Turning the Lights on to Keep Them in the Fold: How Governments Preempt Secession Attempts*

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Abstract

There are many regions that meet the necessary conditions for sovereign governance in the world, but few secessionist conflicts. I argue that this relative paucity of secessionist violence is the result of government preemption of potential secessionist movements. Using cross-national geospatial data from 1992 to 2013, I find that governments invest more, measured via nighttime light emissions, in more secession-prone regions. The same factors that make territory attractive for secession, such as large populations and international borders, also make governments willing to work to retain control of that territory, contributing to the scarcity of separatist civil conflicts.

The Nigerian military maintains a significant presence in the petroleum rich Niger Delta region. While the threat of secession is significantly lower than it was during the height of the Ogoni self-determination movement in the 1990s or the Nigerian Civil war in the 1960s, the government is apparently still worried given the frequency of military operations against rebels in the region (Walker 2009, Owolabi 2017). This concern is not misplaced; loss of the oil revenues generated by the Niger Delta would severely hinder the government's ability to meet its obligations, and militant attacks on oil facilities (Uguru & Faul 2016) have led to up to 30% reductions in production (The Economist 2016). Regular

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military exercises anger local residents who say that the government should "change its military approach" and "address the developmental challenges facing the region," instead (Akwagyiram 2017).

At first glance, this belligerence may seem puzzling. Gone are the demands for secession and independence of the Biafrans; in their place, Ijaw groups call for "federalism and self-determination" (Opejobi 2017). Why the heavy hand if separatism is less of a concern today? One possibility is that the government is unwilling to tolerate the income loss a revenue sharing agreement would entail. Another is that the region's petroleum reserves are so valuable that the government is not willing to risk any chance of losing them to a successful secessionist movement.

In this article, I argue that the large population and international border in the Niger Delta explain the Nigerian Government's course of action because they are both characteristics that mark the region as at-risk for separatist conflict. Population is a necessary condition for collective action and internationally-recognized borders are preexisting institutions that a newly independent state can leverage for faster acceptance in the international community and decreased transaction costs in international trade. Both of these elements are geographic characteristics of specific areas of territory within the overall territory controlled by a state.

If geography influences a region's risk of secession, then this gives states a powerful source of information they can use to head off potential secessionist movements. When a territory is particularly well-suited to secession, the state may take pains to discourage its inhabitants from considering secession by increasing its coercive capacity within the group's territory, thus raising the cost to any potential separatists. Governments may also employ positive inducements rather than negative ones, such as increased spending on public goods like education and healthcare to deter separatist sentiment. Either option potentially represents a deliberate decision by a central government in response to fears of potential separatism, and will manifest as increased levels of state investment relative to less at risk areas.

While this logic can apply to any territory within a state's borders, it is especially relevant in areas where politically excluded minority groups reside. Such groups are prone to separatist conflict due to their lack of access to political processes to further their goals. Shared ethnic identity can lower the barriers to separatist mobilization, so separatism is a largely ethnic phenomenon empirically. The combination of ethnicity and geographic risk factors for secession allows governments to target their preemption efforts at the most likely areas where separatist campaigns may begin. Accordingly, I use ethnic group territories as the unit of analysis to determine whether geographic secession risk

factors, namely population and international borders, make state investment more likely. I capture government investment using nighttime light emissions, which correlate strongly with several measures of state capacity at the local level. This combination of data allows me to test my argument on a cross-national sample of all ethnic group territories from 1990 to 2013.

To test this argument, this paper proceeds as follows. First, I review the literature on separatist conflict risk and outcome. Next, I discuss the importance of geography in assessing secession risk and argue that states use their knowledge of different territories within their borders to identify the most likely candidates for secession and proactively work prevent such movements from emerging. I conduct a cross-national test of this argument using geospatial data to measure both separatism risk and government investment at the local level. Results indicate that high risk areas far from the government's reach have elevated levels of investment, suggesting that governments are deliberately cultivating a presence in these areas despite the cost of doing so. I close by discussing how this strategy can help explain many of the patterns we observe in civil conflict throughout the world.

1 Theory

The starting point for understanding territorial conflict is nationalism. Groups only engage in territorial conflict—the struggle to create new and alternative political institutions within the boundaries of a given territory—when motivated by nationalist desire to ensure that "ethnic boundaries should not cut across political ones" (Gellner 1983, 1). Thus, territorial conflicts represent an attempt to replace existing geographic political divisions with ones that more closely support the "nationalist principle" (Gellner 1983) that the government of a state should represent the interests of the "imagined community" of the nation (Anderson 1983) that lives within its geographic borders.

From 1946 to 2018, 64.31% of ethnic groups globally were excluded from political power.[1] As a result, there has been a steady increase in the number of self-determination movements since 1960 (Cunningham 2014). This category encompasses all organized efforts towards increased autonomy, self-rule, or independence, and includes both violent and non-violent groups (Cunningham 2014). The institutional benefits of United Nations membership and the strengthening norm against territorial conquest have made it 'safer' for new states to emerge, partly explaining the rise in separatist movements and the number of new states that emerged through a process of secession, whether violent or not (Fazal & Griffiths 2014).

[1]Coded as not monopoly, dominant, senior partner, or junior partner by EPR.

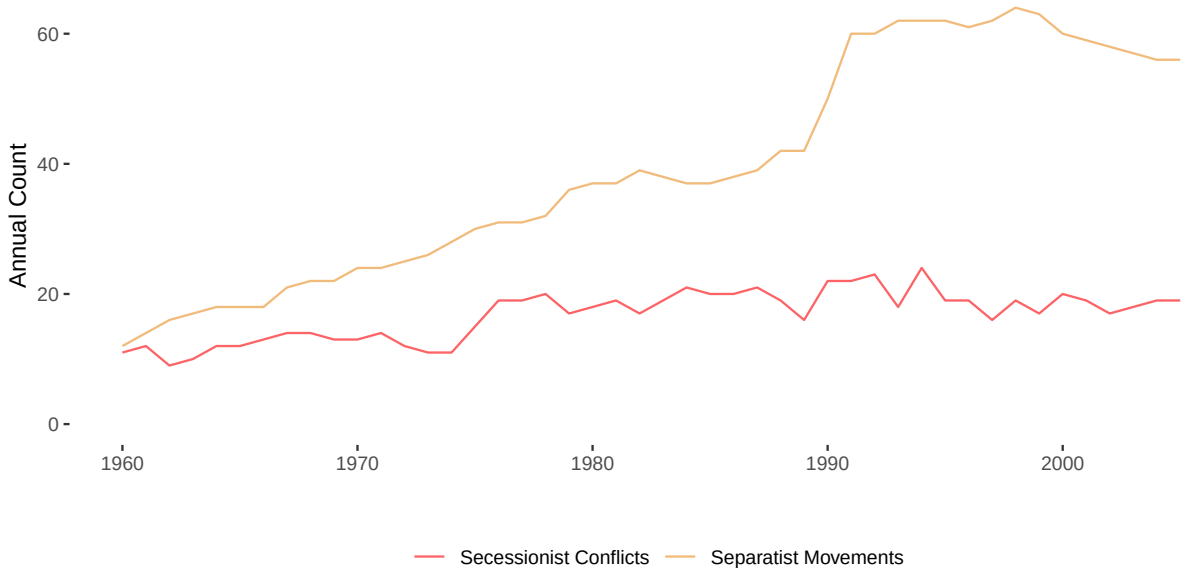


Figure 1: Annual counts of separatist self-determination movements (Cunningham 2014) and secessionist civil wars (Braithwaite & Cunningham 2020).

Despite this rise in nationalist sentiment and corresponding increase in organized separatist movements, there has not been a similar surge in secessionist civil wars. Figure 1 presents the annual number of active separatist movements (self-determination movements whose goal is independence) from 1960 to 2005, along with the number of secessionist civil wars during that period. The percentage of self-determination groups calling for secession has never passed 55% since 1960 (Cunningham 2014, 72), so comparing separatist conflicts with separatist self-determination movements provides the best measure of the gap between genuine separatist desire and conflicts in service of that goal. Despite the general upward trend in separatist self-determination movements, the number of separatist civil wars lags significantly behind. This disconnect is sharpest after 1990; the collapse of the Soviet Union is associated with a marked increase in self-determination movements but not a significant increase in secessionist civil war.

