

# Dynamics of Armed Conflict Essay

Marius Swane Wishman<sup>1</sup>

<sup>1</sup>*Department of Sociology and Political Science, NTNU*

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**Abstract**

***Keywords—***

# 1 Introduction

Growing literature on pre-colonial states and civil conflict. Disagreement on the effects with regards to conflict.

This paper contributes to the literature by 1) presenting new data on independent statehood in Africa. The data covers the 1800-1914 period and maps an unprecedented number of independent states. 2) Finds that overall the presence of pre-colonial states in Africa has had a conflict inducing effect when looking at the total number of conflict related fatalities and number of state-based violence events, in the post World War 2. 3) Finds that this relationship only holds for high levels of pre-colonial state presence *some distance away from the current capital*<sup>1</sup>, while before that a negative relationship exists. This latter finding supports the theory of ‘artificial states’ that emphasises the problems associated with founding states that correspond poorly to the underlying topography of historical statehood. In areas where this correspondence is strong (areas with high state presence, close to the capital) there is a consistent negative (with varying significance) association with measures of conflict, while in areas where modern states correspond poorly with the historical topography of statehood (primarily areas with a rich history of independent statehood, on the periphery of modern states) have experienced higher levels of conflict according to my models/findings.

## 2 Theory

### 2.1 Pre-colonial states

Definitions and some none conflict findings. Discussion of the need to be aware of not only if a given theory predicts peace or conflict, but also of where this effects would take place.

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<sup>1</sup>Roughly 100km

## **2.2 Conflict reducing**

### **2.2.1 Internal monopoly of violence**

The Tilly (1990) argument, States as stationary bandits gradually remove internal competitors. Over time this reduces the number of actors within the borders of a state that are able to wield organized forms of violence, and the remaining ones' ability to do so. In the case of pre-colonial states, they are now either once again 'the' state (for example Morocco or Ashanti/Ghana), have been incorporated into a larger state as part of its apparatus, or had its institutions destroyed by some larger state (colonial or indigenous) consolidating its role as the sole stationary bandit within its borders. In other words within the former borders of a pre-colonial state there should be a reduced number of potential wielders of organized violence (*ceteris paribus*) depending on the pre-colonial states centralization/consolidation, itself a product of time, reforms/political organization/idiosyncrasies and the proximity to its capital. If the pre-colonial state was incorporated only partially into the modern state, it could still pose a threat to the central state through desertion (more on this later). If the pre-colonial state was destroyed, for example by colonizers, without new state (colonial or post-colonial) entering the resulting power vacuum other actors would do so, and become new stationary bandits rivalling the state. How does this compare to other areas not formally part of a pre-colonial state? These areas could inhabit roving bandits (Scott 2009) or other actors already having filled an equivalent vacuum of power. In other words, in this scenario pre-colonial state areas should be no worse than other areas in terms of violence. Any resulting conflict running through this mechanism should occur shortly after decolonization.

### **2.2.2 Better Angles**

Pinker (2012) builds an argument from cognitive science affective and cognitive neuroscience, social and evolutionary psychology, that humans are capable of producing a lot of violence, but also show a lot of restraint and compassion. It all depends on the structures surrounding us, and how we are socialised. He seeks

to explain the extraordinary levels of violence<sup>2</sup> evident in the historical and archaeological record, and its decline to modern levels. Of relevance here, Pinker (2012) identifies five ‘trends’ and five ‘historical forces’ (as well as nine aspects of our psychology, five promoting violence and four inhibiting it), that he uses explain the observed decline in violence. The two first trends are the invention of agriculture, the first cities and *governments*. Early states ‘pacified’ their population following the logic of Hobbes Leviathan. Leading to an estimated fivefold reduction in likelihood of dying a violent death. Second, the consolidation of large *kingdoms with centralized authority* and an infrastructure of commerce engaged their citizens in a ‘civilizing process’, whereby people were able to think and plan more long term. This promoted acting more rational (as *homo economicus*) and inhibit impulsiveness to engage in ever more positive sum games, leading to further reductions in violence at individual, regional and country level. Again, the state (and increasing commerce in this case) are the exogenous factor that sets the virtuous cycle in motion. In addition, as polities become fewer and larger there is a reduction in the number of actors that can engage in large scale/organized violence, leading to fewer albeit bloodier conflicts. Nevertheless, the over all negative trend of violent death continues. Partly as a result in the reduction in conflicts outweigh their increased lethality, but partly also because of the reduction of violence within polities. Citing Richardson (1960) Pinker (2012) states that when area is held constant, there are far fewer civil wars within borders than there are interstate wars crossing them. Pinker (2012) also reiterates Tilly and Hobbes logic that “As small baronies and duchies coalesced into larger kingdoms, the centralized authorities prevented them from warring with each other for the same reason that they prevented individual citizens from warring with each other (and that farmers prevent their livestock from killing each other): as far as an overlord is concerned, private quarrels within his domain are a dead loss.”

Of the ‘historical forces’, the first is the ‘*Leviathan*’; “a state and judiciary with a monopoly on the legitimate use of force, can defuse the temptation of exploitative attack, inhibit the impulse for revenge and circumvent the self-serving biases

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<sup>2</sup>Pinker (2012) examines a number of forms of violence, both organized, unorganized, interpersonal, state based, international and intra-national.

that make all parties believe they are on the side of the angels.” (Pinker 2012, xxvi). Pinker (2012) goes as far as concluding that the Leviathan “may be the most consistent violence-reducer that we have encountered in this book.” (Pinker 2012, 680). The contribution of Pinker (2012) is the synthesis of political and social science theories with psychology. Critically, he shows that the self-control and aggression reducing effects of the Leviathan can become habits so that citizens refrain from violence “Even when Leviathan’s back is turned.” (Pinker 2012, 681). In Pinker (2012)’s eyes then, states, and the evolution of states have played a big role in the historic decline of violence through shaping the environment of its citizens to be more inductive to peace. If Pinker is right in thinking that the formation and growth/expansion of states puts societies on a track toward more peaceful societies, then areas with *longer* and *deeper* histories of statehood should exhibit the effects of this, even after 150-200 years. Working through the mechanisms of the interplay between Leviathan and ‘gentle commerce’, internalising or habitualising and perhaps institutional inheritance (governance evolves so that areas that had some governance in the past have better governance today).

