi 2013). In addition, the coefficients for population, new state, and instability are all positive and significant, while border distance is negative and significant. The rest of the coefficients are not consistent in significance or sign across all models and are hence not discussed here. Notably, the coefficient for GCP is negative although it is statistically significant in only one specification. This can be explained by the fact that GCP measures economic output rather than state capacity or presence, which is captured by our nighttime light indicator. In other words, some regions might exhibit a high level of state presence, but still have low levels of economic activity. Once we account for the effect of state capacity, levels of economic activity display a negative association, albeit with inconsistent statistical significance, with conflict across our models. We also verify that any identified effect is also substantively sizable in the model as a whole (Ward, Greenhill and Bakke 2010; Koren Forthcoming). Specifically, we use these models, re-estimated on a

[19]This finding is also robust to a battery of robustness tests accounting for a large number of alternative explanations. These are reported in the Supplementary Information file.

sample for the years 1992-2006 only, to forecast conflict on out-of-sample data for the years 2007-2008 and show that nighttime light emissions are also a significant and strong *predictive indicator* of localized conflict (see Supplementary Information).

Table 2: Civil War Onset – Substate Level Analysis

	(1) Civil War	(2) "Ethnic War"	(3) Civil War
Nighttime light[2]	0.442*	0.488*	0.442*
	(0.080)	(0.083)	(0.080)
Civil war[1]	−0.479	−0.516	−0.482
	(0.310)	(0.323)	(0.309)
Population[1,2]	0.393*	0.350*	0.390*
	(0.144)	(0.147)	(0.144)
Gross cell product[1,2]	−0.410	−0.725*	−0.411
	(0.261)	(0.294)	(0.261)
Mountainous area (%)	2.071*	1.641*	2.068*
	(0.398)	(0.425)	(0.398)
Distance to border[2]	−0.373*	−0.335*	−0.373*
	(0.079)	(0.084)	(0.079)
Oil production[1, 2]	−0.078	−0.075	−0.065
	(0.121)	(0.121)	(0.120)
New state	2.692*	2.888*	2.558*
	(1.236)	(1.255)	(1.214)
Political instability	1.142*	1.113*	1.073*
	(0.359)	(0.390)	(0.358)
Polity 2[1]	0.038	0.023	–
	(0.038)	(0.039)	
Anocracy[1]	–	–	−0.210
			(0.359)
Polity 2 (binary)[1]	–	–	0.153
			(0.525)
Cell area[2]	−0.008	0.031	−0.006
	(0.324)	(0.343)	(0.323)
Travel time[2]	−0.343	−0.199	−0.346
	(0.278)	(0.283)	(0.278)
Constant	−13.296*	−18.883*	−13.011*
	(6.203)	(6.749)	(6.176)
Observations	898,421	603,664	898,421
Akaike Information Criterion	1,578.662	1,398.525	1,581.321

Note: *p<0.05; values in parentheses are robust standard errors clustered by cell-ID. Country and year fixed effects were included in each regression, although not reported here.
[1] lagged; [2] natural log

Finally, due to its very high specificity and granular nature, which allow us to analyze the effect of the intrastate variation in state capacity on the onset of war at a significantly-localized level, our dataset also includes a disproportionately-high number of observations where no war onset was recorded. To account for this potential bias, we analyze the effect of state capacity on the *time* until civil war onset using a split-population Weibull (SPW) framework, and employing the same variables used in Models 1, 2, and 3 above. These SPW models estimate the likelihood of civil war onset *conditional* on whether a zero observation is likely to have been produced by the zero-only data generating process by using two equations, duration and risk (Box-Steffensmeier and Jones 2004). Note that in these models, fixed effects by country were not included due to the computational requirements involved in such analysis given our massive dataset, which were beyond our hardware abilities. The available computational resources could not compute models that included country fixed effects. This, however, allowed us to include the indicators for ethnic fractionalization and religious fractionalization from Fearon and Laitin's (2003) study as covariates in this stage of analysis.

For each model, we estimate two different specifications. In the first (baseline) specification, we assume that the zero-only data generating process is determined by the lag of the dependent variable, population, cell area, and travel time. We therefore assume that cells that are more densely populated, more rural, and located closer to the equator are not 'immune' to civil war. In the second (full) specification, we assume that this process is additionally affected by gross cell product, ethnic fractionalization, recent independence, and whether a state was a democracy or an anocracy. Note that in the SPW model, negative coefficients in the *duration* equation correspond to *shorter* time until civil war onset. In contrast, negative coefficients in the *risk* equation correspond to a given cell being more likely to be "immune" to conflict.

