(De facto) Historical Ethnic Borders and Contemporary Conflict in Africa

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Abstract

We explore the effect of historical ethnic borders on contemporary conflict in Africa. We document that the intensive and extensive margins of contemporary conflict are higher close to historical ethnic borders. Exploiting variations across artificial regions within an ethnicity's historical homeland and a theory-based instrumental variable approach, we find that regions crossed by historical ethnic borders have 27 percentage points higher probability of conflict and 7.9 percentage points higher probability of being the initial location of a conflict. We uncover several key underlying mechanisms: competition for agricultural land, population pressure, cultural similarity, and weak property rights.

Keywords: Borders, Conflict, Territory, Property Rights, Landownership, Population Pressure, Migration, Historical Homelands, Development, Africa, Voronoi Tessellation, Thiessen Tessellation

JEL Classification: D74, N57, O13, O17, O43, P48, Q15, Q34

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1 Introduction

Conflicts cause immense suffering and loss of human life, hindering development by reducing incentives to accumulate human and physical capital, disrupting the allocation of public resources, and eroding institutions and social capital. In particular, conflicts have been widespread and are a key factor holding back Africa's economic development (Easterly and Levine, 1997). While many underlying drivers of contemporary conflict in Africa have been suggested,[1] ethnic tensions are seen as a fundamental catalyst (Horowitz et al., 1985). Thus, understanding the source of these tensions is central to our understanding of contemporary conflict on the continent. This quest has led to a vibrant recent literature studying the importance of deeply rooted ethnic characteristics in contemporary conflict (Arbatlı et al., 2020; McGuirk and Nunn, 2024; Moscona et al., 2020).

Remarkably, this literature has largely overlooked one deeply rooted source of internal conflicts: historical ethnic borders. This omission is significant for two reasons. First, extensive research in economics, political science, and international studies indicates that shared borders are critical for predicting conflicts between neighboring actors. Specifically, borders affect the opportunity for interaction and the willingness to fight (Starr, 1978), which is often influenced by the presence of resources and disputed territories due to historical demarcation (Abramson and Carter, 2016; Caselli et al., 2015; Goemans, 2006; Okumu, 2010). Interestingly, these theoretical insights have only been empirically applied to national borders and their role in *inter-state* conflict. Yet, as we discuss below, historical ethnic borders generate similar incentives for *intra-state* conflict. Second, and relatedly, border disputes over authority, territory, and resources are perceived as important drivers of contemporary intra-state conflict. Indeed, 42% of individuals surveyed across 17 African countries in 2002 and 2003 stated that "boundary and land disputes" were the main catalysts for violent conflict between groups inside their country.[2] While these types of conflicts are extremely prevalent (44% of conflict events and 47% of conflicts between 1997 and 2015), they tend to be small-scale, local, and usually do not initially involve the government. Yet, these so-called *non-civil conflicts* have the potential to escalate and evolve to become full-fledged civil wars (e.g, Côte d'Ivoire and Sudan) (Fjelde and Østby, 2014).[3]

We aim to fill this gap in the literature by studying the relationship between historical ethnic borders and contemporary conflict in Africa. Specifically, we explore the role of the historical (and fuzzy) demarcation of ethnic territories on the prevalence and intensity of *non-civil conflict* (i.e., conflict events that take place at the local level and do not involve the government). We hypothesize that the fuzzy nature of these borders underlies contemporary disputes over land and territory. Our main argument centers on the idea that historical ethnic homelands are essential to group identities today because they highlight ancestral land ownership (Fearon and Laitin, 2011; Horowitz et al., 1985). In fact, we show

[1] E.g., the role of resource discovery and exploitation, climatic shocks, economic poverty and inequality, lack of democratic institutions, weak property right protection, European colonization, and ethnic and religious diversity have been studied (see among others, Alesina et al. (2003, 2011); Bazzi and Blattman (2014); Berman and Couttenier (2015); Berman et al. (2017); McGuirk and Burke (2020); Michalopoulos and Papaioannou (2016); Miguel et al. (2004)). See Herbst (1990, 2000) and Blattman and Miguel (2010) for surveys of the large conflict literature.

[2] These figures come from round 2 of the Afro-Barometer, where individuals were asked about the three main reasons for which groups fight in their country.

[3] Indeed, according to a report by the EU and UN, "land issues have played a significant role in all but three of the more than 30 intra-state conflicts that have taken place in Africa since 1990" (EU-UN).

empirically that these historical ethnic borders have persisted and still predict ethnic identification today. Importantly, the allocation of authority and resources within ethnic groups continues to be determined by customary laws, which prescribe who can rule or allocate resources within their ethnic homeland (Boone, 2017). These *ethnic property rights* are innately linked to the homelands. Thus, any contestation over their geographical delimitation, as determined by the precise location of historical ethnic borders, weakens them by creating uncertainty over who holds these rights. Therefore, the fuzziness and "porosity" of these historical borders serves as a catalyst for the emergence of conflict. Importantly, this fuzziness has its roots in the past, as the demarcation and enforcement of borders in precolonial Africa were not strictly enforced, since land was historically abundant and the population scarce (Fanso, 1984; Herbst, 2000). Nonetheless, under these precolonial conditions, the link between border fuzziness and conflict was unlikely to be at work. Yet, things changed dramatically during the post-colonial period as population grew explosively. Consequently, land grew scarce, marginal lands became valuable, and competition for resources in general increased (Boone, 2017; Herbst, 2000).[4] In conclusion, we suggest that these soft historical borders are conducive to the existence of weak ethnic (and personal) property rights, overlapping claims on valuable resources, and a higher likelihood of inter-ethnic contact and encroachment, resulting in contemporary conflict. We formalize these insights as empirical hypotheses in section 2, clarifying mechanisms through which historical ethnic borders may affect contemporary conflict.

To test our main hypotheses, we combine georeferenced conflict data at the very fine local level from the Armed Conflict Location and Event Data Project (ACLED) (Raleigh et al., 2010) and the UCDP Georeferenced Events Dataset (GED) (Sundberg and Melander, 2013) with the spatial distribution of borders of ethnic homelands at the eve of colonization (Murdock, 1959).[5,6] As a first step, we use survey data on ethnic identification in contemporary Africa from all rounds of the Afrobarometer (Afrobarometer, 2018) to provide evidence for the persistence, fuzziness, and porosity of these historical ethnic borders. Having established the contemporary relevance of these historical ethnic borders, we next test of our main hypothesis. Specifically, by comparing artificial regions (i.e., grid cells of 50×50km) within an ethnic homeland in a country, we explore whether the presence of historical ethnic borders predicts contemporary conflict across grid cells. Our results hint to the strong influence of historical ethnic borders on non-civil conflict in Africa. Indeed, both the intensive and extensive margins of contemporary conflict are concentrated in the proximity of historical ethnic borders.[7]

[4]In Herbst (2000)'s words "Due to high population growth and the low carrying capacity of much of the land in Africa, there are now far fewer empty areas into which people can move [...] The land frontier has all but closed. The specter of a land shortage is a dramatic development because as late as two generations ago Africa was characterized by small concentrations of people surrounded by large amounts of open land."

[5]These two conflict datasets contain very disaggregated data that allows us to identify the location of many types of conflict including civil, non-civil, state based, non-state based, local, communal, and ethnic conflicts, among others. Importantly, in some cases, these types are not fully mutually exclusive as, e.g., ethnic conflict may also be part of a civil or local conflict or related to land disputes.

[6]Starting with Nunn (2008) the spatial distribution of ethnic homelands introduced in Murdock (1959) has been widely used in economics and related fields for diverse purposes; among others, identifying the spatial distribution of ethnic groups partitioned by the Scramble for Africa (Michalopoulos and Papaioannou, 2016), assigning pre-colonial cultural characteristics like the degree of political centralization (Michalopoulos and Papaioannou, 2013b) or social structure (Moscona et al., 2020), computing geographic characteristics of ethnic homelands (Depetris-Chauvin and Özak, 2018; Fenske, 2014), and estimating the intensity of the disease environment (Alsan, 2015; Depetris-Chauvin and Weil, 2018).

[7]This strong empirical pattern holds regardless of whether we look at the presence, the number, or the total length

While our initial OLS estimates are robust to a range of geographic and climatic controls, as well as country and ethnic group fixed effects, it is possible that the estimated coefficients are still biased. Indeed, historical ethnic borders are unlikely to be randomly assigned, and there may be measurement error in Murdock's map. To mitigate these concerns, we follow a theory-based instrumental variable strategy that exploits variations in the location of *potential* ethnic borders generated by a plausibly exogenous ethno-spatial partition of Africa. Specifically, we provide a theoretical model of ethnic border formation, which predicts that the location of ethnic borders generates a Voronoi partition of the world. I.e., ethnic borders partition the world in such a way that an ethnicity's homeland contains all locations closest to its center of gravity compared to that of any other ethnicity. Based on these results, we create measures of the location, length, and number of potential borders in each grid cell as predicted by the borders of the Voronoi regions generated by the centroids of historical ethnic homelands in Africa. Importantly, as further explained below, these measures, albeit noisy, help address the bias due to (non-classical) measurement error present in our setting (Hausman, 2001).

Using our instrumental variable strategy we find that grid cells with historical ethnic borders have 27 percentage points higher probability to experience conflict events. This probability increase represents roughly 123% of the mean value of prevalence of non-civil conflict in our sample; suggesting a sizable impact of borders. Indeed, when compared to other sources of conflict, the estimated impact of historical borders is substantially larger than the associated impacts of minerals or oil. We also find that hosting a historical ethnic border increases in 7.9 percentage points the probability of conflict onset (i.e., being the initial location of a confrontation within a conflict dyad). While our IV estimates are conditional on country and ethnicity fixed-effects, thus ensuring that they are not driven by time-invariant country or ethnic characteristics, our results are robust to a battery of tests.[8]

Having documented the strong association between historical ethnic borders and non-civil conflict, we delve further into the potential mechanisms underlying this result. First, since our framework suggests that conflicts emerge due to overlapping claims over territory and inter-ethnic encroachment, we show that conflicts caused by land, territorial, authority, local, and ethnic issues are more prevalent close to historical ethnic borders. Interestingly, we do not find any effect on religious conflict. Second, we analyze whether our results are due to the mediating effects of historical conflicts and contemporary ethnic diversity. In line with the narrative that border demarcation was not important in the past, we find that historical ethnic borders do not predict violence in precolonial times, even though the latter does affect contemporary conflict. Further, we find that ethnic diversity is higher around historical ethnic borders, reflecting their porosity, although diversity itself does not appear to be a fundamental mechanism underlying our results. On the contrary, our results suggest that ethnic diversity only generates conflict if there is a border present. Third, we explore whether various characteristics of

of historical ethnic borders.

[8]In particular, our results are robust to alternative strategies for constructing the instrumental variable, to accounting for a large set of potential geographical and climatic confounders, to variations in grid cell sizes, and violations of various econometric assumptions. Additionally, our results are virtually unaltered when accounting for other sources of conflict, and the prevalence of conflict in pre-colonial times. Moreover, we show that accounting for contemporary inter-ethnic diversity, as measured by the number of languages spoken in the cell or the level of linguistic fractionalization of the population living in it, does not alter our main result. Furthermore, our results are robust to spatial autocorrelation and various strategies for clustering of standard errors. Also, we replicate our empirical analyses for grids of 10×10km, 25×25km, and 100×100km obtaining qualitatively similar results.

an ethnic border may amplify or dampen its effect on conflict. In particular, we study how our main result varies at borders that (i) host valuable natural resources (e.g., agriculturally suitable land or minerals), (ii) are congruent with natural features that make the border less fuzzy (e.g., rivers), and (iii) coincide with (subnational or international) de jure borders. While we do not find strong evidence that geographical characteristics that are complementary to border demarcation mitigate the effects of historical borders on contemporary conflict, we do find that the more valuable the region around the border, the more conflict there is. Additionally, our results suggest that de jure borders may formalize ethnic property rights across historical ethnic borders, reducing conflict. This result lends support to our hypothesis that border fuzziness may be conducive to weak inter-ethnic property rights and overlapping claims, which may result in conflict. Fourth, we document that conflict is more prevalent at historical ethnic borders that experienced larger population pressures during the second half of the 20^{th} century. This result echoes Herbst's (1990) narrative on the problem of scarcity of land in rural areas after independence. Fifth, we find that ethnic similarities and complementarities across historical ethnic borders matter for conflict. Our findings indicate that conflict at historical ethnic borders is intensified by economic, cultural, and linguistic similarities. This is because similar ethnicities typically share economic subsistence strategies, suggesting that there may be greater inter-ethnic competition for resources at the border. These results align with the theories of Spolaore and Wacziarg (2016) and Ray and Esteban (2017), who argue that group similarity may be a catalyst for conflict.

Our paper is the first to quantitatively explore the role of historical ethnic borders on non-civil conflict in Africa, contributing to various strands of literature. First, we contribute to the literature on the determinants of conflict in Africa, exploring a largely overlooked and highly prevalent type of conflict and identifying a novel source of conflict. In particular, our work adds to the literature on the historical drivers of contemporary conflict (Besley and Reynal-Querol, 2014; Depetris-Chauvin, 2014; Michalopoulos and Papaioannou, 2016), including a recent literature on the role of deep-rooted ethnic characteristics (Arbatlı et al., 2020; McGuirk and Nunn, 2024; Moscona et al., 2020). Second, we add to the literature on the role of borders for economic and political outcomes, which has mainly focused on contemporary national borders (Abramson et al., 2022; Aker et al., 2014; Bubb, 2013; McCauley and Posner, 2015; Michalopoulos and Papaioannou, 2013a, 2016; Miguel, 2004), and has largely ignored internal borders and their effect on conflict. Third, we also contribute to a large literature documenting the importance of competition over land as a catalyst of conflict (Acemoglu et al., 2020; Berman et al., 2019; Boone, 2017; Fearon and Laitin, 2011). Fourth, we add to the literature on the effects of cultural differences on economic and political outcomes (Alesina and La Ferrara, 2005; Desmet et al., 2017; Ray and Esteban, 2017; Robinson, 2016; Spolaore and Wacziarg, 2016). Fourth, we also contribute to a fruitful research agenda that studies the geographic patterns of within-country conflict, which has focused on the effects of price, climate, and resource shocks (Berman and Couttenier, 2015; Berman et al., 2017; Harari and Ferrara, 2018). Finally, we contribute to the growing literature on the deep-determinants of economic development and the persistent effects of historical institutions (Acemoglu et al., 2005; Diamond, 1997; Galor and Özak, 2016; Guiso et al., 2009; Nunn and Wantchekon, 2011).

The remainder of the paper is organized as follows. In section 2, we provide a conceptual framework to understand the potential relationship between historical ethnic borders and contemporary conflict.

In section 3, we present the data and provide evidence on our presumption that historical ethnic borders are persistent, fuzzy, and porous. In section 4, we outline the empirical strategy for our analysis, introduce our instrument, examine its validity, and provide various robustness tests. In section 5, we present our main empirical results, explore their robustness, and the mechanisms behind them. Section 6 concludes. Additional results and our theoretical model for border location are presented in the appendix.

2 Conceptual Framework: Why Historical Ethnic Borders Matter for Conflict

This section presents our main hypotheses on the role of historical ethnic borders in contemporary conflict in Africa. Central to our main argument is the fact that historical ethnic homelands are fundamental to group identities today (Horowitz et al., 1985), mainly because they highlight the ancestral ownership of the land (Fearon and Laitin, 2011). Nonetheless, the demarcation and enforcement of homelands' borders was not forcefully enforced in the past, as land was historically abundant and population scarce in precolonial Africa (Herbst, 2000). These conditions disincentivized the control of land and the "demarcation" of borders (Fanso, 1984). However, things dramatically changed during the post-colonial period (Herbst, 2000). Due to its late demographic transition, Africa experienced rapid population growth (increasing from 74 million in 1800 to 1.3 billion in 2019), characterized by low urbanization rates and large rural-rural migration. As a result, competition for resources became more salient as land became more scarce and marginal lands became more valuable (Boone, 2017).[9] Indeed, Bates (2008) argues that explosive population growth, territorial expansion, and competing claims over land worked as a combustible combination for domestic tensions in several Sub-Saharan African countries.[10] These so-called *non-civil conflicts*, which are innately local, communal, and inter-ethnic in nature, tend to be linked to the escalation of conflict, potentially evolving to become full-fledged civil wars (Fjelde and Østby, 2014). We build upon these insights to generate a list of testable hypotheses, which will guide our empirical analyses.

Persistence, Porosity, and Fuzziness of Historical Ethnic Borders: While ethnic groups tended to inhabit territories that they perceived as their own (Fanso, 1984; Horowitz et al., 1985), the forces underlying the inadequate (or lack thereof) demarcation and enforcement of borders in the past, also lead to fuzzy and porous borders. Indeed, even in cases in which ethnicities demarcated their borders, the methods employed were imperfect (e.g., the use of fire to burn sections of forest or land, or the use piles of stone), and did not ensure their immutability (Dobler, 2008). Moreover, indigenous mapmaking was rare in precolonial Africa (Herbst, 2000). These conditions entailed that historical ethnic borders were fuzzy and did not ensure a precise division between ethnic groups, serving instead as a transition area between neighbors (Fanso, 1984; Murdock, 1959). Our empirical analysis is based

[9] In Herbst (2000)'s words "Due to high population growth and the low carrying capacity of much of the land in Africa, there are now far fewer empty areas into which people can move [...] The land frontier has all but closed. The specter of a land shortage is a dramatic development because as late as two generations ago Africa was characterized by small concentrations of people surrounded by large amounts of open land."

[10] Boone (2017) documents several ethnic conflicts related to land in 13 different sub-Saharan African countries including Kenya, Malawi, Ghana, Nigeria, Burkina Faso, Senegal, Ivory Coast, Rwanda, DRC, Uganda, Mali, Tanzania, and Zimbabwe.

on the assumption that these historical ethnic borders persisted, remaining relevant, fuzzy, and porous into the contemporary era. In fact, in section 3.2, we provide evidence that supports this assumption.

Historical Ethnic Borders as a Catalyst of Conflict: The fuzziness of these borders are conducive to the existence of weak ethnic (and personal) property rights, resulting in overlapping claims about authority, or on the ownership of territory and its resources (particularly agricultural land). A few examples of conflicts due to overlapping claims are (i) the 2019 dispute between the Tiv and Jukun peoples in Nigeria, (ii) the 2004 disagreement between the Ondonga and Oukwanyama Traditional Authorities in Namibia, and (iii) the long-standing dispute over agricultural land between the Dinka and Nuer in South Sudan. The 2019 ethnic dispute between the Tiv and Jukun peoples in Nigeria started over the erection of a signboard that changed the name of a small town from a Tiv name to a Jukun name. This village is located in the Taraba State in the Jukun homeland according to Murdock's map. According to media, "[r]elations between the two ethnic groups, which has stretched for centuries has suffered as a result of politics, land ownership issues, indigene/settler syndrome, suspicion, and lack of political will". The West Africa Network for Peace Building says at least 600 persons have been killed in the Tiv/Jukun crisis. Similarly, in 2004, a border dispute made the headlines in Namibia's national newspapers, when the Ondonga Traditional Authority tried to install a senior headman in Ekoka, a tiny village east of Ekongo, located 25kms of the historical Ovambo-Heikum ethnic border. The Oukwanyama Traditional Authority formally protested that the area was under their jurisdiction, complaining that these were "tricks and machinations aimed at depriving the Ovakwanyama people of their traditional inheritance". This local dispute soon involved the two major ethnic groups in the country and affected national politics (Dobler, 2008). Similarly, the Dinka and Nuer ethnicities in South Sudan have been fighting over agricultural land for decades (Sundberg and Melander, 2013).

These overlapping claims, and the "porosity" of these poorly demarcated historical borders, increased the likelihood of inter-ethnic contact and encroachment. These forces serve as catalysts for the emergence of conflict, from which we derive our main hypothesis:

Hypothesis H1 (Main). *Conflict is more prevalent close to historical ethnic borders.*

Moreover, our discussion suggests that we should expect certain types of conflicts around borders to be especially prevalent. In particular,

Hypothesis H1.A (Types and Causes of Conflict). *Conflicts caused by land, territorial, authority, local, and ethnic issues are more prevalent close to historical ethnic borders.*

Similarly, by fostering overlapping claims in locations where ethnic groups are in contact, borders may ignite conflict, i.e.,

Hypothesis H1.B (Onset of Conflict). *Conflicts should start more often close to historical ethnic borders.*

Further, if during the pre-colonial era, political authority and property rights extended over people more than land (Englebert et al., 2002; Herbst, 2000), we should expect historical conflict to have occurred closer to population centers, which from the narrative above, should be located farther from historical ethnic borders. Thus,

Hypothesis H1.C (Historical Conflict). *Historical ethnic borders should not predict historical conflicts.*

Therefore, if this hypothesis holds, the persistence of historical conflict cannot be a mechanism through which historical ethnic borders cause contemporary conflict.

The historical narrative, and the persistence and fuzziness of historical ethnic borders, suggest that we should expect higher levels of ethnic heterogeneity in their proximity. While ethnic diversity may be conducive to conflict (Alesina et al., 2003; Fearon, 2003), and may well be a necessary condition for it, an important aspect of our framework is that it does not simply imply that conflict is caused by the presence of multiple ethnicities. Indeed, our hypothesis suggests that it is the weak ethnic property rights generated by these borders that drive conflict, not simply the presence of multiple ethnicities. I.e.,

Hypothesis H1.D (Inter-Ethnic Diversity). *Modern ethnic diversity should affect conflict and be higher close to historical ethnic borders. Yet, historical ethnic borders should affect conflict above and beyond their impact on diversity.*

Clearly, if a valuable territory is threatened or contested, the involved groups should be more willing to fight (Brochmann and Gleditsch, 2012; Caselli et al., 2015; Goemans and Schultz, 2017; Okumu, 2010; Toset et al., 2000). To the extent that borders can harbor valuable natural resources (like agricultural land, minerals, or oil, which are tied to a territory), we should expect more conflict due to the weak property rights generated by their fuzziness. Thus,

Hypothesis H1.E (Types of Border (Resources)). *Historical Ethnic Borders that harbor valuable resources bounded to the territory should generate more conflict.*

While historical ethnic borders were generally not well demarcated in the past, we do expect that certain geographical features may act as natural barriers, e.g., rivers or mountain ranges, effectively delimiting territories. Thus, we expect borders coinciding with these features to be less fuzzy. This should mitigate claims over territory and therefore lower contestation, which ultimately should result in lower levels of conflict. I.e.,

Hypothesis H1.F (Types of Border (Hard vs. Soft)). *Historical Ethnic Borders coinciding with natural geographical barriers should generate less conflict.*

Another way to mitigate the fuzziness of historical ethnic borders is through institutional arrangements. In particular, established political borders, e.g., national or administrative borders, are usually better delimited and facilitate the allocation of property rights. Thus,

Hypothesis H1.G (Types of Border (De Facto vs. De Jure)). *Historical Ethnic Borders that overlap with contemporary de jure borders should have less conflict.*

While relatively low population density and land abundance characterized Africa in pre-colonial times (Austin, 2008; Englebert et al., 2002; Herbst, 2000), things dramatically shifted due to its late demographic transition, which did not start before the mid 20th century (Livi Bacci, 1997). This high population growth in the 20th century, coupled with low urbanization rates and an active rural-rural migration, as well as the limited amount of land, created land shortage problems in rural areas (Herbst, 1990). This increasing pressure over land due to high population growth underlied large violent conflicts such as Darfur and Rwanda (André and Platteau, 1998; Faris, 2009). Similarly, the sons-of-the-soil (SoS) conflict literature points to ethnic migration and competition over land as a key determinant of conflict.[11] This competition over resources, particularly agricultural land, may exacerbate conflict in locations with weak property rights. Thus,

Hypothesis H1.H (Population Pressure). *Historical ethnic borders with higher population growth should have more conflict.*

Given our previous hypotheses, which suggest that competition for agricultural resources and territory in newly populated areas have been conducive to conflict at ethnic borders, it is feasible that ethnic similarity at the border, either in subsistence strategies or culture, may affect the prevalence of conflict. In fact, previous literature has focused on the role of heterogeneity and relatedness between groups and emphasized the importance of shared interests and preferences to understand the role of economic and cultural similarities in conflict (Alesina et al., 2003; Alesina and La Ferrara, 2005; Spolaore and Wacziarg, 2009). In particular, it has been suggested that closely related groups, which tend to have similar preferences over rival goods (e.g., agricultural land), will be more likely to fight over them. Ray and Esteban (2017) highlight the importance for conflict of *economic* similarities and contestation over resources.[12] Anecdotal evidence of conflicts between groups that engage in the same mode of production is abundant, such as the conflict among herders in pastoral areas of Northern Kenya (e.g., Gabra versus Borana) and among farmers fighting over property rights and land tenure in Nigeria (e.g., Tiv versus Jukun in the Taraba State). Within our framework, this suggests that:

Hypothesis H1.I (Cultural Similarities). *Historical ethnic borders where more (culturally) similar ethnic groups come into contact tend to experience higher levels of conflict.*

3 Data and Validation of Ethnic Borders

In this section we introduce the data employed in the analysis, in particular, the geocoded measures of contemporary conflict and historical ethnic borders across Africa. We also discuss the validity and

[11] Put simply, an SoS conflict is characterized by a local confrontation over land (or other natural or economic resource, including jobs and government services) between an ethnic group which claims to be indigenous, and thus the rightful heir to the (ancestral) land, and a relatively recent, ethnically distinct migrant group to this region from other parts of the same country (Fearon and Laitin, 2011). While the SoS's theory was originally applied to India, it clearly is applicable more generally, particularly to the African context (Platteau, 2002). As Platteau (2002) explains, "An immediate upshot of the growing scarcity of land is that strange farmers are being increasingly denied their rights of access to land, especially to plots of relatively high quality. In the Senegal River Valley, for example, the local Haalpulaar (Toucouleur) communities have become concerned that land will not be available in sufficient amounts for their children and grandchildren. [...] Similar events have occurred in many places in sub-Saharan Africa". The steady decline in land-labor ratios is perhaps one of the most remarkable stylized facts in African agriculture (Jayne et al., 2010).

[12] In their words: "Economic similarity, not difference, can breed tensions; indeed, such tensions, involving as they do the direct contestation of resources" (Ray and Esteban, 2017).

contemporary relevance of our measures of historical ethnic borders. Additionally, we explain the main empirical hurdles faced in the exploration of the association between historical ethnic borders and contemporary conflict in Africa. Furthermore, we describe the strategies we employ in order to mitigate these potential concerns. Given our empirical strategy, our main analyses combine data on contemporary conflict, historical ethnic borders, as well as ethnic, geographical, linguistic, and cultural characteristics, across all cells of size 50km×50km in Africa.[13] We explore the robustness of our results by exploiting variations in cell sizes, additionally considering cells of sizes 100km×100km, 25km×25km and 10km×10km.[14]

3.1 Conflict Prevalence, Incidence, Onset, and Types

To explore the geographical distribution of contemporary conflict across Africa and its relation to historical ethnic borders we use the two main sources of georeferenced conflict data available for Africa: (a) the Armed Conflict Location and Event Data Project (ACLED) and (b) the Uppsala Conflict Data Program (UCDP) & Peace Research Institute Oslo (PRIO) Georeferenced Event Dataset (UCDP-GED). Both datasets are widely used in the literature on conflict since they provide high quality, disaggregated, and georeferenced data for various types of conflicts (Raleigh et al., 2010; Sundberg and Melander, 2013).

We employ data from ACLED for the 1997-2014 period, which includes information on the location (latitude and longitude) and severity (number of fatalities) of different types of conflict episodes (i.e., battles, violence against civilians, riots and protests) that involve either the government, rebel group militias, or civilians. Given our interest in studying local conflict that does not involve the government and mostly involves disputes over land and territory between ethnic groups, we exploit information in ACLED to construct several measures of conflict. Our main measure of non-civil conflict follows Moscona et al. (2020) and includes all conflict events that do not include the government or rebels seeking to replace the central government as one of the actors. Additionally, we construct a measure of local conflict defined as all conflict events for which both actors engaged in violence are geographically local and/or ethnically local groups (Moscona et al., 2020). We also exploit the measure of ethnic conflict proposed in Depetris-Chauvin et al. (2020) and follow a similar approach to construct a measure of land-related conflict. To do so, we exploit the fact that ACLED includes a description of its conflict observations. We code conflict as land-related if specific keywords related to land are documented in the dataset.[15]

For each aforementioned conflict definition we construct a measure of (i) conflict prevalence at the grid cell level, i.e. a dummy that equals 1 if during the study period any conflict event of a specific type has occurred in a given cell and zero otherwise. Additionally, we use the information on the severity and recurrence of conflict events to construct three measures of conflict intensity at the grid cell level.

[13] We exclude small islands from the analysis given data constraints.

[14] The construction of the grid is based on the whole globe, i.e. a rectangle ranging from -180 to 180 degrees longitude and -90 to 90 latitude. This globe is reprojected using the cylindrical equal area projection to ensure all cells have the same area. Once the whole globe is reprojected, the rectangle is split into a grid with the specified size. After the creation of this fishnet, we retain for the analysis only those cells that are located in Africa.