### 2.2.3 Conflict resolving institutions

Wig (2016) argues that ethnic groups with ties to pre-colonial statehood are more likely to have inherited institutions that allow the ethnic group to punish defections and hold their leaders accountable. In this way, ethnic groups with ties to pre-colonial statehood are better able to make credible commitments, than ‘non-state’ ethnic groups. Credible commitments help such groups both prevent conflict from occurring in the first place, but also make them better able to end conflicts when then they have broken out. Empirically Wig (2016) finds that groups with histories of statehood do indeed experience less dyadic conflict with their government. Depetris-Chauvin (2016) makes a similar argument and finds that regions with exposure to pre-colonial statehood are more peaceful, *ceteris paribus*.

Inherited pre-colonial institutions could also provide specialised conflict resolution institutions that allow local conflicts to deescalate, be resolved before escalating to violence or channeled into non-violent processes of redress. \*\*\* Need examples \*\*\*

#### 2.2.4 Hypotheses

If one assumes that pre-colonial state presence is positively correlated with post-independence state presence, then both the leviathan/pacifying (Tilly (1990) and Pinker (2012)) and civilising (Pinker 2012) mechanisms predict less violence in high state presence areas. Similarly higher levels of pre-colonial state presence should increase the presence of conflict resolving institutions or at least 'traditional leaders' how are better able to make credible commitments. Thus, Wig (2016) and Depetris-Chauvin (2016) also indicate the following hypothesis.

H1: Grid cells with higher levels of state presence, experience less civil conflict (fatalities and onsets).<sup>3</sup>

Leviathan x gentile commerce. *proxied* by higher levels of development in areas of higher state presence. Predicts lower levels of violence in areas of higher state presence, working *through* development. This could be tested using mediation analysis.

H1.1: Grid cells with higher levels of state presence, experience less civil conflict mediated by higher levels of economic development.

Habitation/internalisation predicts lower levels of violence in higher state presence areas *contingent* on *continuation* of state presence, as this is quickly 'unlearned'. In Africa this is almost exclusively central (historical) Ethiopia and perhaps parts of South Africa depending on the definition of continuation. However, a global sample would be interesting and perhaps contribute new insights to the argument that colonialism caused much of the woes and conflicts in the non-western world.

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<sup>3</sup>An interesting follow up, which would be true to Pinker's hypothesis would be to test against violent crime and homicides rates as well. For now at least that falls outside the scope of this paper, and as far as I am aware there is limited geo-coded data available on this for Africa.

## **2.3 Conflict inducing**

## **2.4 Symbols of past sovereignty**

Following the innovation and spread of nationalism as an ideology, past independence and glory (real or imagined) became an important ingredient in any struggle for national independence. And as the current international system of inviolable international boundaries between formally equally sovereign states took shape following the World Wars, past violations of sovereignty added further to the potential of past states to provide the basis for ethnic claim making (Ahram 2019, Shelef 2016).

Beyond formal claims to the right to self determination past states can provide symbols that conflict entrepreneurs can use to overcome collective action problems and mobilise for conflict. In recent years a number of Islamic groups in North and West Africa have referred to various 1800s Islamic states either as a namesake, such as the Macina Liberation Front, or stated inspiration in the case of the Movement for Oneness and Jihad in West Africa (MUJWA) and the Vanguard for the Protection of Muslims in Black Africa (Ansaru), who seek or claim to revive the jihads of the Tokolor and Sokoto Empires respectively (Zenn 2015). However, the phenomenon is clearly not limited to Islamist groups. For example, the Cyraneica Liberation Army refers to a short lived kingdom in Eastern Libya, and elected a descendent of the former king as their leader (Ahram 2019). Further examples include the various Afrikaaner groups aiming to reestablish the Boer Republics in South Africa.

## **2.5 Networks useful for insurgency**

In addition to symbols, pre-colonial states can leave behind formal and informal social networks that lower the cost of insurgent collective action (Wig 2016, Wood 2000). The most visible examples of this are cases in which kingdoms were ruled indirectly and remained intact into the modern era. Examples include: Buganda, a relatively centralised kingdom in Uganda that led a brief and unsuccessful rebellion against the Obote regime (Tuck & Rowe 2005), the Mwati of the pre-colonial-come-traditional kingdom Lunda-Yeke in the Democratic Republic of Congo attempted

the secession of the Katanga region following the independence of Zaire, and the sultan of Aussa (Awsa) violently resisted the Ethiopian Dirge regimes attempt to depose him. While his Afar (ethnic group) Liberation Front did not achieve independence, the institution of the sultanate survived to this day (Shehim 1985, Hanfare 2011).

Other kingdoms were formally disbanded, but nevertheless were able to retain regional elite networks, as exemplified by the aforementioned Al Senussi dynasty/clan/tribe in Cyreneica who mobilised on a mix of resentment among the population that they had received an unfair share of Libya's oil wealth (largely stemming from wells in the region), the increasing frustration with the Tripoli government following the toppling of Muammar Gaddafi and allegedly elites who had prospered under the former monarchy (Fetouri 2012).