As shown in Table 3, nighttime light is again significant across all models and specifications. Its coefficient is consistently negative, suggesting that the time until civil war is significantly *shorter* in regions with more state capacity after accounting for local population density, cell productivity, and geographic variations, among others. These effects hold even after the conditional relationship between cells and years that are 'immune' to civil war onset and those that are not is taken into account, suggesting that the relationship is robust to inflation concerns. This is a strong confirmation of our earlier findings; civil war is more likely to arise in countries with lower levels of state capacity, but in regions within these states that have, on average, a higher degree of state capacity, all else equal.

In addition to nighttime light, mountainous area is negative and significant across all models, which confirms that a relationship between mountainous regions and civil war onset exists at the subnational level. Distance to border is positive and significant, suggesting that cells located further away from the border experience longer time until civil war onset, while new states experienced significantly shorter time until civil war onset. Interestingly, these are the only consistent results across all models; the other coefficients are significant only in some models, or for only some specifications. None of the inflation stage's coefficients was robust in sign or significance across all models. Consequently, we do not discuss inflation stage estimates here.

Briefly stated, our statistical analyses indicate that while weak states face a higher probability of armed challenges, such challenges are likely to emerge in areas within such states where the state exercises a *higher* degree of control. This effect persists even when we account for local population densities, economic activity, and geographic features, as well as political (and other country-level) indicators. In other words, weak states are more prone to civil wars, but such states face armed challenges in areas where they have greater capacity. These results are consistent across both the logit and SPW models. They also survive a battery of robustness tests as well as analyses that focus on the district level, which – due to space limitations – are reported in the Supplementary Information file. Importantly, these intriguing and counterintuitive findings cannot be attributed to population density and economic activity since we control for these factors in our models.