[15] Example of such keywords are "land", "land dispute", "dispute over land", "clash over land", "land invasion", or "over disputed land".

Specifically, we measure (ii) the number of conflict events that occurred in a given cell, (iii) the fraction of years with at least one conflict event in a given cell, and (iv) the number of casualties associated with these events in a given cell. Figure A.3(a) depicts the prevalence of non-civil conflict in Africa at the 50km×50km grid cell level according to ACLED. Additionally, Figures A.3(b)-A.3(d) depict the various measures of conflict incidence, i.e., the number of deaths, the number of events, and the share of years with conflict.

Additionally, we employ data from UCDP-GED for the 1989-2017 period, which includes information on the location and severity of all major episodes of violent conflict to construct similar measures of prevalence and incidence of conflict. In particular, we construct measures of prevalence of non-state-based conflict and communal conflicts. Unlike ACLED, UCDP-GED focuses on major violent conflicts among warring factions. Specifically, a conflict event is included in UCDP-GED if in any year during the period of analysis there are at least 25 deaths in the conflict between a given pair of warring factions (i.e., a dyad). Thus, UCDP-GED follows the whole history of a conflict and permits us to identify the location where conflict between any set of warring factions started. With this information we construct two additional measures of conflict: (v) first onset at the grid cell level, i.e. a dummy that equals 1 if any conflict started in a given cell and zero otherwise, and (vi) the number of onsets at the grid cell level, i.e. the number of conflicts that started in a given cell. We also employ the UCDP Non-state Conflict Issues and Actors Dataset (Von Uexkull and Pettersson, 2018) to identify conflict events related to territorial, authority, border, and religious disputes. Figure A.4(a) depicts the prevalence of non-state-based conflict in Africa at the 50km×50km grid cell level according to UCDP-GED. Additionally, Figures A.4(b)-A.4(d) depict the various measures of conflict incidence according to UCDP-GED, i.e., the number of deaths, the number of events, and the share of years with conflict. Finally, Figures A.4(e)-A.4(f) depict the location and the number of conflict onsets in each cell.

3.2 Historical Ethnic Borders

We exploit information on the location of historical ethnic borders using data on the spatial distribution of ethnic homelands at the eve of colonization (Murdock, 1959). The so-called Murdock map presents the location of ethnic homelands in Africa according to the classification of ethnicities provided by Murdock (1959). For our analyses, we use the geocoded version introduced in Nunn (2008).[16] Figure 1 depicts the distribution of ethnic homelands in Murdock's map.

This map has been widely used in economics, history, anthropology, and political science.[17] Specifically, it has been used to identify the effect of the historical location of ethnicities and their characteristics on economic development and conflict (Michalopoulos and Papaioannou, 2013b; Moscona et al., 2020). Nonetheless, there is a debate among scholars about the existence and stability of ethnic identities, the location of historical ethnic homelands, and thus their borders (Mamdani, 2012; Michalopoulos and Papaioannou, 2018). Moreover, as discussed above, even if these issues were not present, these homelands and their borders could potentially be mismeasured, since it is a historical map and ethnic borders are arguably soft and fuzzy. To support the validity and fuzziness of the historical ethnic bor-

[16]The map is available at https://worldmap.harvard.edu/data/geonode:Murdock_EA_2011_vkZ

[17]There are more than 2300 citations to Murdock (1959) on Google Scholar (verified on February 26, 2023).

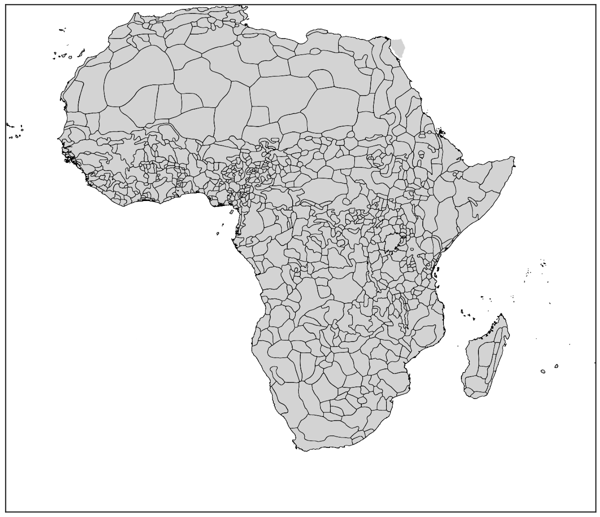


Figure 1: Historical Ethnic Borders in Africa (Murdock Map)

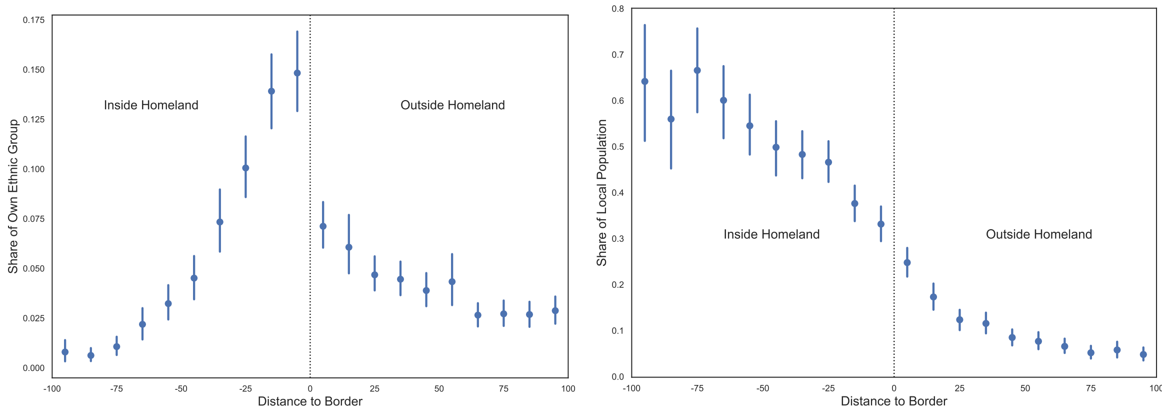
ders identified by Murdock (1959), we analyze how contemporary ethnic identification varies around them. We use the ethnic self-identification of over 170,000 geolocated Africans as reported in rounds 1-6 of the Afrobarometer (Afrobarometer, 2018), which we linked to over 200 ethnic groups in the Murdock map. Using the location of individuals, we find that on average, across all ethnic groups, a 59% of an ethnic group's population still lives inside their ancestral homeland (Figure A.1 maps the spatial distbution). In Figure 2(a), we document the share of an ethnicity living at less than 100kms of the border. As it is evident, this share decreases significantly when crossing the border and moving away from the homeland. Moreover, as we document in Figure 2(b), not only do most individuals live in their ancestral homeland, but they also represent a larger share of the local population. Specifically, the share of the ancestral ethnic group in the local population decreases as we move from the center of the homeland, crossing the border, and moving into neighboring homelands. It is worth noting, however, that while there is a noticeable decline in ethnic identification around the border, groups are not perfectly separated by them.

Given the Murdock map and our grids of cells of various sizes, we construct measures of presence of historical ethnic borders at the grid cell level. In particular, we measure the presence of a historical ethnic border in a grid cell as a dummy that equals 1 if for some ethnic group the border of its homeland in the Murdock map intersects the cell.[18]

To explore the robustness of our analysis, we also use other ethnographic sources to identify the historical core locations and borders of ethnicities. In particular, Weidmann et al. (2010) provide an alternative ethnographic map (GREG), which depicts the geographical distribution of ethnicities circa 1960.[19] Additionally, we use the core locations of ethnicities in the precolonial era as identified in the

[18] Additionally, we generate various measures of the intensity of exposure to historical ethnic borders by counting the number of borders that exist in a grid cell, as well as the length of the borders in each cell. We employ these measures for robustness checks in the Appendix.

[19] GREG is constructed based on the Soviet Atlas Narodov Mira and focuses on politically relevant groups for the study of contemporary conflict. So, it may reflect a more modern distribution of ethnic borders, which may be subject to further concerns of endogeneity and reverse causality in the study of the relation between the spatial distribution of



(a) Share of Own Ethnic Group

(b) Share of Local Population

Figure 2: Distribution of Ethnic Identification around Historical Ethnic Borders

Note: The figures illustrate the relationship between self-reported ethnicity and the geographic location of ethnic borders. The data is derived from survey responses collected during rounds 1 to 6 of the Afrobarometer, which included more than 170,000 geolocated individuals reporting ethnic identification linked to over 200 ethnic groups as defined by Murdock's map. The y-axes represent the proportion of individuals within a given population that identify with an ethnic group, at varying distances from the ethnic border. In the left panel, the reference population is the individual's own ethnic group, while in the right panel, the reference population is the local population. The x-axis displays geographic distance from the ethnic border, with data aggregated at 5km bin intervals. Negative distances indicate kilometers into the territory of the individual's own ethnic homeland, while positive values represent kilometers into the homeland of neighboring ethnic groups.

Ethnographic Atlas (Murdock, 1967) and the Atlas of Precolonial Societies (Müller, 1999). Although these Atlases do not provide the location of borders, they allow us to construct alternative instrumental variables based on those core locations.

4 Empirical Strategy

In order to explore the association between historical ethnic borders and contemporary non-civil conflict in Africa, we estimate the following model:

$$Conflict_{ice} = \alpha + \beta EthnicBorder_{ice} + \gamma' X_{ice} + \delta' G_{ice} + \Phi_c + \Theta_e + \varepsilon_{ice}, \quad (1)$$

where $Conflict_{ice}$ is one of our four measures of conflict computed for the grid i located in country c in ethnic homeland e. $EthnicBorder_{ice}$ is our indicator of the presence of ethnic borders. X_{ice} is the vector of basic geographic and climatic controls. The vector G_{ice} includes additional control variables that may constitute potential drivers of conflict and will be analyzed in our robustness analyses. Φ_c and Θ_e refer to a full set of country and ethnicity fixed effects, respectively.[20] Finally, ε_{ice} is an error term,

ethnic groups and contemporary conflict.

[20]If a cell is partitioned by a country border, we treat each partition independently, so that it is analyzed only with other cells that belong to the same country once fixed effects are accounted for. Assigning instead each cell to a unique country based on maximal area or the location of the centroid generates the similar results. For each cell we assign a fixed effect for each ethnic group that is present in it. Assigning instead a unique ethnic group to each cell based on the

which is allowed to be heteroskedastic and correlated at the country level. Thus, in all our analyses we report standard errors that are heteroskedasticity-robust and clustered at the country level.[21]

There are several potential threats to estimating the impact of historical ethnic borders on contemporary conflict. Clearly, the number, location, and identity of ethnic groups reflected in the Murdock Map is the result of an endogenous evolutionary process, which may have been affected by conflict and its correlates. Thus, any analysis that studies conflict based on ethnic groups or even ethnic dyads, would face such a "macro" endogeneity concern.[22] By exploiting grid-cell variation within ethnic groups, we aim to mitigate this concern, as we account for ethnic characteristics, which include its culture, history, the number of its neighbors and location. Yet, other endogeneity concerns remain at this unit of analysis. First, one may worry that the observed association may reflect the reverse causality from ethnic conflict to ethnic borders. Indeed, it is conceivable that the location of ethnic borders is the result of ethnic conflict. Nevertheless, given the temporal structure of the data, it is not feasible that contemporary conflict determines historical ethnic borders reflecting the African pre-colonial period. A more plausible concern is that historical drivers of inter-ethnic interaction (conflict, trade) may codetermine the location of historical ethnic borders and contemporary conflict potentially generating biases in any direction in our OLS estimation.[23] Second, as the previous case suggests, the observed association between historical ethnic borders and contemporary conflict may be governed by omitted geographical, institutional, cultural, linguistic, historical, and ethnic factors. Finally, given the historical nature of the measure of ethnic borders, as well as the fact that ethnic borders are potentially soft and fuzzy, the main independent variable in our analysis may be mismeasured. This would suggest that the association between historical ethnic borders and contemporary conflict based on ordinary least squares may be biased due to non-classical measurement error. In fact, based on simulations, Figure B.1 shows that even small rates of misclassification extremely downward biases the estimate.[24]

Our empirical analysis exploits several strategies to mitigate potential concerns regarding the role of reverse causality, omitted variables, and mismeasurement in the observed association at the grid-level between historical ethnic borders and contemporary conflict in Africa. In our main empirical analysis we follow an instrumental variable approach based on the potential location of historical ethnic borders, which we describe in section 4.1. Additionally, we to control for an extensive set of observables: (i)

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maximal area or the location of the centroid generates the similar results.

[21]In additional robustness analyses, we show that applying alternative levels of clustering at the ethnic or country-ethnicity level or accounting for spatial autocorrelation does not change our main results (Table E.14).

[22]Indeed, to the best of our knowledge, the literature on conflict that exploits ethnicities, takes the number, location, and identity of ethnic groups as given. This stems partly from the lack of time variation in ethnic data.

[23]In particular, historical ethnic conflict may have persisted in a given location or may have given rise to other types of conflict that persisted in the same geographical area. Simultaneously, ethnic borders may have formed in locations where conflict took place. Thus, historical ethnic conflict would be a potentially omitted variable in our analysis biasing the estimate upwards. Similarly, historical trade between ethnicities may have occurred at locations that became borders and improved ethnic relations permanently. Thus, omitting historical trade could potentially downward bias the OLS estimate. Likewise, if historical ethnic borders had low population densities in the past, which may have persisted to the contemporary era, they may have lower levels of conflict than non-border locations, which would also potentially downward bias the OLS estimate.

[24]Given the binary nature of our independent variable, any measurement error results in misclassification, which creates non-classical measurement error due to a perfectly negative correlation with the error term in equation (1). Using intensive measures of borders does not resolve this issue, since in those measures are censored at zero.

we account for country fixed-effects, and thus for any unobservable time-invariant characteristics at the country level. Specifically, accounting for country fixed-effects mitigates concerns that our analysis reflects countries' geography, (colonial) history, institutions, or culture. Moreover, it ensures that the observed association is driven more by local (cell-level) characteristics than by global (country- or regional-level) ones. (ii) We account for ethnicity fixed-effects and thus for any unobservable time-invariant characteristics at the ethnicity level. In particular, by accounting for ethnic fixed-effects, we ensure that our results are not driven by any characteristics of the ethnicities inhabiting a cell, including their location and number of neighbors. (iii) We account for a large set of geographical and climatic characteristics of each cell that may be correlated with both the existence of historical borders and contemporary conflict. Importantly, we always control for key drivers of population density, ethnic diversity, trade, and economic development and thus indirectly for their effect on conflict. Specifically, we account for a cell's absolute latitude, longitude, elevation above sea level, and the mean and standard deviation of temperature and precipitation, and caloric agricultural suitability. (iv) We also expand the set of variables to document the strength of the instrumental variable results. Specifically, we account for ruggedness, difficulty of mobility, disease environment, ecological diversity, the presence of rivers (or their length), the presence of coasts (or their length), the presence of water bodies (perennial, fluctuating, seas), and the presence of ecological borders. (v) Furthermore, we account for other sources of conflict identified in the literature. In particular, we control for the presence of diamonds, minerals, oil, cities, and capitals, as well as cell's distances to these sources of conflict.[25]

4.1 Potential Historical Ethnic Borders as a Source of Variation

This section explains the construction and properties of our instrument. We exploit the predictions of our theoretical model (Appendix C) to construct potential borders for ethnicities in Africa. In particular, our model suggests that if history, geography, culture, institutions, etc. do not play a role, the theoretical location of ethnic borders and homelands partitions the world into Voronoi Tesselation. Specifically, given the location of centers of ethnic groups, the homeland of some ethnicity i should be composed by the regions that are closer to its center than to the center of any other ethnicity $j \neq i$. Importantly, this unique Voronoi partition depends solely on the number and location of the centers, and some notion of distance, and is independent of any characteristics of the ethnicities or the geography of the world (except its overall shape). In particular, given the centers of ethnicities, the Voronoi partition would not change if we were to change the geography or climate of Africa, or change the identity or characteristics of the ethnicity linked to the center.[26] In fact, this Voronoi partition of the world is a global property of the set of centers and the shape of Africa, for any given notion of

[25]While our IV strategy should mitigate concerns due to potential mismeasurement in historical ethnic borders, we also exploit changes in the size of the grid cell to further address this concern. In particular, the potential measurement error should differ as the size of the grid cell changes. Specifically, a measure of the presence of historical ethnic borders has potentially less measurement error if cells are larger. We also provide improved bounds on the true causal effect of historical borders in the presence of non-classical measurement error. Specifically, as Black et al. (2000) show, in our setting the true causal effect in the presence of non-classical measurement error will lie between the OLS and IV estimates.

[26]E.g., given the centers, if we were to shuffle the ethnographic characteristics and history of all ethnicities, the Voronoi partition would remain unchanged. Similarly, if the geography and climate of Africa was different, it would also not affect the partition, given the centers.

distance employed. Thus, the location of Voronoi borders is independent of any local characteristics of the region where the border is located, in particular, of our unit of analysis - a grid cell.

Construction: We generate our measure of potential borders following a two-step procedure: (i) we identify a center for each ethnicity and (ii) we construct the Voronoi partition based on these centers and a notion of distance. In order to understand our construction of potential borders, let's exemplify the construction of the instrument in a simplified world. Figure 3 depicts on a grid of cells a two dimensional squared world with two ethnicities A and B. The homeland of ethnicity A is shown as the region in blue (NW-SE line pattern) and the one of ethnicity B in red (NE-SW line pattern). The true ethnic border between A and B is depicted in purple. Given these conditions, the centers of these homelands are shown as points x_A and x_B. If we use the Euclidean distance as our notion of distance, the unique Voronoi partition generated by the centers x_A and x_B splits the world in the two depicted rectangular Voronoi regions separated by the black line depicting the Voronoi border, i.e., the potential ethnic border. It is important to note, that given the shape of the world, the distance function, and the centers x_A and x_B, the Voronoi partition and consequently the Voronoi borders *are independent* of the precise shape of the actual ethnic borders, any characteristics of these ethnicities, their homelands or subregions within their homeland. In particular, notice that the location of the Voronoi border is constructed independently of any characteristic of grid cells, which suggests that potential borders are orthogonal to the characteristics of our unit of analysis.

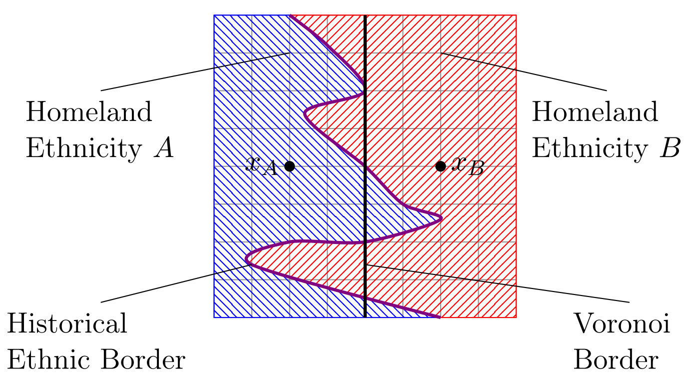


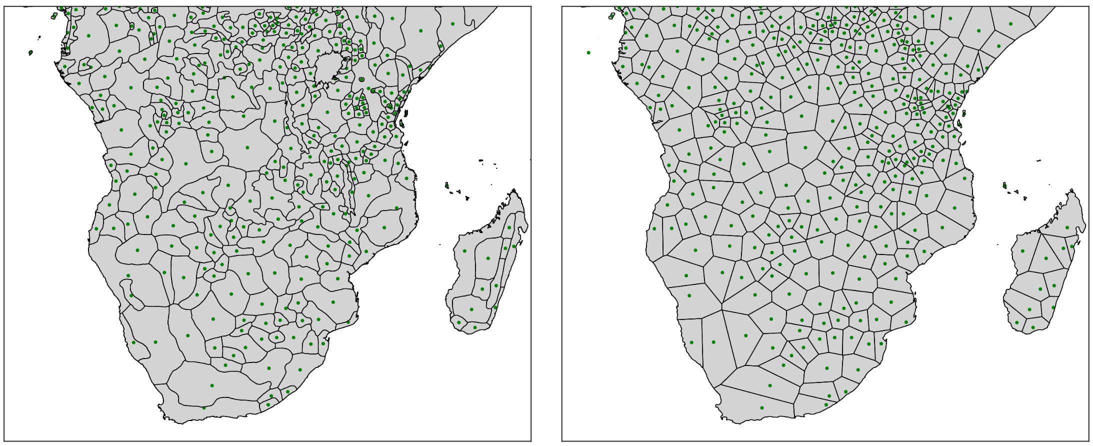
Figure 3: Potential Border Construction: A Simplified Example

Clearly, there are many potential locations that could be taken as centers of an ethnic group including its most important city, its most densely populated location, or its earliest populated location. Nonetheless, using this type of locations may not be feasible due to lack of data (e.g. archaeological or historical) for all ethnic groups or may create endogeneity concerns due to the direct effects that some of these characteristics may have on conflict. Thus, we use locations that may be plausibly exogenous and should have high predictive power. Specifically, for our main analyses, we use the geographical centroid of each historical ethnic homeland, i.e., the location identified by the average latitude and longitude of all points in the homeland, as the centers for the construction of the Voronoi partition.[27]

Based on these centroids and using geodesic distances, we construct the unique Voronoi partition

[27] Appendix D presents some properties of Voronoi partitions, which may be useful to understand its stability and global properties. We exploit some of these in variations of our instrument.

of Africa to create our main instrumental variable. Figure 4(a) depicts for each ethnic group in the southern part of Africa its historical ethnic border and centroid. Additionally, Figure 4(b) depicts the centroids and the unique potential (Voronoi) ethnic borders associated with them. Visual inspection suggests a positive correlation between the location of historical and potential ethnic borders, suggesting that potential borders predict the location of historical ethnic borders. We explore this association more formally in the next subsection.



(a) Historical Borders & Centroids of Ethnic Homelands

(b) Potential Borders & Centroids of Ethnic Homelands

Figure 4: Historical Ethnic Borders, Centroids and Potential (Voronoi) Borders in Africa

Addressing Measurement Error in the Murdock Map: As discussed above, one major source of bias is the potential for significant non-classical measurement error in the representation of ethnic homelands in Murdock's Map. Since our Voronoi borders serve as an additional noisy representation of these homelands, they help us address this problem. In particular, instrumenting one noisy measure with another can correct this bias (Hausman, 2001). Moreover, by using various different types of extensive and intensive measures of historical ethnic and Voronoi borders, we can explore the impact of varying the measurement error and its type. In this setting, we cannot point-identify our parameter of interest, but the OLS and IV estimates provide set-identification, where the value of the parameter of interest lies between these two estimates (Black et al., 2000). Below we show that our main results are not affected by different combinations of extensive or intensive measures of the endogenous and instrumental variables (see, e.g., Appendix E.9). Since the results are robust to these choices, but the interpretation and comparability of the coefficient is simpler when using extensive measures, we use them in our main specifications throughout the body of the paper. Within this setting, we further explore the role of measurement error by varying the size of the grid-cells used in the analyses. Moreover, we use alternative sources (ethnic maps and geocoded ethnographic databases) to construct alternative Voronoi borders or directly as instruments to explore this issue further. The results are again qualitatively similar and will be discussed further below in our robustness discussion.

Plausible Exogeneity: Given a set of centroids, the associated Voronoi partition is a global property of their spatial distribution (i.e., their number and location), while centroids themselves are a global

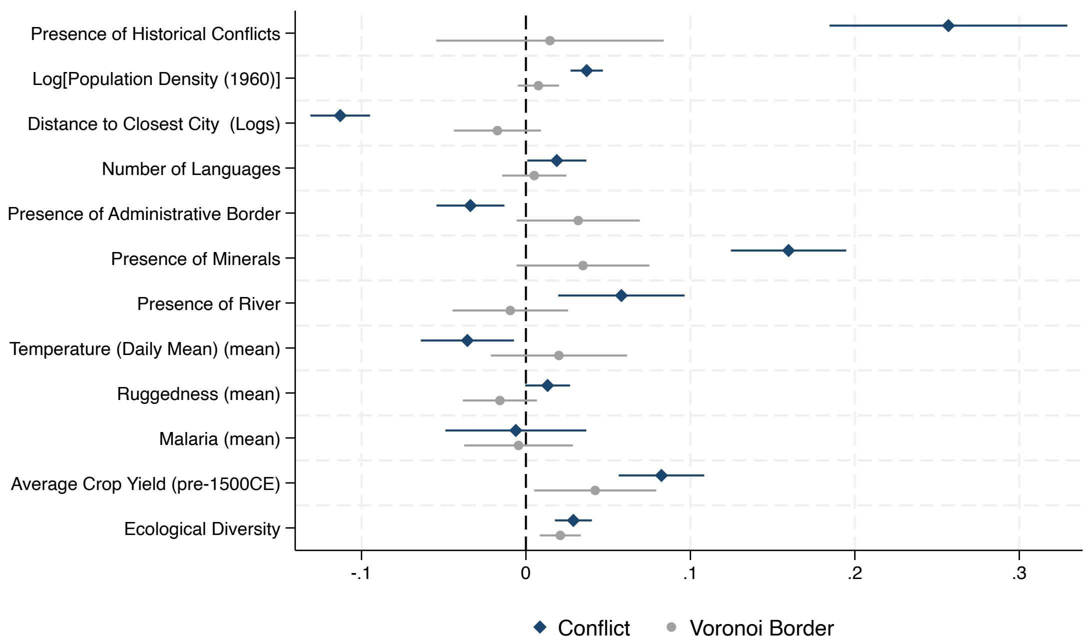


Figure 5: Conditional Association of Correlates of Conflict with Conflict and Potential Ethnic Borders

property of the ethnic homelands. Thus, our measures of potential historical ethnic borders (i.e., Voronoi borders) at the cell-level should be theoretically orthogonal to cell-level characteristics (e.g., population density, isolation, history, etc.). Moreover, by accounting for country and ethnicity fixed effects, as well as the latitude and longitude of each grid cell, our analysis strengthens the plausibility of the (conditional) exogeneity assumption of the instrument. While our main objective with the IV is to address measurement error, we assess the validity of this argument by performing the following analysis: we identify a list of correlates of conflict that have been proposed in the literature, and explore whether they correlate with the presence of a Voronoi border. Reassuringly, as we show in Figure 5, these correlates predict conflict in our sample. More importantly, we find that these correlates have very weak associations with our instrument. Specifically, Figure 5 shows the standardized estimated conditional correlation between these correlates and the location of conflict and Voronoi borders, after accounting for country and ethnicity fixed effects, and latitude and longitude. The estimates depicted in Figure 5 provide supporting evidence for the plausibility of the (conditional) exogeneity of our instrument. In particular, the location of historical conflicts as identified in Besley and Reynal-Querol (2014) is strongly associated with contemporary conflicts, and is not significantly correlated with our instrument.[28] Moreover, our instrument is not significantly associated with key correlates of conflict, such as population density, proximity to populated places, number of languages, malaria suitability, and the presence of minerals, as well as characteristics that may act as de facto or de jure borders, like rivers and subnational administrative borders. Furthermore, the estimated coefficients suggest

[28] Using Brecke (1999)'s conflict catalogue, Besley and Reynal-Querol (2014) identified the specific geographical location of different conflicts between African actors and between African and Non-African actors for the period 1400-1700. Brecke (1999) documents all violent conflicts in which 32 or more people died.

very small effect sizes. While these results support the plausible exogeneity of our instrument, we nonetheless account for a comprehensive set of geographical characteristics of the cells (including those presented in Figure 5) and show in the Appendix and robustness sections that our results are not affected by the inclusion of drivers of conflict.

4.2 Historical Ethnic and Voronoi Borders - The First Stage

We now establish that our instrument is a strong predictor of historical ethnic borders. Indeed, in Table 1 we explore the statistical relationship between the presence of a Voronoi border and the presence of a historical ethnic border under different econometric specifications. In column 1 we show that a grid intersected by at least one Voronoi border is, unconditionally, 32 percent more likely to host an actual historical ethnic border. This association is strongly statistically significant as reflected by a First-Stage F-statistic of 196. The predictive power of Voronoi borders remains strong and statistically significant as we sequentially add country fixed effects (column 2), and ethnicity fixed effects (column 3). Consistent with our discussion in the previous subsection, the addition of an expanded set of geographical and climatic controls in columns 4 and 5 has almost no effect on the estimated first-stage relationship. The First-Stage F-statistic for the specification with the full set of controls remains remarkably high. Moreover, once we control for country and ethnicity fixed effects, the point estimate for the presence of a Voronoi border remains virtually unaltered as we add different geographic and climatic controls. This suggests that once we control for unobserved country and ethnic characteristics our instrument is nearly orthogonal to geographic and climatic characteristics of the grid cell.