The longer and stronger the recent history of independent statehood, the stronger the symbolic value and legal claims based on that history would be. Equally, the more likely networks (formal or informal) are to have survived. If these factors are indeed conflict inducing, then the following hypothesis should be true:

H2: Grid cells with higher pre-colonial state presence experience higher levels of civil conflict.

### **2.5.1 Central State Weakness/Collapse**

When modern states 'collapse' or in another sense achieve 'failed state' status, it creates a (series of) power vacuums and room/need for other actors to fill the various roles usually filled by the state. At the regional level one can imagine a handful of actors capable of filling this vacuum (of power and service provision), one of which is pre-colonial state. Other candidates could be active rebel groups, religious organizations and ethnic groups (not tied to pre-colonial states). I would argue that pre-colonial states and active rebel groups have distinct advantages above the others. Prime mover advantage and capacity to monopolise violence on part of rebel groups, and legitimacy and organizational benefits on the part of pre-colonial states.

The dynamics of this lie in how state collapse unfolds and 'evolves'. Although



I am not sure if I will be able to test or properly examine this process I will nevertheless sketch out how I imagine it (typically) unfolds.

Democratic collapse, succession/reform crises, state predation and/or civil war are usually on the path toward state failure (Goldstone 2008). Once a state has failed, lost its legitimacy and effectiveness (Goldstone 2008), other actors will attempt to fill the void. This happens at all levels of government I imagine, but most visibly at the country (repeated coups, attempts to overthrow the government) and regional level (various forms of regional self governance). I will focus on pre-colonial states reemerging as a basis of regional self governance (RSG) and the dynamics of it. If or when a pre-colonial state, through either ethnic group, formal institutions or less formal networks, begins to engage in RSG it sets out on a path that will at some point clash with the interests of the central government. Because of its position as a pre-colonial *state* it is inevitably a challenge to the integrity of the state as a whole. This creates a potential for further conflict, along new lines, in often war torn countries.

A different aspect of pre-colonial states engaging in RSG is that they can create pockets of relatively functioning government within otherwise failed states. I believe this can at least be tentatively explored on few case-by-case basis using the data I have available. Do areas of high state presence (see data section) outside the capital, experience a drop in combat events after engaging in RSG.

The example I primarily had in mind is Puntland in Somaila, which corresponds to the pre-colonial state of the Majarteen sultanate, has engaged in RSG as an autonomous state within Somailas federal system. In terms of both peace and prosperity the region has fared better than the rest of Somalia. Unlike Somaliland the state is not seeking full independence. However, they do have their own military force and tensions could rise if the central government were to attempt further integration.

Other potential cases in Africa (see data) include Chad, Nigeria, DRC, Sudan/Darfur and Lebanon.

Consider the illustrative case of the Russian federal state of Tatarstan. The Tatar Khanate of Kazan was conquered by Ivan the Terrible in 1552 and incorporated into the Russian empire as Kazan province by Peter the Great in 1708

(Sharifzhanov 2007). Despite Russification policies until the reign of Cathrine II the Great (1762-96), when the Russian Empire collapsed following the February revolution of 1917 Tatar nationalist seized the moment and declared the creation Idel-Ural state (Devlet 1993). The nascent state laid claim to boundaries closely resembling those of the old Khanate (Hartley 2020), but the Bolsheviks and the Red Army were able to thwart the secession after a month (Hartley 2020). While the Tatars of Kazan no doubt were able to retained their dreams of independence in large part to the ethnic and religious differences between themselves and their rulers, it is striking that the proposed borders follow those of the old Khanate and not of settlement patterns of the Tatar ethnic group who were spread over a larger territory as part of the Russification policy of the Tsars. Part of the movements goals was also the also to allow Tatars émigré populations to return to their homeland (Devlet 1993). When in turn the Soviet Union began to open up and collapse in 1990-1991, the space once again opened up for the Tatars to reassert their sovereignty. Following the example of Moscow and Russia the Tatar Autonomous Soviet Socialist Republic declared itself a sovereign republic within the USSR, which it attained in a declaration adopted by the Supreme Soviet. Thus on 12 June 1991 Russia acquired two presidents, Boris Yeltsin and Mintimir Sheymiev (Sharifzhanov 2007). A referendum was set for 21 March 1992 on the question of Tatarstan's independence. Authorities in Moscow tried to prevent the referendum through the Constitutional Court of Russia and televised appeal by Yeltsin to boycott the referendum, warning that an affirmative response "would possibly lead to bloodshed." (Sharifzhanov 2007). Nevertheless, the referendum went ahead in the presence of international observers and boasted a turnout 82 percent of which 61.4 percent voted for independence (Devlet 1993). Following the referendum a new constitution was drafted confirming Tatarstan's sovereignty. "The Republic of Tatarstan shall be a sovereign state, a subject of international law, associated to the Russian Federation - Russia - on the basis of the Treaty on Mutual Delegation of Powers and Subjects under Jurisdiction." Sharifzhanov (2007). Unlike Chechen leaders the Tatar leaders did not threaten use violent resistance to secede from Russia, and through negotiations with the Yeltsin government they were able to carve out a unique position of autonomy within the Russian Federation in 1994.