Table 3: Civil War Onset – Split Population Analysis

	(1) Civil War		(2) "Ethnic War"		(3) Civil War	
	(Baseline)	(Large)	(Baseline)	(Large)	(Baseline)	(Large)
Duration equation						
Nighttime light[2]	-0.158*	-0.213*	-0.227*	-0.238*	-0.175*	-0.213*
	(0.079)	(0.084)	(0.082)	(0.080)	(0.082)	(0.088)
Civil war[1]	-0.605	0.211	-0.664*	-0.816*	-0.602*	0.492
	(0.294)	(0.618)	(0.303)	(0.387)	(0.302)	(0.557)
Population[1,2]	-0.744*	-0.278	-0.742*	-0.659*	-0.771*	-0.385
	(0.151)	(0.224)	(0.157)	(0.169)	(0.157)	(0.224)
Gross cell product[1,2]	0.900*	2.128*	1.035*	0.392	0.931*	2.354*
	(0.264)	(0.468)	(0.294)	(0.547)	(0.273)	(0.590)
Mountainous area (%)	-1.102*	-1.058*	-0.800*	-0.866*	-1.130*	-1.132*
	(0.360)	(0.366)	(0.357)	(0.344)	(0.367)	(0.369)
Distance to border[2]	0.501*	0.529*	0.452*	0.425*	0.510*	0.529*
	(0.092)	(0.102)	(0.096)	(0.093)	(0.096)	(0.103)
Oil production[1, 2]	0.018	0.026	0.012	0.021	0.016	0.026
	(0.019)	(0.020)	(0.020)	(0.020)	(0.019)	(0.020)
New state	-2.784*	-3.790*	-2.971*	-2.481*	-2.740*	-4.394*
	(0.856)	(1.735)	(0.848)	(0.885)	(0.885)	(1.909)
Political instability	-1.392*	0.173	-1.185*	-3.285*	-1.337*	-0.181
	(0.374)	(0.702)	(0.388)	(0.630)	(0.385)	(0.749)
Ethnic fractionalization	-2.094*	-0.600	-1.121	-1.600*	-1.975*	-0.188
	(0.550)	(1.413)	(0.583)	(0.722)	(0.568)	(1.281)
Religious fractionalization	0.918	0.948	0.247	-0.002	1.154	1.210
	(0.667)	(0.724)	(0.704)	(0.735)	(0.703)	(0.744)
Polity 2[1]	0.037	-0.084	0.045*	0.099*	–	–
	(0.020)	(0.050)	(0.021)	(0.043)		
Anocracy[1]	–	–	–	–	0.371	0.493
					(0.305)	(0.676)
Polity 2 (binary)[1]	–	–	–	–	0.394	-2.075*
					(0.338)	(0.848)
Cell area[2]	0.624	2.232*	0.023	-0.452	0.284	1.995*
	(0.498)	(0.750)	(0.422)	(0.497)	(0.484)	(0.875)
Travel time[2]	0.545*	2.271*	0.281	-0.535	0.554	2.551*
	(0.278)	(0.647)	(0.282)	(0.640)	(0.288)	(0.696)
Constant	8.523*	-22.740*	14.455*	22.175*	11.176*	-21.259*
	(3.934)	(7.485)	(3.917)	(6.690)	(4.010)	(8.745)
Risk equation						
Civil war[1]	-275.20	0.931	-1111.81	-2.580	-300.10	1.403
	(643.87)	(0.966)	(1175.87)	(2.427)	(502.63)	(0.812)
Population[1,2]	-138.94	0.441	-11.68	-0.120	-115.65	0.382
	(332.82)	(0.253)	(12.70)	(0.455)	(196.90)	(0.263)
Gross cell product[1,2]	–	1.893*		-3.011*	–	2.231*
		(0.494)		(1.195)		(0.524)
New state	–	-1.004	–	20.192*	–	-2.136
		(1.706)		(0.002)		(1.954)
Political instability	–	3.151*	–	-5.439	–	2.543*
		(1.032)		(3.324)		(1.097)
Polity 2[1]	–	-0.178*	–	0.316*	–	–
		(0.066)		(0.123)		
Anocracy[1]	–	–	–	–	–	0.145
						(1.047)
Polity 2 (binary)[1]	–	–	–	–	–	-3.448*
						(0.932)
Ethnic fractionalization	–	1.954	–	-5.220	–	2.374
		(2.073)		(3.255)		(1.945)
Log cell area	377.83	2.397*	186.81	-3.970	277.97	2.185*
	(898.62)	(0.831)	(193.82)	(2.658)	(463.15)	(0.945)
Travel time[2]	-52.96	2.603*	143.35	-3.350*	-9.763	3.280*
	(29.36)	(0.779)	(167.64)	(1.011)	(24.31)	(0.787)
SP constant	-509.77	-41.782*	-900.52	60.242*	-230.62	-42.605*
	(117.86)	(8.110)	(997.42)	(24.459)	(333.78)	(8.683)
Log(α)	0.097	0.067	0.083	0.042	0.126	0.084
	(0.108)	(0.109)	(0.114)	(0.114)	(0.109)	(0.110)
Observations	892,913		603,664		892,913	
Akaike information criterion	1,463	1452	1,317	1,347.866	1,463	1,445

Note: *p<0.05.
[1] lagged; [2] natural log

5 Discussion of Causal Mechanisms

What explains this unexpected finding? We hypothesize that three plausible mechanisms link increased state presence in a given location to civil war onset. We label these mechanisms *rebel gravitation*, *elite fragmentation*, and *expansion reaction.* The intuition behind the *rebel gravitation* mechanism is that insurgents aiming to overthrow the government and take control of the state will gravitate toward areas that have more state presence, as happened, for example, during the urban insurgencies in Latin America and Asia in the 1960s and 1970s (Jenkins 1974). Even within regions that are characterized by lower state presence and capacity, overall, insurgent efforts are often directed towards areas within these marginal regions where the state has a greater presence.

There are three possible explanations for rebel gravitation. First, insurgents aimed at overthrowing the incumbent and establishing control, whether over the entire country or a particular region – the latter being the case in secessionist wars – have to target state actors. They also need to target the infrastructure and the institutions where these actors are present to advance their objective. Second, in the case of asymmetric wars, the insurgents' efforts not only involve armed actions such as terrorism and guerrilla warfare but also entail 'penetrating' state institutions by influencing the actors and processes associated with their operation. For example, the former police chief of Mizoram in India, a territory affected by a low-intensity insurgency in the 1970s, admitted that insurgents had a powerful presence in the state capital, Aizawl, where they interacted with "government officials, political leaders and even newspaper editors" (Marwah 1995, 243). Finally, financial considerations may also force insurgents to gravitate towards areas with higher levels of state presence, which usually afford greater opportunity for resource extraction through higher levels of public and private sector activities. Thus, within insurgency-affected Northeast India, insurgent activities are centered around border towns (such as Moreh in Manipur), commercial centers (such as Dimapur in Nagaland), and state capitals. These locations all involve significant levels of state presence and provide economic extraction opportunities for the purpose of sustenance and profit.