Table 1: Murdock's Ethnic Borders and Voronoi Ethnic Borders
Instrumental Variable Analysis (First-Stage)

	Presence of Ethnic Border				
	(1)	(2)	(3)	(4)	(5)
Presence of Voronoi Border	0.326***	0.273***	0.125***	0.111***	0.107***
	(0.018)	(0.019)	(0.021)	(0.019)	(0.018)
Country FE	No	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes
Geographic Controls	No	No	No	Yes	Yes
Climatic Controls	No	No	No	No	Yes
Adjusted-R^2	0.11	0.15	0.68	0.70	0.71
Observations	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. The set of geographic controls are: absolute latitude, longitude, elevation above sea level, and the mean and standard deviation of caloric agricultural suitability; and the set of climatic controls includes: the mean and standard deviation of temperature and precipitation.

Robustness: Given the fundamental role centroids play in the construction of our instrument, we next study the sensitivity of our first-stage results to the choice of center and the method for construction of the Voronoi borders. To explore this issue, we follow various strategies. First, we vary the choice of central location, so that instead of using the geometric centroid within the homeland (i.e., the mean latitude and longitude) based on the Murdock map, we use either (i) the core locations of ethnicities in the precolonial era as identified in the Ethnographic Atlas (Murdock, 1967) and the Atlas of Precolonial Societies (Müller, 1999), (ii) the core locations of ethnicities circa 1960 as depicted in GREG (Weidmann et al., 2010); (iii) the centroid of the cell in the homeland in the Murdock map that produces the maximum calories using only 1 crop (Galor and Özak, 2016), and (iv) the centroid of the cell in the homeland that produces the maximum average calories using all available crops (Galor and Özak, 2015). These analyses allow us to explore the sensitivity of our results to changing the number and location of centroids. In particular, it mitigates any concerns due to the potential mechanical relation between geometric centroids and homelands.

Additionally, we exploit structural properties of the distribution of Voronoi borders generated by the shape of the African continent and the number of ethnic groups. Given the number and general location of ethnic groups and the shape of the continent, not all cells have an equal probability of hosting borders. So, first, we randomize the location of the centroid within each homeland and construct the associated Voronoi partition. We repeat this procedure 10,000 times to estimate the propensity of cells to host Voronoi borders. Unlike our randomization inference below, where (Voronoi) border status is randomized, this randomization *does not* randomize this treatment, but identifies the probability of hosting a Voronoi border given the general location and number of ethnic groups and the shape of the continent (i.e., probability of treatment). Specifically, if in all randomizations a cell hosts a Voronoi border, it suggests that one cannot create a Voronoi partition of Africa without assigning a border to it. We use this probability of hosting a Voronoi border as an instrument for the location of historical ethnic borders. While this instrument addresses concerns about the choice of location of the centroid *within* a homeland, one may still be concerned by the fact that we took the spatial distribution of ethnicities as given. So, we also randomize the location of centroids without imposing constraints in terms of their spatial distribution. This allows us to construct a similar propensity to host a Voronoi border, which we employ as an IV.

Table 2 shows the first-stage results of using the Voronoi borders generated by these alternative central locations or our propensity measure as an instrument for historical ethnic borders. We present three panels showing the results without controls (Panel A), with fixed effects (Panel B), and finally with fixed effects and our full set of basic controls (Panel C). Our main results remain qualitatively unchanged. In particular, the estimates are similar across instruments, and conditional on our set of fixed effects, additionally controlling for geography and climate has virtually no effect on them.[29]

[29]We also replicate these analyses using data from GREG as our measure of the historical ethnic borders with similar results (Table E.11). Additionally, we vary how given the centroid we compute the location of Voronoi borders. In particular, instead of using geodesic distances, which assume geography and climate do not affect mobility, we employ migratory distances based on the Human Mobility Index (Özak, 2010, 2018). Reassuringly, as established in Table E.10 the results remain unchanged. These results suggest that Voronoi borders are good predictors of historical ethnic borders *independently* of the choice of centroid and Voronoi construction method. Appendix E.1 presents further robustness analyses. In particular, in Table E.44 we estimate all possible combinations for the first-stage by permuting our three measures of prevalence and intensity of historical ethnic borders as well as their three counterparts based on Voronoi borders. All specifications in Table E.44 account for the full set of controls as before. Tables E.45 and E.46 replicate the analysis of Table 1 using the number and total length of Voronoi borders as predictors of the presence of historical ethnic borders, respectively. We find that our two measures of the intensive margin of Voronoi borders are indeed strong and statistically significant predictors of the presence of historical ethnic borders based on the Murdock's map.

Table 2: Murdock's Ethnic Borders and Voronoi Ethnic Borders
First-Stage (Robustness to Construction)

	Presence of Ethnic Border							
	Main	Atlas	EA	GREG	CSI	CSIMEAN	Random Within	Random Across
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A: No Controls							
Presence of Voronoi Border	0.326***	0.253***	0.248***	0.212***	0.207***	0.220***	1.186***	1.073***
	(0.018)	(0.017)	(0.018)	(0.021)	(0.021)	(0.022)	(0.080)	(0.039)
	Panel B: Fixed Effects							
Presence of Voronoi Border	0.125***	0.110***	0.122***	0.118***	0.097***	0.099***	0.945***	1.077***
	(0.021)	(0.020)	(0.023)	(0.025)	(0.020)	(0.020)	(0.039)	(0.066)
	Panel C: All Controls							
Presence of Voronoi Border	0.107***	0.091***	0.104***	0.098***	0.078***	0.080***	0.851***	0.984***
	(0.018)	(0.017)	(0.019)	(0.022)	(0.017)	(0.017)	(0.041)	(0.056)

Notes: This table shows the robustness of the first-stage to choice of centroids for the construction of the Voronoi borders used as instruments. Columns (1)-(6) use different specific centroids to construct Voronoi borders. Column (1) replicates our the main strategy using the geometric centroid. Columns (2)-(4) use the centroid of each ethnicity taken from other major ethnographic datasets: Atlas (Müller, 1999), Ethnographic Atlas - EA (Murdock, 1967), GREG (Weidmann et al., 2010)). Columns (5) and (6) use the most agriculturally productive locations in a homeland, which produce the maximum amount of calories with a unique crop (CSI) or the maximum average number of calories across all suitable crops in the region (CSIMEAN). Finally, columns (7) and (8) compute the propensity of a cell to host a Voronoi border when centroids are randomly located within the homeland (column 7) or across the continent (column 8). Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

5 Empirical Results

5.1 Historical Ethnic Borders and Conflict - Main Result

In this section, we establish that the presence of historical ethnic borders predicts the prevalence of contemporary conflict in Africa (Hypothesis H1). In Table 3 Panel A we present OLS estimates for the association between an indicator for the occurrence of non-civil conflict, as well as measures of its intensity, and the presence of historical ethnic borders in the grid cell, while accounting for country and ethnicity fixed effects, and our main set of geographic and climatic characteristics.[30] In particular, column (1) shows the conditional relationship between the prevalence of conflict and the presence of historical ethnic borders accounting only for country and ethnicity fixed effects. The estimated coefficient is statistically significant at the 1 percent level and is consistent with an economically significant effect of the presence of historical ethnic borders. In particular, grids with a historical ethnic border are 7.2 percentage points more likely to have at least one conflict during our period of analysis (i.e., 1997-2014). Accounting additionally for geographic and climatic controls has little effect

[30] In order to ease comparison with previous work on conflict we carry out our empirical analysis on 50km×50km grid cells and exploit conflict data from ACLED. Nonetheless, below we present robustness checks to using alternative conflict data and different grid cell sizes.

Table 3: Historical Ethnic Borders and Conflict
Main Result

	Conflict				
	Prevalence		Intensity		
	Presence		Events	Years	Fatalities
	(1)	(2)	(3)	(4)	(5)
	Panel A: OLS				
Presence of Ethnic Border	0.072***	0.059***	0.127***	0.012***	0.066**
	(0.016)	(0.015)	(0.029)	(0.003)	(0.027)
Adjusted-R^2	0.32	0.32	0.37	0.36	0.34
	Panel B: IV				
Presence of Ethnic Border	0.274***	0.273***	0.534***	0.044***	0.519***
	(0.064)	(0.066)	(0.136)	(0.014)	(0.128)
First-stage F-statistic	35.03	34.14	34.14	34.14	34.14
Adjusted-R^2	0.30	0.30	0.35	0.35	0.32
Country FE	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes
Observations	14078	14078	14078	14078	14078
Mean Prevalence	0.22	0.22	0.36	0.03	0.32

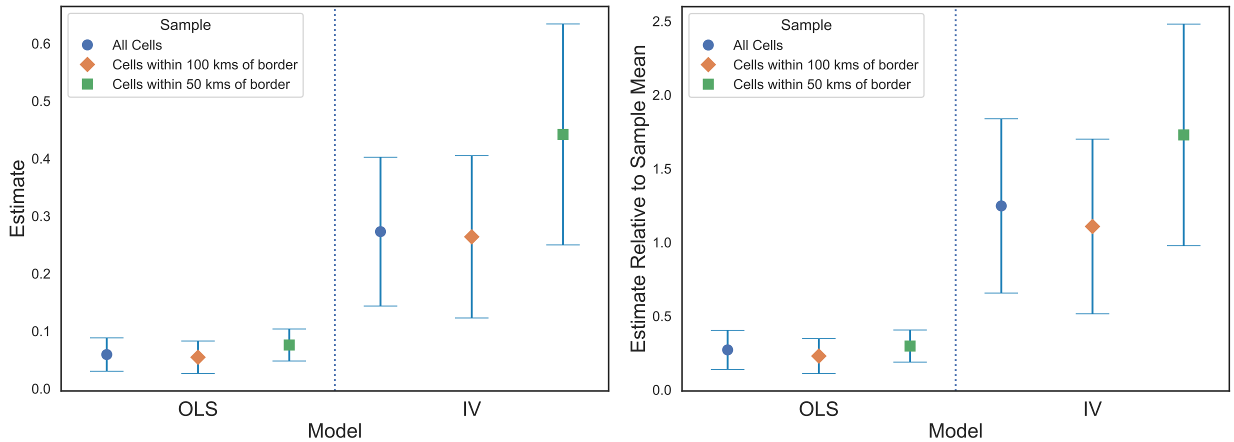
Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main controls are all the geographical and climatic controls included in Table 1. Intensive measures of conflict have been log-transformed.

on the estimated coefficient. Moreover, as shown in Figures 6(a)-6(b), constraining the analysis to cells located within 100 or 50 kms of the border does not change the quantitative results and mitigates concerns that the our previous results were driven by comparisons across distant cells. This also holds when using smaller 10×10km cells (Figures 6(c)-6(d)). In columns (3) to (5), we use three alternative dependent variables accounting for the intensive margin of conflict during our period of analysis: the log-number of conflict events (column 3), the fraction of years with at least one conflict event (column 4), and the log-number of casualties associated with these events (column 5).[31] Regardless of the dependent variable used, we find that the prevalence of historical ethnic borders is a strong and statistically significant predictor of conflict.[32]

[31]Log-transforming the dependent variable facilitates the interpretation of the point estimates for prevalence of ethnic borders as standard semi-elasticities.

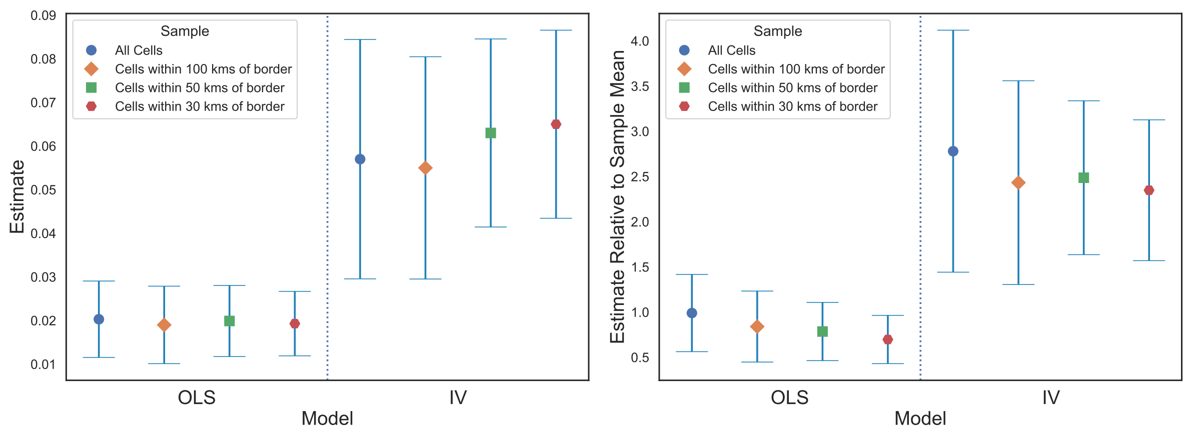
[32]We also explore the relation between intensive measures of exposure to historical ethnic borders and conflict. In particular, in Tables E.42-E.43 we study the prevalence of conflict, accounting for the full set of controls, but replacing the measure of the extensive margin of historical ethnic borders for two measures of its intensive margin in each grid: total length of historical ethnic borders and total number of historical ethnic borders (both variable in logs). We find that the two measures of intensity of borders are strongly and statistically associated with an increase in the prevalence of conflict. Additionally, in Table E.12 we replicate the analysis of Table 3 using an alternative source for ethnic borders. Specifically, we use the ethnic borders from GREG (Weidmann et al., 2010), which depict the location of homelands circa 1960. Reassuringly, we obtain qualitatively similar results.

50 × 50 kms Cells



(a) OLS and IV estimates (b) OLS and IV estimates relative to mean

10 × 10 kms Cells



(c) OLS and IV estimates (d) OLS and IV estimates relative to mean

Figure 6: Historical Ethnic Borders and Conflict in Africa - Border Adjacent Regions

While the previous results are consistent with a positive impact of historical ethnic borders on contemporary conflict, the estimated coefficients might be biased. Indeed, historical ethnic borders are unlikely to be randomly assigned, while Murdock's map may contain non-trivial measurement error. To alleviate these concerns, we employ the theory-based instrumental variable strategy introduced in section 4. In Table 3 Panel B, we present our main results, where we instrument the potentially endogenous presence of historical ethnic borders based on Murdock's map with the presence of Voronoi borders based on centroids. First, columns 1 and 2 present the results for the prevalence of conflict as we add different set of controls. Column 1 accounts only for country and ethnicity fixed effects, while column 2 additionally accounts for the set of geographical and climatic controls. The estimated coefficient in both columns is basically identical, providing further support to the view that the location of Voronoi borders is mostly orthogonal to cell-level characteristics as discussed in the last part of section

4.1. Figures 6(a)-6(d) provide further evidence on this, by constraining the analysis to cells located within 100, 50, or 30km of the border, showing no quantitative changes in estimates for cells of size 50×50 (and 10×10). Second, columns 3, 4, and 5 show the results for the 3 measures of intensity of conflict (the number of conflict events, fraction of years with at least one conflict, and number of conflict-related fatalities, respectively) when accounting the full set of controls. Our IV results indicate a sizable economic impact of borders: hosting a historical ethnic border increases the prevalence of conflict by 27 percentage points (column 2) which is larger than the mean value of prevalence of conflict in our sample. While not perfectly comparable due to methodological differences, the magnitude of our estimates is inline with previous work on the drivers of conflict in Africa. Case in point, Berman et al. (2017) find that the activation of a mineral mine increases the probability of conflict in one year by 11 percentage points,[33] while Michalopoulos and Papaioannou (2016) find that partitioned ethnicities experience a 6 percentage point increase in the prevalence of deadly violence, and Berman et al. (2019) find that a one-standard deviation increase in fertilizer prices increases the probability of conflict in 6 percentage points. When compared with its OLS counterpart, IV point estimates are roughly four times larger. This inflation in the IV coefficient is consistent with our presumption that attenuation bias due to non-classical measurement error in our historical ethnic borders from Murdock's map was likely to be sizable. Moreover, omitted historical factors that may have codetermined the location of ethnic borders and the incentives for peaceful coexistence between ethnic groups (such as trade, inter-ethnic marriage) would also bias the OLS estimates towards zero. Nonetheless, the results in Figure 6 suggest it is unlikely that unobservables drive our results.

The impact of historical ethnic borders on the intensity of conflict is also statistically and economically important regardless of the measure of conflict intensity we use. Indeed, the presence of a historical ethnic border increases the number of conflict events and fatalities by 53 (column 3) and 52 (column 5) percent, respectively. We also find that the presence of historical ethnic borders increases by 4.4 percentage points the fraction of years with at least one conflict (column 4), which represents almost three additional years of conflict in the sample period under analysis.[34]

In Table E.1, we compare the IV estimates based the various alternative instrumental variables introduced in section 4.2. Again, the results suggest a significant effect of historical ethnic borders on contemporary conflict. Moreover, as can be seen by comparing the results of Panels B and C, conditional on country and ethnicity fixed effects, accounting for geographical and climatic characteristics of a cell does not affect the estimates, further providing support for our identification strategy.[35]

Robustness: Our core results shown in Table 3 are robust to a battery of sensitivity checks (see Appendix E). First, in Appendix E.1, we show that our results are robust to the selection of the central

[33]Remarkably, when exploring the robustness of our main results to other sources of conflict, Table E.40, we find a very similar estimate for the effect of the presence of mines: a 14 percentage point increase in the prevalence of conflict in cells that host a mine.

[34]Importantly, using the intensive Voronoi border measures as an instrument generates similar results. In particular, Table E.47 replicates IV estimations of our main specification in Table 3 Panel B using the number as well as the total length of Voronoi borders as instruments for the presence of historical ethnic borders. The IV point estimates in all specifications are similar to those in Table B.

[35]Tables E.1-E.7 replicate our main results in Table 3 for the different instruments. The qualitative nature of the results does not change, although the estimated coefficients are usually larger.

location as well as Voronoi construction. Second, in Appendix E.2, we address concerns regarding inference, sampling of countries, and measurement error. Third, in Appendix E.3, we show that our results are robust across conflict data sources and grid sizes used in the empirical analysis. Fourth, in Appendices E.4 and E.5, we also study the potential confounding effect of disease, climate, mobility, isolation, and accessibility to water. Fifth, in Appendix E.6, we show that our results are not driven by the presence of rivers, coasts, and other types of borders (either geographic, ecological, or administrative) that may confound the presence of historical homeland boundaries as documented in Murdock's map. Sixth, in Appendix E.7, we explore the robustness of our results to accounting for other sources of conflict, such as presence of minerals and oil. Finally, in Appendix E.8, we perform a randomization inference analysis. All these robustness tests suggest that there exists a robust link between historical ethnic borders and conflict as shown in our main analysis.

5.2 Mechanisms

In the previous section we have documented a strong statistically and economically significant association between the presence of historical ethnic borders and the prevalence and incidence of contemporary non-civil conflict in Africa. While we have strived to show that the estimated coefficient can be given a causal interpretation, we have not yet shown *why* or *how* historical ethnic borders cause conflict. This section presents evidence for our hypothesized causal mechanisms (see Section 2) through which historical ethnic borders affects contemporary conflict. As a first step, we establish that historical ethnic borders play a larger role in the onset of conflict and the prevalence of conflict related to land, authority, and territorial demarcation, as hypothesized in our conceptual framework. Based on this result, we explore the role of historical conflict, contemporary ethno-linguistic diversity, the heterogeneous characteristics of borders, population pressure, and cultural similarities as potential key mechanisms.

Types and Causes of Conflict (Hypothesis H1.A): In section 2, we hypothesized that historical ethnic borders drove contemporary conflict due to poor demarcation, weak (ethnic) property rights, and encroachment. Thus, we expect borders to have an especially strong effect on conflicts caused by land, territorial, authority, and ethnic issues with no clear interference from national governments. Moreover, while these small-scale conflicts may escalate to the national level, we expect conflicts to start at borders more often. To explore these possibilities, we further take advantage of the richness of the available conflict datasets to compute measures of prevalence of conflict across additional types of conflict: local, ethnic, and land conflict as explained in section 3.1. Additionally, we use data from the UCDP Non-state Conflict Issues and Actors Dataset (Von Uexkull and Pettersson, 2018), which identifies for a subset of conflicts from the UCDP PRIO dataset the causes of the conflict.[36] This data identifies (i) authority conflict between groups when there are competing claims over who exerts control through the state apparatus or informal power structures; (ii) territorial conflict related to the

[36]The data includes only conflicts in the period 1989-2011 and we focus on those conflicts which do not include the government nor any type of organized group. These so called communal conflicts are very local in their nature and thus may allow us to better understand the role of historical ethnic borders. Although this category of conflict is more restricted and presents a substantially smaller prevalence in our sample (only 5 percent of our grids experienced at least one of these conflict events), this dataset allows us to distinguish between conflict issues related to land, especially territory and authority, and other issues.

control or use of the land, but not authority over other warring faction. Moreover, the data identifies two additional subcategories of causes of conflict, namely borders and territorial disputes, and religion. We also identify the initial location of each conflict in the UCDP-PRIO dataset to construct measures of the likelihood of conflict onset and their number in a cell.

Table 4: Historical Ethnic Borders and Conflict (IV)
Effect on Conflict Type & Cause

	Prevalence of Conflict							Onset	
	Local	Ethnic	Land	Territory	Authority	Border & Territorial	Religious	Onset	Number of onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Presence of Ethnic Border	0.194***	0.130***	0.046**	0.065*	0.044*	0.071***	-0.001	0.079***	0.075***
	(0.066)	(0.049)	(0.020)	(0.039)	(0.023)	(0.027)	(0.005)	(0.025)	(0.023)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	34.14	34.14	34.14	16.34	16.34	16.34	16.34	34.14	34.14
Mean Prevalence	0.16	0.07	0.03	0.04	0.02	0.03	0.01	0.03	0.03
Adjusted-R^2	0.28	0.28	0.17	0.31	0.34	0.31	0.41	0.15	0.18
Observations	14078	14078	14078	9973	9973	9973	9973	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main controls are all the geographical and climatic controls included in Table 1. Number of onsets has been log-transformed.

Table 4 replicates our main analysis for these various types of conflict. Columns 1-6 establish that historical ethnic borders have a large and statistically significant effect on these types of conflict. In particular, the estimated effect is 20-100% larger than the mean prevalence of these types of conflicts. Specifically, the increase in ethnic conflict due to the presence of historical ethnic borders (i.e., 13 percentage points) roughly doubles the mean prevalence of ethnic conflict. Interestingly, we find that conflict about religious issues does not seem to be linked to the presence of historical ethnic borders (column 7). Moreover, we find that the probability of a conflict starting in a location is 3 percent, and increases by 8 percentage points at borders. Similarly, the number of conflicts that start in a cell increases by 8 percent if it hosts a historical ethnic border (Hypothesis H1.B). These results support our view that historical ethnic borders play a fundamental role in conflicts related to land, border, and authority issues, as well as in their ignition.

Persistence of Historical Conflict (Hypothesis H1.C): One may think that what underlies our estimated relation between historical ethnic borders and contemporary conflict is the effect of the former on conflict in the past, which persisted into the contemporary era. Indeed, there is evidence that historical conflict breeds contemporary conflict (Besley and Reynal-Querol, 2014). Nonetheless, as discussed above, the historiography of Africa indicates that pre-colonial conflict was not driven by the quest to control land but people (Englebert et al., 2002; Herbst, 1990, 2000), i.e, that territorial demarcation was irrelevant in the past. In Columns 1 and 4 in Table 5, we explore these two possibilities. As hypothesized in our conceptual framework, column 1 shows that historical ethnic borders do not predict the location of historical conflict. Yet, we do find that historical conflict does predict contemporary conflict in our sample (column 4), without affecting our estimated effect of borders on contemporary conflict. Additionally, in column (5), we explore the heterogeneity across borders and historical conflict location by exploring their interaction. Clearly, locations that have historical ethnic borders and historical conflict may have more contemporary conflict if the sources of contestation persisted, or could in fact have less conflict in the contemporary era if historical conflict resulted in better defined borders and the resolution of the historical causes of disputes. The estimated interaction is negative and large (decreasing the effect of historical borders by about 40% and of historical conflict by about 37%), although statistically insignificant (reflecting that very few locations in our data had both historical conflict and borders). This result suggests that the persistence of conflict is not a major mechanism behind our result.

Table 5: Historical Ethnic Borders and Conflict (IV)
Potential Mechanisms: Historical Conflict and Contemporary Ethnic Diversity

	Potential Mediating Channel			Prevalence of Conflict					
	Historical Conflict	Number of Languages	Ethno-linguistic Fraction-alization	Historical Conflict		Number of Languages		Ethnoliguistic Fractionaliza-tion	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Presence of Ethnic Border	0.001	0.017	0.463***	0.272***	0.275***	0.272***	0.287***	0.259***	0.294***
	(0.016)	(0.148)	(0.167)	(0.066)	(0.066)	(0.066)	(0.064)	(0.066)	(0.071)
Potential Mechanism				0.239***	0.312***	0.012	-0.048**	0.029***	-0.022
				(0.033)	(0.108)	(0.009)	(0.022)	(0.006)	(0.029)
Presence of Ethnic Border					-0.114		0.104***		0.090**
× Potential Mechanism					(0.167)		(0.032)		(0.045)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	34.14	34.14	34.14	34.09	16.87	34.11	20.72	33.69	20.55
Adjusted-R^2	0.06	0.65	0.45	0.31	0.31	0.30	0.30	0.31	0.29
Observations	14078	14078	14078	14078	14078	14078	14078	14078	14078

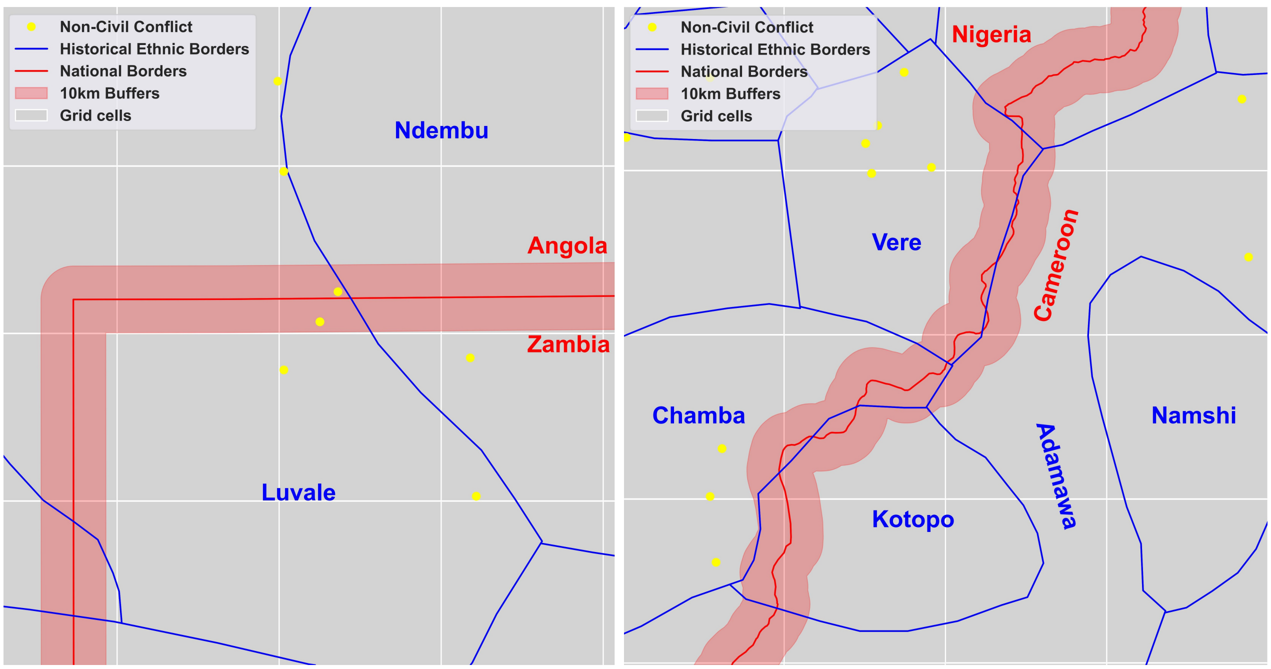
Notes: Potential mechanisms are normalized to have mean 0 and standard deviation 1. So in columns (2)-(3), the coefficient shows the number standard deviations the outcome variable changes when a border is present. In columns (4)-(9) the coefficient on the potential mechanism shows the effect of increasing it by 1 standard deviation. In columns (7) and (9) the interaction effect takes a value equal to zero at the mean of the potential mechanism, i.e., the main effect of the presence of the border reflects the estimate at the mean. Changes in the potential mechanism are in standard deviations relative to the mean. So, in columns (7) and (9), values below the mean decrease the effect of borders and values above the mean increase it. Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Inter-Ethnic Diversity (Hypothesis H1.D): There is a large literature claiming the positive effect of ethnic diversity on modern conflict. We next analyze whether ethnic diversity is a key underlying mechanism for our results. After all, one may expect a strong correlation between the presence of a historical ethnic border and the presence of multiple groups today. To explore the role of diversity in our results, for each cell we compute the number of languages that are present in it using data from the Ethnologue (Lewis et al., 2009), and its implied ethnic fractionalization in the cell using 1960's population data. To simplify the interpretation of our estimates, we normalize these measures to have mean zero and standard deviation equal to one. Columns (2) and (3) in Table 5 show that the presence of a historical border does not affect the number of languages present in a cell, but increases ethnic fractionalization by half-a-standard deviation. This result suggests that it is not the contemporary number of groups that changes, but the composition of the population close to the border, i.e., the probability that two randomly chosen individuals speak different languages. This is in line with the results shown in Figure 2(b), where diversity increased close to these borders. Columns (6) and (8) in Table 5 show that accounting for these measures of ethnic diversity does not affect our results (albeit our estimate decreases by 5% when controlling for ethnic fractionalization).[37] To explore the relation further, we also study whether the presence of a historical ethnic border exacerbates the effects of ethnic diversity on conflict, as well as whether more ethnically diverse borders have more conflict. Columns (7) and (9) show the results when we include the interaction of our measures of ethnic diversity and ethnic borders. The estimated effect of the interaction is positive, economically and statistically significant, suggesting that increasing ethnic diversity by one standard deviation in a cell that hosts an ethnic border increases the probability of conflict by about 10 percentage points. Importantly, since our measures of ethnic diversity are normalized, including the interaction does not affect our estimate of the main effect of historical ethnic borders, which shows the estimated effect of borders at the mean level of ethnic diversity (Balli and Sørensen, 2013). In particular, the results in column 9 imply that the probability of conflict would fall by 9 percentage points (to 0.204) in cells that host an ethnic border and have fractionalization one standard deviation below the mean, while those with fractionalization one standard deviation above the mean would have 9 percentage points higher probability of conflict (i.e., 0.384). Moreover, and interestingly, the estimate of the main effect of diversity is negative in both columns (7) and (9), suggesting that diverse locations, without an ethnic border, have less conflict. These results suggest that although ethnic diversity is higher around historical ethnic borders, it is not the fundamental mechanism underlying our results. On the contrary, it seems to be the presence of ethnic borders which drives the effect of diversity.