Secessionist conflicts are most likely when marginalized ethnic minorities who suffer from discrimination at the hands of the state are located far from the capital (Cederman, Buhaug & Rød 2009, Cederman, Wimmer & Min 2010). Secessionist conflicts are almost purely an ethnic phenomenon as ethnicity can whip up the nationalist fervor such efforts require more easily than other identities such as class or religion (Cederman, Buhaug & Gleditsch 2013). Given these facts, the empirical distribution of the location of excluded minority groups suggests that we should observe more secessionist conflicts than we do. Figure 2 presents the distribution of the distance from an ethnic group's territory to the

capital, split by political status. Excluded groups are much more represented in the right side of the distribution. Despite the frequency of excluded groups located far from the capital, the prevalence of secessionist conflict is relatively low.

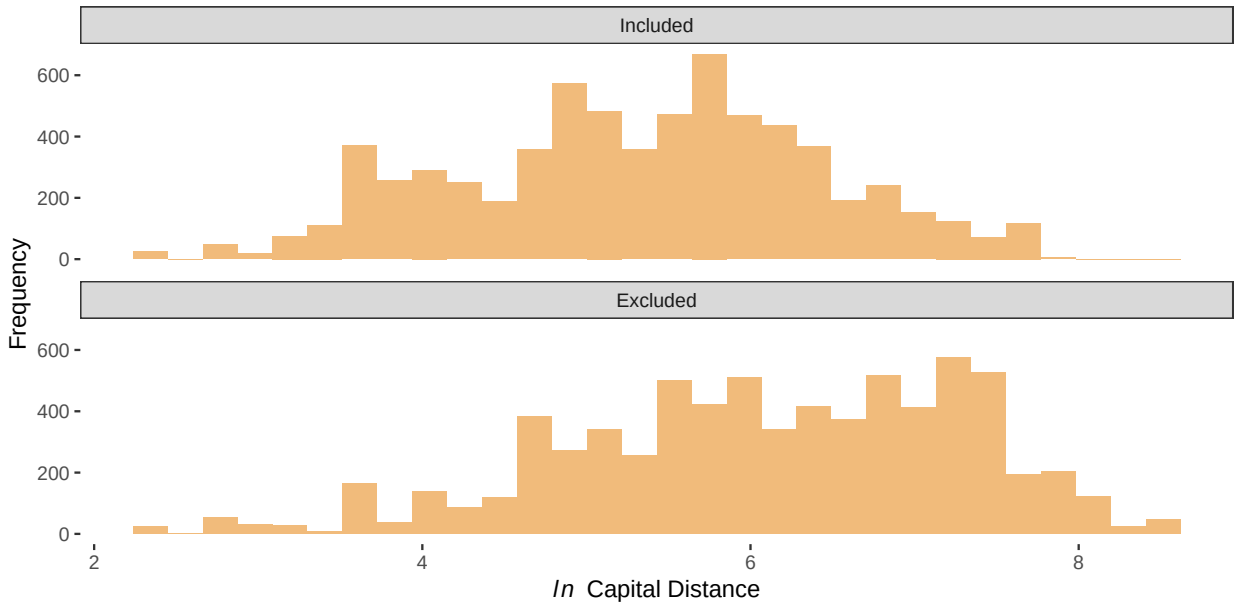


Figure 2: Histogram of the distance from ethnic group territories to the national capital (log transformed and standardized) by group political status in 2013.

The relative paucity of secessionist civil war is especially surprising given both the rise in the number of new states in the post-WWII era (Griffiths & Butcher 2013), and the location of politically excluded minority groups within existing states. The remainder of this section lays out my explanation for this puzzling phenomenon.

1.1 Keeping a lid on it

To understand what explains the lower than expected number of separatist civil wars we must follow Griffiths (2016) and turn our eye from rebel movements to central governments. Separatist civil conflict is rarely monocausal and often has multiple political causes (Moore 1998, Doyle 2010), ranging from the interaction between governments and rebel movements (Florea 2018) to movement factionalism (Cunningham 2013).

One potential explanation for the shortage of secessionist conflicts is that governments preemptively stop conflicts from occurring in the areas most prone to secession. If this is the case, we should observe governments investing more in these regions to develop their capacity to prevent unrest from escalating into armed conflict. While governments have limited resources and cannot employ these measures in all regions of their territory,

the areas that receive less investment are less secession-prone and consequently less likely to engender separatist conflict. The net result will be fewer separatist conflicts than if governments did not engage in preemptive behavior, which could explain the gulf between the number of separatist movements and the number of groups engaged in armed separatist violence.

This strategy can be carried out by either providing elevated levels of public goods or by increasing the coercive capacity of the state. While they represent two different approaches, each option still involves an increase in investment by the central government at the local level. State capacity entails both ensuring a monopoly on the legitimate use of force (Weber 1965) and maintaining political institutions (Acemoglu, Johnson & Robinson 2001). Creating effective institutions and providing public goods decrease the attractiveness of secession by meeting citizens' needs and increasing the opportunity cost for secession. Conversely, increasing the policing and surveillance capabilities in a region deters secession by increasing the costs of militarily challenging the state and decreasing the probability of victory. While the facts on the ground differ greatly for each of these approaches, both require increased government investment and will reduce the number of secessionist conflicts in the aggregate.

Although ethnic identity is a key component in the process of secession, more concrete concerns also play a role. Secession is a territorial phenomenon, and requires a territory to attempt to create a new state in, so ethnic homelands are another important element to consider. Ethnic homelands are special and not exchangeable with other similar pieces of territory due to their importance in group myths and identity. Even though a group could technically establish a new and independent state in territory that was not historically associated with it, this would largely be seen as a failure by the group's members. Possession and control of homelands is essential to group members' understanding of their identity (Toft 2003, 20), so any attempt at violent separatism will begin in a group's homeland.

When ethnic groups try to secede, they attempt to do so with their traditional settlement areas due to the symbolic significance of these areas. This is clearly a simplification of how wars are actually fought since successful rebel groups are rarely able to secede with all of their preferred territory. They may only be able to liberate a subset of their homeland, or they may end up holding onto conquered territory they did not originally desire depending on their level of success on the battlefield and their bargaining position relative to the government. Groups launch their separatist campaigns from their ethnic homelands, so states can make judgments about the risk of secession based on characteristics of theses territories.

Armed with this information, states can act decisively to prevent large-scale secessionist violence. The actions of China in Xinjiang in the second decade of the 21st century provide an illustration of how this process can play out. After riots between Muslim Uyghurs and Han Chinese in the city of Urumqi killed almost 200 people in 2009 (Wong 2009), the Chinese government executed nine people it claimed were responsible for the violence (Demick 2009). However, this was just the beginning of the government's response. As a first step, Xinjiang's "security forces doubled between 2009 and 2011 to more than 11,000 people" (Coca 2018). The government has built "convenience police stations" at major intersections in cities throughout Xinjiang, which allow police officers to more easily monitor people (Wen 2017).

In addition to the increased presence of security forces, China has initiated a massive surveillance operation in the region. Cameras on streetlights use facial recognition technology to track the movement of people throughout the region (Millward 2018), and in Urumqi, people must use their government IDs and submit to a facial recognition scan to buy gasoline (Chin, Bürge & Marchi 2017). Government data are so comprehensive that the system can alert authorities if someone wanders more than 300 meters from their home or workplace (Phillips 2018). The government has deployed this immense security apparatus to identify potential dissidents, and UN human right experts believe that potentially up to a million Uyghurs have been detained in reeducation camps (Cumming-Bruce 2018).

Why has China dedicated so much money and human capital to a remote and underdeveloped region? While Xinjiang has never experienced a widespread armed secessionist movement, there are long-simmering desires for self-determination in the region (Bovingdon 2010). These aspirations have also fueled some degree of organized agitation in the form of the East Turkestan Islamic Movement, which has demanded independence for Xinjiang's Uyghur population since the 1990s (Gunaratna, Acharya & Wang 2010, 47-88). Given these tensions, the Chinese government has decided that the risks of full scale secessionist conflict justify the expense of the surveillance effort and "indoctrination campaign, which aims to eradicate . . . any yearning for an independent Uighur homeland" (Buckley 2018). This effort is part of a shift in policy towards ethnic minorities from a Soviet-style model that accommodates minority rights to one based on "assimilation" of groups into a single Chinese identity (Elliott 2015).