The different positions on the use of violence between the Chechens and Tatars I believe is due to the feasibility of armed resistance to even a greatly weakened Russian state based on geographic conditions. Chechnya is on the very edge of the Russian periphery and is a mountainous country. Tatarstan on the other hand lies relatively close to Moscow, and its steppe terrain lends an advantage to modern national armies. In the words of the Chairman of the Tatarstan parliament: “We take a completely *realistic* view of the state of affairs: full independence is too abstract and unnecessary a concept whereas Tatarstan and Russia are linked by inseparable bonds.” (Sharifzhanov 2007)(emphasis added). At the same time parallels were still drawn all the way back to the Kazan Khanate. During a speech at the first World Congress of Tatars the Tatarstan president Mintimir Sheymiev declared that:

*The history of the Tatars nation is very difficult and tragic. The Tatars lost their Bulgar state, but found a respectable place for themselves within the Golden Horde. After its collapse they created the khanates of Kazan [...] the restoration of statehood was an idea ever present in Tatar history.* (cited in Mustafin & Khasanov (1995), 113).

H2.1: Grid cells with higher state presence experience higher levels of civil conflict following state collapse.

Currently not testing this hypothesis for a lack of a good measure of state collapse. Of course, this is not insurmountable, but I am not sure if it falls outside the scope of this paper. Perhaps this is best proxied by resent decolonisation/independence in the African context, which is somewhat testable by running the models of sub-samples of years. Specifically compare 1946-69 (or so) to other subsets of years. Perhaps split by decades. This would of course be an instance of state weakness more than collapse (unless you count it as the collapse of the colonial regime, in which case it is apt).

### 2.5.2 Political Inequality

In countries where an ethnic group has a history of statecraft, said group is likely to be have an over sized share of power in government. This can come about through indirect colonial rule, which preferred to leave existing power structures intact, or

by seizure from less politically experienced groups following independence (Paine 2019). Paine (2019) argues that such state groups are likely to either exclude other groups from power, leaving them with few options outside violence to achieve political representation. Or, in the cases where state groups are excluded themselves, they have the means to organize and solve the necessary collective action problems and will reclaim their dominating position by force (Paine 2019). In case of fighting then, it would happen in the area of the state group only in the cases where that group was excluded from power. However, using our more fine grained data it is apparent that this is far more common than Paine (2019) supposes.

In Paine (2019)’s data there are no instances of multiple state groups in one country, and so he does not account for this in his theory. However, in our more exhaustive data this occurs in several countries. Following Paine (2019)’s logic however, it would be expected that only one of the groups were handed (or grabbed) the keys to the kingdom following independence, and that other state group(s) would be relatively more likely to challenge any attempts at exclusion. As this is a continuation of Paine (2019)’s original mechanism, this would also be best proxied by high levels of state presence far from the capital predicting higher levels of violence.

TODO: where does this predict conflict, and how to best test it.

### **2.5.3 Resistance to western influence**

An interesting hypothesis proposed by Wishman & Butcher (Forthcoming) builds on the finding that where European colonizers met organized/powerful states (often Muslim), they more often either took longer to colonise them or not at all, if/when they did they were integrated more indirectly (Gerring et al. 2011, Hariri 2012, Englebert 2000). This left these areas more isolated from western influences, particularly that of protestant missionaries (Woodberry 2012). If so, areas of higher states presence should have been exposed to less western influences such as humanism, ‘the escalator of reason’ (Pinker 2012) and democracy (Woodberry 2012, Hariri 2012), leading to less democratic and peaceful outcomes in the post-colonial period (Hegre & Sambanis 2006)

H2.2 Grid cells with higher levels of state presence, experience more civil conflict mediated by lower levels of support for humanist ideas, liberal values or democracy.

Currently not testing due to lack of data.

## 2.6 Conflict regulating

Both sides to the existing literature could be right if there is some intervening variable that causes state presence to be conflict inducing in one instance and conflict reducing in another instance. I propose/present two candidates for such an intervening variable.

### 2.6.1 Artificial states

Within the literature there are a number of conceptualisation and definitions of ‘artificial states’ or states whose borders are more or less ‘artificial’ (Alesina et al. 2011, Clapham 1996, Englebert et al. 2002, Herbst 2014). The underlying principle, I argue, is the degree to which current states conform to the pre-existing topography of historical statehood (which is itself a product of geography and the military/political reach of political entities). The measure of pre-colonial state presence presented below captures this better than existing measures (such as the straightness of boundaries (Alesina et al. 2011) or the variance in pre-colonial ethnic centralisation (Englebert et al. 2002)). The only caveat is that it does not distinguish between the presence of for example the pre-colonial Tunisian state, who the current country of Tunisia corresponds very well with, or the kingdom of Darfur, who does not correspond to any current country. To illustrate how the pre-colonial state presence can measure state artifice, take the case of Ethiopia. Ethiopia contains a clear continuation of the pre-colonial (in terms of time period) Empire of Ethiopia, but it also contains a number of other pre-colonial states (conquered by the Ethiopian Empire in the period cover in our data). In this example high levels of state presence would most often reflect a strong presence of the Ethiopian state and thus, for as long as its still inside the boundary of modern day Ethiopia, it would indicate low state artifice (or natural borders). However,

The further away from the capital one would go the less likely and the less strong is this presence, and equally the more artificial it is if this is part of Ethiopia today. Additionally, if one is far from the capital and yet there are high levels of state presence, it most likely represents the presence of one of the kingdoms most recently incorporated into the Ethiopian Empire (such as the aforementioned sultanate of Aussa). In this area high values would also indicate a poor conformity to the existing history of statehood, and thus be more artificial. Likewise, areas of little to no pre-colonial state presence close to its current capital would indicate a state built without any precedent or on top of colonial institution, and thus also be more artificial. The literature suggest that artificial states experience more conflict (Alesina et al. 2011, Englebert et al. 2002), which implies the following hypotheses:

H3: The relationship between grid cell level levels of state presence and civil conflict is modified by the grid cell's distance to the current capital (as measured by an interaction term).