Type of Historical Ethnic Borders: In section 2, we argued that the presence of valuable natural resources is conducive to overlapping claims at historical ethnic borders (Hypothesis H1.E). Thus, we hypothesized that these claims, and ultimately violence, are exacerbated due to the fuzziness (Hypothesis H1.F) and lack of de jure nature of these borders (Hypothesis H1.G). We next delve deeper into these issues by looking at the characteristics of historical ethnic borders, which may reinforce or mitigate the causes underlying conflict. In particular, we focus on three aspects of historical ethnic borders: (i) the presence of valuable natural resources at the border (e.g., presence of agriculturally suitable land, minerals, or oil), (ii) their congruence with observable and immutable geographical characteristics (e.g., rugged terrain, or rivers), and (iii) their congruence with national or administrative

[37] Table F.1 shows that similar results hold when using other measures of ethnic diversity or its determinants.

borders. Importantly, our analysis is not the usual cell-level interaction analysis, which may confound the differing effects of local characteristics or congruence. Figure 7 illustrates this issue, by depicting cells that host both historical ethnic borders and contemporary national borders. In Figure 7(a), these borders are non-congruent, so that national borders split ethnicities, not resolving contestation issues, and potentially exacerbating conflict (Michalopoulos and Papaioannou, 2016). In Figure 7(b), national and ethnic borders are "congruent", which we hypothesize may resolve contestation issues, decreasing the probability of conflict. Clearly, other characteristics we study are subject to similar confounding issues.[38]



(a) Non-Congruent (b) Congruent

Figure 7: Historical Ethnic Borders & National Borders

To explore these heterogeneous effects, we compute very local statistics of the prevalence of these characteristics based on a small buffer around the border within a cell. In particular, for valuable resources and non-linear features (e.g., ruggedness), we compute the presence or mean value within a 2.5km-buffer around the historical ethnic border. This allows us to capture the very local characteristics at the border and differentiate it from the characteristics of the cell in which the border is located. We follow a similar procedure for linear features (e.g., rivers, administrative and national borders), we construct a buffer of 10km around the linear feature and compute the length of the border that falls within this buffer. We then normalize this length by the length of the historical ethnic border within a

[38]E.g., our strategy mitigates the potential role of rivers to cause conflict due to running from one ethnic homeland into another generating an upstream/downstream relations between ethnic groups (Toset et al., 2000), i.e., when rivers and borders are non-congruent. In particular, it has been argued that an upstream/downstream relationship has a higher conflict potential. For example, if the upstream actor restricts the supply of water, the downstream actor has strong incentives to initiate conflict. On the other hand, the downstream actor can restrict navigation for its upstream counterpart, increasing the conflict incentives for the later.

cell to proxy for the share of the historical border that is congruent with the linear feature.[39] This helps us to differentiate situations in which historical ethnic borders and some linear feature (e.g., a national border) are present in a cell, but are not congruent. Figure 7 gives an idea of the construction of this measure. Figure 7(a) shows an example when national and ethnic borders are non-congruent, so that only a small share of the length of the border between the Luvale and the Ndembu is contained in the buffer. Figure 7(b) shows a case in which there is congruence, all of the border between the Adamawa and Vere, as well as the border between the Chamba and Kotopo is contained in the buffer, and thus we can expect these historical ethnic borders to be hard (de jure). Although potentially mismeasured, this should proxy for the similarity in the shape of the ethnic border with these linear features.[40] To ensure that our measure at the border is not simply reflecting the effect of these characteristics, we always control for its level in a cell. For completeness, and to better understand the role of this potential confounding effect, in Panel A in Table 6, we present the traditional interaction analysis for these measures, while, in Panel B, we explore the effects of local characteristics of borders or their congruence with linear features.

Table 6 shows the results of these analyses. In all columns the association between conflict and historical ethnic borders remains positive and significant. Columns 1-3 show the heterogeneous effect of the presence of valuable natural resources at the border (Hypothesis H1.E). They suggest that the presence of valuable resources at historical ethnic borders, especially land highly suitable for agriculture and minerals, exacerbates conflict. These results echo the findings of Berman et al. (2017) and Berman et al. (2019) which also provide evidence for the effect of the presence of minerals and agricultural productivity on conflict. Interestingly, we document a smaller and statistically insignificant effect of the presence of oil, which may reflect the fact that a large proportion of oil fields in Africa are located on the coast, especially in the case of Subsaharan Africa (see Figure A.6(e)).

In columns 4 and 5 we explore the heterogeneous effect of characteristics that facilitate demarcation and observability (Hypothesis H1.F). In contrast to our hypothesis, the results in column 4 show that terrain ruggedness around the border is conducive to more conflict. This result is in line with the strategic and military importance of elevated and rugged areas, which are more difficult to control and provide safe-heavens for warring factions, and thus may be subject to more conflict (Fearon and Laitin, 2003). Therefore, our estimate may reflect these two opposing forces, being the latter the one prevailing. Additionally, in column 5, we do not find that our measure of congruence with rivers mitigates conflicts, contrary to our hypothesis (Section 2). This may reflect that our proxy for the congruence of rivers and borders is mismeasured, or the fact that even if no measurement error were present, rivers at borders may have dual effects. On the one hand, rivers are economically and strategically valuable, which may increase conflict at rivers. On the other, rivers may make borders less fuzzy, as they improve demarcation, which should lead to less conflict.

In columns 6 and 7, we next explore whether the congruence of historical ethnic borders and

[39] To instrument these measures we follow a similar procedure using buffers around our instrument, i.e., Voronoi borders.

[40] Given the nature of the historical ethnic borders and the Murdock map, it may be the case that although an actual ethnic border overlaps a linear feature exactly, it is misrepresented in the map. Our strategy tries to recover this potential overlap.

Table 6: Historical Ethnic Borders and Conflict (IV)
Potential Mechanisms: Heterogeneity at Borders

	Prevalence of Conflict						
	Resources			Hard vs. Soft		De Facto vs. De Jure	
	CSI	Minerals	Oil	RIX	River	Adm1 Border	National Border
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Interactions without Local Effects or Congruence							
Presence of Ethnic Border	0.276***	0.275***	0.269***	0.270***	0.272***	0.230**	0.172*
	(0.067)	(0.065)	(0.072)	(0.068)	(0.065)	(0.092)	(0.094)
Presence of Ethnic Border × Characteristic	-0.018	-0.097	0.030	0.009	0.043	0.064	0.145**
	(0.049)	(0.083)	(0.109)	(0.020)	(0.064)	(0.059)	(0.059)
First-stage F-statistic	13.47	16.50	17.43	14.91	18.71	22.03	21.02
Adjusted-R^2	0.30	0.31	0.30	0.30	0.30	0.30	0.31
Panel B: Local Effects and Congruence							
Presence of Ethnic Border	0.271***	0.245***	0.267***	0.234***	0.280***	0.432***	0.415***
	(0.066)	(0.067)	(0.070)	(0.066)	(0.068)	(0.117)	(0.130)
Characteristic at Border	0.005***	0.190**	0.071	0.045***	-0.002	-0.070**	-0.057*
	(0.002)	(0.084)	(0.110)	(0.011)	(0.024)	(0.032)	(0.033)
First-stage F-statistic	16.98	17.26	17.89	16.89	23.01	21.58	17.83
Adjusted-R^2	0.30	0.31	0.30	0.31	0.30	0.29	0.29
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Effect of Characteristic in Cell	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main controls are all the geographical and climatic controls included in Table 1. Characteristic at border refers to very local statistics of the prevalence of these characteristics based on a small buffer around the border within a cell. See text for construction and discussion. All columns control for cell-level values of the same characteristic.

contemporary de jure borders lowers conflict (Hypothesis H1.G). In particular, as discussed in section 2, we expect historical borders that closely follow contemporary de jure borders to be less conducive to conflict as the authority and territorial issues underlying the demarcation of ethnic homelands may have been resolved in these locations. In line with this hypothesis, we find that historical ethnic borders that coincide with those of subnational administrative units correlate less with modern conflict (Panel B Column 6). In particular, if 50% (i.e., 3 standard deviations) of a historical ethnic border coincides with an administrative border, conflict prevalence would fall by 21 percentage points, i.e., it would decrease the effect of historical ethnic borders by half. This sheds light on the importance of the institutional demarcation as a tool for mitigating conflict. This result echoes the findings of Bazzi and Gudgeon (2021), who find that "[r]edrawing district borders along group lines reduces conflict".

In line with the above discussion, the results in column 7 in Panels A and B show that the joint presence of historical ethnic and contemporary national borders has two very distinct effects depending on their congruence or lack thereof. On the one hand, regardless of how congruent they are, if the two types of borders are present, the presence of a national border increases the prevalence of conflict in locations that also host a historical ethnic border. This is consistent with the ethnic partitioning effect of national borders (Michalopoulos and Papaioannou, 2016). On the other hand, the more congruent both types of borders are, the less conflict there is at historical ethnic borders, which is consistent with the beneficial effect of the modern institutionalization of historical ethnic borders (Hypothesis H1.G).[41]

Two key insights emerge from this analysis: (i) the more valuable the region around the border, the more conflict there is; and (ii) formalizing ethnic property rights can be instrumental to reducing these types of conflicts.

Table 7: Historical Ethnic Borders and Conflict (IV)
Potential Mechanism: Growth in Population Density (1960-2005)

	Prevalence of Conflict				
	Non-Civil	Local	Ethnic	Land	Border & Territorial
	(1)	(2)	(3)	(4)	(5)
Presence of Ethnic Border	0.240***	0.164**	0.118**	0.035*	0.067**
	(0.071)	(0.065)	(0.047)	(0.021)	(0.026)
Presence of Ethnic Border × Growth Population Density	0.080***	0.075**	0.031**	0.029***	0.014*
	(0.031)	(0.030)	(0.015)	(0.011)	(0.008)
Growth Population Density	0.010	0.007	-0.000	-0.002	-0.003
	(0.010)	(0.009)	(0.004)	(0.003)	(0.002)
Country FE	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes
Log[Population Density 1960]	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	11.98	11.98	11.98	11.98	6.08
Mean Prevalence	0.22	0.16	0.07	0.03	0.03
Adjusted-R^2	0.32	0.30	0.29	0.18	0.31
Observations	14078	14078	14078	14078	9973

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Growth in Population Density is computed for the period 1960-2005. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3. Growth in population density at the border based on a small buffer around the border within a cell. See text for construction and discussion.

[41] As explained above, our measure prevents the analysis of capturing the effect of national borders on conflict due to ethnic partitioning. While national borders may be present in the cell and cut ethnic borders, causing ethnic partition, our measure only focuses on overlaps between ethnic and national borders (i.e., captures if they run parallel to each other). Moreover, we explore whether split ethnicities or ethnicities whose neighbors are split drive our main results (Table E.18). Reassuringly, the results are similar for split and non-split ethnicities, as well as for ethnicities that are not split and which do not have split neighbors.

Population Pressure (Hypothesis H1.H): Having established the link between historical ethnic borders, agriculturally suitability, and land-related conflicts in the previous subsections, we next show that population pressure at historical ethnic borders aggravate conflict. To do so, we use the grid level data on population from HYDE (Klein Goldewijk et al., 2011) for various years to compute levels and growth of population densities across time. In Table 7, we explore the effect of historical ethnic borders and population growth on various types of conflicts (non-civil, local, ethnic, land-related, and border & territory). Since the effect of population pressure, as measured by population growth, may depend on initial conditions at the cell-level, in all columns we not only account for the growth in population density between 1960 and 2005, but also for the level of population density in 1960. As in the previous analysis, we normalize these values to have mean zero and standard deviation equal to one. This ensures that our main effect does not change and is comparable to our previous estimates, and that interactions are easily interpretable as deviations above or below the mean (Balli and Sørensen, 2013). Specifically, the results in column (1) suggest that cells that host a historical ethnic border, and experienced the average growth in population density, had 24 percentage points higher probability of conflict than cells with similar growth but without a border. Moreover, cells that host borders, but had growth rates of population density above the mean have a higher probability of conflict. In fact, if population density grew 3 standard deviations more than average would have 48 percentage points higher probability of conflict if they host a border. On the contrary, in cells that grew 3 standard deviations below the mean, we would not expect any conflict even in the presence of a border. Similar results hold in the other columns, suggesting that historical ethnic borders that experienced a larger increase in population density have also experienced a higher prevalence of conflict. Importantly, as shown in Table F.4 it is the recent growth in population density that drives this result. Indeed, population density growth at the border between 1800 and 1900 does not seem to generate more conflict, and it is only growth post-1950 that seems to increase conflict prevalence. While we acknowledge the limitations of these historical population figures (especially pre-1950) as well as the potential endogeneity of population growth to conflict and ethnic border status, the results echo Herbst (1990)'s narrative on scarcity of land in rural areas being a contemporaneous issue.[42]

Cultural Similarities at the Border (Hypothesis H1.I): Given our previous results, which suggest that competition for agricultural resources and territory in newly populated areas have been conducive to conflict at ethnic borders, we test our last hypothesis that ethnic similarity at the border, either in subsistence strategies or culture, should intensify conflict. To explore the role of ethnic similarities and complementarities in both cultural and economic traits across the historical ethnic borders, we match ethnicities in Murdock's map with the Ethnographic Atlas (Murdock, 1967) and languages from the Ethnologue (Lewis et al., 2009) to compute several measures of economic, cultural, and linguistic distances across the historical ethnic borders. Specifically, we compute measures of similarity in subsistence strategy, linguistic distances for various levels of aggregation of the language tree coded

[42] In Herbst (1990)'s words "Due to high population growth and the low carrying capacity of much of the land in Africa, there are now far fewer empty areas into which people can move [...] The land frontier has all but closed. The specter of a land shortage is a dramatic development because as late as two generations ago Africa was characterized by small concentrations of people surrounded by large amounts of open land."

in Ethnologue, as well as cultural distances based on the Ethnographic Atlas.[43] The construction requires a match of ethnic groups between these various datasets, which cannot be fully accomplished based on current available matches (Fenske, 2014). Thus, we restrict our analysis only to those cells within 100 kms of an ethnic border in which both ethnic groups have been matched. These similarity measures at the cell-level represent the mean across all pairs of ethnicities that share a border within it.

Table 8: Historical Ethnic Borders and Conflict (IV)
Effect of Cultural Distances

	Prevalence of Conflict						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.596***	0.607***	0.603***	0.585***	0.621***	0.620***	0.610***
	(0.110)	(0.113)	(0.116)	(0.114)	(0.125)	(0.120)	(0.114)
Cultural Distance (Subsistence)		-0.206***					
		(0.044)					
Cultural Distance (Subsistencec)			-0.149***				
			(0.036)				
Linguistic Distance (Level 6)				-0.121***			
				(0.032)			
Linguistic Distance (Level 15)					-0.214***		
					(0.051)		
Cultural Distance (All)						-0.262***	
						(0.060)	
Cultural Distance (All85)							-0.255***
							(0.057)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	29.11	31.69	27.61	30.12	27.72	32.05	33.35
Mean Prevalence	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Adjusted-R^2	0.20	0.24	0.22	0.22	0.23	0.25	0.25
Observations	5242	5242	5242	5241	5241	5242	5242

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table 8 shows the results of this analysis. Importantly, even in this restricted sample that constrains

[43] We employ variables v1-v5 in the Ethnographic Atlas, which provide measures of the share of subsistence coming from hunting, gathering, fishing, herding and agriculture. We compute cosine distances based on the ordinal levels of all these variables (Subsistence Column 2 in Table 8), as well as pairwise Euclidean distances based on the cardinal levels of all these variables (Subsistence Column 3). We follow the literature and compute linguistic distances as the share of non-common nodes in the language tree (Fearon, 2003). We compute two measures based on all variables in the Ethnographic Atlas. The first employs all questions, including question with no data, where we treat missing data as a category in itself. The second employs only variables where at least 85% of the ethnicities have data. We compute cosine distances based on the answer categories of all these variables. By construction cell inside the homeland without borders have distance zero.

the analysis to closely located cells, our main result holds (column 1). Additionally, the table establishes that the more dissimilar ethnicities are on both sides of the border, the less conflict there is. In particular, columns 2-3 show that the larger the differences in economic subsistence strategy between ethnicities, the lower the probability of conflict. In other words, if two ethnic groups across the border rely on a similar type of economic subsistence strategy (e.g., agriculture), they will be more likely to fight. In columns 4 to 7 we employ different measures of cultural and linguistic distances and obtain similar results. Moreover, as shown in Tables F.5-F.6, the results are robust to the specific measures employed. The pattern in the data is clear and suggests that the more alike two groups are, the higher the probability of conflict at the border.

6 Concluding Remarks

This research explored the contribution of historical ethnic borders to contemporary conflict in Africa. We hypothesized that the fuzziness and porosity of these borders lead to contemporary disputes over land and territory. Our empirical analyses suggest that the intensive and extensive margins of contemporary conflict are concentrated in the proximity of these borders. Our results survive a large set of robustness checks, and suggest a sizable and significant effect. We document that the presence of these borders is especially important for non-civil, local, and ethnic conflicts, as well as disputes over territory and authority. Moreover, we present evidence that their role is amplified at borders that host valuable natural resources, have experienced a recent increase in population, and in which culturally similar ethnicities interact. Finally, we provide evidence suggesting that formalizing historical ethnic borders, by changing their de facto nature into actual de jure borders, e.g., by converting them into administrative borders, may mitigate conflict.

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Online Appendix (Not for Publication)

Available for download here

(De facto) Historical Ethnic Borders andContemporary Conflict in Africa

by

Emilio Depetris-Chauvin ⓡ and Ömer Özak

Online Appendix

Table of Contents

A Additional Figures

A.1 Share of Ethnic Population in Homeland (Afrobarometer)

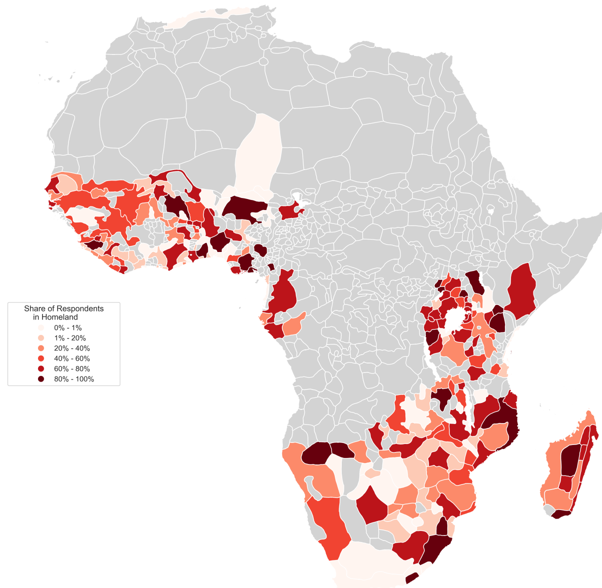
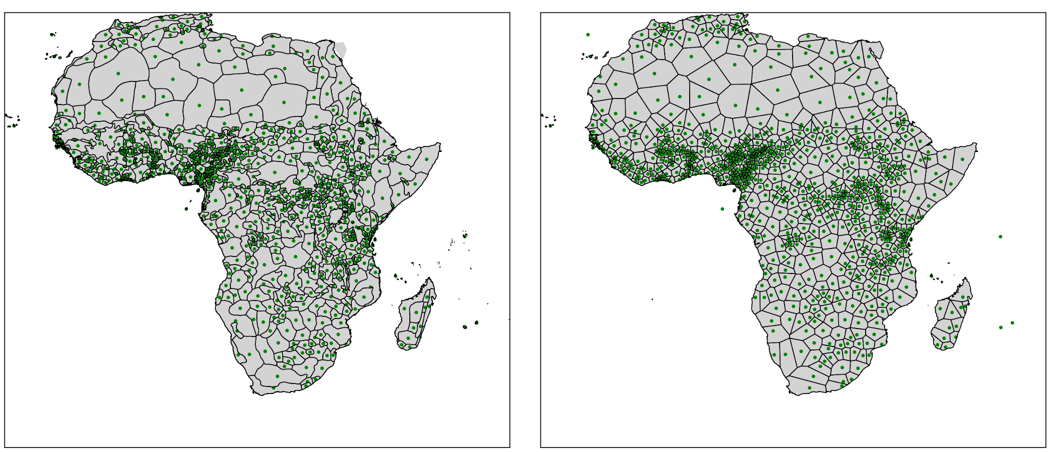


Figure A.1: Share of Ethnic Population in Homeland

A.2 Historical Ethnic and Voronoi Borders

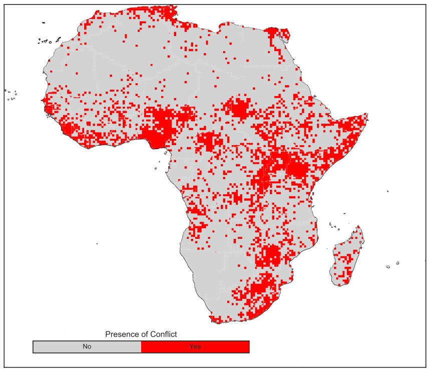


(a) Historical Borders & Centroids of Ethnic Homelands

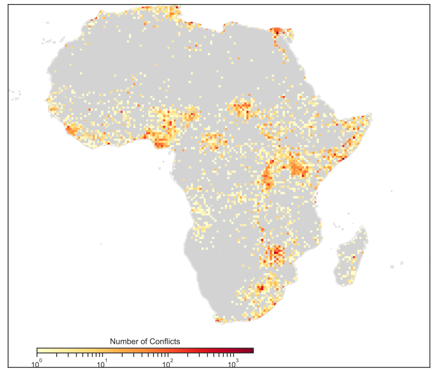
(b) Potential Borders & Centroids of Ethnic Homelands

Figure A.2: Historical Ethnic Borders, Centroids and Potential (Voronoi) Borders in Africa

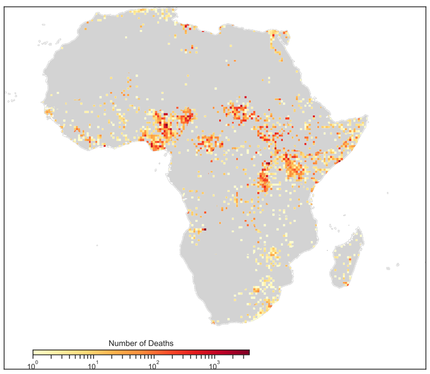
A.3 Spatial Distribution of Conflict



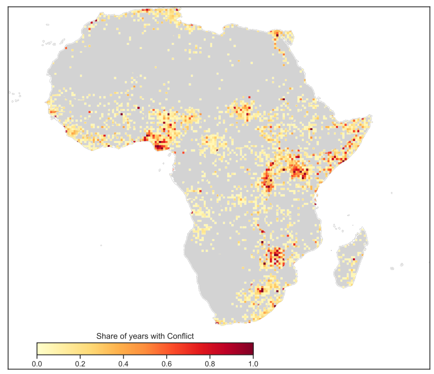
(a) Prevalence



(b) Number of Events

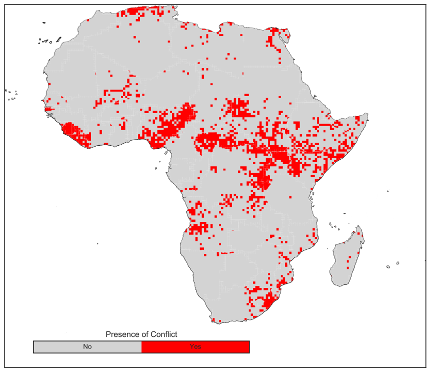


(c) Number of Deaths

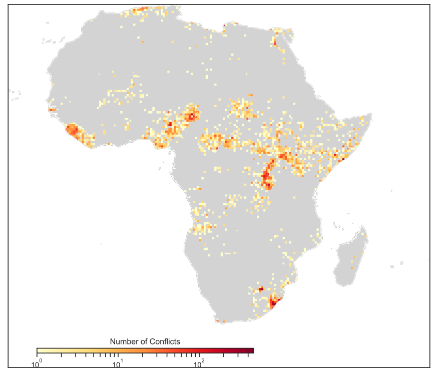


(d) Share of Years with Conflict

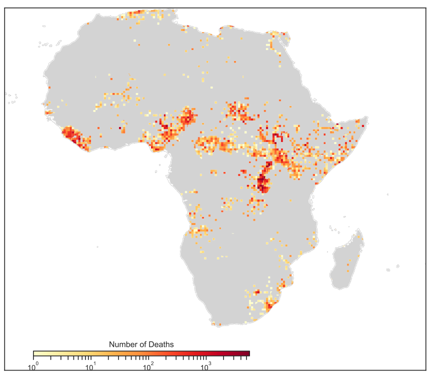
Figure A.3: Conflict in Africa (ACLED)



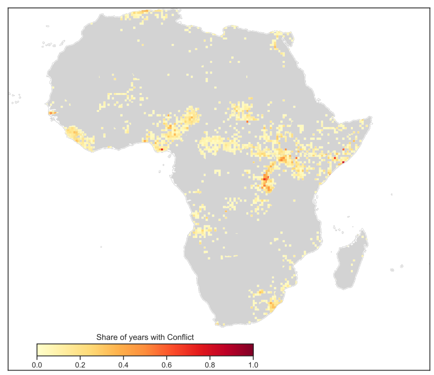
(a) Prevalence



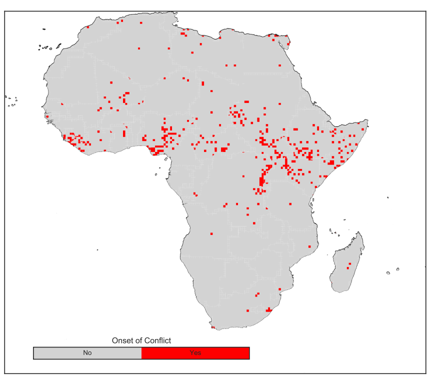
(b) Number of Events



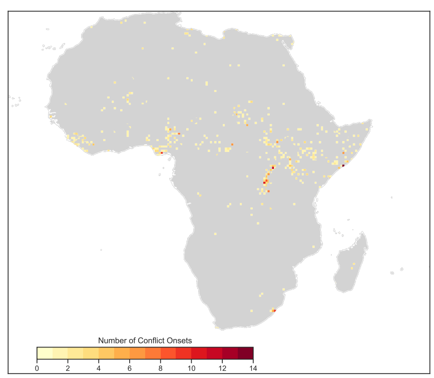
(c) Number of Deaths



(d) Share of Years with Conflict



(e) Prevalence of Conflict Onsets

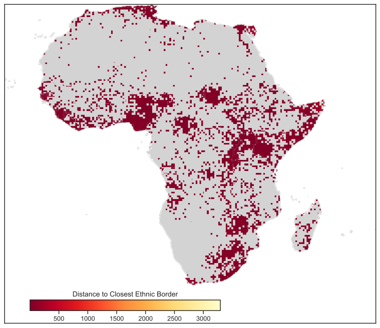


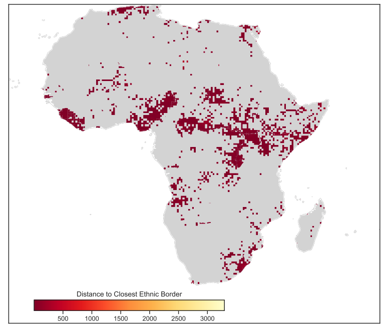
(f) Number of Conflict Onsets

Figure A.4: Conflict in Africa (UCDP-GED)

A.4 Conflict and Proximity to Historical Ethnic Borders

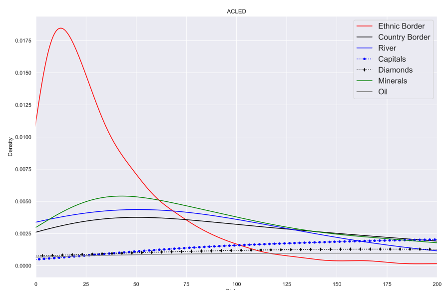
Figure A.5 presents some descriptive statistics and associations between historical ethnic borders and contemporary conflict. Specifically, Figures (a1) and (a2) depict for each cell that experienced conflict according to ACLED and PRIO, its distance to the closest historical ethnic border, where darker tones denote smaller distances. Clearly, most cells in Africa that experienced conflict are a short distance from a historical ethnic border. Figures (b1) and (b2) show additional patterns consistent of the potential link between historical borders and conflict. In particular, these figures show the distribution of distances between cell's centroids and some of the main sources of conflict identified in the literature. It is apparent that conflict occurs closer to historical ethnic borders than to any of these other sources. Figures (c1) and (c2) show the distribution of distances to historical ethnic borders for cells that experienced conflict and those which did not. The difference in these distributions is quite noticeable and suggests that locations close to a historical ethnic border are more prone to conflict. This is further supported by Figures (d1) and (d2), which depict the probabilities of conflict across cells with and without historical ethnic borders. Clearly, cells with historical ethnic borders have a much higher probability of contemporary conflict.