1.2 Mapping risk

An important question remains, and that is what heuristics governments use to identify areas within their territories that are at risk of secession. Xinjiang has all the makings

of a potential secessionist conflict and is instructive in answering this question. It is situated far from the centers of state power in Beijing, has a relatively large population, and sits along a recognized international border. The former aspect makes secession more attractive because it increases the odds of victory against the government, while the latter two improve the prospects of a newly independent state in that territory.

The far-flung regions of a state's territory are prone to separatist conflict due to the simple fact of their remoteness. The farther from centers of military and administrative power a region is, the more difficult, and therefore expensive, it will be for the government to exert influence on them (Boulding 1962). This concept of remoteness is typically operationalized using the distance to the national capital, as this is the seat of state authority. Distance to the capital is positively related to both civil conflict onset generally (Buhaug 2010) and territorial conflict specifically (Buhaug & Rød 2006, Cederman, Buhaug & Rød 2009). However, distance is not the only factor that influences the likelihood of separatist conflict, so not all remote areas of a state's territory are equally in danger of secession.

Higher population density lowers barriers to collective action, facilitating the organization and execution of armed rebellion (Weidmann 2009). Once a conflict begins, individual locations are more likely to experience rebel violence if they have high population density for the same reason (Raleigh & Hegre 2009, Daly 2012, Zhukov 2012). The more tightly concentrated populations are, the more feasible any political action becomes, suggesting that the post-independence process of state-building may be easier in more densely populated areas.

The historical experiences of state formation suggest that population plays a role in whether a group will push for independence. Societies where people were concentrated in specific geographic areas were able to consolidate faster and develop more robust institutions due to the lower cost of administering centralized populations. By comparing population across territories inhabited by potential rebel groups, we can get an idea of how it influences the likelihood of secession.

The more heavily populated a territory is, and the farther from the reaches of the state it is located, the higher the likelihood of secession will be. The effect of population is conditional on distance from the existing state's centers of power because a proximate central government will be a stronger adversary than a distant one. Further, newly independent states located near the previous host state will face significant harassment, so groups that reside in territories far from the nexus of state power will face a more favorable post-independence situation.

As a group's territory becomes more populous and farther from the state, secession

becomes more attractive. As a result, governments should increase their investment in the group's territory. A demographically large and politically excluded group located near the center of state power will merit far less investment because the looming threat of effective military response will deter armed separatism. Accordingly, the effect of population on state investment will be higher the more remote a group is. This leads to my first hypothesis:

Hypothesis 1 *The effect of population on state investment should be positive and increasing in distance from the reach of the state.*

The presence of international borders within a territory also makes it much more desirable from the perspective of a separatist movement. International borders can provide cross-border safe havens where rebel groups are able to elude the reach of the state; as non-state actors they are more free to violate sovereignty norms which constrain militaries from pursuing them across the border (Salehyan 2007). International borders can also be a site of mobilization if members of the group also reside in the neighboring state (Cederman, Gleditsch, Salehyan & Wucherpfennig 2013). Both of these factors mean that borders increase the risk of separatist conflict by making rebellion more feasible.

Secession is a process both domestic and international, and it will only be fully successful if the newly independent state is recognized as sovereign by the other members of the international system. When a government loses a separatist war on the ground, it shifts to the international arena. Many states with breakaway regions have successfully lobbied and pressured other states not to recognize these regions, such as when Serbia convinced several other countries not to recognize Kosovo after its unilateral secession (Ker-Lindsay 2012). These international pressure campaigns can spell serious trouble for hopeful separatists, so groups where that are less susceptible to them will be a greater risk of secession.

Existing international borders also offer two key benefits for the likelihood of international recognition after a successful separatist campaign. First, borders are institutions that shape interactions between neighboring states (Simmons 2016). Having an internationally recognized border with another state or states gives newly formed states an increased element of legitimacy that will make establishing trading relationships with new neighbors easier. Such borders come with pre-established access to international commerce, supplying much-needed income to a new state.

Second, the temporal dynamics of borders can be relatively sticky and being able to leverage existing borders will reduce the number of problems a new state must resolve. Many new borders in international politics are actually drawn according to existing ad-

ministrative boundaries, with only the ownership on each side of the border changing (Carter & Goemans 2011). Further, new borders that closely follow existing borders are associated with shorter periods of instability and dispute (Carter & Goemans 2013), meaning that a new state that has an existing international border in its territory will face fewer objections to recognition of those borders. By controlling an existing international boundary instead of drawing new ones, ethnic groups that possess an international within their territory are better prime to win recognition post-secession. This advantageous situation makes international borders a secession risk factor.

As with population, the effect of borders on secession-risk is conditional on distance to the capital. A group with an international border in their territory located near the centers of state power is a minimal secession risk given the ease with which the state can crush separatist activity. As a result, governments will be much more concerned about groups that live along international borders far from the capital. These are the cases where governments will be more willing to make costly investments in preemption. This leads to my second hypothesis:

> **Hypothesis 2** *The effect of an international border on state investment should be positive and increasing in distance from the reach of the state.*

It can be difficult to discern government intentions from behavior, especially given that the pursuit of economic development may be observationally equivalent to the intent to surveil and repress. Both motivations will result in increased investment by the central government in outlying regions. If governments do not strategically invest to preempt separatist conflict, the alternative is not a lack of investment, but different geographic patterns of investment. In Section 3.2 I assess the possibility that some factor other than concern of risk of separatist conflict, such as a desire to reap the economic benefits of development, may explain the patterns of subnational government investment that we observe.

1.3 Scope conditions

An important scope condition of this argument is that it is intended solely to explain the dynamics of government preemption of separatist conflicts. Governments cannot rely on geographic information as strongly when trying to prevent center-seeking governmental conflict because the qualities of the territory that a group inhabits are less relevant when their goal is to overthrow the government and capture the entire state. While the territory that a group controls at the start of a governmental conflict might shape the dynamics of

the conflict, that territory is not the end goal of the conflict. When the goal is larger than a group's territory, characteristics of that territory will be less useful in predicting conflict.

While many separatist groups receive support from external actors, these dynamics are outside the scope of this argument. Weak rebel groups are unlikely to receive external support, and groups that do receive external support tend to have strong centralized command structures or control territory (Salehyan, Gleditsch & Cunningham 2011). This argument concerns by attempts governments to ascertain the risk of potential separatist conflict and preempt such activity. The factors that make external rebel sponsorship more likely all characterize more-established rebel groups that the government is more likely to already be aware of. It is highly unlikely that a group with a strong central command could control territory without the state's knowledge, meaning that external sponsorship is not a major factor in how states confront uncertainty about potential separatist conflicts.

The principal-agent dynamics that characterize rebel-sponsor relationships mean that external states are more likely to sponsor more-established groups, and governments are more likely to be aware of these older groups. Additionally, many of the reasons why states offer sponsorship to rebel groups are external to the characteristics of the rebel movement itself. For example, states sponsor rebel groups to substitute for traditional alliances (San-Akca 2016). The centrality of external factors in determining rebel sponsorship means that governments are sufficiently uncertain about the likelihood of external sponsorship when assess the risk of secessionist conflict within their territories.

In the following section I discuss my measurements of population and international borders to capture secession risk. I also detail the rationale for using nighttime light emissions to measure state investment and present the statistical test of my argument using cross national geospatial data.

2 Data and methods

I test my argument that governments work to deter secession in the most high risk areas on a sample of all ethnic group territories from 1990 to 2013. My unit of analysis is the ethnic group, so my universe of cases is all ethnic groups that have defined territorial settlement areas between these dates. Recent work on civil war onset has focused on ethnic groups because the shared identity of an ethnicity can channel grievances in a manner that overcomes barriers to collective action (Cederman, Buhaug & Gleditsch 2013). Since many ethnic groups have defined settlement areas, they also have a natural homeland to create a new state in, should they decide to secede (Toft 2003). If a group wishes to secede, it needs "a potential independent nation" with a territory that could serve as a "national

homeland" (Orridge 1982, 46), which allows me to make comparisons across ethnic group settlement areas.