H3.1: Grid cells with higher levels of state presence, further from the current capital experience higher levels of civil conflict.

H3.2: Grid cells with higher levels of state presence, closer to the current capital experience lower levels of civil conflict.

### **2.6.2 Multiple pre-colonial states**

It could be true as that pre-colonial states are individually (or dyadically) conflict reducing (Pinker 2012, Wig 2016), but as the number of groups with ties to pre-colonial states increase this positive (normatively speaking) relationship breaks down due to increased complexity of bargaining (Walter 2009) and altered incentives for the state to punish (rather than accommodate) early groups who (try or threaten to) assert autonomy in order to dissuade others from doing the same. This is one of the arguments of Wishman & Butcher (Forthcoming), but has only been tested at a country level (albeit on a global sample), but found that countries that were hosts to more historical state entities (pre-colonial states in this paper), experienced more civil conflict in the post World War 2 period. If the observed correlation is due to any of the mechanisms that the authors outline, then

there should be an equivalent correlation between areas of high state presence in countries with multiple pre-colonial states.

H4: The relationship between grid cell level levels of state presence and civil conflict is modified by the number of unique pre-colonial states in the country dominating the grid cell (as measured by an interaction term).

H4.1: Grid cells with higher levels of state presence, in grid cells of a country that hosts more unique pre-colonial states experience higher levels of civil conflict.

H4.1: Grid cells with higher levels of state presence, in grid cells of a country that hosts only one unique pre-colonial state experience lower levels of civil conflict.

### 3 The Geo-ISD

The main independent variable is a measure of what I call ‘state presence’ per PRIO grid cell. It is a measure of the aggregate presence of independent pre-colonial states in the period 1800-1914. The data comes from the Geo-ISD project where Charles Butcher (NTNU), myself and our excellent research assistant Eirin Haugseth geocoded African states from the International Systems Data (hereafter ISD) (Griffiths & Butcher 2013)

To get the locations of different pre-colonial states we used a combination of maps from the time period and maps found in historical atlases compiled by modern historians that were covered by the ISD. The historically contemporary maps were collected from the David Rumsey project at davidrumsey.com. We then georeferenced the maps and traced polygons for the states included in both the map and the ISD. Similarly the historical atlases were scanned, georeferenced and relevant state entities were traced.

In the end we were left with over 3400 polygons covering the period 1800 to 1914 for continental Africa and Madagascar. For some pre-colonial states in the ISD there were no maps for any years, some are covered only for some of the years they are in the ISD, but a substantial number of them are covered by multiple maps for many years. When maps disagreed on where the various borders were in a given year, we take it as an indication of the ambiguity of where a given state had *de facto* or *de jure* control in that year. In the areas where all the maps

agree we could be quite sure that the given state entity had real presence. While in areas where only one map indicated that the state was presence, this could either be wrong, an indication of *de jure* as opposed to *de facto* presence or some other form of limited presence. The coding process of looking at hundreds of maps strengthened this initial intuition, and the resulting figures of state presence drawn from the complete data lends it further credence. On aggregate most maps should agree on the core areas of a state while the further away from the core fewer maps would consider the area part of the state. We believe this approximates the real ambiguities surrounding where states governed and where they did not, resulting in a measure of state presence in a given area. Figure 1 is an overlay of all the map polygons of Libya, Tunisia and Egypt. It demonstrates how the authority of these states faded into the desert, partially overlap at the borders, and in the Libyan case, its tenuous hold on the Fezzan region. Although to a lesser degree, one can also see that Libya as a whole spent fewer years as an independent state than its neighbours in the region.

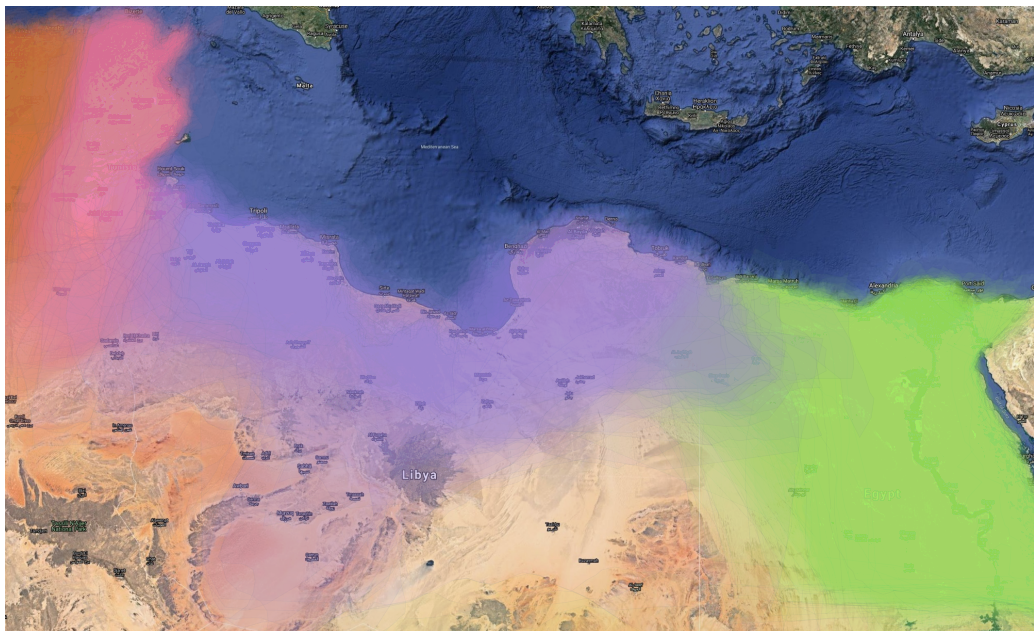


Figure 1: Overlay of all map polygons of Tunisia, Libya and Egypt

The data from this project can be aggregated and used in many ways and to



produce many variables. All of these indicators are aggregated over all years for individual PRIO-GRID cells in Africa. The primary indicator used in this essay is a measure of the presence of one state over time. It is measured by the number of maps that indicate that a state was present there, counting only those of the state most often present in that cell. Figure 3 shows the log transformation (to lessen the visual impact of large variations in the number of maps for different states) of this measure for all African PRIO grid cells.