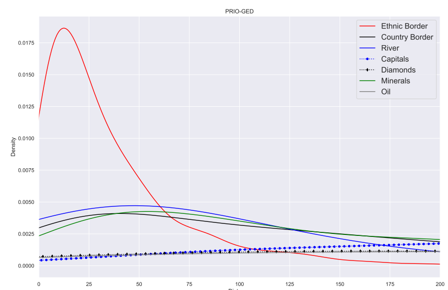




(a1) ACLED (a2) PRIO

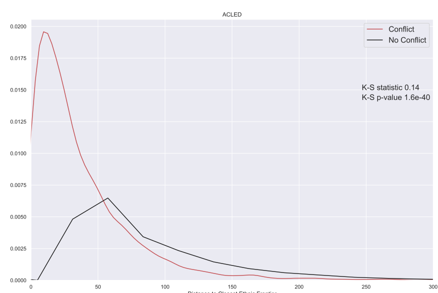
(a) Distance to Closest Ethnic Border

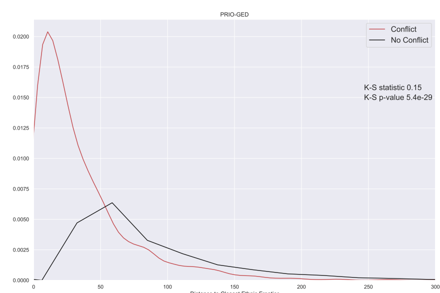




(b1) ACLED (b2) PRIO

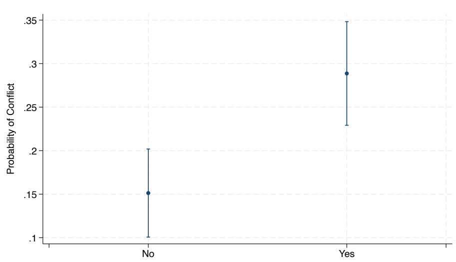
(b) Density of Distances to Sources of Conflict

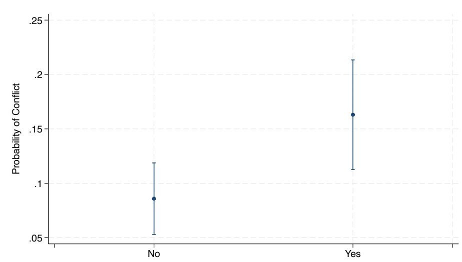




(c1) ACLED (c2) PRIO

(c) Distribution of Distances to Closest Ethnic Border



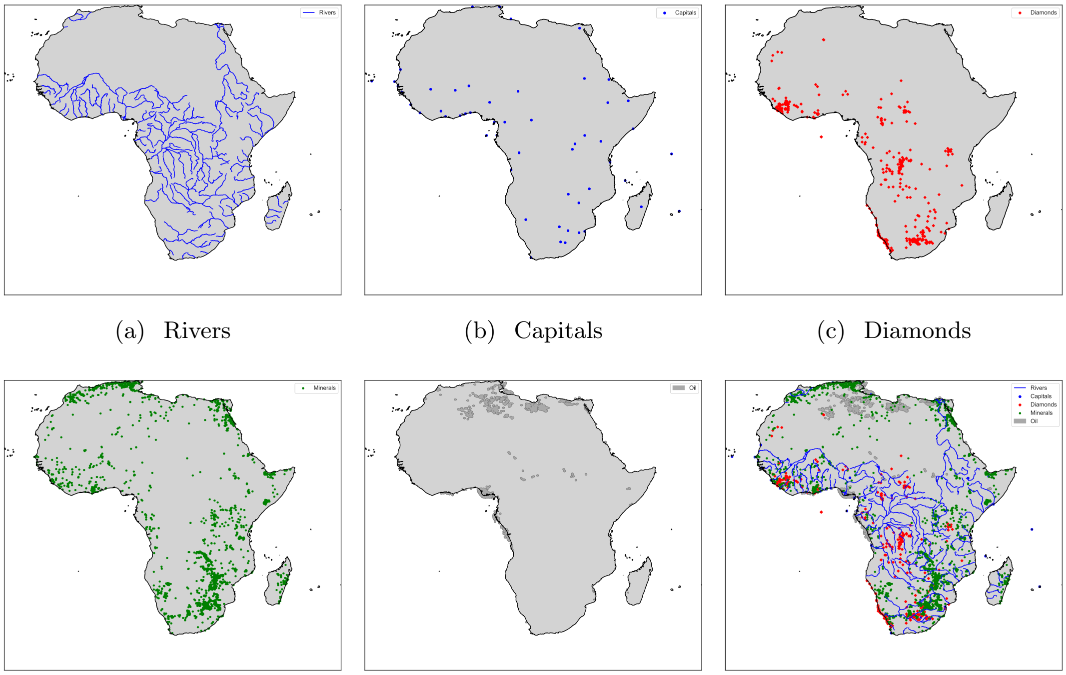


(d1) ACLED (d2) PRIO

(d) Conflict Probability Cells with and without Historical Ethnic Borders

Figure A.5: Ethnic Borders and Conflict in Africa

A.5 Other Sources of Conflict

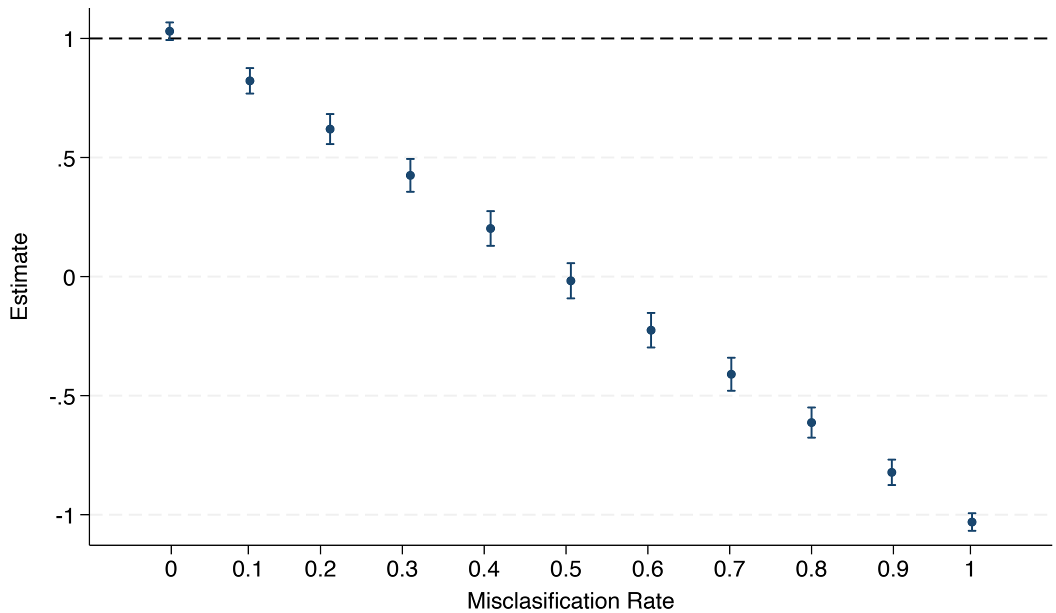


(a) Rivers (b) Capitals (c) Diamonds

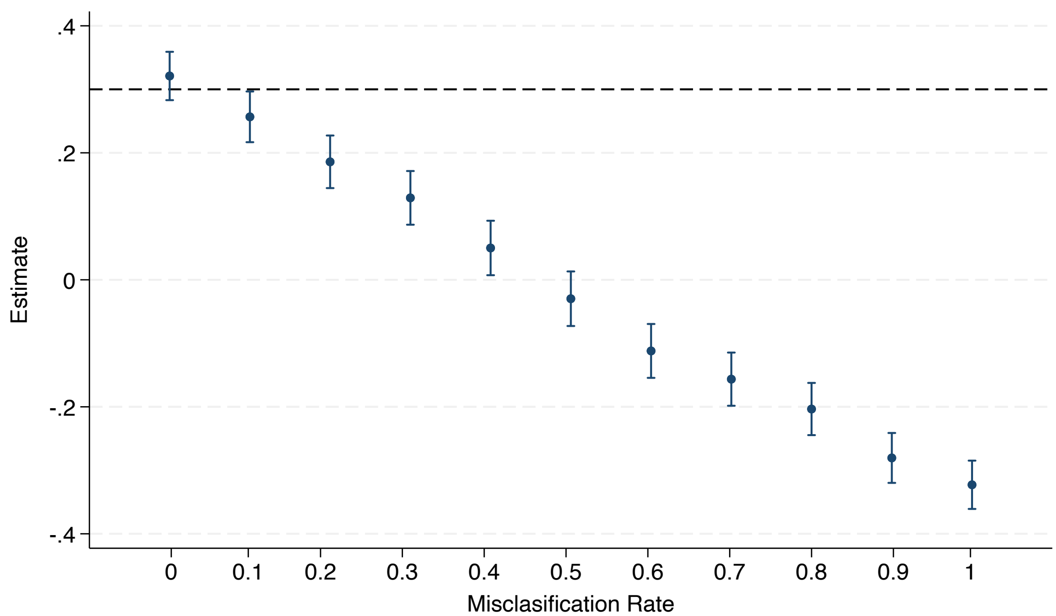
(d) Minerals (e) Oil (f) All

Figure A.6: Location of Other Potential Determinants

B Simulations of the Effect of Non-Classical Measurement Error on Estimates



(a) True Parameter is 1



(b) True Parameter is 0.3

Figure B.1: Simulated Estimates of the Effect of Border on Conflict in the Presence of Non-Classical Measurement Error (50% of Cells have Borders)

C A Model of Ethnic Borders

This section presents a model of ethnic border formation. The model provides a framework for predicting the location of borders in a world where geography, institutions, culture and history do not matter. Thus, giving us a framework for the construction of a theoretical instrumental variable for the location of ethnic borders, which we use in the empirical analysis. The model is similar to the one presented in Spolaore (2009), but generalizes it by allowing for a larger number of ethnic groups, a higher dimensional geographical space, and an endogenous choice of location by each population.

C.1 Basic Setup

Consider a world with three ethnic groups (A, B, C) of equal size, normalized to 1. Each ethnicity i decides simultaneously its homeland's center x_i in a circular world X of size $3R$. Given these locations, each ethnic group i decides the amount of territory around x_i it wants to control. Let T_i denote the size of ethnicity i's territory, so that

$$T_A + T_B + T_C = 3R. \tag{2}$$

The territory between any pair of ethnicities i and j is valuable to them since it contains resources (land, water, other natural resources) that can be used by either one of them to produce output. We assume that this territory is of economic interest only to i and j, so that only these two neighboring populations have an incentive to exploit and control it. This assumption is equivalent to assuming that weapon technology is such that ethnicities can only exert control on areas that are contiguos to their center location. Since we are interested in modeling conditions in Africa during the pre-colonial era, this does not seem too strong an assumption. Without loss of generality, we assume that each unit of territory produces 1 unit of output. Thus, the amount of output that can be produced on the territory between any pair of ethnicities is equal to its size R_{ij}. Thus,

$$R_{AB} + R_{BC} + R_{CA} = 3R. \tag{3}$$

Figure C.1 depicts the world for a given set of location choices and territorial control.

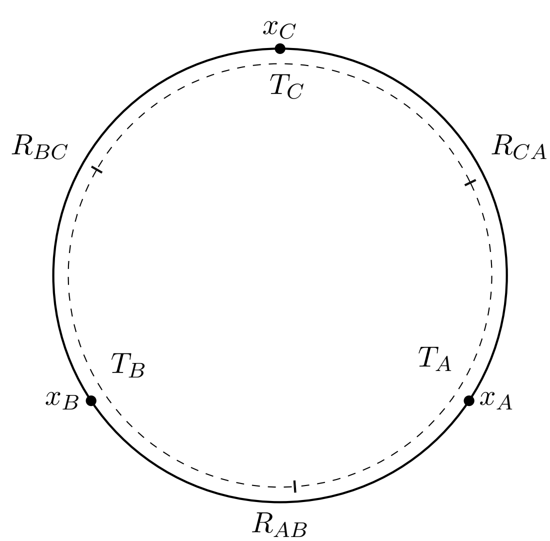


Figure C.1: A world with three ethnicities

In order to control some territory, each ethnicity needs to spend resources to build their military capabilities (i.e., weapons). Ethnicities allocate the output of their territory between consumption (C_i) and weapons (W_i). Thus, each ethnicity's consumption is

$$C_i = T_i - W_i. \tag{4}$$

We assume that weapons are not easily mobile and thus ethnicities allocate weapons to each region they want to control. Thus, the total number of weapons built by ethnicity i is

$$W_i = W_{ij} + W_{ik}, \tag{5}$$

where W_{ij} is the amount of weapons built to control the territory between i and j, and similarly W_{ik} is the amount of weapons built to control the territory between i and k. The territory located between any pair of ethnicities i and j, R_{ij}, is divided between them in proportion of their military strength. In particular, following the literature on the subject, we assume that if ethnicity i has an amount of weapons W_{ij} and ethnicity j and amount W_{ji} at its disposal in the territory between them, then the share of the territory controlled by ethnicity i is

$$P(W_{ij}, W_{ji}) = \frac{W_{ij}}{W_{ij} + W_{ji}}. \tag{6}$$

Clearly, this contest success function $P(W_{ij}, W_{ji})$ is increasing in W_{ij} and decreasing in W_{ji}. While $P(W_{ij}, W_{ji})$ can be interpreted as the probability that ethnicity i wins control of the whole territory if there was a conflict between i and j, we assume instead that it reflects the amount of territory each ethnicity naturally dominates given their own and their neighbor's military strength. One possible interpretation is that territorial division between i and j occurs under the threat of conflict, and each obtains a share equal to the one they expect to gain in case of conflict. Clearly, if the spatial reallocation of weapons is costly or if their spatial reach is limited, then ethnicities would locate them at the border in order to protect their homeland. This would explain why conflict should be expected to occur at border locations. Another interpretation is that in each point of the region a small conflict over that piece of territory occurs with the winner of the contest keeping control of that piece of territory. While the ex-post distribution of territory may differ with the one presented below, the ex-ante distribution of territory, as well as allocations of consumption and weapons would be identical. Unlike the previous interpretation, conflict would be expected to be more uniformly distributed. Nonetheless, ethnic homelands would not be expected to be convex sets, making their definition more problematic, especially in an ex-post sense.

We assume that all individuals in each ethnicity i have identical risk neutral preferences over consumption C_i. Thus, the optimal weapons and consumption choices of ethnicity i's representative agent maximize her expected utility, i.e. they solve the following problem:

$$\max \frac{W_{ij}}{W_{ij} + W_{ji}} R_{ij} + \frac{W_{ik}}{W_{ik} + W_{ki}} R_{ik} - W_{ij} - W_{ik}. \tag{7}$$

C.2 Equilibrium

Clearly, her choice W_{ij} is independent of her choice W_{ik} and so we analyze the solution for each pair of ethnicities independently at this stage. In particular, her best response to ethnicity j's weapon choice is

$$W_{ij} = \sqrt{R_{ij} W_{ji}} - W_{ji}. \tag{8}$$

This implies that the equilibrium allocation of weapons for ethnicities i and j is

$$(W^*_{ij}, W^*_{ji}) = \left(\frac{R_{ij}}{4}, \frac{R_{ij}}{4}\right), \tag{9}$$

so that each controls half the territory R_{ij}. By a similar analysis we obtain that the equilibrium for ethnicities i and k is

$$(W^*_{ik}, W^*_{ki}) = \left(\frac{R_{ik}}{4}, \frac{R_{ik}}{4}\right), \tag{10}$$

and each controls half of the territory R_{ik}. Notice that ethnicities allocate more resources to the larger region. Still, the expected amount of conflict is similar in both regions. Importantly, each ethnicity controls the territory closest to its center, i.e. the optimal allocation of territories generates one-dimensional Voronoi regions.[44] In particular, it follows that for each ethnicity i,

$$T_i = \{x \in X \mid d(x, x_i) \leq d(x, x_j), j \neq i\}, \tag{11}$$

where $d(x, x_i)$ the notes the length of the arc between x and x_i. This implies that the territories T_i define a Voronoi partition of the world. The (Voronoi) border between ethnicity i and j, B_{ij}, is given by the intersection between their territories, i.e., $B_{ij} = T_i \cap T_j$.

These results imply that the level of consumption of ethnicity i is

$$C_i = \frac{1}{4}\Big(R_{ij} + R_{ik}\Big), \tag{12}$$

which is increasing in the distance of ethnicity i's center from the center of other two ethnicities. Thus, given the locational choice of j and k, ethnicity i's best response is to choose a location X_i on the circle, such that the regions R_{ij} and R_{ik} satisfy

$$R_{ij} + R_{ik} \geq \max\left\{R^+_{jk}, R^-_{jk}\right\}, \tag{13}$$

where R^+_{jk} is the length of the arc that connects j and k clockwise and R^-_{jk} counter-clockwise. So, in a Nash equilibrium, all locations, x_A, x_B, and x_C satisfy condition (13). It is not difficult to see that the set of Nash equilibria is a continuum, since given a set of Nash equilibrium locations, a rotation around the center of the circle is also an equilibrium. Even if one were to define classes of Nash equilibria based on the angles defining R^+_{AB}, R^+_{BC} and R^+_{CA}, there still exist a continuum of these classes, since given the location of two ethnicities in one of these classes, one can perturb the location of the third and still be in a Nash equilibrium. Nevertheless, there exists a unique class of symmetric Nash equilibria, in which the locations of all ethnicities are such that each is at a distance R from the other.[45] In this

[44]Letting X be a metric space with associated metric d, given a set of N points, $P = \{p_1, \ldots, p_N\}$, the *Voronoi region* associated with point p_i, V_i, is defined by

$$V_i = \{x \in X \mid d(x, p_i) \leq d(x, p_j), j \neq i\}.$$

[45]If locations were chosen sequentially instead of simultaneously, there would be a unique subclass of Nash equilibria, in which the first ethnicity chooses any location on the circle, the second chooses the location directly on the opposite side of the first ethnicity, and the third ethnicity chooses any location between the other two. Thus, e.g., the locations behind the symmetric Nash equilibrium, which has been employed as starting point in many analyses in the literature, would not generate Nash equilibria in this variation of the model.

class of symmetric Nash equilibria, the levels of consumption, weapons and territory are

$$C_A = C_B = C_C = \frac{R}{2}, \tag{14a}$$

$$W_{AB} = W_{AC} = W_{BA} = W_{BC} = W_{CA} = W_{CB} = \frac{R}{4}, \tag{14b}$$

$$R_{AB} = R_{BC} = R_{CA} = R. \tag{14c}$$

C.3 Generalizations

While the previous model is quite specialized given its assumption of only three ethnicities on a circle, it is not difficult to generalize it to consider more interesting settings. First, notice that increasing the number of ethnicities to $N > 3$ on a circle does not affect the optimal weapon allocations for each pair of ethnicities. Thus, equilibrium weapon allocations and borders are similar to the $N = 3$ case. Thus, equilibrium territories in this case would still define a Voronoi partition of the circle. Similarly, the optimal location for ethnicity i would satisfy a more general version of equation (13). Specifically, the best response of ethnicity i to the location of all other $N - 1$ ethnicities has to satisfy

$$R_{i\hat{j}} + R_{i\hat{k}} \geq \max \left\{ R^+_{jk}, R^-_{jk} \right\}, \tag{15}$$

for all $j, k \neq i$, where $\hat{j}$ and $\hat{k}$ are the ethnicities between which ethnicity i chooses to locate. Clearly, the set of Nash equilibria is non-empty and non-unique, since the class of symmetric Nash equilibria, in which $R_{ij} = \hat{R} = 3R/N$ for all i, j is non-empty.

Second, let's generalize the geographical space. In particular, consider the case of $N = 3$ ethnicities on a 2-dimensional sphere X. As in the previous section, we assume that ethnicities can only control regions of the sphere located close to them. Thus, let

$$R_{ij} = \{x \in X \mid d(x, x_i) \leq d(x, x_k) \text{ and } d(x, x_j) \leq d(x, x_k)\} \tag{16}$$

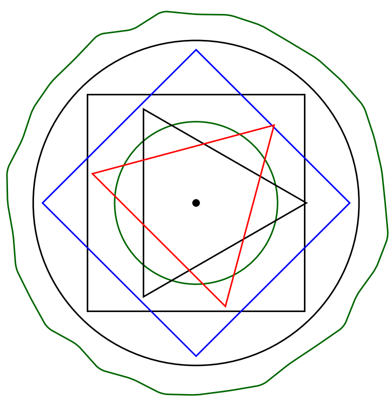
be the region of the sphere that is closer to i and j than to k.[46] Clearly, the results of the previous section generalize *mutatis mutandis* to this setting. Specifically, the optimal choices of weapons would remain unchanged and would imply a Voronoi partition of the sphere based on the location of the ethnicities. Moreover, the location of each ethnicity i has to ensure that the area of R_{ij} and R_{ik} satisfies equation (13), where R^+_{jk} and R^-_{jk} are the areas of the half-spheres defined by the location of ethnicities j and k.

Finally, it should be clear that we can generalize this last result to $N > 3$ ethnicities and $n > 2$ dimensional spheres following a similar procedure to the previous two generalizations. Moreover, since we have worked with an unspecified metric d, it is clear that the choice of metric plays no role in the results.

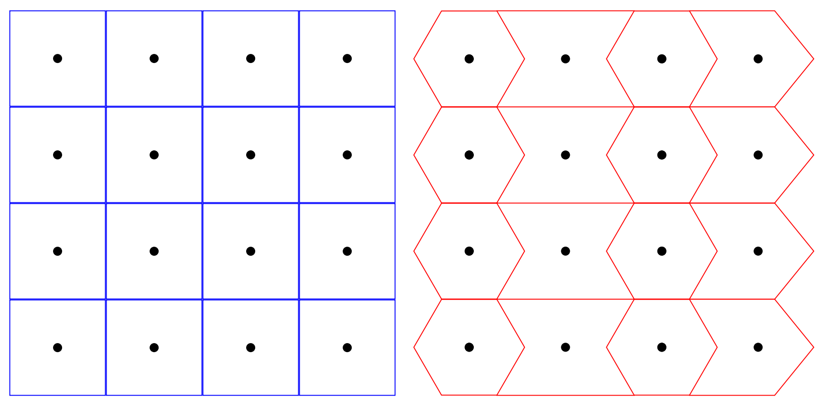
[46] On a circle, the arc between the location of i and j satisfies a similar property.

D Voronoids

The use of centroids has various advantages that follow from their geometrical properties and relations to the underlying polygons. Particularly important for our analysis are the following: (i) centroids are global properties of each ethnic homeland (polygon), and thus are not affected by characteristics of specific locations (i.e., a grid cell in our analysis) in the homeland; and (ii) centroids are stable to perturbations in the polygons. E.g., rotations or scalings of the homeland will affect the location of borders, but not the location of the centroid. Hence, centroids do not have a 1-1 relation with the geometry of the ethnic homeland. In particular, while every polygon has a unique centroid, the same centroid may be associated with different polygons (see Figure D.1(a)). Thus, knowing the location of the centroid does not allow one to predict the underlying geometry that generated the centroid. Moreover, knowing the location of all the centroids also does not uniquely identify the original shapes that generated them either (see Figure D.1(b)). I.e., a given set of centroids may have been generated by very different sets of polygons. Nevertheless, the Voronoi partition generated by the centroids should capture the global structure of the underlying original polygons and borders.



(a) No 1-1 Relation.



(b) No 1-1 Relation.

Figure D.1: Centroids and Polygon Shapes

E Robustness

Our core results shown in Table 3 Panel B are robust to a battery of sensitivity checks. In this section we present several types of robustness analyses. First, we show that our results are robust to the selection of location of the central location as well as Voronoi construction. Second, we address concerns regarding inference, sampling of countries, and measurement error. Third, we show that our results are robust across conflict data sources and grid sizes used in the empirical analysis. Fourth, we also study the potential confounding effect of disease, climate, mobility and isolation as well as accessibility to water. Fifth, we show that our results are not driven by other types of borders (either geographic, ecological or administrative) that may confound with the presence of historical homeland boundaries as documented in Murdock's map. Sixth, we explore the robustness of our results to accounting for other sources of conflict, such as presence of minerals and oil, as well as historical wars. Seventh, we show that our results are not merely reflecting the potential direct impact of contemporary diversity or its geographical determinants. Finally, we perform a placebo test similar to the one performed of our OLS analysis.

E.1 Instrumental Variable: Centroid Selection and Voronoi Construction

Although the results presented so far suggest that our instrumental variable strategy is very robust, one may be concerned that the choice of central location or the method for construction of the Voronoi borders may drive the results. To explore this issue, we follow various strategies. First, we vary the choice of central location, so that instead of using the geometric centroid within the homeland (i.e., the mean latitude and longitude) based on the Murdock map, we use either (i) the core locations of ethnicities in the precolonial era as identified in the Ethnographic Atlas (Murdock, 1967) and the Atlas of Precolonial Societies (Müller, 1999), (ii) the core locations of ethnicities circa 1960 as depicted in GREG (Weidmann et al., 2010); (iii) the centroid of the cell in the homeland in the Murdock map that produces the maximum calories using only 1 crop (Galor and Özak, 2016), and (iv) the centroid of the cell in the homeland that produces the maximum average calories using all available crops (Galor and Özak, 2015). Additionally, we construct a measure of the propensity of a cell to host a Voronoi border. Specifically, we randomize the location of centroids and construct its Voronoi partition of Africa. We repeat this procedure 10,000 times and compute the probability a cell hosts a Voronoi border. We randomize centroids in two ways: (i) we require centroids to be located within the current homelands (i.e., randomization within), and (ii) we allow centroids to be located anywhere on the continent (i.e., randomization across).

Table 2 shows the first-stage results of using the Voronoi borders generated by these alternative central locations as an instrument for historical ethnic borders. Our main results remain qualitatively unchanged. In particular, the estimates are similar across instruments, and conditional on our set of fixed effects, additionally controlling for geography and climate has virtually no effect on them. Additionally, Table E.1 compares the IV estimates based the various instrumental variables. Again, the results suggest a significant effect of historical ethnic borders on contemporary conflict. Moreover, as can be seen by comparing the results of Panels B and C, conditional on country and ethnicity fixed effects, accounting for geographical and climatic characteristics of a cell does not affect the estimates, further providing support for our identification strategy.[47] Tables E.11 and E.13 replicate these analyses using instead data from GREG as a measure of historical ethnic borders with similar results.

Additionally, we vary how given the centroid we compute the location of Voronoi borders. In particular, instead of using geodesic distances, which assume geography and climate do not affect mobility, we employ migratory distances based on the Human Mobility Index (Özak, 2010, 2018). Reassuringly, as established in Table E.10 the results remain unchanged.

[47]Tables E.2-E.7 replicate our main Table E.7 for all the different instruments. The qualitative nature of the results does not change, although the estimated coefficients are usually larger.