In order to measure the secession risk of different ethnic group territories, I draw on geospatial data. I use the GeoEPR (Wucherpfennig, Weidmann, Girardin, Cederman & Wimmer 2011) dataset, which is a geocoded extension of the EPR data (Vogt, Bormann, Rüegger, Cederman, Hunziker & Girardin 2015). Each ethnic group with a defined territorial settlement pattern has a polygon in the GeoEPR data.[2] As I am interested in preemption of secessionist conflict, I use the least aggregated level of observation, which splits ethnic groups along state borders. For example, the GeoEPR data have polygons for Kurds in Iraq, Syria, and Turkey, so each of these group-state dyads are a separate entry in the data. I use territory-years because population and nightlights vary yearly, as do many control variables.

Although this sample necessarily involves omitting potential non-ethnic conflicts from my study, there is significant evidence that the ascriptive nature of ethnic identity channels political grievances in a more effective manner than other identities such as class or ideology and lowers barriers to collective action (Lichbach 1995, Cederman, Buhaug & Gleditsch 2013), so focusing on ethnic conflicts is appropriate because they are likely to follow qualitatively different causal pathways than non-ethnic ones. From 1946-2011, 84.00% of separatist rebel groups that emerge are ethnic or religious in nature; in the sample period, 90.32% are coded as ethnic or religious (Braithwaite & Cunningham 2020).[3] As secession is almost purely an ethnic phenomenon empirically, focusing on ethnic groups allows me to uncover the effects of geographic secession risk on government preemption efforts. I exclude groups with a monopoly on political power, because by definition they are in power and are not worried about themselves seceding.[4] While governments may not deploy extensive surveillance infrastructure against politically included groups, they may still provide them with elevated levels of public goods if they are located in areas prone to secession.

[2]The exclusion of groups without defined geographic settlement patterns does not bias my analysis because the proposed causal mechanism could not function for geographically dispersed or nomadic groups.

[3]The three groups in the sample period that are not ethnic or religious are the FLEC-FAC, which was a new group that emerged from an ongoing conflict, the Democratic Republic of Yemen, which was a result of the failure of the unification of the People's Democratic Republic of Yemen and the Yemen Arab Republic four years prior, and the Republic of South Sudan, which arose over the status of Abyei after the South Sudanese independence referendum. None of these were unforeseen outbreaks, and are therefore outside the scope of the theory.

[4]I retain groups whose political power is dominant or who are partners in a government, because these powerful groups may still rebel if they have recently had their political power downgraded (Cederman, Wimmer & Min 2010). Monopoly groups are excluded because as the top category, they cannot have been recently downgraded.

The response and key explanatory variables are all measured at the level of the ethnic group territory-year. Below I discuss how I operationalize each before covering control variables and the model used to test my hypotheses

2.1 Government investment

By maintaining a large presence in an excluded group's territory, the state may be able to deter a secessionist uprising. I use the fact that nighttime light emissions correlate strongly with government investment to conduct a cross-national test of this hypothesis. If governments are indeed trying to make secession too costly, then more secession-prone territory should also have higher levels of nightlights.

When areas are physically difficult for agents of the state to reach, tax revenues will be lower, and acceptance of government policies may be more difficult to obtain (Herbst 2000). In extreme cases, people may not even be aware of changes in government policies. Investing in physically remote areas is a costly process, and so when governments do so, it is the result of a strategic decision where the costs of administering and monitoring this remote territory are worth paying to deter potential secessionists.

This concept has been explored before at the state level with the idea of political reach, which captures the degree to which states can mobilize their citizens to implement policy (Kugler & Tammen 2012). However, these approaches rely on an aggregation of national-level data and are insufficient for measuring differential levels of investment across a state's territory. Instead, we require subnational data to measure the degree of government reach into specific ethnic group territories.

To accomplish this, I use data on nighttime light emissions. While nightlights are a reliable proxy for overall economic activity in a given area (Cederman, Weidmann & Bormann 2015, Kuhn & Weidmann 2015, Weidmann & Schutte 2016), they are also an indicator for government investment in an area specifically. Electrification is often a tool used by the government in developing states to extend their reach into rural areas (Kale 2014). Chibuike Rotimi Amaechi, the governor of Rivers State from 2007-2015, stated in an interview that he did not feel comfortable campaigning in rural areas that lacked electricity (Africa News 2011), highlighting the connection between electrification and the expansion of legibility across states' territories (Scott 1998). Governments also use electrification strategically, as evidenced by the fact that the African National Congress prioritized electrification in core constituencies after the end of Apartheid (Kroth, Larcinese & Wehner 2016). Increasing investment provides states with information they can use to preempt secessionist conflicts, and dampens separatist desires by building local legitimacy.

Nighttime lights correlate with a number of contemporary measures of government investment at the subnational level in many different states. Tax revenue and quality of public service provision are positively related to nighttime lights at the municipal level in Ecuador (Harbers 2014). Nighttime lights are also positively correlated with the number of government employees per district in Gahana medical clinics in a subdistricts in Andhra Pradesh, India (Koren & Sarbahi 2017). Specifically relevant for this analysis, De Juan & Pierskalla (2015) provide data on the number of security force personnel deployed to all counties in Southern Sudan (now South Sudan) in 2008. These county-level security force data correlate positively with 2008 nightlights ($\rho = 0.34$), providing further evidence that nightlights are a reasonable proxy for government investment.

Lee & Zhang (2016) develop a measure of state capacity that draws on irregularities in reported ages in census data to capture administrative capacity via a statistic called the Myers number. Higher Myers numbers indicate more irregularities in reported birth years, signifying lower bureaucratic capacity in a given subnational region. Myers numbers for 2,403 region-years in the sample period correlate negatively with nighttime lights ($\rho = -0.42$), meaning that as governments invest more in a given region, the quality of information a government possess about its citizens increases.

While nightlights are a noisy and imperfect way to measure government investment, they correlate with both the administrative and coercive dimensions of state capacity that governments invest in. They also have several useful properties for this analysis. Nightlights are a globally available method to measure investment, which means they can be used even for countries with poor or nonexistent data (Chen & Nordhaus 2011), which are also the countries most at risk for civil conflict (Fearon & Laitin 2003). Further, they are largely immune to government incentives to misrepresent economic statistics. The more a state invests in a given territory, the more nighttime light will be observable.

The specific dataset that I use to measure nighttime light emissions is the Defense Meteorological Satellite Program (DMSP) Operational Linescan System (OLS) (Elvidge, Erwin, Baugh, Ziskin, Tuttle, Ghosh & Sutton 2009), which measures average light emissions over the course of a year at 30 arc-second grid cells ($\approx$ 1km $\times$ 1km at the equator). For each ethnic group territory, I follow the 'cookie cutter' approach (Cederman, Buhaug & Rød 2009, Cederman, Weidmann & Bormann 2015) of using the territory polygon to capture the value of all nightlights that fall within the group's territory, accounting for overlapping group polygons when necessary.[5]

[5]See the Supplemental Information for a discussion of this process.

2.2 Secession risk

The first spatial component of secession risk, which conditions the effect of population and international borders, is the distance from a group's territory to the capital. I rely on the CShapes dataset on the geography of major states from 1945 to the present, which provides the geographic location of capitals for all major states (Weidmann, Kuse & Gleditsch 2010). Combining these data with ethnic group locations from EPR allows me to measure the distance between the centroid of a group's territory and the capital.

To measure the population of a group's territory, I rely on the Gridded Population of the World (GPW) data.[6] I follow the same 'cookie cutter' approach to measuring nightlights to measure population, and make the same correction for overlapping ethnic group territories.

To measure whether a group's territory contains an international border, I again draw on the CShapes data. I check whether each territory overlaps the borders of the state it is located within.[7] This procedure captures both terrestrial and maritime borders. While coastal borders do not provide access to safe havens in another state the way land borders do, they do offer the institutional benefits of internationally-recognized borders for trade and sovereign recognition.