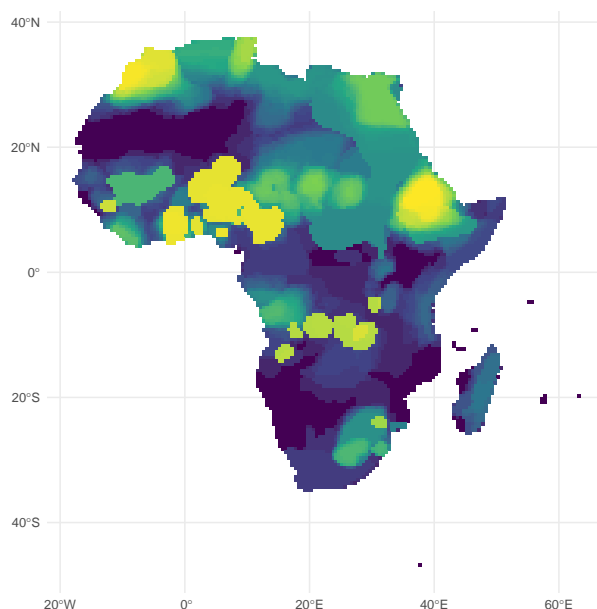


Figure 2: State presence (sqrt transformed) with interpolated years based on historical atlases.

## 4 Research design

### 4.1 Dependent variable

The unit of analysis are PRIO grid cells, which are one degree by one degree cells (Tollefsen et al. 2012). Accordingly, the dependent variables are fatalities - square root transformed, logged or untransformed, and state based conflict events - square

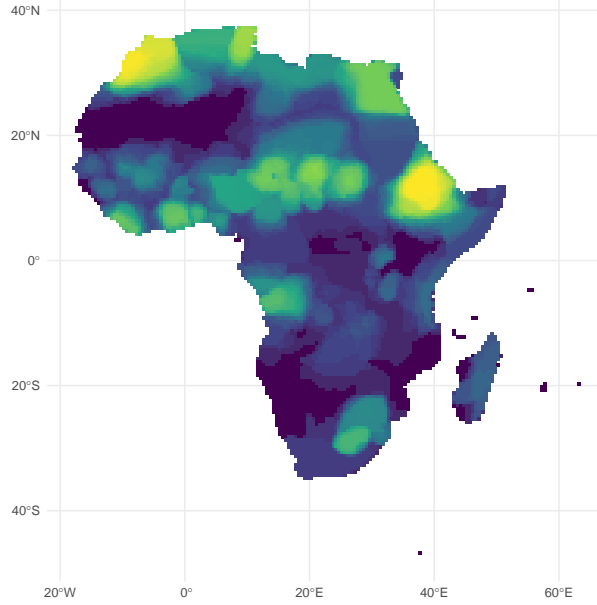


Figure 3: State presence (sqrt transformed)

root transformed, logged or untransformed) per grid cell in the period 1946-2018  
 \*\*\* Check end date \*\*\*. In other words these are cross sectional count data. The data are from the GED project (Sundberg & Melander 2013).

## 4.2 Independent variable

The main explanatory variable is the per grid cell sum of state presence - square root transformed or logged depending on the model. For the main model I use measure of state presence from the Geo-ISD that counts all maps that intersect a given grid cell, even if multiple maps do so in a single year, but only for the state that has the most presence overall in that grid cell. This measure has the benefit of including more data, which allows for the approximation of relative degrees of state presence by one state in any year, as described in the data section above. At the same time it avoids over counting state presence where there were overlaps in sovereignty or changes in who controlled the territory. As a robustness check I also ran models using the measure that counts if there was any state presence in

a grid-cell-year. In other words, it is more so a measure of the maximum *extent* of state presence, and is less accurate in terms of depth. Again counting only the presence of the most present state for each grid cell.

\*\*\* DISCLAIMER - the models reported in the results use this last measure. However, models using the main measure are very similar. \*\*\*

### 4.3 Controls

Mountains help in early state formation by providing protection and limiting the exit options of sedentary farmers (Carneiro 1988). Water is essential for state formation. States typically formed either as coastal cities, close to navigable rivers or by the shores of great lakes. People still tend to live next to a source of water, thus this acts as a proxy for population density, and fighting usually happens where there are people. Water could also be related to the conflict measures more directly by being a non divisible resource to fight for control over.

Distance to coast

Population density and barren

Temperature, precipitation and forest (remove).

### 4.4 Alternative measures

### 4.5 Modelling

Negative binomial models

Zero inflated negative binomial is probably a good idea. Zeros could be true zeros - there were no fatalities or state based conflict events in the grid cell during the period, or zeros could be measurement error, most likely resulting from lack of reporting.

Interaction models

Controlling for spatial interdependence.