Table E.1: Historical Ethnic Borders and Conflict (IV)
Robustness to Centroid Choice

	Conflict Prevalence							
	Main	Atlas	EA	GREG	CSI	CSIMEAN	Random (Within)	Random
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: No Controls								
Presence of Ethnic Border	0.382***	0.506***	0.509***	0.476***	0.611***	0.547***	0.375***	0.392***
	(0.066)	(0.080)	(0.087)	(0.085)	(0.097)	(0.092)	(0.059)	(0.061)
Panel B: Fixed Effects								
Presence of Ethnic Border	0.274***	0.346***	0.407***	0.216**	0.389***	0.307***	0.200***	0.313***
	(0.064)	(0.087)	(0.096)	(0.091)	(0.104)	(0.090)	(0.062)	(0.077)
Panel C: All Controls								
Presence of Ethnic Border	0.273***	0.351***	0.433***	0.215**	0.422***	0.328***	0.194***	0.331***
	(0.066)	(0.100)	(0.103)	(0.100)	(0.123)	(0.105)	(0.066)	(0.081)

Notes: This table shows the robustness of our main result in Table 3 to choice of centroids for the construction of the Voronoi borders used as instruments. Columns (1)-(6) use different specific centroids to construct Voronoi borders. Column (1) replicates our the main strategy using the geometric centroid. Columns (2)-(4) use the centroid of each ethnicity taken from other major ethnographic datasets: Atlas (Müller, 1999), Ethnographic Atlas - EA (Murdock, 1967), GREG (Weidmann et al., 2010)). Columns (5) and (6) use the most agriculturally productive locations in a homeland, which produce the maximum amount of calories with a unique crop (CSI) or the maximum average number of calories across all suitable crops in the region (CSIMEAN). Finally, columns (7) and (8) compute the propensity of a cell to host a Voronoi border when centroids are randomly located within the homeland (column 7) or across the continent (column 8). Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

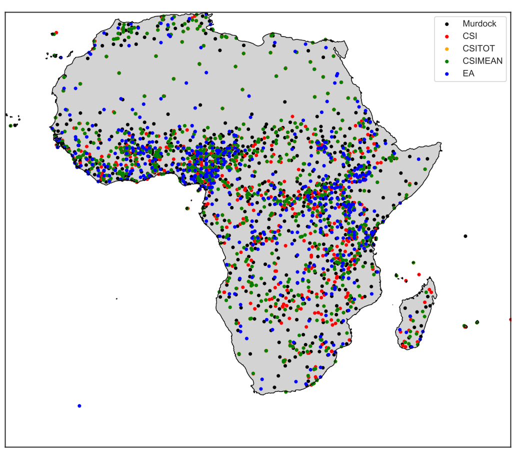
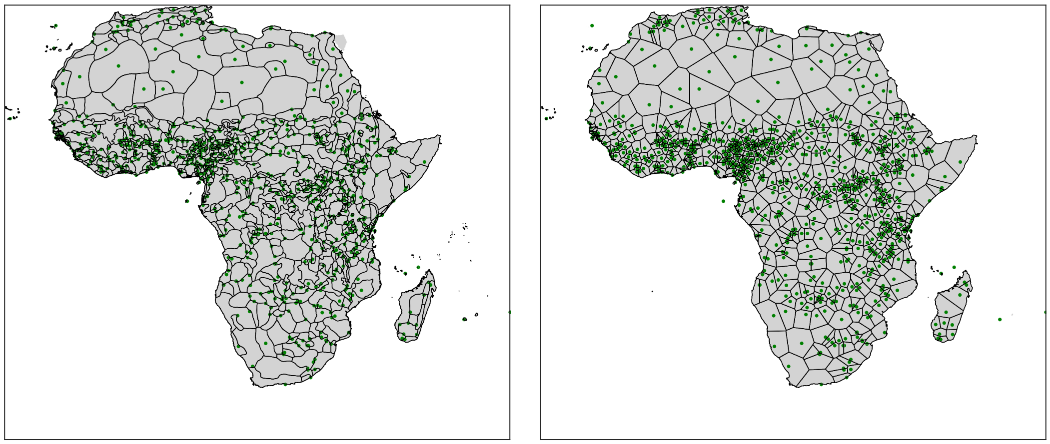


Figure E.1: Location of Centroids by Source and Method



(a) Historical Borders & CSI Centroids of Ethnic Homelands

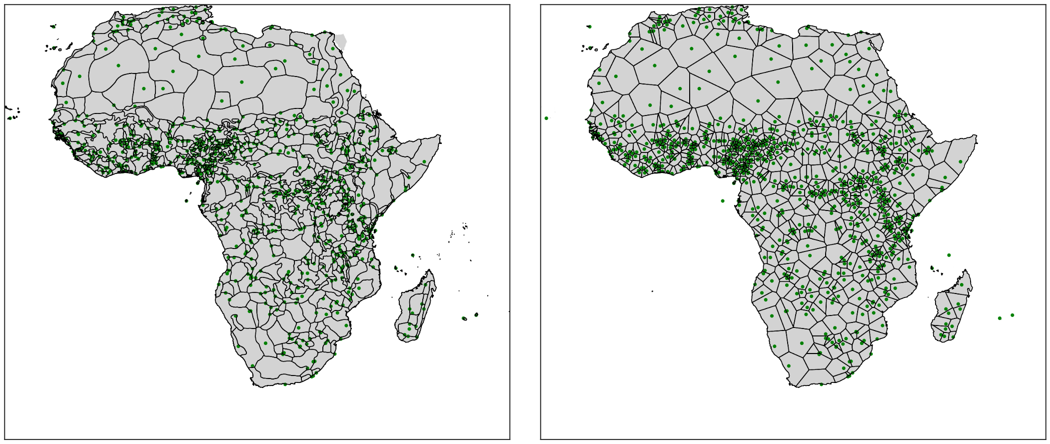
(b) Potential Borders & CSI Centroids of Ethnic Homelands

Figure E.2: Historical Ethnic Borders, CSI Centroids and CSI Potential (Voronoi) Borders in Africa

Table E.2: Historical Ethnic Borders and Conflict (IV)
Robustness to Centroid Location (CSI)

	Conflict						
	Prevalence		Intensity			Onset	
	Presence		Events	Years	Fatalities	Onset	Number of onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.389***	0.422***	0.904***	0.095***	0.661***	0.090**	0.088**
	(0.104)	(0.123)	(0.242)	(0.027)	(0.216)	(0.038)	(0.035)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	23.30	20.62	20.62	20.62	20.62	20.62	20.62
Mean Prevalence	0.22	0.22	0.36	0.03	0.32	0.03	0.03
Adjusted-R^2	0.27	0.26	0.31	0.30	0.31	0.15	0.18
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.



(a) Historical Borders & CSIMEAN Centroids of Ethnic Homelands

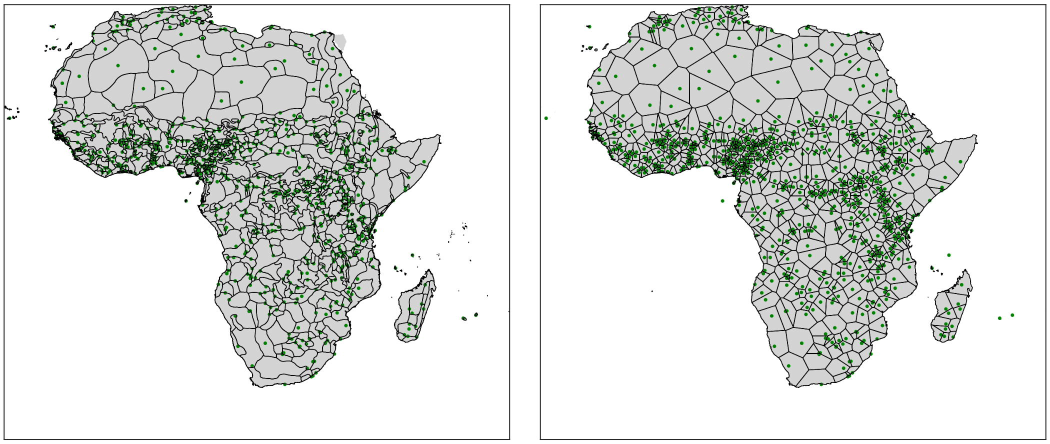
(b) Potential Borders & CSIMEAN Centroids of Ethnic Homelands

Figure E.3: Historical Ethnic Borders, CSIMEAN Centroids and CSIMEAN Potential (Voronoi) Borders in Africa

Table E.3: Historical Ethnic Borders and Conflict (IV)
Robustness to Centroid Location (CSIMEAN)

	Conflict						
	Prevalence		Intensity			Onset	
	Presence		Events	Years	Fatalities	Onset	Number of onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.307***	0.328***	0.795***	0.075***	0.689***	0.085**	0.098***
	(0.090)	(0.105)	(0.221)	(0.022)	(0.226)	(0.040)	(0.037)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	24.95	23.33	23.33	23.33	23.33	23.33	23.33
Mean Prevalence	0.22	0.22	0.36	0.03	0.32	0.03	0.03
Adjusted-R^2	0.29	0.29	0.32	0.32	0.31	0.15	0.17
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.



(a) Historical Borders & EA Centroids of Ethnic Homelands

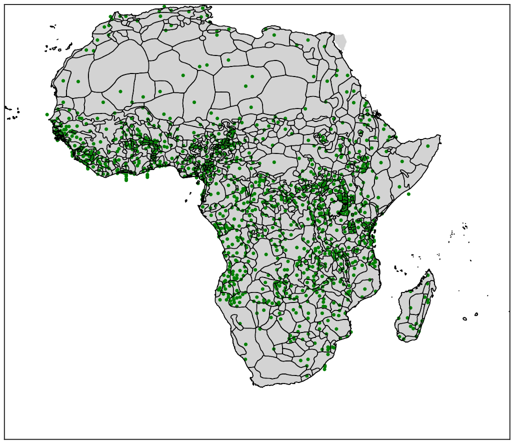
(b) Potential Borders & EA Centroids of Ethnic Homelands

Figure E.4: Historical Ethnic Borders, EA Centroids and EA Potential (Voronoi) Borders in Africa

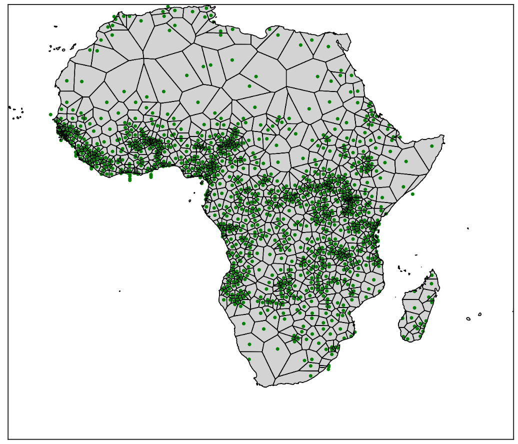
Table E.4: Historical Ethnic Borders and Conflict (IV)
Robustness to Centroid Location (EA)

	Conflict						
	Prevalence		Intensity			Onset	
	Presence		Events	Years	Fatalities	Onset	Number of onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.407***	0.433***	0.787***	0.062***	0.581***	0.031	0.040
	(0.096)	(0.103)	(0.201)	(0.019)	(0.204)	(0.037)	(0.032)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	29.31	28.84	28.84	28.84	28.84	28.84	28.84
Mean Prevalence	0.22	0.22	0.36	0.03	0.32	0.03	0.03
Adjusted-R^2	0.26	0.26	0.32	0.34	0.32	0.16	0.19
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.



(a) Historical Borders & Atlas Centroids of Ethnic Homelands



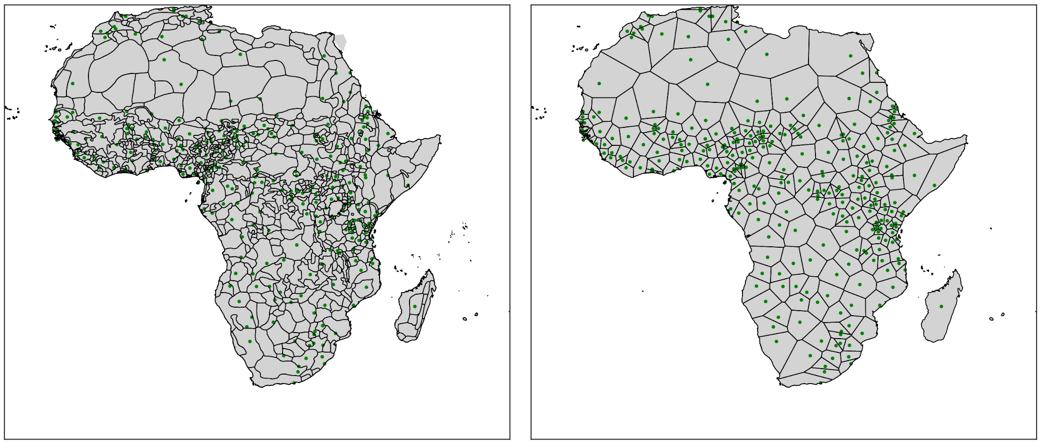
(b) Potential Borders & Atlas Centroids of Ethnic Homelands

Figure E.5: Historical Ethnic Borders, Atlas Centroids and Atlas Potential (Voronoi) Borders in Africa

Table E.5: Historical Ethnic Borders and Conflict (IV)
Robustness to Centroid Location (atlas)

	Conflict						
	Prevalence		Intensity			Onset	
	Presence		Events	Years	Fatalities	Onset	Number of onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.346***	0.351***	0.794***	0.074***	0.481**	0.041	0.048
	(0.087)	(0.100)	(0.177)	(0.017)	(0.216)	(0.031)	(0.030)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	30.79	29.37	29.37	29.37	29.37	29.37	29.37
Mean Prevalence	0.22	0.22	0.36	0.03	0.32	0.03	0.03
Adjusted-R^2	0.28	0.29	0.32	0.32	0.32	0.16	0.19
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.



(a) Historical Borders & GREG Centroids of Ethnic Homelands

(b) Potential Borders & GREG Centroids of Ethnic Homelands

Figure E.6: Historical Ethnic Borders, GREG Centroids and GREG Potential (Voronoi) Borders in Africa

Table E.6: Murdock's Ethnic Borders and Voronoi Ethnic Borders
Instrumental Variable Analysis (First-Stage)

	Presence of Ethnic Border							
	Main	Atlas	EA	GREG	CSI	CSIMEAN	Random (Within)	Random
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Presence of Voronoid Border	0.107***	0.091***	0.104***	0.098***	0.078***	0.080***	0.851***	0.984***
	(0.018)	(0.017)	(0.019)	(0.022)	(0.017)	(0.017)	(0.041)	(0.056)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.71	0.70	0.70	0.70	0.70	0.70	0.74	0.73
Observations	14078	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.7: Historical Ethnic Borders and Conflict (IV)
Robustness to Centroid Location (greg)

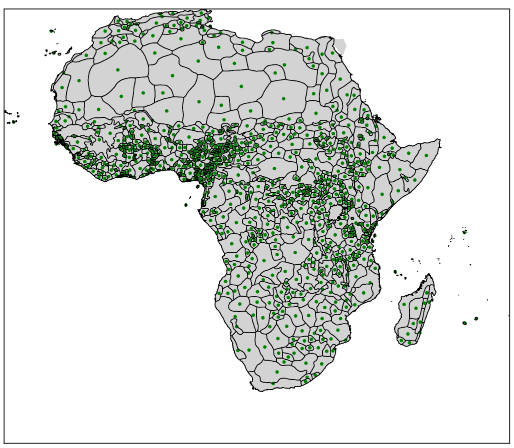
	Conflict						
	Prevalence		Intensity			Onset	
	Presence		Events	Years	Fatalities	Onset	Number of onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.216**	0.215**	0.536***	0.053***	0.390**	0.026	0.027
	(0.091)	(0.100)	(0.171)	(0.020)	(0.172)	(0.036)	(0.033)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	21.57	19.80	19.80	19.80	19.80	19.80	19.80
Mean Prevalence	0.22	0.22	0.36	0.03	0.32	0.03	0.03
Adjusted-R^2	0.31	0.31	0.35	0.34	0.33	0.17	0.19
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

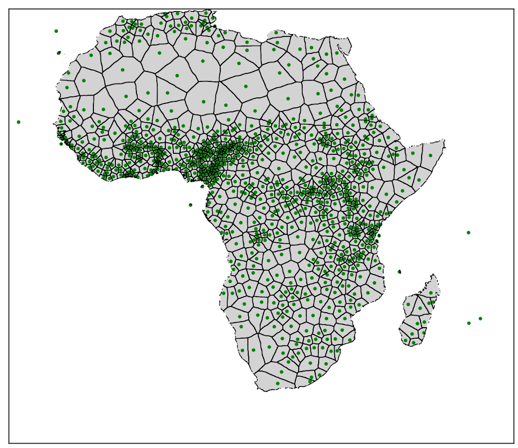
Table E.8: Historical Ethnic Borders and Conflict (IV)
Alternative Ethnic Map (GREG)

	Conflict						
	Prevalence		Intensity			Onset	
	Presence		Events	Years	Fatalities	Onset	Number of onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ethnic Borders (GREG)	0.181**	0.167**	0.415***	0.041***	0.303**	0.020	0.021
	(0.079)	(0.080)	(0.139)	(0.016)	(0.134)	(0.028)	(0.025)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	20.43	18.99	18.99	18.99	18.99	18.99	18.99
Mean Prevalence	0.22	0.22	0.36	0.03	0.32	0.03	0.03
Adjusted-R^2	0.30	0.31	0.35	0.34	0.33	0.17	0.20
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.



(a) Historical Borders & Centroids of Ethnic Homelands



(b) Potential Borders & Centroids of Ethnic Homelands

Figure E.7: Historical Ethnic Borders, Centroids and Potential (Voronoi) Borders in Africa
Robustness to Voronoi Construction (HMI)

Table E.9: Murdock's Ethnic Borders and Voronoi Ethnic Borders (HMI)
Instrumental Variable Analysis (First-Stage)

	Presence of Ethnic Border				
	(1)	(2)	(3)	(4)	(5)
Presence of Voronoi Border	0.323***	0.270***	0.121***	0.107***	0.105***
	(0.018)	(0.019)	(0.020)	(0.017)	(0.017)
Absolute Latitude				0.003	0.006
				(0.037)	(0.042)
Longitude				0.052	0.049
				(0.052)	(0.056)
Elevation (mean)				-0.129***	-0.157***
				(0.017)	(0.013)
Average Crop Yield (pre-1500CE) (mean)				0.115***	0.075***
				(0.019)	(0.018)
Average Crop Yield (pre-1500CE) (std)				0.014	0.005
				(0.010)	(0.009)
Precipitation (mm/month) (mean)					0.119***
					(0.033)
Temperature (Daily Mean) (mean)					-0.083***
					(0.014)
Precipitation (mm/month) (std)					0.006
					(0.005)
Temperature (Daily Mean) (std)					0.023***
					(0.005)
Country FE	No	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes
Adjusted-R^2	0.10	0.15	0.68	0.70	0.70
Observations	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.10: Historical Ethnic Borders and Conflict (IV)
Robustness to Voronoi Construction (HMI)

	Conflict						
	Prevalence		Intensity			Onset	
	Presence		Events	Years	Fatalities	Onset	Number of onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.279***	0.283***	0.560***	0.048***	0.505***	0.102***	0.100***
	(0.066)	(0.069)	(0.138)	(0.014)	(0.123)	(0.032)	(0.030)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	37.67	37.29	37.29	37.29	37.29	37.29	37.29
Mean Prevalence	0.22	0.22	0.36	0.03	0.32	0.03	0.03
Adjusted-R^2	0.29	0.30	0.35	0.35	0.32	0.14	0.17
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

E.1.1 Using Alternative Ethnic Map - GREG

Table E.11: GREG Ethnic Borders and Voronoi Ethnic Borders
Instrumental Variable Analysis (First-Stage)

	Presence of Ethnic Border							
	Murdock	Atlas	EA	GREG	CSI	CSIMEAN	Random Within	Random Across
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A: No Controls							
Presence of Voronoi Border	0.239***	0.262***	0.244***	0.255***	0.234***	0.228***	1.144***	1.046***
	(0.021)	(0.026)	(0.026)	(0.033)	(0.021)	(0.023)	(0.078)	(0.066)
	Panel B: Fixed Effects							
Presence of Voronoi Border	0.105***	0.122***	0.133***	0.140***	0.111***	0.098***	0.922***	1.162***
	(0.025)	(0.024)	(0.026)	(0.031)	(0.020)	(0.021)	(0.075)	(0.088)
	Panel C: All Controls							
Presence of Voronoid Border	0.092***	0.108***	0.119***	0.127***	0.099***	0.084***	0.872***	1.096***
	(0.023)	(0.022)	(0.024)	(0.029)	(0.018)	(0.019)	(0.078)	(0.091)

Notes: This table shows the robustness of the first-stage to choice of historical ethnic border measure, and centroids for the construction of the Voronoi borders used as instruments. Columns (1)-(6) use different specific centroids to construct Voronoi borders to predict the location of GREG historical ethnic borders. Column (1) uses the centroids from the Murdock map. Columns (2)-(4) use the centroid of each ethnicity taken from other major ethnographic datasets: Atlas (Müller, 1999), Ethnographic Atlas - EA (Murdock, 1967), GREG (Weidmann et al., 2010)). Columns (5) and (6) use the most agriculturally productive locations in a homeland, which produce the maximum amount of calories with a unique crop (CSI) or the maximum average number of calories across all suitable crops in the region (CSIMEAN). Finally, columns (7) and (8) compute the propensity of a cell to host a Voronoi border when centroids are randomly located within the homeland (column 7) or across the continent (column 8). Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.12: Historical Ethnic Borders (GREG) and Conflict (OLS)

	Conflict							
	Prevalence					Intensity		
	Presence					Events	Years	Fatalities
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Presence of Ethnic Borders (GREG)	0.124***	0.083***	0.047***	0.044***	0.041***	0.093***	0.008***	0.076***
	(0.027)	(0.020)	(0.014)	(0.013)	(0.013)	(0.024)	(0.002)	(0.021)
Country FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	No	No	No	Yes	Yes	Yes	Yes	Yes
Climatic Controls	No	No	No	No	Yes	Yes	Yes	Yes
Adjusted-R^2	0.02	0.18	0.31	0.32	0.32	0.37	0.36	0.34
Observations	14078	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; denotes statistical significance at the 1% level, at the 5% level, and at the 10% level, all for two-sided hypothesis tests.

Table E.13: Historical Ethnic Borders (GREG) and Conflict (IV)
Robustness to Centroid Choice

	Conflict Prevalence							
	Murdock	Atlas	EA	GREG	CSI	CSIMEAN	Random Within	Random Across
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A: No Controls							
Presence of Ethnic Borders (GREG)	0.521***	0.487***	0.517***	0.396***	0.540***	0.528***	0.389***	0.402***
	(0.090)	(0.077)	(0.101)	(0.084)	(0.093)	(0.097)	(0.062)	(0.075)
	Panel B: Fixed Effects							
Presence of Ethnic Borders (GREG)	0.326***	0.312***	0.376***	0.181**	0.339***	0.312***	0.206***	0.290***
	(0.088)	(0.078)	(0.096)	(0.079)	(0.094)	(0.105)	(0.068)	(0.077)
	Panel C: All Controls							
Presence of Ethnic Borders (GREG)	0.318***	0.295***	0.377***	0.167**	0.333***	0.315***	0.189***	0.297***
	(0.090)	(0.082)	(0.098)	(0.080)	(0.098)	(0.115)	(0.069)	(0.078)

This table shows the robustness of our main result in Table 3 to an alternative measure of historical ethnic borders and choice of centroids for the construction of the Voronoi borders used as instruments. Columns (1)-(6) use different specific centroids to construct Voronoi borders. Column (1) replicates our the main strategy using the geometric centroid. Columns (2)-(4) use the centroid of each ethnicity taken from other major ethnographic datasets: Atlas (Müller, 1999), Ethnographic Atlas - EA (Murdock, 1967), GREG (Weidmann et al., 2010)). Columns (5) and (6) use the most agriculturally productive locations in a homeland, which produce the maximum amount of calories with a unique crop (CSI) or the maximum average number of calories across all suitable crops in the region (CSIMEAN). Finally, columns (7) and (8) compute the propensity of a cell to host a Voronoi border when centroids are randomly located within the homeland (column 7) or across the continent (column 8). Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

E.2 Spatial Autocorrelation, Sampling, Measurement Error, and Cell Sizes

One concern relates to the potential underestimation of the standard errors due to spatial autocorrelation, not fully captured by our approach of adjusting standard errors for within-country correlation in the error term. Nonetheless, our main results are robust to a non-parametric estimation of the standard errors allowing for cross-sectional spatial correlation (Conley, 1999). Indeed, in Table E.14 we report standard errors adjusted for two-dimensional spatial autocorrelation for the cases of 100km, 200km, 500km, and 1000km cut-off distances both in the OLS and IV cases (i.e., main specifications in Tables 3 and B, respectively).[48,49] For our preferred specification (i.e., IV estimates when including the full set of controls), we obtain the largest standard errors when adjusting by two-dimensional spatial autocorrelation up to 1000km. Nonetheless, these standard errors are only 10 percent larger than in the case of clustering at the country level. Moreover, as we show in Table E.15 standard errors clustered at the ethnicity-level are smaller than when clustering at the country-level. A similar result obtains if instead standard errors are two-way clustered at the country and ethnicity levels (Table E.16). In all these approaches the associated p-values are below the standard level of 0.01. This suggests that clustering at the country level does not remarkably underestimate standard errors and represents a conservative approach for avoiding over-rejection of the null hypothesis concerning the statistical significance of the coefficient for the prevalence of historical ethnic borders.

Another potential concern is that our results may be driven by some influential observations in countries that are known to be disproportionally affected by conflict or have very low population density and few ethnic groups. To alleviate this concern we re-estimate our baseline regression dropping observations in a set of countries one at a time (Table E.17). Specifically, we drop observations in all the countries of the Magreb region, Congo DRC, Kenya, Nigeria, Sierra Leone, Somalia, and South Africa. All the point estimates in Table E.17 are virtually equal to the one for the unrestricted case. This suggests that no particular region or country is driving our core results.

Finally, in Tables E.24, E.29, and E.34 we replicate Table B for grid cells of sizes 100×100km, 25×25km, and 10×10km respectively; showing that our results do not depend on the grid cell size employed in our econometric analysis (see also Figure E.9).[50] Moreover, since variations in cell sizes generate variations in the nature of potential measurement errors, these results suggest that our main findings are not driven by measurement error.[51,52]

[48]For the purpose of comparison, we also report in the same table the standard errors adjusted for clustering at the country level which is the standard method we follow in our main analysis.

[49]We thank Mathias Thoening for sharing the Stata command that allows for spatial autocorrelation adjustment in an IV setting (see Colella et al. (2018)).

[50]Appendix E.2.2 replicates our main results for all these cell sizes.

[51]For instance changes in grid size may affect the size of the signal-to-total-variance ratio under classical measurement error. Indeed, one should expect that increases in grid size increase this ratio.

[52]We also provide evidence that our results are robust to the presence of non-classical measurement error. In particular, we follow the method of Black et al. (2000) to estimate improved lower bounds for the effect of historical borders in the presence of non-classical measurement error. In particular, given two measures of historical ethnic borders (Murdock and Voronoi), Black et al. (2000) show that the estimated OLS coefficient for the presence of both measures of historical ethnic borders relative to the absence of borders according to both measures provides a more precise lower bound for the true causal effect. As Black et al. (2000) show, the true effect under non-classical measurement error, due to truncation as in our setting, is bounded between this OLS estimate (Table E.35) and our IV estimate (Table B).