2.3 Control variables

In order to account for other important causal forces, I include a number of non-spatial control variables, which I refer to as political controls. Many of these capture aspects of a group's organizational structure or capabilities. Politically excluded groups are more likely to be shut out from public goods (Cederman, Buhaug & Gleditsch 2013), so I code a group as excluded from political power if their political status is 'state collapse,' 'self-exclusion,' 'discriminated,' or 'powerless' according to EPR.

Lacina (2015) argues that secession is less likely in areas where the government is willing to pay high costs to defend its territory. She operationalizes this theory by assuming that governments will fight harder to defend territory occupied by the dominant ethnic group, so groups whose territory overlaps the dominant group's will be deterred from launching a secessionist campaign, and finds support for this prediction among excluded groups (Lacina 2015, 701-703). I thus include a binary variable that notes whether there is any dominant group presence in an ethnic group's territory, coded using GeoEPR.

[6] These data are described in detail in the Supplemental Information.

[7] Formally, I test for an intersection between the group's polygon and the state's polygon, buffered 1km inward to account for any potential border inaccuracies.

I also include a measure of whether a group has lost autonomy in the past five years because these groups are the most likely to start a secessionist conflict, given the combination of motivation due to lost status and capability from the experience of administering quasi-state institutions (Siroky & Cuffe 2015). Autonomy can be a driver for separatist conflict even in the absence of reversal of status by providing ethnic elites with the necessary skills for sovereign governance via regional institutions (Cornell 2002), so controlling for lost autonomy accounts for when states are most likely to invest in these groups' territories as a way of preventing secession.

Natural resources present a potential alternative mechanism behind the subnational investment decisions governments make. Governments may invest more in areas that contain high levels of natural resources to secure access to the rents they generate. To account for this possibility, I include a measure of whether an ethnic group's territory contains oil or not, using data from Lujala, Rod & Thieme (2007). While many natural resources may draw government investment to an area, oil extraction is particularly capital-intensive and requires infrastructure that generates observable night time light emissions, making it particularly well-suited to address this possibility.

I also include a number of regime-based controls to reflect the fact that groups do not make these decisions in a vacuum. Factors such as regime type, monetary resources, and military capability all influence the government's ability and willingness to inflict costs on rebels if they choose to fight for secession. To account for these effects, I include measures of polyarchy from V-Dem (Coppedge, Gerring, Lindberg, Skaaning, Teorell, Altman, Andersson, Bernhard, Fish & Glynn 2017) which captures the degree to which electoral democracy is realized in a country and GDP per capita (World Bank 2018) to proxy for overall state capacity. This last element is especially important to control for as stronger states will be better able to marshal their resources toward the goal of preventing the outbreak of violence (Malone 2020).

2.4 Model

As nightlights are a continuous outcome variable, I analyze them with linear regression. To account for unobserved unit heterogeneity, I use a model with random intercepts $\boldsymbol{\alpha}$ by country. This controls for the possibility that some countries are more likely to deploy resources in certain areas than others. While ethnic group territories are the unit of analysis, states are the actors deciding the level of investment to allocate to each territory, so accounting for this unobserved heterogeneity at the state rather than group level is appropriate. I also include random intercepts $\boldsymbol{\gamma}$ by year to account for unmodeled

temporal heterogeneity. Equations 2.1-2.6 present this model, along will all priors and hyperpriors. I employ diffuse regularizing hyperpriors on all parameters in the model to avoid overfitting the data.

$$
\begin{aligned}
Y &\sim \mathcal{N}(\boldsymbol{\alpha} + \boldsymbol{\gamma} + \mathbf{X}\boldsymbol{\beta}, \sigma^2) && (2.1)\\
\boldsymbol{\beta} &\sim \mathcal{N}(\mu_\beta, \sigma_\beta) && (2.2)\\
\boldsymbol{\alpha} &\sim \mathcal{N}(\mu_\alpha, \sigma_\alpha) && (2.3)\\
\boldsymbol{\gamma} &\sim \mathcal{N}(\mu_\gamma, \sigma_\gamma) && (2.4)\\
\mu_\alpha, \mu_\gamma, \mu_\beta &\sim \mathcal{N}(0, 5) && (2.5)\\
\sigma_\alpha, \sigma_\gamma \sigma_\beta, \sigma &\sim \text{half-Cauchy}(0, 2.5) && (2.6)
\end{aligned}
$$

The response variable is the total amount of luminosity recorded in a group's territory in a given year, which proxies the degree of investment by the central government in that territory. All predictors are lagged by one year to reduce endogeneity concerns. Due to the conditional nature of the relationship specified by the hypotheses, I interact population and borders with capital distance in the models.

3 Results

The bivariate relationships between population, capital distance, and nightlights are unsurprising. The correlation between capital distance and nightlights is -0.094, the correlation between group population and nightlights is 0.61, and the correlation between an international border and nightlights is 0.16. More people and international borders mean more state penetration, while governments are less likely to have a presence in areas far from the capital. However, a bivariate correlation does not account for unobserved heterogeneity in the data due to the dependent nature of observations across country-years. I estimate two sets of models using the data described above.[8] The first set uses population as a measure of secession risk to evaluate Hypothesis 1, while the second uses the presence of an international border to evaluate Hypothesis 2.

Table 1 presents results for Hypothesis 1. Model 2 includes geographic variables measured in each group's territory, while Model 3 includes political control variables at the group and state level. The introduction of political controls does not meaningfully

[8]Standard diagnostics indicate good convergence of the chains and are available in the Supplemental Information.

	Model 1	Model 2	Model 3
ln Population	1.14*	0.79*	0.72*
	[1.13; 1.15]	[0.73; 0.85]	[0.65; 0.78]
ln Capital Distance		−1.11*	−1.18*
		[−1.26; −0.95]	[−1.34; −1.01]
ln Population × *ln* Capital Distance		0.04*	0.05*
		[0.03; 0.05]	[0.04; 0.06]
ln Area		0.08*	0.06*
		[0.05; 0.10]	[0.03; 0.08]
Excluded			−0.09*
			[−0.15; −0.03]
Dominant Group Presence			0.18*
			[0.11; 0.25]
Lost Autonomy			0.22
			[−0.10; 0.53]
Oil			0.42*
			[0.36; 0.49]
ln GDP_{PC}			0.34*
			[0.27; 0.42]
Polyarchy			0.48*
			[0.24; 0.72]
(Constant)	−8.84*	−1.47*	−3.39*
	[−9.58; −8.13]	[−2.70; −0.36]	[−4.83; −1.95]
σ_α	1.93*	1.94*	1.47*
	[1.72; 2.18]	[1.72; 2.20]	[1.29; 1.67]
σ_γ	1.55*	1.41*	1.31*
	[1.13; 2.13]	[1.05; 1.95]	[0.96; 1.83]
WAIC	40235.86	39761.14	39464.94
5-fold RMSE	1.18	1.16	1.14
Observations	12714	12714	12714

* 0 outside 95% credible interval

Table 1: Linear models explaining nightlights as a function of ethnic group population and capital distance. The standard deviation of the country and year random intercepts are represented by σ_α and σ_γ, respectively. Continuous variables logged and standarized.

affect the estimates for the effect of capital distance and population, suggesting that they are strongly related to the level of nightlights within a territory.

