INSTITUTO DE ECONOMÍA

DOCUMENTO de TRABAJO

573

2023

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www.economia.uc.cl · ISSN (edición impresa) 0716-7334 · ISSN (edición electrónica) 0717-7593

(De facto) Historical Ethnic Borders and Land Tenure in Africa*

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Abstract

We explore the effect of historical ethnic borders on contemporary conflict in Africa. We document that both 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

*We wish to thank Giorgio Chiovelli, James Fenske, Raphael Franck, Pauline Grosjean, Moshe Hazan, Federico Masera, Moti Michaeli, Nathan Nunn, Elias Papaioannou, Dominic Rohner, Assaf Sarid, Yannay Spitzer, Mathias Thoenig, Leonard Wantchekon, and David Weil, as well as participants at STATA TX Empirical Microeconomics Conference, MIPP Workshop in Political Economy and Political Science, 6th OzClio Workshop at UNSW, WEIA Conference at Keio University, LSE - Stanford - Universidad de los Andes Long-Run Development in Latin America, EH-Clio Lab Conference at PUC Chile, the Deep-Rooted Factors in Comparative Development Conference, LACEA, Quantitative History Webinar Series - Asia Global Institute, SECHI, Conference on the Political Economics of Conflict and Nation-Building (Lausanne), and seminar participants at Brown, Ben-Gurion, Diego Portales, ICESI, Haifa, Hebrew, LANE HOPE, SMU, Tel Aviv, UC Merced, Universidad Nacional de Colombia, Virtual Economic History Seminar, and Wilfred Laurier University for helpful comments. We also thank Mathias Thoening for sharing the Stata command that allows for spatial autocorrelation adjustment in an IV setting. Emilio Depetris-Chauvin acknowledges financial support from CONICYT, FONDECYT Regular 1201036.

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1 Introduction

Conflicts are a major scourge in many regions of the world, generating immense suffering and loss of human life. Moreover, conflicts remain a significant obstacle to the development process, lowering the incentives to accumulate human and physical capital, affecting the efficiency in the allocation of public resources, and eroding institutions and social capital. The African case is especially notable, given the wide geographical prevalence of conflicts and the pervasiveness of different types of *intra-* and *interstate* conflicts in its recent history. Unsurprisingly, conflicts are considered a key factor holding back African economic development (Easterly and Levine, 1997). Many underlying drivers of conflict in Africa have been suggested and explored in the literature, especially the determinants of intra- and interstate conflicts.[1] There is an overwhelming consensus that ethnic tensions are a key catalyst of intrastate conflicts (Horowitz et al., 1985). Also, the extensive literature in economics, political science, and international studies focused on the causes of interstate conflict has documented the pivotal role of shared national borders as a strong predictor of conflict between countries. Intuitively, shared international borders matter because they affect both the opportunity for interaction and the willingness to fight (Starr, 1978), which in many cases, is affected by the presence of resources and disputed territories. Interestingly, although similar forces should be prevalent across ethnic groups within countries, the role of (historical) ethnic borders as a source of internal conflict remains overlooked.

This seems an especially important gap in the literature as conflicts over land and territory are perceived to be especially prevalent in Africa. Indeed, 42% of individuals surveyed across 17 African countries in 2002 and 2003 stated that "boundary and land disputes" (the most prevalent first response) were the main catalysts for violent conflict between groups.[2] 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). Although 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 tend to be linked to the escalation of conflict, evolving to become full-fledged civil wars (e.g, Côte d'Ivoire and Sudan) (Fjelde and Østby, 2014).

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 relationship between the historical (and fuzzy) demarcation of ethnic territories and 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. 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

[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); Miguel et al. (2004); Alesina et al. (2011); Bazzi and Blattman (2014); Berman and Couttenier (2015); Michalopoulos and Papaioannou (2016); Berman et al. (2017); McGuirk and Burke (2020)). 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.

and Laitin, 2011). Nonetheless, the demarcation and enforcement of these 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).[3] We argue that it is the "porosity" of these poorly demarcated historical borders that serves as catalyst for the emergence of conflict, especially when accompanied by increases in population or the presence of land suitable for agriculture. Indeed, these soft historical borders are conducive to the existence of weak ethnic (and personal) property rights, overlapping claims on resources (particularly agricultural land), and a higher likelihood of inter-ethnic contact and encroachment.[4]

To test our main hypothesis, 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 historical ethnic borders (Murdock, 1959).[5,6] 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. This strong empirical pattern holds regardless of whether we look at the presence, the number, or the total

[3]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."