Table E.14: Historical Ethnic Borders and Conflict
Robustness to Spatial-Autocorrelation

	Prevalence of Conflict					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Ethnic Border	0.137***	0.072***	0.059***	0.382***	0.274***	0.273***
	(0.022)	(0.016)	(0.014)	(0.066)	(0.064)	(0.066)
	[0.015]	[0.014]	[0.013]	[0.036]	[0.057]	[0.059]
	((0.020))	((0.017))	((0.014))	((0.051))	((0.063))	((0.066))
	[[0.023]	[[0.019]	[[0.016]	[[0.059]	[[0.071]	[[0.068]
	([0.026])	([0.020])	([0.009])	([0.073])	([0.066])	([0.072])
Country FE	No	Yes	Yes	No	Yes	Yes
Ethnic FE	No	Yes	Yes	No	Yes	Yes
Main Controls	No	No	Yes	No	No	Yes
R^2	0.03	0.36	0.37	-0.06	0.34	0.35
Observations	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses, spatial auto-correlation corrected standard errors with distance cutoffs at 100, 200, 500 and 1000 kms. are shown below; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

Table E.15: Historical Ethnic Borders and Conflict
Robustness to Clustering at Ethnic-Level

	Prevalence of Conflict					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Ethnic Border	0.137***	0.072***	0.059***	0.382***	0.274***	0.273***
	(0.013)	(0.014)	(0.015)	(0.032)	(0.058)	(0.065)
Country FE	No	Yes	Yes	No	Yes	Yes
Ethnic FE	No	Yes	Yes	No	Yes	Yes
Main Controls	No	No	Yes	No	No	Yes
R^2	0.03	0.36	0.37	-0.06	0.34	0.35
Observations	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the ethnic-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

Table E.16: Historical Ethnic Borders and Conflict
Robustness to Two-way Clustering at the Country and Ethnic-Level

	Prevalence of Conflict					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Ethnic Border	0.137***	0.072***	0.059***	0.382***	0.274***	0.273***
	(0.023)	(0.016)	(0.016)	(0.067)	(0.065)	(0.068)
Country FE	No	Yes	Yes	No	Yes	Yes
Ethnic FE	No	Yes	Yes	No	Yes	Yes
Main Controls	No	No	Yes	No	No	Yes
R^2	0.03	0.36	0.37	-0.06	0.34	0.35
Observations	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates two-way clustered at the country and ethnic-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

Table E.17: Historical Ethnic Borders and Conflict (IV)
Robustness to Sample

	Prevalence of Conflict							
		Exclude						
	Full	Magreb	COD	KEN	NGA	SLE	SOM	ZAF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Presence of Ethnic Border	0.273***	0.269***	0.283***	0.269***	0.263***	0.263***	0.312***	0.287***
	(0.066)	(0.081)	(0.068)	(0.067)	(0.066)	(0.065)	(0.064)	(0.072)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	34.14	28.33	31.51	32.73	32.65	33.72	35.01	30.47
Adjusted-R^2	0.30	0.28	0.31	0.30	0.28	0.30	0.29	0.30
Observations	14078	11105	13035	13801	13656	14033	13762	13503

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

Table E.18: Historical Ethnic Borders and Conflict (IV)
Robustness to Excluding Split Ethnicities & Split Neighbors

	Prevalence of Conflict			
	All	Split	Not Split	Not Split Self & Neighbor
	(1)	(2)	(3)	(4)
Presence of Ethnic Border	0.273***	0.422***	0.136**	0.165**
	(0.066)	(0.137)	(0.062)	(0.076)
Country FE	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes
First-stage F-statistic	34.14	17.68	20.90	18.26
Adjusted-R^2	0.30	0.28	0.32	0.29
Observations	14078	9646	4432	1507

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

E.2.1 Robustness to Sampling – OLS

Table E.19: Historical Ethnic Borders and Conflict (OLS)
Robustness to Sample

	Prevalence of Conflict							
		Exclude						
	Full	Magreb	COD	KEN	NGA	SLE	SOM	ZAF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Presence of Ethnic Border	0.059***	0.046***	0.058***	0.058***	0.060***	0.057***	0.068***	0.061***
	(0.015)	(0.016)	(0.016)	(0.015)	(0.015)	(0.015)	(0.012)	(0.015)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.32	0.30	0.34	0.32	0.30	0.32	0.32	0.32
Observations	14078	11105	13035	13801	13656	14033	13762	13503

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

E.2.2 Robustness to Cell size

E.2.2.1 ACLED Dataset 100×100

Table E.20: Historical Ethnic Borders and Conflict (OLS)

	Conflict							
	Prevalence					Intensity		
	Presence					Events	Years	Fatalities
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Presence of Ethnic Border	0.278***	0.208***	0.147***	0.136***	0.125***	0.274***	0.027***	0.196**
	(0.024)	(0.023)	(0.026)	(0.026)	(0.027)	(0.078)	(0.009)	(0.094)
Absolute Latitude				0.025	0.087*	0.372***	0.031**	0.086
				(0.044)	(0.044)	(0.126)	(0.012)	(0.136)
Longitude				0.003	0.017	0.019	-0.008	-0.011
				(0.036)	(0.033)	(0.132)	(0.015)	(0.164)
Elevation (mean)				0.021	0.034*	0.040	0.006	0.058
				(0.021)	(0.019)	(0.065)	(0.006)	(0.057)
Average Crop Yield (pre-1500CE) (mean)				0.081**	0.071	0.312**	0.030**	0.202*
				(0.040)	(0.044)	(0.124)	(0.013)	(0.103)
Average Crop Yield (pre-1500CE) (std)				0.060***	0.051**	0.090*	0.007	0.093
				(0.020)	(0.021)	(0.050)	(0.007)	(0.056)
Precipitation (mm/month) (mean)					0.060*	0.160	0.016	0.126
					(0.035)	(0.100)	(0.013)	(0.089)
Temperature (Daily Mean) (mean)					0.047**	0.088*	0.008	0.065
					(0.021)	(0.052)	(0.006)	(0.047)
Precipitation (mm/month) (std)					0.054***	0.127**	0.016**	0.118**
					(0.014)	(0.059)	(0.007)	(0.052)
Temperature (Daily Mean) (std)					-0.002	-0.012	-0.000	0.002
					(0.008)	(0.027)	(0.003)	(0.027)
Country FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.07	0.22	0.37	0.38	0.39	0.53	0.53	0.52
Observations	4070	4070	4070	4070	4070	4070	4070	4070

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; denotes statistical significance at the 1% level, at the 5% level, and at the 10% level, all for two-sided hypothesis tests.

Table E.21: Historical Ethnic Borders and Conflict (OLS)

	Conflict Intensity		
	Events	Years	Fatalities
	(1)	(2)	(3)
Presence of Ethnic Border	0.274***	0.027***	0.196**
	(0.078)	(0.009)	(0.094)
Country FE	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes
Adjusted-R^2	0.53	0.53	0.52
Observations	4070	4070	4070

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

Table E.22: Historical Ethnic Borders and Conflict (OLS)

	Prevalence of Conflict		
	(1)	(2)	(3)
Presence of Ethnic Border	0.125***		
	(0.027)		
Length of Ethnic Borders (Logs)		0.035***	
		(0.006)	
Number of Ethnic Borders (Logs)			0.147***
			(0.035)
Country FE	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes
Adjusted-R^2	0.39	0.39	0.39
Observations	4070	4070	4070

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

Table E.23: Murdock's Ethnic Borders and Voronoi Ethnic Borders Instrumental Variable Analysis (First-Stage)

	Presence of Ethnic Border				
	(1)	(2)	(3)	(4)	(5)
Presence of Voronoi Border	0.418***	0.367***	0.193***	0.171***	0.165***
	(0.022)	(0.026)	(0.025)	(0.023)	(0.023)
Absolute Latitude				-0.031	-0.013
				(0.041)	(0.051)
Longitude				0.051	0.038
				(0.062)	(0.065)
Elevation (mean)				-0.142***	-0.154***
				(0.019)	(0.017)
Average Crop Yield (pre-1500CE) (mean)				0.144***	0.105***
				(0.020)	(0.021)
Average Crop Yield (pre-1500CE) (std)				0.029**	0.015
				(0.014)	(0.015)
Precipitation (mm/month) (mean)					0.135***
					(0.047)
Temperature (Daily Mean) (mean)					-0.053**
					(0.023)
Precipitation (mm/month) (std)					0.015
					(0.014)
Temperature (Daily Mean) (std)					0.033***
					(0.012)
Country FE	No	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes
Adjusted-R^2	0.17	0.20	0.56	0.58	0.59
Observations	4070	4070	4070	4070	4070

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.24: Historical Ethnic Borders and Conflict (IV)

	Conflict						
	Prevalence		Intensity			Onset	
	Presence		Events	Years	Fatalities	Onset	Number of onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.561***	0.571***	1.160***	0.125***	0.959***	0.199***	0.170***
	(0.095)	(0.103)	(0.244)	(0.028)	(0.269)	(0.057)	(0.054)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	59.01	52.15	52.15	52.15	52.15	52.15	52.15
Mean Prevalence	0.41	0.41	0.84	0.08	0.76	0.08	0.08
Adjusted-R^2	0.30	0.31	0.49	0.49	0.50	0.27	0.34
Observations	4070	4070	4070	4070	4070	4070	4070

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

E.2.2.2 ACLED Dataset 25×25

Table E.25: Historical Ethnic Borders and Conflict (OLS)

	Conflict							
	Prevalence					Intensity		
	Presence					Events	Years	Fatalities
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Presence of Ethnic Border	0.056***	0.035***	0.052***	0.050***	0.043***	0.090***	0.009***	0.047***
	(0.013)	(0.006)	(0.010)	(0.009)	(0.008)	(0.017)	(0.002)	(0.012)
Absolute Latitude				0.014	0.027	0.066*	0.005	-0.001
				(0.016)	(0.018)	(0.036)	(0.003)	(0.024)
Longitude				0.007	0.010	0.014	0.001	0.013
				(0.014)	(0.014)	(0.024)	(0.002)	(0.024)
Elevation (mean)				0.000	-0.007	-0.015	-0.001	-0.006
				(0.007)	(0.007)	(0.013)	(0.001)	(0.009)
Average Crop Yield (pre-1500CE) (mean)				0.039***	0.027***	0.048***	0.004**	0.028**
				(0.009)	(0.008)	(0.016)	(0.002)	(0.014)
Average Crop Yield (pre-1500CE) (std)				0.010**	0.010**	0.015*	0.001	0.015*
				(0.004)	(0.004)	(0.007)	(0.001)	(0.008)
Precipitation (mm/month) (mean)					0.039***	0.069**	0.006**	0.027
					(0.014)	(0.026)	(0.003)	(0.016)
Temperature (Daily Mean) (mean)					-0.015*	-0.026*	-0.003*	-0.019*
					(0.008)	(0.015)	(0.002)	(0.011)
Precipitation (mm/month) (std)					0.010***	0.013**	0.002**	0.006
					(0.002)	(0.006)	(0.001)	(0.006)
Temperature (Daily Mean) (std)					-0.003	-0.009**	-0.001*	-0.005
					(0.002)	(0.004)	(0.000)	(0.004)
Country FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.01	0.11	0.20	0.21	0.21	0.21	0.19	0.17
Observations	51972	51972	51972	51972	51972	51972	51972	51972

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; denotes statistical significance at the 1% level, at the 5% level, and at the 10% level, all for two-sided hypothesis tests.

Table E.26: Historical Ethnic Borders and Conflict (OLS)

	Conflict Intensity		
	Events	Years	Fatalities
	(1)	(2)	(3)
Presence of Ethnic Border	0.090***	0.009***	0.047***
	(0.017)	(0.002)	(0.012)
Country FE	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes
Adjusted-R^2	0.21	0.19	0.17
Observations	51972	51972	51972

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.27: Historical Ethnic Borders and Conflict (OLS)

	Prevalence of Conflict		
	(1)	(2)	(3)
Presence of Ethnic Border	0.043***		
	(0.008)		
Length of Ethnic Borders (Logs)		0.013***	
		(0.002)	
Number of Ethnic Borders (Logs)			0.063***
			(0.014)
Country FE	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes
Adjusted-R^2	0.21	0.21	0.21
Observations	51972	51972	51972

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.28: Murdock's Ethnic Borders and Voronoi Ethnic Borders
Instrumental Variable Analysis (First-Stage)

	Presence of Ethnic Border				
	(1)	(2)	(3)	(4)	(5)
Presence of Voronoi Border	0.238***	0.200***	0.100***	0.092***	0.090***
	(0.016)	(0.015)	(0.018)	(0.016)	(0.016)
Absolute Latitude				0.003	-0.009
				(0.033)	(0.042)
Longitude				0.071	0.069
				(0.044)	(0.047)
Elevation (mean)				-0.085***	-0.113***
				(0.012)	(0.011)
Average Crop Yield (pre-1500CE) (mean)				0.056***	0.030**
				(0.012)	(0.013)
Average Crop Yield (pre-1500CE) (std)				0.009*	0.007
				(0.005)	(0.005)
Precipitation (mm/month) (mean)					0.068**
					(0.031)
Temperature (Daily Mean) (mean)					-0.075***
					(0.010)
Precipitation (mm/month) (std)					0.001
					(0.003)
Temperature (Daily Mean) (std)					0.009**
					(0.004)
Country FE	No	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes
Adjusted-R^2	0.05	0.09	0.75	0.76	0.77
Observations	51972	51972	51972	51972	51972

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.29: Historical Ethnic Borders and Conflict (IV)

	Conflict						
	Prevalence		Intensity			Onset	
	Presence		Events	Years	Fatalities	Onset	Number of onsets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.186***	0.183***	0.308***	0.030***	0.254***	0.024**	0.023**
	(0.030)	(0.029)	(0.056)	(0.006)	(0.072)	(0.011)	(0.011)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	31.20	32.98	32.98	32.98	32.98	32.98	32.98
Mean Prevalence	0.09	0.09	0.13	0.01	0.11	0.01	0.01
Adjusted-R^2	0.19	0.20	0.20	0.18	0.17	0.08	0.08
Observations	51972	51972	51972	51972	51972	51972	51972

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

E.2.2.3 ACLED Dataset 10×10

Table E.30: Historical Ethnic Borders and Conflict (OLS)

	Conflict				
	Prevalence		Intensity		
	Presence		Events	Years	Fatalities
	(1)	(2)	(3)	(4)	(5)
Presence of Ethnic Border	0.023***	0.020***	0.042***	0.004***	0.019***
	(0.005)	(0.004)	(0.009)	(0.001)	(0.007)
Country FE	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes
Adjusted-R^2	0.08	0.08	0.06	0.06	0.05
Observations	308122	308122	308122	308122	308122

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; denotes statistical significance at the 1% level, at the 5% level, and at the 10% level, all for two-sided hypothesis tests.

Table E.31: Historical Ethnic Borders and Conflict (OLS)

	Conflict Intensity		
	Events	Years	Fatalities
	(1)	(2)	(3)
Presence of Ethnic Border	0.042***	0.004***	0.019***
	(0.009)	(0.001)	(0.007)
Country FE	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes
Adjusted-R^2	0.06	0.06	0.05
Observations	308122	308122	308122

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.32: Historical Ethnic Borders and Conflict (OLS)

	Prevalence of Conflict		
	(1)	(2)	(3)
Presence of Ethnic Border	0.020***		
	(0.004)		
Length of Ethnic Borders (Logs)		0.006***	
		(0.001)	
Number of Ethnic Borders (Logs)			0.026***
			(0.007)
Country FE	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes
Adjusted-R^2	0.08	0.08	0.08
Observations	308122	308122	308122

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.33: Murdock's Ethnic Borders and Voronoi Ethnic Borders
Instrumental Variable Analysis (First-Stage)

	Presence of Ethnic Border				
	(1)	(2)	(3)	(4)	(5)
Presence of Voronoi Border	0.156***	0.137***	0.088***	0.085***	0.084***
	(0.016)	(0.015)	(0.017)	(0.016)	(0.016)
Absolute Latitude				0.002	-0.020
				(0.038)	(0.045)
Longitude				0.070*	0.066
				(0.040)	(0.042)
Elevation (mean)				-0.039***	-0.060***
				(0.007)	(0.008)
Average Crop Yield (pre-1500CE) (mean)				0.018***	0.006
				(0.006)	(0.008)
Average Crop Yield (pre-1500CE) (std)				0.001	0.000
				(0.002)	(0.002)
Precipitation (mm/month) (mean)					0.021
					(0.023)
Temperature (Daily Mean) (mean)					-0.053***
					(0.011)
Precipitation (mm/month) (std)					-0.001
					(0.001)
Temperature (Daily Mean) (std)					0.006***
					(0.002)
Country FE	No	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes
Adjusted-R^2	0.02	0.04	0.78	0.79	0.79
Observations	308122	308122	308122	308122	308122

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.34: Historical Ethnic Borders and Conflict (IV)

	Conflict				
	Prevalence		Intensity		
	Presence		Events	Years	Fatalities
	(1)	(2)	(3)	(4)	(5)
Presence of Ethnic Border	0.060***	0.057***	0.104***	0.009***	0.054***
	(0.014)	(0.014)	(0.022)	(0.002)	(0.018)
Country FE	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes
First-stage F-statistic	26.98	27.92	27.92	27.92	27.92
Mean Prevalence	0.02	0.02	0.03	0.00	0.02
Adjusted-R^2	0.08	0.08	0.06	0.05	0.05
Observations	308122	308122	308122	308122	308122

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

E.2.2.4 Robustness to Non-classical Measurement Error

Table E.35: Historical Ethnic Borders and Conflict (OLS)
Lower Bounds Under Non-Classical Measurement Error

	Prevalence of Conflict					
	(1)	(2)	(3)	(4)	(5)	(6)
Both Ethnic Borders Present	0.232***	0.158***	0.104***	0.100***	0.090***	0.104***
	(0.036)	(0.021)	(0.022)	(0.019)	(0.019)	(0.023)
Country FE	No	Yes	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes	Yes
Geographic Controls	No	No	No	Yes	Yes	Yes
Climatic Controls	No	No	No	No	Yes	Yes
Adjusted-R^2	0.04	0.19	0.33	0.34	0.34	0.37
Observations	14078	14078	14078	14078	14078	9333

Notes: This table follows the method of Black et al. (2000) to estimate lower bounds for the effect of historical ethnic borders. Specifically, it shows the estimated OLS coefficient for the presence of both measures of historical ethnic borders relative to the absence of borders according to both measures. As Black et al. (2000) show the true effect under non-classical measurement error, due to truncation as in our setting, is bounded between this OLS estimate and the IV estimate in Table B. Column 6 replicates column 5 for the subsample where both measures are in agreement. Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; denotes statistical significance at the 1% level, at the 5% level, and at the 10% level, all for two-sided hypothesis tests.

E.3 Conflict Data Source

Next, we show the robustness of our result to using PRIO's Georeferenced Event dataset (UCDP-GED) to compute our four different measures of conflict prevalence and intensity studied above. Specifically, we replicate Table B using our measure of non-state conflict.[53] The results are shown in Table E.36 and suggest that our results does not depend on the choice of the conflict data source.

Table E.36: Historical Ethnic Borders and Conflict - PRIO (IV)

	Conflict						
	Prevalence				Intensity		
	Presence				Events	Years	Fatalities
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.223***	0.169***	0.134**	0.121**	0.214**	0.011**	0.616***
	(0.061)	(0.038)	(0.055)	(0.059)	(0.103)	(0.006)	(0.213)
Country FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes	Yes	Yes
Main Controls	No	No	No	Yes	Yes	Yes	Yes
First-stage F-statistic	319.16	207.65	35.03	34.14	34.14	34.14	34.14
Adjusted-R^2	-0.04	0.15	0.35	0.36	0.42	0.39	0.38
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

[53] We do not replicate the analysis for onsets, as they are constructed using PRIO, since ACLED does not provide this information.

E.4 Disease and Climate

Our results are also robust to an expanded set of disease and climatic controls. In particular, the results in Table E.37 account for the mean and standard deviation of malaria suitability (Column 2), the mean and standard deviation of the suitability for tse-tse flies (Column 3), the mean and standard deviation of various additional climate controls (diurnal temporal range, vapor pressure, cloud cover, wet day frequency) (Column 4). Reassuringly, the estimated IV coefficient remains basically unchanged. Moreover, accounting for all these additional controls jointly (Column 5) does not affect the results either.

Table E.37: Historical Ethnic Borders and Conflict (IV)
Robustness to Disease and Climate

	Prevalence of Conflict				
	(1)	(2)	(3)	(4)	(5)
Presence of Ethnic Border	0.273***	0.270***	0.268***	0.288***	0.282***
	(0.066)	(0.069)	(0.071)	(0.068)	(0.074)
Malaria (mean)		-0.002			0.000
		(0.018)			(0.017)
Malaria (std)		0.003			0.002
		(0.003)			(0.003)
Tse-Tse (mean)			0.002		0.001
			(0.020)		(0.021)
Tse-Tse (std)			0.009		0.007
			(0.008)		(0.008)
Diurnal Temperature Range (degrees Celsius) (mean)				0.023	0.023
				(0.018)	(0.018)
Vapour Pressure (hPa) (mean)				0.007	0.006
				(0.030)	(0.031)
Cloud Cover (				(0.032)	(0.032)
Wet Day Frequency (days) (mean)				0.002	0.001
				(0.039)	(0.039)
Diurnal Temperature Range (degrees Celsius) (std)				0.026***	0.027***
				(0.007)	(0.007)
Vapour Pressure (hPa) (std)				0.044***	0.044***
				(0.011)	(0.012)
Cloud Cover (				(0.007)	(0.007)
Wet Day Frequency (days) (std)				0.026**	0.025**
				(0.011)	(0.010)
Country FE	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	34.14	36.16	31.85	34.59	33.81
Adjusted-R^2	0.30	0.30	0.30	0.30	0.30
Observations	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

E.5 Geographical Isolation and Access to Water

One possible concern regarding the interpretation of our IV results could be that Voronoi borders were systematically predicted to be located at highly isolated regions. In this sense, since rebel groups tend to operate more easily in remote and isolated locations, we could just be capturing the effect of these characteristics on conflict instead. Nonetheless, we show in Table E.38 that our results are robust to different measures of isolation and remoteness. To do so, we compute two indicators accounting for geographic characteristics that make traversing a giving grid cell costly. Specifically, we control for terrain ruggedness (column 2) and the Human Mobility Index (HMI) from Özak (2018) (column 3). Reassuringly, our previous results are not qualitatively affected by the inclusion of these mobility indicators.

Furthermore, the inclusion of different indicators of access to water bodies as controls has basically no effect on our results. Neither the length of rivers (column 4) or coasts (column 5) nor an indicator of access to water (column 6) affects the statistical or economic significance of historical ethnic borders for the prevalence of conflict.[54] Including all the previous controls together has virtually no impact on our results. Finally, in Table E.41 we show that proximity to capitals, large cities, and the geometric centroid of the ethnic homeland does not qualitatively alter our results. This suggests that borders do not simply reflect isolated locations with low state capacity where the projection of power from the central government is weak.

Table E.38: Historical Ethnic Borders and Conflict (IV)
Robustness to Geographical Isolation and Access to Water

	Prevalence of Conflict						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.273***	0.272***	0.273***	0.272***	0.248***	0.273***	0.242***
	(0.066)	(0.066)	(0.066)	(0.065)	(0.078)	(0.066)	(0.077)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	None	Ruggedness	Mobility	River Length	Coast Length	Water Access	All
First-stage F-statistic	34.14	34.12	34.14	34.20	36.79	34.14	36.87
Adjusted-R^2	0.30	0.30	0.30	0.31	0.31	0.30	0.31
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

[54] Our indicator of accessibility to water accounts for the percentage of area within 100 kms of sea, rivers, lakes, perennial and fluctuating water.

E.6 Rivers, Coasts, and Other Types of Borders

When interpreting our main results regarding the relationship between historical ethnic borders and contemporary conflict, a possible source of concern is that the estimated effect of the presence of ethnic borders may be driven, at least in part, by other types of borders (either geographic, ecological or administrative) that may coincide with the historical homeland boundaries as documented in Murdock's map. Nonetheless, as we argued above, our IV identification strategy seeks to precisely exploit variation in historical ethnic border presence (as predicted by Voronoi borders) that is orthogonal to grid's characteristics such as geography and ecology. Results in Table E.39 are consistent with this view. Indeed, while the presence of rivers, coast, and ecological borders are positively correlated with the prevalence of contemporary conflict, their inclusion as controls in our main specification does not change our previous results (see columns 1 to 4 of Table E.39).

Moreover, our previous results are not qualitatively affected by the inclusion of indicators of presence of country (column 5) and sub-national administrative borders (column 6). Interestingly, these political and administrative boundaries are associated with a reduction in conflict; results that are line with the idea that "dejure" borders may increase the cost of engaging in violent disputes or may reflect an agreement that prevents conflict. We however interpret the point estimate on the presence of sub-national administrative boundaries with caution, given its potential endogeneity to both conflict and the preexistence of historical ethnic borders. Finally, including all the previous set of borders does not affect our results (column 7 of Table E.39), although the estimated coefficient of the prevalence of historical ethnic borders on contemporary conflict becomes larger and remains statistically significant.

Table E.39: Historical Ethnic Borders and Conflict (IV)
Robustness to Rivers, Coasts and Other Types of Borders

	Prevalence of Conflict						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.273***	0.279***	0.396***	0.250***	0.280***	0.283***	0.295***
	(0.066)	(0.065)	(0.112)	(0.072)	(0.062)	(0.065)	(0.102)
Presence of River		0.060***					0.064***
		(0.017)					(0.016)
Presence of Coast			-0.156*				-0.043
			(0.081)				(0.071)
Presence of Ecological Border				0.027*			0.033**
				(0.016)			(0.014)
Presence of Country Border					-0.088***		-0.074***
					(0.016)		(0.015)
Presence of Administrative Border						-0.052***	-0.022**
						(0.010)	(0.010)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	34.14	34.17	34.40	35.66	41.28	36.67	34.70
Adjusted-R^2	0.30	0.30	0.28	0.31	0.31	0.30	0.31
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

E.7 Other Sources of Conflict

We next take into account other sources of conflict highlighted in previous literature. We do so for two reasons. First, we aim to check whether our point estimates are potentially affected by the inclusion of these covariates of conflict. Second, this analysis allows us to compare the economic importance of historical ethnic borders vis-à-vis other important sources of conflict. We take into account the impact of the presence of diamonds, minerals, oil, capitals, and populated places. Figure A.6 depicts the spatial distribution of these potential sources of conflict.

Table E.40 shows that accounting for other sources of conflict does not affect our previous results. In line with previous literature these other sources of conflict are statistically significant predictors of conflict. The economic impact of hosting a historical ethnic border is more than double the magnitude associated with the presence of diamonds and minerals (columns 2 and 3). The likelihood of conflict due to historical ethnic borders is ten times larger than in the case of the presence of oil (column 4). On the other hand, the presence of a capital (column 5) or a populated place (column 6) are associated with a larger likelihood of contemporary conflict. This is not surprising since high population density is a key driver of conflict. In the last column of Table E.40 we include all the set of covariates together and the point estimate for the presence of historical ethnic borders remains remarkably large at 0.21.

Table E.40: Historical Ethnic Borders and Conflict (IV)
Robustness to Other Sources of Conflict

	Prevalence of Conflict						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.273***	0.266***	0.263***	0.272***	0.264***	0.216***	0.206***
	(0.066)	(0.066)	(0.065)	(0.066)	(0.064)	(0.061)	(0.060)
Presence of Diamond		0.100***					0.041*
		(0.022)					(0.021)
Presence of Mineral			0.145***				0.094***
			(0.018)				(0.015)
Presence of Oil				0.007			-0.002
				(0.016)			(0.014)
Presence of Capitals					0.491***		0.171***
					(0.044)		(0.044)
Presence of Populated Place						0.397***	0.381***
						(0.024)	(0.024)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	34.14	34.33	34.05	34.52	33.94	34.57	34.87
Adjusted-R^2	0.30	0.31	0.31	0.30	0.31	0.38	0.38
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

In Table E.41 we replicate Table E.40 using measures of distances instead of indicators of the presence of other sources of conflict. We find similar results, although the estimated coefficient of historical ethnic borders is larger, namely 0.32. Noteworthy, including the distance to the nearest centroid does not qualitatively affect out results.

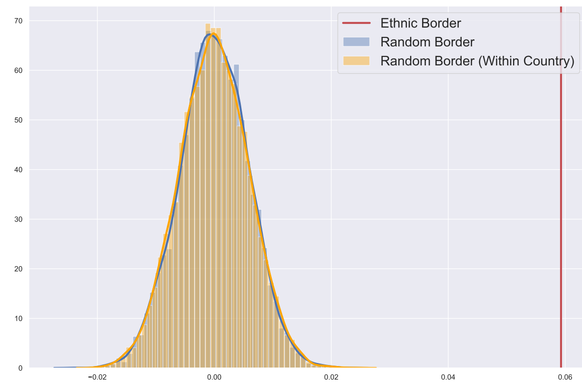
Table E.41: Historical Ethnic Borders and Conflict (IV)
Robustness to Distance to Other Sources of Conflict

	Prevalence of Conflict							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Presence of Ethnic Border	0.273***	0.272***	0.262***	0.272***	0.255***	0.251***	0.408***	0.319***
	(0.066)	(0.066)	(0.066)	(0.066)	(0.065)	(0.068)	(0.073)	(0.069)
Distance to Diamond Mine (Logs)		-0.006						-0.005
		(0.009)						(0.011)
Distance to Minerals Mine (Logs)			-0.040***					-0.014
			(0.009)					(0.009)
Distance to Oil Field (onshore) (Logs)				-0.006				0.004
				(0.005)				(0.004)
Distance to Closest Capital (Logs)					-0.063***			-0.029**
					(0.012)			(0.012)
Distance to Closest Populated Place (Logs)						-0.098***		-0.089***
						(0.009)		(0.008)
Distance to Ethnic Centroid (Logs)							-0.032***	-0.018**
							(0.009)	(0.008)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	34.14	34.15	33.68	34.59	32.45	36.23	38.25	35.35
Adjusted-R^2	0.30	0.30	0.31	0.30	0.31	0.34	0.27	0.32
Observations	14078	14078	14078	14078	14078	14078	14078	14078

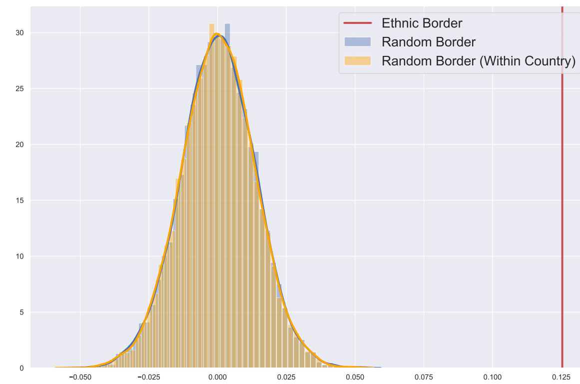
Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

E.8 Placebo: Random Allocation of Ethnic Borders Status

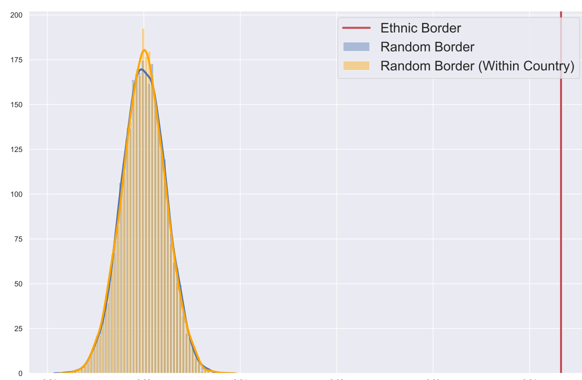
One may be concerned that our results are simply reflecting the high prevalence of both ethnic borders and conflict across Africa. In particular, given the high prevalence of conflict across the African continent, as well as the high number of ethnicities, and thus ethnic borders, the positive association between borders and conflict may arise by pure chance. In order to mitigate this potential concern, we undertake a simple placebo test.