Figure 3 presents the marginal effect of population on nightlights from Models 2 and 3, which is positive and increasing in capital distance. The marginal effect of population at two standard deviations above the mean of capital distance in Model 3 is 1.08, so the effect of a one unit shift in logged population represents a 6.02% shift in the outcome

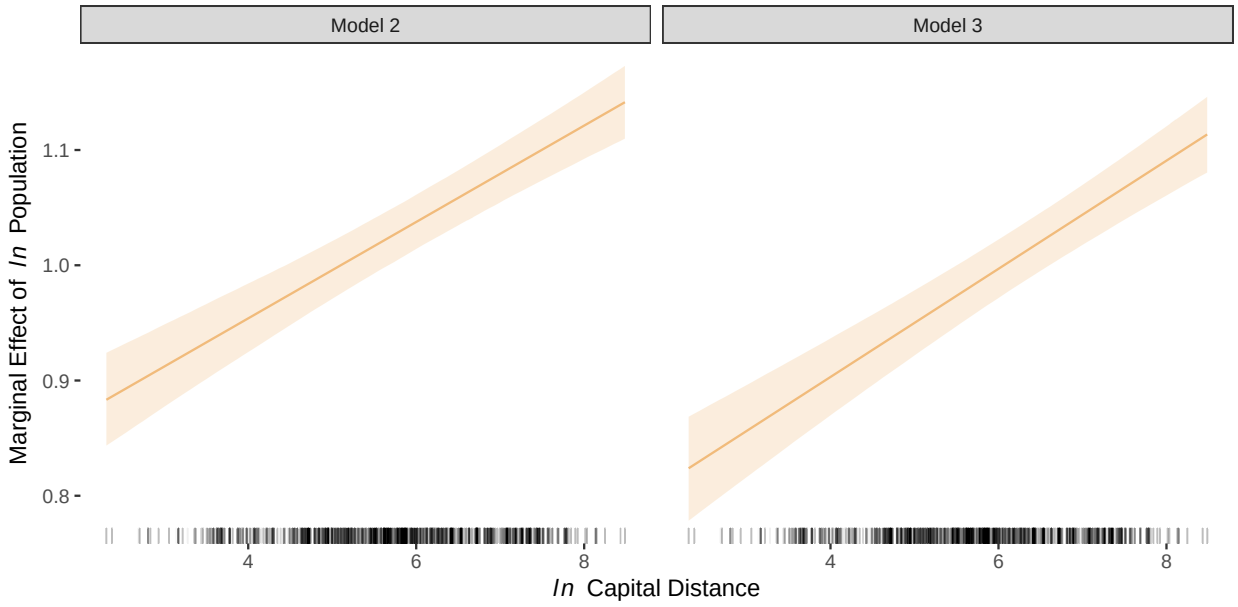


Figure 3: Marginal effects of ethnic group population on nighttime light levels, conditional on distance to the capital

variable. This effect is substantially larger than the effect of any control variables in Model 3, suggesting that the danger of separatism in a territory plays a significant role in government decisions to invest in a given area.

Table 2 presents results for Hypothesis 2. Model 5 includes geographic variables measured in each group's territory, while Model 6 includes political control variables. The introduction of political controls does not meaningfully affect the estimates for the effect of capital distance and population, suggesting that they are strongly related to the level of nightlights within a territory.

Figure 4 presents the marginal effect of international borders on nightlights for Models 5 and 6. As with population, the association between borders and nightlights is increasing in distance from the capital. In contrast, however, the relationship is negative at distances extremely close to the capital. This suggests that governments are less concerned with investing in the territories of ethnic groups who live along an international border near the centers of state power because they pose less of a secession risk than remote groups that live near a border. The marginal effect of an international border at two standard deviations above the mean of capital distance in Model 6 is 0.77, which means the presence of a border represents a 4.29% shift in the outcome variable. This effect is more positive than the effect of any control variables in Model 6.

Comparing the fit of Models 2 and 5 with Models 3 and 6 shows that the inclusion of country and group level control variables mildly improves the in-sample predictive

	Model 4	Model 5	Model 6
Border	1.21*	−0.71*	−0.98*
	[1.07; 1.35]	[−1.23; −0.18]	[−1.49; −0.47]
ln Capital Distance		−1.33*	−1.18*
		[−1.42; −1.25]	[−1.27; −1.10]
Border × *ln* Capital Distance		0.17*	0.22*
		[0.09; 0.25]	[0.15; 0.30]
ln Area		0.99*	0.80*
		[0.97; 1.00]	[0.78; 0.82]
Excluded			−0.90*
			[−0.97; −0.84]
Dominant Group Presence			0.33*
			[0.25; 0.42]
Lost Autonomy			0.57*
			[0.19; 0.95]
Oil			0.75*
			[0.67; 0.83]
ln GDP_{PC}			0.42*
			[0.32; 0.51]
Polyarchy			0.34*
			[0.05; 0.63]
(Constant)	8.83*	6.58*	3.95*
	[8.37; 9.34]	[5.89; 7.31]	[2.96; 4.98]
σ_α	2.57*	2.36*	1.85*
	[2.29; 2.93]	[2.07; 2.70]	[1.63; 2.10]
σ_γ	0.36*	0.37*	0.27*
	[0.25; 0.51]	[0.27; 0.52]	[0.19; 0.38]
WAIC	55740.98	45648.52	44469.92
5-fold RMSE	2.17	1.46	1.39
Observations	12714	12714	12714

* 0 outside 95% credible interval

Table 2: Linear models explaining nightlights as a function of ethnic group border and capital distance. The standard deviation of the country and year random intercepts are represented by σ_α and σ_γ, respectively. Continuous variables logged and standarized.

accuracy of the model measured via the Watanabe-Akaike information criteria (WAIC). WAIC is akin to AIC and BIC in likelihood based models, with lower values indicating better fit (Gelman, Hwang & Vehtari 2013). WAIC also penalizes the inclusion of extra parameters, so Models 3 and 6 better explain the data than Models 2 and 5, despite increasing the number of free parameters. However, the change in WAIC from Models 2 to 3 and 5 to 6 is smaller than the change from Models 1 to 2 and 4 to 5, suggesting that

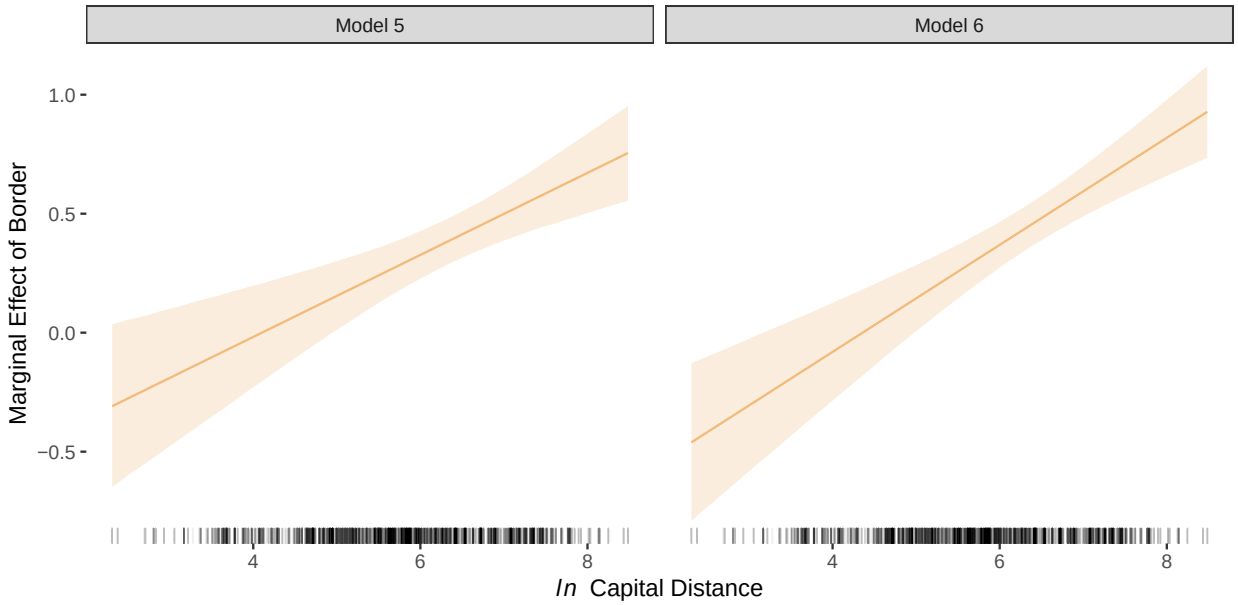


Figure 4: Marginal effects of international borders in ethnic group territory on nighttime light levels, conditional on distance to the capital

geographic factors explains more of the variation in nightlights than political ones do.

However, WAIC is a measure of in-sample fit, and we must assess out-of-sample fit as well. I perform k-fold cross-validation with $k = 5$, computing the root mean squared error (RMSE) for each fold, and present the average RMSE for all 5 folds in Tables 1 and 2. In both tables, the introduction of additional variables successively reduces RMSE. The addition of political controls in Models 3 and 6 results in a marginal reduction in RMSE, suggesting that geographic patterns drive government risk assessments to a large degree.