## 5 Preliminary results

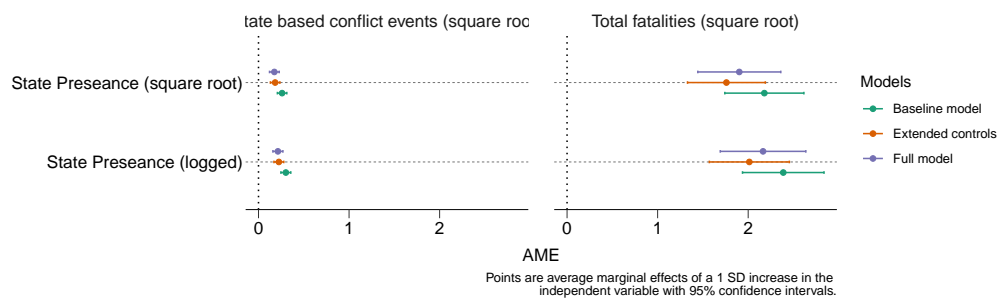


Figure 4

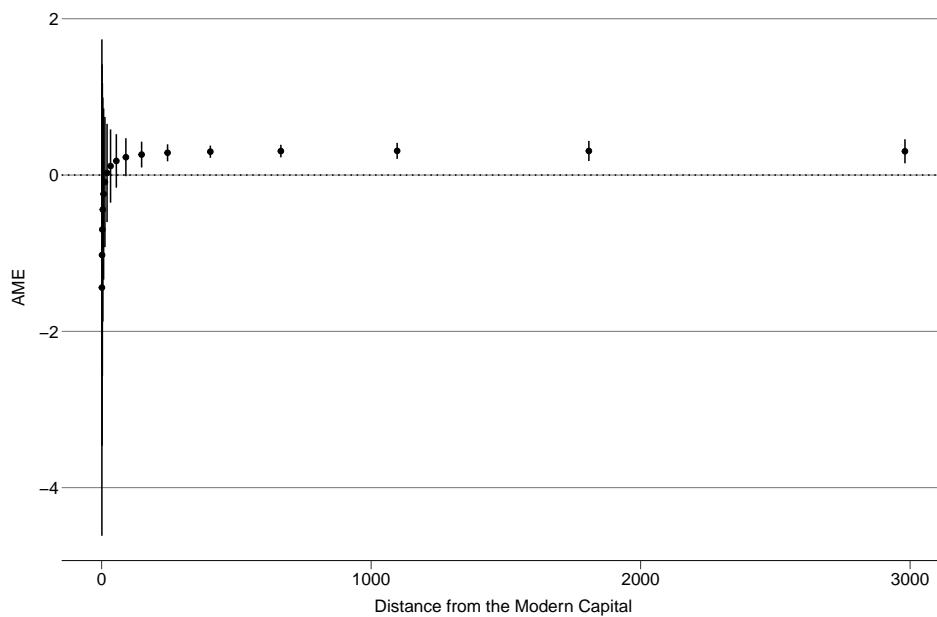


Figure 5

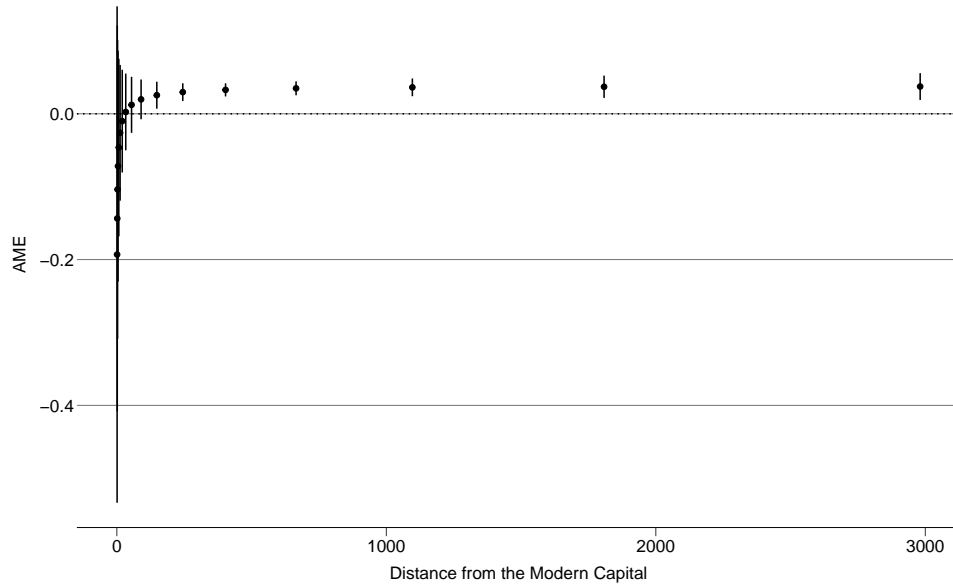


Figure 6

## 6 Conclusion

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## Appendix

	Baseline	Extended Controls	Full Model	Baseline	Extended Controls	Full Model
(Intercept)	0.50*** (0.08)	-0.23** (0.09)	-3.02*** (0.26)	0.31*** (0.09)	-0.40*** (0.09)	-3.26*** (0.26)
sqrtSpAny	0.11*** (0.01)	0.08*** (0.01)	0.09*** (0.01)			
mountains_mean	1.10*** (0.13)	0.62*** (0.12)	1.03*** (0.13)	1.13*** (0.13)	0.66*** (0.12)	1.08*** (0.13)
water_gc	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
barren_gc	-0.02*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.02*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
distcoast	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
logPopd		0.77*** (0.05)	0.83*** (0.05)		0.77*** (0.05)	0.83*** (0.05)
temp_sd			0.84*** (0.10)			0.81*** (0.10)
temp			0.06*** (0.01)			0.06*** (0.01)
prec_sd			0.01 (0.00)			0.01* (0.00)
prec_gpcc			0.00 (0.00)			0.00 (0.00)
forest_gc			0.00 (0.00)			0.00 (0.00)
logSpAny				0.25*** (0.02)	0.20*** (0.02)	0.21*** (0.02)
AIC	29551.90	29272.50	29042.38	29530.66	29250.65	29019.86
BIC	29602.71	29330.56	29136.69	29581.47	29308.71	29114.18
Log Likelihood	-14768.95	-14628.25	-14508.19	-14758.33	-14617.33	-14496.93
Deviance	5709.62	5757.30	5778.43	5713.03	5759.00	5778.60
Num. obs.	10492	10482	10453	10492	10482	10453