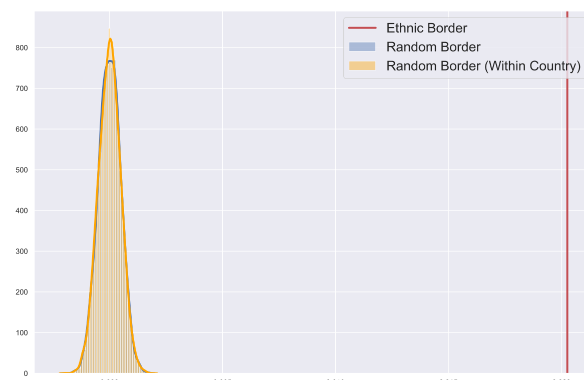
(a) Cell Size 50 × 50



(b) Cell Size 100 × 100



(c) Cell Size 25 × 25



(d) Cell Size 10 × 10

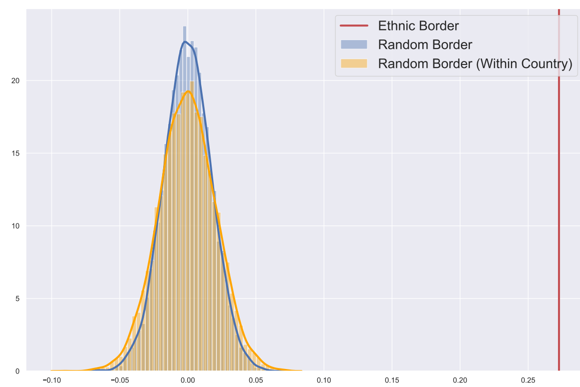
Figure E.8: Placebo Test: Ethnic vs. Random Border Status

In our placebo test we randomly re-allocate historical ethnic border status across grid cells. Specifically, we randomly assign ethnic border status to each grid cell, ensuring that we match the mean and standard deviation of the actual distribution of prevalence of historical ethnic borders across Africa. We then re-estimate our main specification (i.e., column 5 in Table 3) using the randomly assigned border status as main independent variable. We repeat this procedure 10,000 times. Additionally, we repeat this placebo analysis imposing a more restrictive spatial structure: we ensure that our randomization matches the mean and standard deviation of the actual distribution of prevalence of historical ethnic borders within each country in our sample.

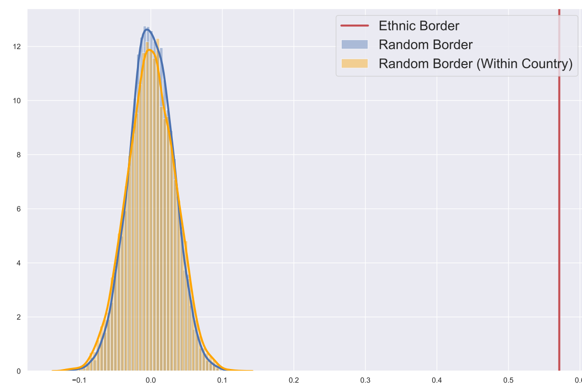
Figure E.8(a) depicts the distributions of point estimates underlying the two aforementioned randomization methods as well as the estimated coefficient obtained in column 5 of Table 3 (depicted as the red vertical line in the figure). Regardless of the randomization method used, all the estimated coefficients for the fake border status are centered around zero and distributed far from our baseline estimate. As shown in Figures E.8(b)-E.8(d) we obtain similar results for the other grid cell sizes analyzed in the paper. Thus, this placebo test suggests that our results are not driven by the high prevalence of both ethnic borders and conflict, but due to the deeper spatial structure of historical ethnic borders. The vertical lines in the figure also serve as evidence that our results do not depend on the size of the grid chosen for the analysis.

Finally, to complement our placebo tests, Table E.19 explores the robustness of the analysis to exclusion of regions with low population and ethnic density (e.g., the Magreb), as well as countries with a large number of ethnicities (e.g., Nigeria) and conflict (eg., Somalia). Reassuringly, the results remain qualitatively unchanged.

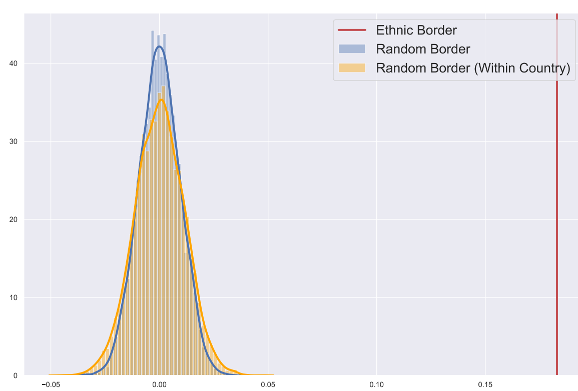
Next we use this placebo strategy in the IV setting to randomly re-allocate both historical ethnic border status and potential (Voronoi) border status across grid cells. Specifically, we randomly assign ethnic border status and Voronoi border status to each grid cell, ensuring that we match the mean and standard deviation of the actual distribution of prevalence of each variable across Africa (or within each country in the more restrictive approach), as well as the correlation between historical and Voronoi borders. Thus, we ensure that the joint distribution of the randomly assigned ethnic and Voronoi borders matches the joint distribution of these variables in the sample. We then re-estimate our main IV specification (i.e., column 2 in Table B) using the randomly assigned border status as main independent variable, which we instrument using the randomly assigned Voronoi border. We repeat this procedure 10,000 times. Figure E.9(a) depicts the distribution of point estimates for these 10,000 IV regressions as well as the estimated coefficient obtained in column 3 of Table B (depicted as the red vertical line in the figure). Reassuringly, all the estimated coefficients for the fake border status are centered around zero and distributed far from our baseline estimate. As shown in Figures E.9(b)-E.9(d) we obtain similar results for the other grid cell sizes analyzed in the paper. Moreover, as Figures E.10(b)-E.10(d) show, the first-stage is equally strong in the random samples as in the actual data, as should be expected given the underlying distributional assumptions made in these simulations. As an additional test, Figures E.11(b)-E.11(d) show similar results for the reduced form regression in which conflict is associated with the random instrument. Reassuringly, the distribution of these reduced form coefficients for the random instruments is also centered around zero, while the reduced form coefficient of the Voronoi borders remains large, positive and statistically significant. Thus, these placebo tests suggest that our results are not driven by the high prevalence of both ethnic borders and conflict, but due to some deeper force due to the spatial structure of ethnic borders.



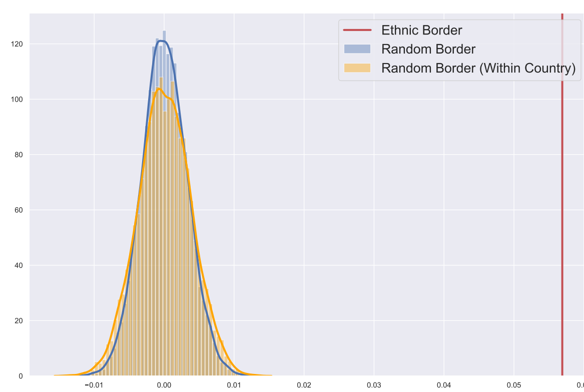
(a) Cell Size 50 × 50



(b) Cell Size 100 × 100

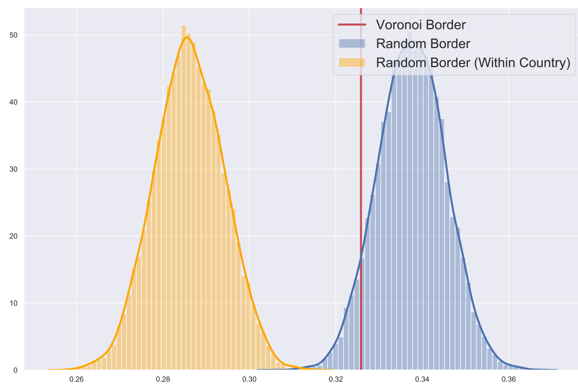


(c) Cell Size 25 × 25

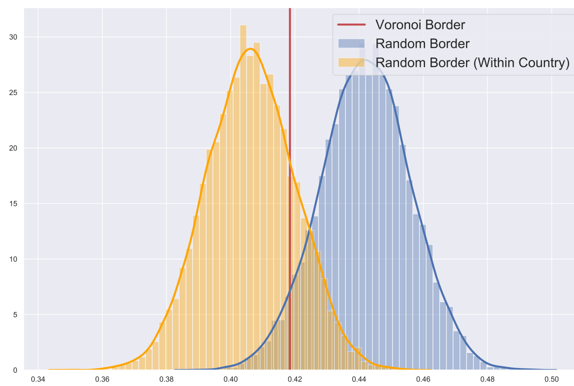


(d) Cell Size 10 × 10

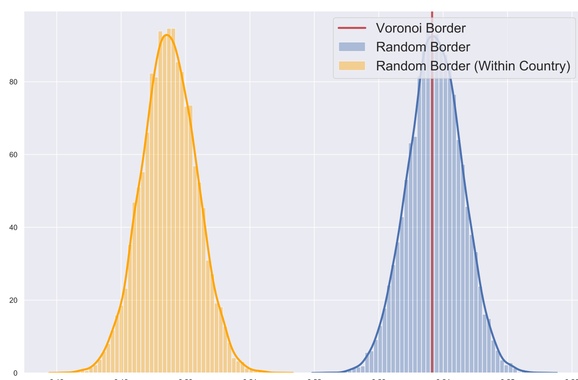
Figure E.9: Placebo Test: Ethnic vs. Random Border Status (IV)



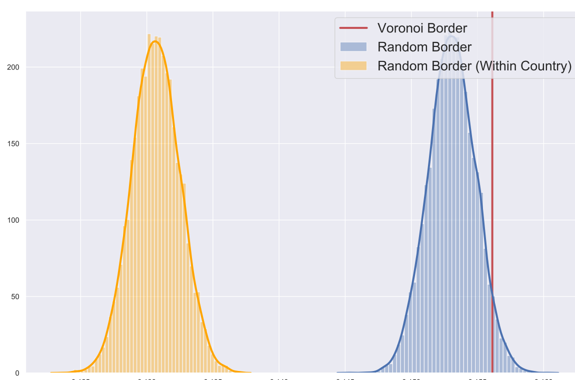
(a) Cell Size 50 × 50



(b) Cell Size 100 × 100

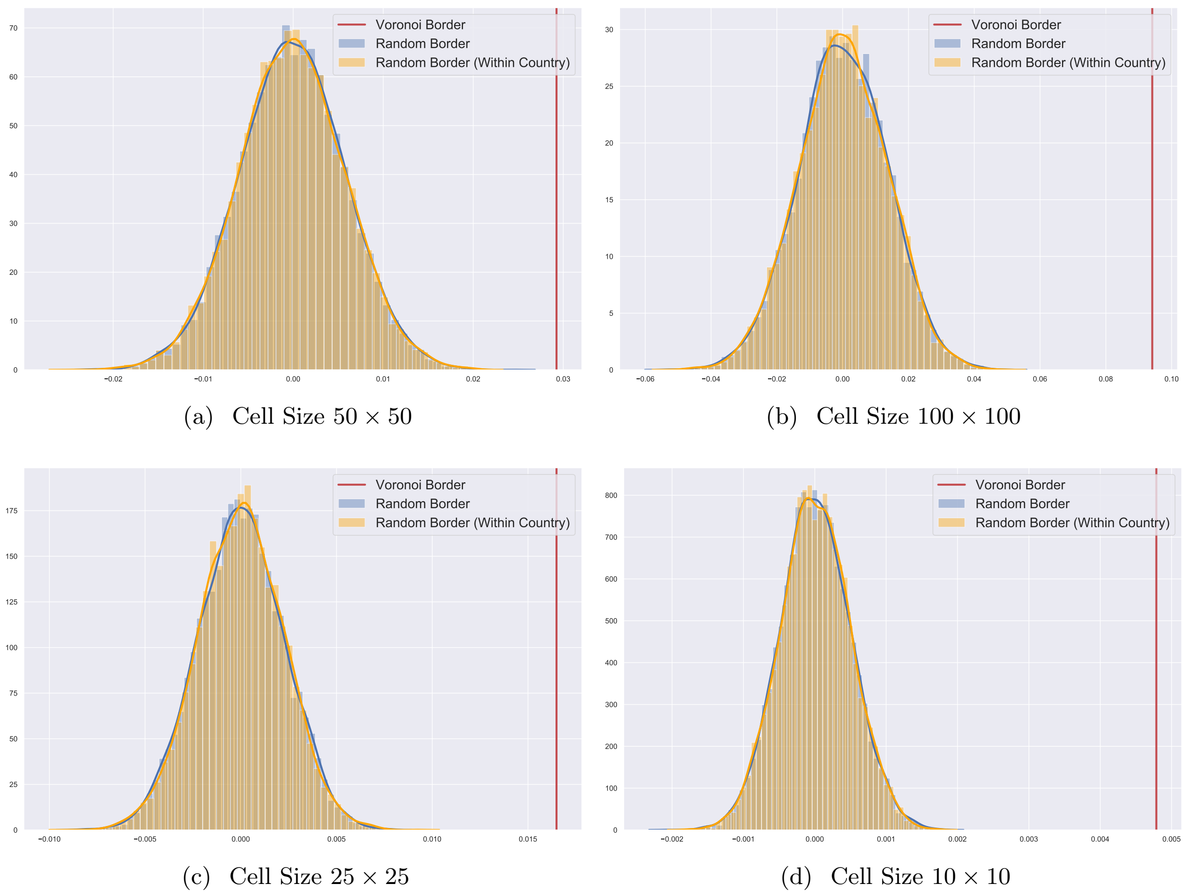


(c) Cell Size 25 × 25



(d) Cell Size 10 × 10

Figure E.10: Placebo Test: Ethnic vs. Random Border Status (First-Stage)



(a) Cell Size 50 × 50

(b) Cell Size 100 × 100

(c) Cell Size 25 × 25

(d) Cell Size 10 × 10

Figure E.11: Placebo Test: Ethnic vs. Random Border Status (Reduced Form)

E.9 Robustness to Intensive Border Measures

The main results exploit the prevalence of historical ethnic borders and Voronoi borders. This section shows that the results are qualitatively similar if instead we use intensive measures of borders, such as the number or the length of borders in a cell. Reassuringly, the qualitative results remain unchanged.

E.9.1 Intensive Measures – OLS Results

Table E.42: Historical Ethnic Borders and Conflict (OLS)

	Prevalence of Conflict		
	(1)	(2)	(3)
Presence of Ethnic Border	0.059***		
	(0.015)		
Length of Ethnic Borders (Logs)		0.021***	
		(0.004)	
Number of Ethnic Borders (Logs)			0.098***
			(0.027)
Country FE	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes
Adjusted-R^2	0.32	0.33	0.32
Observations	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

Table E.43: Historical Ethnic Borders and Conflict (OLS)

	Conflict Intensity					
	Events		Years		Fatalities	
	(1)	(2)	(3)	(4)	(5)	(6)
Length of Ethnic Borders (Logs)	0.045***		0.004***		0.026***	
	(0.008)		(0.001)		(0.008)	
Number of Ethnic Borders (Logs)		0.246***		0.024***		0.150**
		(0.057)		(0.005)		(0.062)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.37	0.37	0.36	0.36	0.34	0.34
Observations	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

E.9.2 Intensive Measures – First Stage

Table E.44: Murdock's Ethnic Borders and Voronoi Ethnic Borders
Instrumental Variable Analysis (First-Stage)

	Ethnic Border								
	Presence			Length			Number		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Presence of Voronoi Border	0.107***			0.463***			0.076***		
	(0.018)			(0.068)			(0.013)		
Length of Voronoi Borders (Logs)		0.021***			0.108***			0.015***	
		(0.004)			(0.015)			(0.002)	
Number of Voronoi Borders (Logs)			0.079***			0.362***			0.064***
			(0.015)			(0.058)			(0.011)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.71	0.70	0.70	0.74	0.74	0.74	0.89	0.88	0.88
Observations	14078	14078	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

Table E.45: Murdock's Ethnic Borders and Voronoi Ethnic Borders
Instrumental Variable Analysis (First-Stage)

	Presence of Ethnic Border				
	(1)	(2)	(3)	(4)	(5)
Number of Voronoi Borders (Logs)	0.305***	0.250***	0.094***	0.082***	0.079***
	(0.015)	(0.016)	(0.018)	(0.016)	(0.015)
					(0.005)
Country FE	No	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes
Geographic Controls	No	No	No	Yes	Yes
Climatic Controls	No	No	No	No	Yes
Adjusted-R^2	0.10	0.14	0.67	0.69	0.70
Observations	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. The sets of Geographic and Climatic controls are described in Table 3.

Table E.46: Murdock's Ethnic Borders and Voronoi Ethnic Borders
Instrumental Variable Analysis (First-Stage)

	Presence of Ethnic Border				
	(1)	(2)	(3)	(4)	(5)
Length of Voronoi Borders (Logs)	0.073***	0.061***	0.025***	0.022***	0.021***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Country FE	No	Yes	Yes	Yes	Yes
Ethnic FE	No	No	Yes	Yes	Yes
Geographic Controls	No	No	No	Yes	Yes
Climatic Controls	No	No	No	No	Yes
Adjusted-R^2	0.10	0.15	0.68	0.69	0.70
Observations	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. The sets of Geographic and Climatic controls are described in Table 3.

E.9.3 Robustness to Intensive Voronoi Border Measures – IV

Table E.47: Historical Ethnic Borders and Conflict (IV)

	Prevalence of Conflict					
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Ethnic Border	0.470***	0.476***	0.506***	0.402***	0.360***	0.361***
	(0.089)	(0.139)	(0.161)	(0.070)	(0.074)	(0.079)
Instrument	Number of Voronoi Borders			Voronoi Border Length		
Country FE	No	Yes	Yes	No	Yes	Yes
Ethnic FE	No	Yes	Yes	No	Yes	Yes
Main Controls	No	No	Yes	No	No	Yes
First-stage F-statistic	288.76	19.38	19.02	324.09	36.42	35.49
Adjusted-R^2	-0.13	0.24	0.23	-0.07	0.28	0.28
Observations	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

F Mechanisms

F.1 Historical Ethnic Borders and Diversity

Table F.1: Historical Ethnic Borders and Conflict (IV)
Robustness to Intra- and Inter-Ethnic Diversity

	Prevalence of Conflict					
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Ethnic Border	0.273***	0.273***	0.259***	0.287***	0.263***	0.263***
	(0.066)	(0.066)	(0.066)	(0.067)	(0.065)	(0.065)
Number of Languages		0.007				-0.004
		(0.005)				(0.004)
Ethnolinguistic Fractionalization			0.029***			0.031***
			(0.006)			(0.006)
Agricultural Suitability (Climatic) (mean)				0.089***		0.085***
				(0.017)		(0.017)
Agricultural Suitability (Climatic) (std)				0.014**		0.011*
				(0.006)		(0.006)
Ecological Diversity					0.019***	0.016***
					(0.005)	(0.005)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	34.15	34.12	33.69	34.69	33.18	33.38
Adjusted-R^2	0.30	0.30	0.31	0.30	0.31	0.31
Observations	14077	14077	14077	14077	14077	14077

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

F.2 Historical Ethnic Borders and Historical Conflict– IV

Table F.2: Historical Ethnic Borders and Conflict (IV)
Robustness to Historical Conflict

	Prevalence of Conflict					
	Historical Conflict			Contemporary Conflict		
	All	Both AFR	Non-AFR	All	Both AFR	Non-AFR
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Ethnic Border	0.001	-0.016	0.016	0.272***	0.276***	0.269***
	(0.016)	(0.010)	(0.014)	(0.066)	(0.066)	(0.065)
Presence of Historical Conflicts				0.239***	0.222***	0.234***
				(0.033)	(0.041)	(0.036)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	34.14	34.14	34.14	34.09	34.16	34.10
Adjusted-R^2	0.06	0.06	0.04	0.31	0.30	0.31
Observations	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

Table F.3: Historical Ethnic Borders and Historical Conflict

	Prevalence of Historical Conflict					
	All		Both African		Non-African	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Ethnic Border	0.005	0.001	0.003	-0.016	0.003	0.016
	(0.004)	(0.016)	(0.003)	(0.010)	(0.003)	(0.014)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic		34.14		34.14		34.14
Adjusted-R^2	0.06	0.06	0.06	0.06	0.04	0.04
Observations	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

F.3 Population Pressure

Table F.4: Historical Ethnic Borders and Conflict (IV)
Heterogeneous Effect: Growth in Population Density

	Prevalence of Conflict					
	Non-Civil			Ethnic		
	1900	1950	2000	1900	1950	2000
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Ethnic Border	0.276***	0.253***	0.223***	0.131***	0.122**	0.110**
	(0.069)	(0.067)	(0.067)	(0.049)	(0.049)	(0.048)
Growth Population Density at Border	0.026	0.075*	0.097***	0.005	0.030	0.041**
	(0.039)	(0.042)	(0.037)	(0.021)	(0.025)	(0.020)
Growth Population Density	0.036**	0.049**	0.051***	0.017**	0.021**	0.018**
	(0.018)	(0.019)	(0.017)	(0.008)	(0.009)	(0.007)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log[Population Density 1960]	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	16.92	16.06	14.62	16.92	16.06	14.62
Mean Prevalence	0.22	0.22	0.22	0.07	0.07	0.07
Adjusted-R^2	0.31	0.32	0.33	0.29	0.29	0.29
Observations	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

F.4 Similarity and Conflict – IV

Table F.5: Historical Ethnic Borders and Conflict (IV)
Effect of Cultural Distances

	Prevalence of Conflict						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.596***	0.620***	0.610***	0.607***	0.603***	0.587***	0.503***
	(0.110)	(0.120)	(0.114)	(0.113)	(0.116)	(0.110)	(0.094)
Cultural Distance (All)		-0.262***					
		(0.060)					
Cultural Distance (All85)			-0.255***				
			(0.057)				
Cultural Distance (Subsistence)				-0.206***			
				(0.044)			
Cultural Distance (Subsistencec)					-0.149***		
					(0.036)		
Cultural Distance (State)						-0.152***	
						(0.035)	
Cultural Distance (Statec)							-0.096***
							(0.021)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	29.11	32.05	33.35	31.69	27.61	30.25	39.07
Adjusted-R^2	0.20	0.25	0.25	0.24	0.22	0.23	0.24
Observations	5242	5242	5242	5242	5242	5242	4937

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table F.6: Historical Ethnic Borders and Conflict (IV)
Effect of Linguistic Distances

	Prevalence of Conflict						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.596***	0.594***	0.600***	0.589***	0.584***	0.592***	0.621***
	(0.110)	(0.113)	(0.118)	(0.115)	(0.114)	(0.117)	(0.125)
Linguistic Distance (Level 1)		-0.046***					
		(0.015)					
Linguistic Distance (Level 3)			-0.079***				
			(0.022)				
Linguistic Distance (Level 5)				-0.110***			
				(0.030)			
Linguistic Distance (Level 7)					-0.130***		
					(0.034)		
Linguistic Distance (Level 10)						-0.165***	
						(0.041)	
Linguistic Distance (Level 15)							-0.214***
							(0.051)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	29.07	29.05	27.36	29.42	30.40	29.21	27.72
Adjusted-R^2	0.20	0.20	0.20	0.21	0.22	0.23	0.23
Observations	5241	5241	5241	5241	5241	5241	5241

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

F.5 Types & Causes of Conflict

Table F.7: Historical Ethnic Borders and Conflict (IV)
Effect on Conflict Type & Onset

	Prevalence of Conflict					
	Non-Civil	Local	Ethnic	Land	Onset	Number of Onsets
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Ethnic Border	0.273***	0.194***	0.130***	0.046**	0.079***	0.075***
	(0.066)	(0.066)	(0.049)	(0.020)	(0.025)	(0.023)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	34.14	34.14	34.14	34.14	34.14	34.14
Mean Prevalence	0.22	0.16	0.07	0.03	0.03	0.03
Adjusted-R^2	0.30	0.28	0.28	0.17	0.15	0.18
Observations	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

Table F.8: Historical Ethnic Borders and Conflict (IV)
Effect by Conflict Cause

	Prevalence of Conflict								
	Non-Civil	Communal	Territory	Authority	Other	Agr. Land & Water	Other Territorial	Livestock	Religious
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Presence of Ethnic Border	0.307***	0.067	0.065*	0.044*	0.047**	0.019	0.071***	0.034*	-0.001
	(0.095)	(0.042)	(0.039)	(0.023)	(0.024)	(0.023)	(0.027)	(0.019)	(0.005)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	16.34	16.34	16.34	16.34	16.34	16.34	16.34	16.34	16.34
Mean Prevalence	0.24	0.05	0.04	0.02	0.03	0.03	0.03	0.02	0.01
Adjusted-R^2	0.30	0.31	0.31	0.34	0.30	0.26	0.31	0.34	0.41
Observations	9973	9973	9973	9973	9973	9973	9973	9973	9973

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests. Main Controls refer to the sets of Geographic and Climatic controls described in Table 3.

F.6 Types of Borders (Interaction with Cell-level) – IV

Table F.9: Historical Ethnic Borders and Conflict (IV)
Interaction between Borders and Cell characteristics

	Prevalence of Conflict						
	Resources			Hard vs. Soft		De Facto vs. De Jure	
	CSI	Minerals	Oil	RIX	River	Adm1 Border	National Border
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Presence of Ethnic Border	0.276***	0.275***	0.269***	0.270***	0.272***	0.230**	0.172*
	(0.067)	(0.065)	(0.072)	(0.068)	(0.065)	(0.092)	(0.094)
Interaction	-0.018	-0.097	0.030	0.009	0.043	0.064	0.145**
	(0.049)	(0.083)	(0.109)	(0.020)	(0.064)	(0.059)	(0.059)
Main Effect	0.026	0.198***	-0.005	-0.009	0.036	-0.077***	-0.143***
	(0.018)	(0.053)	(0.040)	(0.010)	(0.041)	(0.025)	(0.026)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	13.47	16.50	17.43	14.91	18.71	22.03	21.02
Adjusted-R^2	0.30	0.31	0.30	0.30	0.30	0.30	0.31
Observations	14078	14078	14078	14078	14078	14078	14078

Notes: Heteroskedasticity robust standard error estimates clustered at the country-level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

G Variable Definitions, Sources and Summary Statistics

This section presents the definition, sources, and summary statistics for the variables used in the different analyses in the main body of the paper.

G.1 Variable Definition and Sources

- **Absolute latitude**: The absolute value of the latitude of cell's geodesic centroid. Author's computations.
- **Longitude**: The longitude of cell's geodesic centroid. Author's computations.
- **Mean Elevation**: The mean elevation of a homeland in km above sea level, calculated using geospatial elevation data taken from GLOBE Task Team and others (1999). Author's computations.
- **Terrain Ruggedness**: The mean change in elevation across cells in a homeland in km, calculated following the methodology of Riley et al. (1999), using geospatial elevation data taken from GLOBE Task Team and others (1999). Author's computations.
- **Caloric Suitability**: Pre-1500CE Caloric suitability is the potential caloric output in a region as reported in Galor and Özak (2015) and Galor and Özak (2016).
- **Land Suitability**: Average probability within a region that a particular grid cell will be cultivated as computed by Ramankutty et al. (2002).
- **Coast length**: Length, in thousands of km, of a country's coastline. Author's computations.
- **Ecological Diversity**: Herfindahl index of share's of a country's area in various ecologies. Author's computations following the method of Fenske (2014) and Depetris-Chauvin and Özak (2016).
- **Share of Area within 100kms of Sea**: Share of a country's area within 100kms of Sea. Author's computations.
- **Share of Area within 100kms of Waterbodies**: Share of a country's area within 100kms of waterbody (perennial, fluctuating). Author's computations.
- **Climate variables (temperature, precipitation, etc.)**: Mean and standard deviation of climatic characteristics (e.g., temperature and precipitation) constructed using v3.2 of the Climatic Research Unit (CRU) database.