The *elite fragmentation* mechanism operates in situations where the insurgents emerge following the fragmentation of political elites (see, e.g., Wood 2003). In such cases, warring parties are led by elites that were either part of the same political group, competed peacefully for power as separate political groups/parties, or cooperated with the regime and participated – in some capacity – in running the national or the local government. This mechanism is clearly discernible in cases involving coups d'état, where armed combat is largely centered around national or regional political centers. In other cases, military struggle focuses on the respective political power bases of these emerging rebel groups (see, for instance, Goodwin 2001), in addition to the nation's political center. The latter happened, for example, in the case of the Biafra (Nigeria, 1967-1970) and Katanga (Republic of Congo-Leopoldville, 1960-1963) secessionist wars.

There are two explanations for how elite fragmentation can cause civil war in areas with higher levels of state presence. Firstly, under different configurations of international pressures and state weakness, incumbents might fail to continue co-opting political opponents. Under the same conditions, they might also not be able to repress emerging opposition groups. As a result, in many past situations, "even some highly autocratic leaders were unable to eliminate important arenas of contestation" (Levitsky and Way 2002, 63). Splintering political groups can thus use these arenas to mobilize their supporters and attack the regime in locations where the state has high levels of capacity. Second, even when political groups develop in the periphery and aspire for self determination or secession, these groups are still likely to challenge political centers – e.g., regional capitals – in these locations to acquire the state apparatus already in place, or to destroy it.

The third mechanism – *expansion reaction* – captures situations where the expansion of the state apparatus into a given territory could actively generate insurgent mobilization and violence. The process of state expansion does not necessarily translate into a greater integration of the population. It could also lead to their disengagement and disenchantment

(Azarya 1988) for at least three reasons. First, the enhancement of a given state's capacity manifests in the establishment of infrastructure, state institutions, and policy measures that could trigger resentment among the local population. In other words, the locals may perceive such an expansion as constituting cultural, economic, and political threat to its way of life. Second, some policies can directly enforce the customs and traditions of the ruling group. This, in turn, bolsters existing ethnic and religious cleavages, eliminates the reliance on traditional customary justice mechanisms, or even prevents certain languages from being spoken or read.

The expectation here is that when the state expands its presence into a given region along the four pathways discussed in the theoretical section, promoting policies negatively viewed by individuals and groups in this region, then these state institutions will be violently contested. For instance, in the context of post-World War II Southeast Asia, Scott (2009) alludes to the upland population's inability to escape the presence of the state as contributing to numerous ethno-nationalist struggles in the regions. In Afghanistan, the expansion of government institutions into certain regions, viewed as "globalism" associated with the government or the Soviet invaders, was met with resentment and violence and ultimately contributed to the onset of multiple civil wars (Goodson 2001). Rather than integrating the population, as it was originally intended, these attempts to expand state presence outside of Kabul fueled tensions along ethnic and religious cleavages. Rebellions in these regions began by attacking state institutions.

5.1 Evidence From Sub-Saharan Africa

In this section, we present qualitative evidence from sub-Saharan Africa to demonstrate the empirical validity of the three hypothesized mechanisms above. *Rebel gravitation* played an important role in the outbreak of violent conflicts in Burundi, Angola, Zimbabwe (then Rhodesia) and Namibia in the 1960s and 1970s. In Burundi, a Tutsi-led military regime abolished all democratic institutions that existed in the country since its independence in 1962.

In response, a coalition of Hutu forces from Rumone and Nyanza-Lac southern provinces and Mulelist rebels from Zaire attacked military barracks and provincial administrator buildings in these two regions in 1972. They seized control of important armories and killed many ethnic Tutsi, which they viewed as being affiliated with the repressive state (Lemarchand 1994, 90-92). These attacks triggered the onset of a civil war that entailed a brutal indiscriminate campaign against civilians by the Burundian government forces, which resulted in the death of 100,000-200,000 civilians (Lemarchand 1994).

Similar dynamics could be observed in Angola, where forces of the Popular Movement for the Liberation of Angola (MPLA) opened their struggle against Portuguese occupation by launching a deadly attack against police garrisons and a prison in Luanda, the future Angolan capital (Falola and Oyebade 2010, 106-107). In neighboring Rhodesia (now Zimbabwe), forces of the Zimbabwe African People's Union (ZAPU) mobilized urban workers to specifically show their force in urban areas, as well as by attacking Rhodesian government strongholds (Ibid., 110-111). Similarly, the South West Africa People's Organization (SWAPO) in Namibia focused its initial attacks in 1966 on forces of the South African Apartheid regime around the capital (Falola and Oyebade 2010, 112-114).