\*\*\* $p < 0.001$ ; \*\* $p < 0.01$ ; \* $p < 0.05$ ;  $p < 0.1$

Table 1: Deaths (square root)

	Baseline	Extetended Controls	Full Model	Baseline	Extetended Controls	Full Model
(Intercept)	-1.07*** (0.07)	-1.65*** (0.08)	-4.41*** (0.24)	-1.26*** (0.08)	-1.80*** (0.09)	-4.55*** (0.24)
sqrtSpAny	0.09*** (0.01)	0.06*** (0.01)	0.06*** (0.01)			
mountains_mean	0.57*** (0.11)	0.13 (0.11)	0.63*** (0.12)	0.59*** (0.11)	0.15 (0.11)	0.64*** (0.12)
water_gc	0.01*** (0.00)	0.00 (0.00)	0.01** (0.00)	0.01*** (0.00)	0.00 (0.00)	0.01** (0.00)
barren_gc	-0.02*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.02*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
distcoast	-0.00 (0.00)	0.00 (0.00)	0.00* (0.00)	0.00 (0.00)	0.00 (0.00)	0.00* (0.00)
logPopd		0.68*** (0.04)	0.79*** (0.04)		0.66*** (0.04)	0.78*** (0.04)
temp_sd			0.93*** (0.08)			0.92*** (0.08)
temp			0.06*** (0.01)			0.06*** (0.01)
prec_sd			0.01** (0.00)			0.01** (0.00)
prec_gpcc			-0.00 (0.00)			-0.00 (0.00)
forest_gc			0.00 (0.00)			0.00 (0.00)
logSpAny				0.23*** (0.02)	0.16*** (0.02)	0.15*** (0.02)
AIC	15438.32	15145.27	14813.26	15407.16	15123.40	14793.76
BIC	15489.13	15203.33	14907.57	15457.97	15181.46	14888.07
Log Likelihood	-7712.16	-7564.64	-7393.63	-7696.58	-7553.70	-7383.88
Deviance	4780.92	4838.63	4909.97	4796.23	4845.88	4914.13
Num. obs.	10492	10482	10453	10492	10482	10453

\*\*\* $p < 0.001$ ; \*\* $p < 0.01$ ; \* $p < 0.05$ ;  $p < 0.1$

Table 2: State based conflict events (square root)

	Baseline	Extetended Controls	Full Model
(Intercept)	2.92*** (0.47)	2.18*** (0.46)	-0.73 (0.54)
sqrtSpAny	-0.08 (0.08)	-0.40*** (0.08)	-0.32*** (0.08)
logCapdist	-0.40*** (0.07)	-0.39*** (0.07)	-0.35*** (0.07)
mountains_mean	1.05*** (0.13)	0.66*** (0.12)	1.04*** (0.13)
water_gc	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
barren_gc	-0.02*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
distcoast	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
sqrtSpAny:logCapdist	0.03* (0.01)	0.08*** (0.01)	0.06*** (0.01)
logPopd		0.81*** (0.05)	0.84*** (0.05)
temp_sd			0.84*** (0.10)
temp			0.06*** (0.01)
prec_sd			0.00 (0.00)
prec_gpcc			0.00* (0.00)
forest_gc			0.00 (0.00)
AIC	29506.64	29244.49	29021.37
BIC	29571.96	29317.06	29130.19
Log Likelihood	-14744.32	-14612.24	-14495.69
Deviance	5715.60	5761.58	5780.71
Num. obs.	10492	10482	10453

\*\*\* $p < 0.001$ ; \*\* $p < 0.01$ ; \* $p < 0.05$ ;  $\cdot p < 0.1$

Table 3: Deaths \* Distance to capital

	Baseline	Extetended Controls	Full Model
(Intercept)	1.15** (0.41)	-0.16 (0.41)	-3.28*** (0.48)
sqrtSpAny	-0.09 (0.07)	-0.30*** (0.07)	-0.16* (0.07)
logCapdist	-0.37*** (0.07)	-0.24*** (0.06)	-0.17** (0.06)
mountains_mean	0.60*** (0.11)	0.20 (0.11)	0.65*** (0.12)
water_gc	0.01** (0.00)	0.00 (0.00)	0.01** (0.00)
barren_gc	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
distcoast	0.00* (0.00)	0.00 (0.00)	0.00 (0.00)
sqrtSpAny:logCapdist	0.03* (0.01)	0.06*** (0.01)	0.03** (0.01)
logPopd		0.70*** (0.04)	0.79*** (0.04)
temp_sd			0.92*** (0.08)
temp			0.06*** (0.01)
prec_sd			0.01* (0.00)
prec_gpcc			-0.00 (0.00)
forest_gc			0.00 (0.00)
AIC	15398.04	15128.06	14809.21
BIC	15463.36	15200.64	14918.03
Log Likelihood	-7690.02	-7554.03	-7389.60
Deviance	4793.87	4861.03	4925.32
Num. obs.	10492	10482	10453

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ ;  $p < 0.1$

Table 4: State based conflict events \* distance to capital