Exclusion's negative estimate makes sense given that excluded groups are often shut off from access to state resources. Dropping politically included groups and re-running the analysis yields substantively similar results for both hypotheses, suggesting that governments may worry about the possibility of separatism even by well-connected groups in the future. However, groups that have lost regional autonomy have a higher nightlights value, which suggests that states are investing more in those groups' territories because they are at the highest risk of secession (Siroky & Cuffe 2015). Similarly, groups whose territory overlaps the dominant group's have higher levels of nightlights, reflecting the government's interest in these regions (Lacina 2015). Oil, GDP per capita, and Polyarchy are all positive, which align with our expectations.

3.1 Robustness checks

Despite the decision to focus on population as an indicator of secession risk, the accessibility and geographic distribution of that population also impact secession risk. Widely dispersed populations increase barriers to collective action, decreasing the likelihood of conflict (Weidmann 2009). To explore the importance of population distribution, I measure the concentration of population by calculating a Gini coefficient of population within each group's territory and use it to reestimate the models in Table 1. This coefficient captures how unequally population is distributed on average, meaning that groups with a higher population Gini have more of their population concentrated in smaller geographic areas like cities. In contrast, a group with a low population Gini would feature people relatively evenly dispersed across its territory with no major population centers. The relationship is smaller than in Figure 3, but still consistently positive and increasing in distance from the capital, suggesting that the results are not simply an artifact of the choice of variable used to measure population-based secession risk.

Omitting groups with a monopoly on political power, or who dominate the political system within a country does not substantively affect the results in Tables 1 and 2. As a further robustness check, I estimate models with both wider and narrower priors. Results in both models are substantively unchanged from those in Tables 1 and 2. I also estimate a model that uses nightlights per capita as the outcome variable and distance from the capital as the explanatory variable to test whether remoteness is the only risk factor driving secession risk. If this were the case, we would expect to see a positive relationship between capital distance and nightlights per capita. However, this relationship is negative and statistically significant, which indicates that population and international borders are important risk factors for secession, and that they pose the largest risk when they are located far from the capital.[9]

3.2 Placebo test

As a final robustness check, I assess the possibility that some other factor is driving population, international borders, and state investment to co-occur as distance from the capital increases. One potential explanation for this pattern is that capital cities are densely populated, and that other major cities tend to occur near borders and far from the capital, so the sparsely populated countryside is responsible for this relationship. Both population ($\rho = -.04$) and international borders ($\rho = -0.21$) are negatively correlated with the distance from the capital to an ethnic group's territory, but the conditional nature

[9]See the Supplemental Information for these alternative specifications.

of their relationship may mask an association. To test this possibility, I conduct a placebo test by constructing two alternative datasets using different geographic units. If some third factor is responsible for the stronger association between population and nightlights and borders and nightlights at high distances from the capital, we should observe the same relationship across different units.

The first alternative dataset uses administrative units instead of ethnic group territories. Specifically, I use first-order administrative divisions. Administrative divisions are political entities that sometimes reflect ethnic settlement patterns, but often do not. They thus allow me to capture politically driven patterns of investment and test whether some other political phenomenon is responsible for the pattern observed at the ethnic group level.

The second alternative dataset uses a spatial unit of analysis that is agnostic towards sociopolitical boundaries. PRIO-GRID divides the world into 0.5×0.5 decimal degree grid cells, which correspond to approximately 50km $\times$ 50km at the equator. As grid cells are exogenous to political phenomena such as ethnic settlement patterns, decisions about the distribution of government investment, and civil war onset (Tollefsen, Strand & Buhaug 2012), this test evaluates whether some non-political factor is behind this relationship.

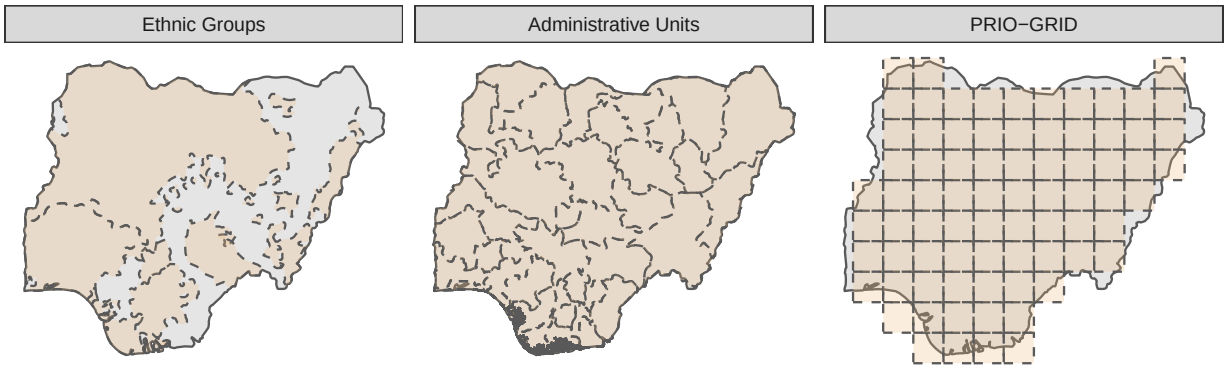
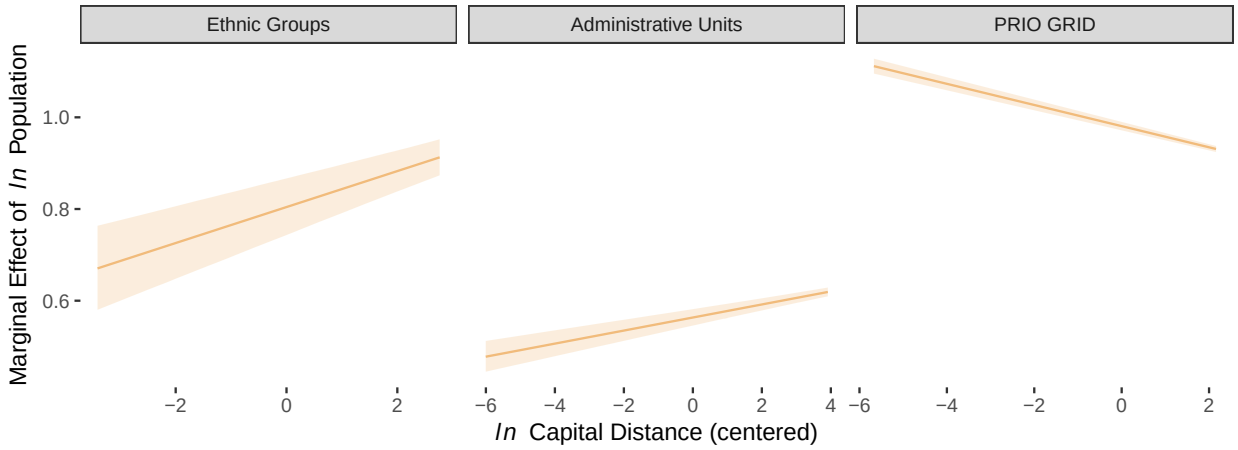