Common to all of these cases is the fact that civil war onset occurred in areas where the state had maintained relatively-high levels of political and military presence. These initial attacks targeted provincial and national administration offices, military garrisons, police stations, and armories, specifically, rather than small contingencies of troops or smaller towns. This was frequently the case, even though in a vast majority of these cases civil war eventually unfolded primarily in rural areas, where these rebel groups could operate more easily. In these cases, rebel forces *gravitated* to areas with more state presence in order to deal the first blow where it hurts the most, and potentially to secure important gains early on.

Qualitative evidence also lends support to the elite fragmentation mechanism. For instance, the second civil war in Liberia erupted in the capital Monrovia after the Justice

Coalition of Liberia (JCL) split from Charles Taylor's National Patriotic Front of Liberia (NPFL). The JCL, which later became a part of the Liberians United for Reconciliation and Democracy (LURD), was led by the former NPFL commander General Liberty (Gerdes 2013, 157). While the LURD fought, at least in the initial stages of the war, primarily in peripheral areas, the first battle of the war took place within a state stronghold.

Elite fragmentation also accounts for two civil war outbreaks in Uganda in the 1970s and 1980s. In the first case, the Ugandan President Milton Obote was deposed by forces loyal to his own army chief and ally, Idi Amin, following a short and relatively low-intensity war that began with a *coup d'état*. This war unfolded in and around the capital, Kampala (Lindemann 2010). Obote resumed power following a contested election after Amin was deposed in 1979, but faced an armed challenge from his one-time ally Yoweri Museveni and his Popular Resistance Army (PRA). Museveni played an important role in the ouster of Amin and was the Minister of Defense in the transitional military government that replaced Amin and contested the 1980 presidential elections (Oloka-Onyango 2004). The so-called Ugandan Bush War (1981-1986) originated in Uganda's center of state power even though the fighting was primarily confined to the countryside (Lindemann 2010).

The role of the expansion reaction mechanism is evident in a number of cases involving marginalized indigenous minorities in sub-Saharan Africa. A striking example of this is the Ogoni conflict in the Niger Delta. Despite significant investment in the state infrastructure as a result of the availability of massive oil reserves in the region, the local population remains exceptionally under-served and marginalized. The Delta region also bears the brunt of the oil production's social and environmental costs (Bob 2005, 61). Environmental degradation forced a large number of people to abandon traditional agricultural practices. The Nigerian state resorted to violent repression to suppress dissent and protests such as the 1990 Umuenchem protest (Ibid., 70). The result is a low intensity insurgency waged by local ethnic militia groups such as the *Egbesu Boys*, which, again, began with the targeting of the government installations in the delta region (Ukeje 2001, 344). Thus, the Ogoni insurgency was the result of a local reaction to the expansion of the state and its institutions within the region, which promoted unequal economic policies that hurt and alienated the local population.

The conflict in Darfur is another, albeit somewhat different, illustrative example of the working of the expansion reaction mechanism. The post-colonial Sudanese state progressively expanded it's presence in Darfur and implemented policies aimed at cultural, political and economic marginalization of non-Arabs in the region. This escalated under the National Islamic Front, which sought to subjugate and Islamize (and Arabize) ethnic groups in areas of weak state presence in the north of the country. The regime more or less succeeded in the Nuba Mountains and the Red Sea Hills Province after violent confrontation, but encountered fierce resistance in Darfur (Bassil 2013, 2). Facing increased competition over resources following years of severe drought, the regime began arming Arab militias (Straus 2005). In response, non-Arab ethnic groups – the Fur, Massaliet, and Zaghawa – organized themselves into two main secessionist rebel movements, the Darfur Liberation Front (DLF)/Sudanese Liberation Movement/Army (SLM/A) and the Justice and Equality Movement (JEM) (Flint and De Waal 2008).[20] The first wave of attacks was aimed specifically at provincial authorities, police stations, and military bases, which symbolized the expansion of the state into Darfur, and not Arab militias. In the Darfur case, civil war occurred because the state increased its local involvement and expanded its presence in order to promote the marginalization of non-Arabs and facilitate the appropriation of resources such as land, water and oil by Arabs.