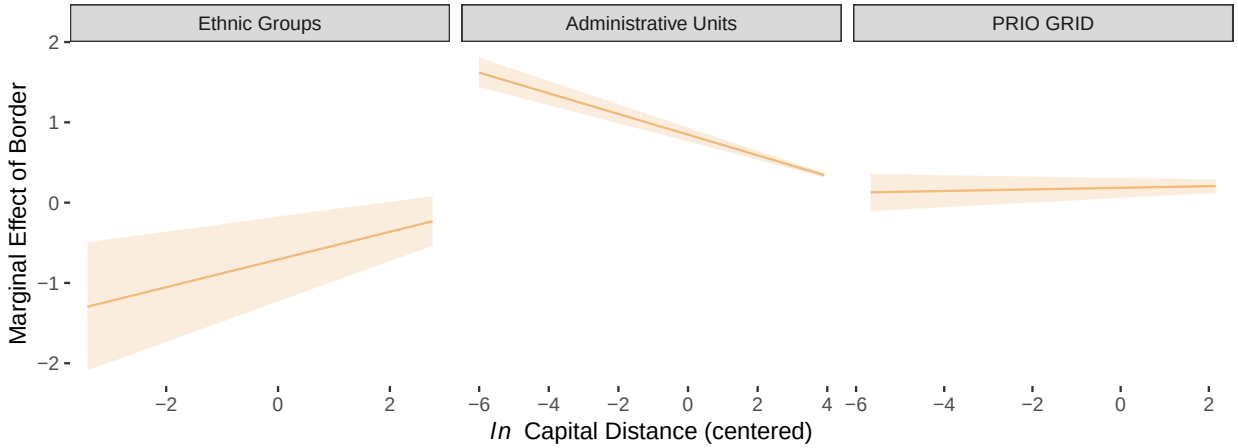
Figure 5: Spatial units used to construct data for main analyses, administrative unit placebo test, and PRIO-GRID placebo test denoted in tan

For both alternative datasets I measure population, the presence of a border, and level of nightlights in each unit for the study period, following the same procedure used to construct the dataset for the main analysis. Figure 5 illustrates the geographic units used to construct these datasets for Nigeria. Measuring capital distance can be done in the same way for administrative units as they are political entities that only exist inside the

borders of one sovereign state. For PRIO-GRID, I measure capital distance by assigning each cell to the state that covers the largest proportion of its area. I also include the area of each spatial unit as a covariate to match the specifications in Models 2 and 5. Due to the computational cost of estimating a complex Bayesian model on the PRIO-GRID dataset (375,537 observations), I mean center the continuous predictors to improve sampling efficiency. I also mean center continuous predictors in the ethnic group and administrative unit models to facilitate direct comparison between the results.



(a) Marginal effect of population on nighttime light levels, conditional on distance to the capital



(b) Marginal effect of border on nighttime light levels, conditional on distance to the capital

Figure 6: Marginal effects at the ethnic group, administrative unit, and grid cell level

The leftmost panel of Figure 6a reproduces the relationship between capital distance, population, and nightlights from Model 2 in Figure 3. While the discussion of results above has focused on Model 3, which includes sociopolitical controls, I compare the placebo test results to Model 2, as it is not possible to measure these control variables at the level of these alternative geographic units. The results change only marginally between Models 2

and 3, so this decision does not heavily affect these comparisons.

The center panel of Figure 6a displays this relationship for first-order administrative units. The effect is smaller in magnitude across the range of capital distance values, and, importantly, the slope of the line is smaller than in Model 3. This suggests that the strong positive relationship observed in Model 3 is conditional on ethnic difference, not larger political processes, as emphasized by the fact that ethnic groups in Figure 5 span multiple administrative units.

Finally, the right panel of Figure 6b displays the relationship between between capital distance, population, and nightlights measured at PRIO-GRID cells. While the substantive effect is larger than with ethnic group territories or administrative units, it has the opposite sign and decreases sharply as capital distance increases.

Figure 6b presents results for the same geographic units, but using international borders instead of population to measure secession risk. The leftmost panel replicates Model 5 in Figure 4, while the center panel uses administrative units and the rightmost uses PRIO-GRID cells. The opposite pattern holds here where the conditional relationship between secession risk (measured via international borders) and state investment is decreasing as capital distance increases for in administrative units and increasing in grid cells. Ethnic group territories are the only geographic units where the relationship between secession risk and investment is consistent across both measure of secession risk.

Given the role of ethnicity in mobilizing people for armed conflict (Cederman, Wimmer & Min 2010), it makes sense that data measured at the level of ethnic group territories exhibit a larger rate of increase in the marginal effect of population and international borders on nightlights. The inconsistent findings when data are measured at the first-order administrative unit and PRIO-GRID cell provide evidence that while concerns over ethnic secession are neither the sole nor the primary driver of decisions over where to invest, they are an important one. The relationship between secession risk and government investment is conditional on ethnic difference, which provides further evidence that this pattern is a deliberate response by states to concerns over potential separatist conflict.

4 Discussion and Conclusion

These findings highlight an important disconnect that is often overlooked in studies of space and conflict. Geography is static when compared with the dynamism of politics. While the political fortunes of ethnic groups may shift quickly, the territory they inhabit remains largely unchanged. This means that all actors involved in a conflict have relatively equal information about the geography within a country and can use this knowledge to

their benefit. Since governments can devote their considerable resources to shutting down secessionist movements in the most likely places, then the ones that do arise may originate in territory that is less suited to secession. The prominent role of oil as a cause of secession also suggests that secessionist violence is most likely when the resources at stake can contribute to discontinuous shifts in the balance of power between governments and dissidents.

Governments may strategically keep secession-prone regions underdeveloped in order to deter self-determination movements from launching wars of independence. While underdevelopment may lead to political grievances and low level violence, states make a calculated risk that it is better to keep these regions unhappy but dependent than to inadvertently give them the tools for governance and spark a secessionist conflict.

Similarly, while we know that 'sons of the soil' conflicts can drag on indeterminately we know less about why states engage in the internal colonization practices that often trigger the them (Fearon & Laitin 2011). One possibility is that they are the result of people in highly secession-prone regions chafing under military controls or responding to the influx of majority group members such monitoring efforts entail (Bhavnani & Lacina 2015). Such conflicts are not particularly costly to fight, and keeping the military close at hand ensures that dissidents do not have the space to mobilize a mass movement for secession unchallenged. As such, governments may prefer the risk of sparking a low intensity sons of the soil conflict over the possibility of losing an unexpected secessionist civil war.

Government efforts to preempt secession are often successful because territory is relatively fixed in comparison to the political processes responsible for civil conflict. While populations change as people migrate and cities grow, these changes typically occur at a glacial pace, so governments have the same information as rebel groups. Given this relative informational symmetry, governments can act preemptively to try and prevent territorial conflicts from erupting.

These preemption tactics appear to be effective on initial inspection. In a logistic regression analysis of separatist conflict onset, nightlights are negatively and statistically associated with the likelihood of separatist conflict onset while controlling for distance from the capital.[10] Further research should investigate whether the low intensity conflicts that emerge throughout the world were preceded by government preemption efforts. It is possible that without government intervention, these relatively small conflicts may have taken a much more costly path. Potential separatists do not face a binary choice between separatist violence and nonviolence, and government intervention can just as easily guide

[10]See the Supplemental Information for a full discussion of this specification and presentation of these results.

them towards other modes of violent conflict with the state.

The analyses presented in this paper are unable to disaggregate the balance of coercion and positive inducements employed by states in their efforts to preempt separatist conflict. A purely coercive strategy would entail very little in the way of infrastructure, so these results suggest that states mix carrots and sticks. Counterinsurgency tactics rely on winning 'hearts and minds' but do not shy away from using violence when deemed necessary (Kilcullen 2010). Future research should draw on this literature to identify when governments are likely to use more or less harsh tactics in their repertoires of preemption.

This mixture of coercion and cooptation can also explain the puzzle of why governments ever invest in territories of that investment might subsequently make that territory more likely to secede. Since governments are constrained to choosing between only coercion and only cooptation, they can selectively administer each approach within a territory. Targeting minority groups members for surveillance may make them more likely to turn to violence, but if member of the majority have been rewarded for living in the same area, they are more likely to resist any nascent separatist movements. Many groups' settlement areas overlap with one another, and so governments may use different tactics with different groups in the same region. While Beijing has imprisoned large numbers of Uyghurs and subjected them to pervasive monitoring, it simultaneously encourages Han Chinese to relocate to Xinjiang and provides them with employment. Investing in citizens who belong to dominant social groups but live in minority group territories may preempt secession by providing them with reasons to personally oppose separatist activity.

The ability of states to preempt potential secessionist movements in the regions where they are most likely to succeed highlights an important power asymmetry we must consider when thinking about the effect of geography on conflict. While governments and rebel groups are likely to have similar levels of knowledge about geography due to its relatively static nature, governments will be better able to exploit this knowledge due to their disproportionately larger resources. This suggests that we need to move beyond thinking about selection processes at the national level to thinking about them at the subnational level.

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