6 Conclusion

The analysis presented in this paper suggests that state capacity has a more complicated relationship with civil war than previously hypothesized. While civil war is more likely to break out in countries with lower degrees of state capacity, such conflict, at the same time,

[20]These movements splintered over time into multiple groups. See Flint and De Waal (2008).

frequently erupt in regions and localities within these countries that have higher levels of state penetration. These findings validate Fearon and Laitin's main conclusion that state capacity is critical to explaining the onset of civil wars. However, they call into question their contention that civil war onsets are related to poor administrative and institutional control of the peripheries.

Our findings suggest that there are two dimensions of state capacity – the average, or aggregate level; and the variance over space, or distribution. We highlight the need for a disaggregated measure of state capacity that encapsulates both of these dimensions. We further contend and demonstrate that nighttime light constitutes a valid measure of state capacity. The use of nighttime light helps us to overcome some of the challenges involved with measuring the actual distribution of state capacity and its associated effects at the subnational level on a *global* scale.

By highlighting the intrastate distribution of state capacity's salience using subnational units of analysis, our study also has important implications for research into the causes and consequences of civil war. It calls for problematizing the dominant narrative about the relationship between state capacity and civil war. While some insurgencies and civil wars have emerged and thrived in regions characterized by an absence of state institutions, the weight of the evidence strongly suggests an alternative relationship. Increased state presence in a given location is associated with a higher probability of a civil war onset. We outline three possible mechanisms connecting higher state capacity levels with civil war onset for future research to analyze – rebel gravitation, elite fragmentation and expansion reaction.

We also articulate four different pathways for the expansion of state capacity into a given location. We believe that a second fruitful direction of research is to analyze how the expansion of state capacity along these four pathways is related to the different mechanisms that link higher state capacity levels with civil war onset. For instance, we suggested that civil war is likely to erupt in areas with more state presence due to elite fragmentation dynamics. Because these dynamics likely center around aspirations for political power and access to state revenues, they can be associated specifically with political mobilization or revenue mobilization. In contrast, rebel gravitation and expansion reaction dynamics might characterize the expansion of state capacity along the lines of economic development or national security. The relative importance of these different pathways and their relationship to civil war onset may also vary according to the regime's nature. Investigating this aspect can yield valuable insight into how and why the expansion of state capacity in some regimes is different than in others.

Finally, we acknowledge two limitations of our analysis. First, an escalation of an incipient conflict and insurgent mobilization could manifest in the affected territory's penetration by the state apparatus. However, we believe that such conflicts are unlikely to cause noticeable change in state presence as captured by nighttime light emissions. These conflicts are more likely to involve small arms tactics characterized by low-intensity violence (Besley and Persson 2010). They are also usually confined to peripheral and marginal areas within states where, as numerous examples from south and southeast Asia suggest, a massive expansion in state capacity is unlikely regardless of conflict occurrences. In other words, the affected areas are not salient enough for the state to embark upon a sizable expansion (see Sarbahi 2011). In high-intensity conflicts, especially civil wars, the scale and frequency of fighting usually forecloses the possibility of an expansion of the state apparatus (and related infrastructure). Moreover, even if expansion occurs in response to an incipient conflict, as long as it precedes the actual outbreak of armed rebellion, i.e., civil war onset – the focus of this paper – it should help alleviate endogeneity concerns. To at least partly verify that our findings are robust to these concerns, we lag all of our time-varying independent variables. We recognize that this is not the panacea for all endogeneity concerns.

Second, we emphasize that our theory and findings pertain specifically to the onset of civil war. We are cognizant that our findings regarding civil war outbreak may not necessarily explain its continuation, and may even have varied effects, depending on the particular conflict phase analyzed (Ross 2004; Sarbahi 2011). For instance, dense ties with the civilian population may force insurgents to negotiate and commit to a ceasefire, but such ties may also prevent them from reaching a negotiated settlement that entails a significant compromise (Sarbahi 2011). Moreover, our theory and analysis are not aimed at explaining micro-dynamics within an ongoing civil war such as violence against civilians, disavowal and defection, and spatio-temporal variation in conflict following the onset. The presence of the state may cause the victimization of a certain group of people, as happened, for instance, in northwest Pakistan, where tribal elders face insurgent violence because they are frequently perceived to be agents of the state. Establishing that the same mechanisms operate in these situations requires distinct theorization and analysis that are beyond the scope of this study. We thus believe that such analyses provide a compelling direction for future research.

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