[4]E.g., in 2019, an ethnic dispute between the Tiv and Jukun peoples made the headlines in Nigeria's national newspapers. The crisis 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).

[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 (Fenske, 2014; Depetris-Chauvin and Özak, 2018), and estimating the intensity of the disease environment (Alsan, 2015; Depetris-Chauvin and Weil, 2018). As Moscona et al. (2020) have shown these borders have persisted and predict contemporary discontinuities in ethnic identification.

length of historical ethnic borders.

While we show that initial OLS estimates are robust to a set of geographic and climatic controls as well as to country and ethnic group fixed effects, those estimated coefficients might still be biased. Indeed, historical ethnic borders are unlikely to be randomly assigned, while Murdock's map may contain non-trivial measurement error. 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, our theoretical model of ethnic border formation predicts that the location of ethnic borders in a homogeneous world, in which ethnicities do not differ in their geographical, institutional, cultural, linguistic, historical, and ethnic characteristics, 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, after accounting for country and ethnicity fixed-effects, these measures of potential ethnic borders are, at least in theory, orthogonal to any grid cell characteristics.

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 124 percent of the mean value of prevalence of non-civil conflict in our sample; suggesting a sizable economic 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 diamonds, minerals and 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.[7]

Having documented the strong association between historical ethnic borders and non-civil conflict, we delve further into the potential mechanisms underlying this result. Specifically, we explore whether various characteristics of an ethnic border may amplify or dampen its effect on conflict. In particular, we study whether the role of borders is amplified at borders that are (i) agriculturally suitable, (ii) host natural resources such as minerals, (iii) overlaps with natural features that make the border less fuzzy, (iv) have experienced a recent increase in population (e.g, due to drastic climate change), and (v) in which culturally similar ethnicities interact.

Our analyses of potential mechanisms suggest that conflict increases at borders with higher agricul-

[7]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.

tural potential. This supports our hypothesis that competition over productive land is a key mechanism underlying the strong positive impact of historical ethnic borders on modern conflict. We present four additional pieces of evidence for this explanation as an underlying mechanism: (i) exploiting information on the causes and issues of local conflicts, we find that conflict over territories and authority is more prevalent in the proximity of historical ethnic borders. Interestingly, we find that the proximity of historical ethnic borders does not drive conflicts related to religious issues. (ii) 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 (1990)'s narrative on the problem of scarcity of land in rural areas after independence. (iii) We find that ethnic similarities and complementarities across historical borders matter for conflict. Specifically, we show that economic, cultural, and linguistic similarities exacerbate conflict at historical ethnic borders. Since similar ethnicities tend to share economic subsistence strategies, these results suggest there may exist more inter-ethnic competition for resources at the border, consistent with Spolaore and Wacziarg (2016) and Ray and Esteban (2017), who propose group similarity may be conducive to conflict. (iv) Using individual level data we document that land ownership is lower close to historical ethnic borders. In particular, we show that individuals are less likely to own land if they live close to a border compared to others of the same ethnic group living in the same historical ethnic homeland within a country.

Further, we explore whether the tangibility, observability and immutability of ethnic borders may help prevent conflict. Specifically, we analyze if geographical characteristics that are complementary to border demarcation mitigate the effects of historical borders on contemporary conflict. Our results suggest that certain geographical features of historical ethnic borders, e.g., congruence with water bodies (rivers, lakes, and seas), may have decreased their fuzziness and thus decreased the likelihood of conflict. Furthermore, we find that the concordance of historical ethnic borders with de jure borders, e.g., administrative borders (both at the subnational and the international level), also decreases 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. Indeed, by allocating authority and property, de jure borders lower these problems.

Our paper is the first to 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. Second, we add to the literature on the role of borders for economic and political outcomes, which has mainly focused on the role of contemporary national borders (Miguel, 2004; Bubb, 2013; Aker et al., 2014; McCauley and Posner, 2015; Michalopoulos and Papaioannou, 2013a, 2016), and has largely ignored the role of internal borders and their role on conflict.[8] Third, we also contribute to a large literature (mostly in political science based on qualitative analyses and case studies) documenting the importance of competition over land as a catalyst of conflict (Fearon and Laitin, 2011; Boone, 2017; Acemoglu et al., 2020; Berman et al., 2019). Fourth, we add to the literature on the effect of cultural differences (Alesina and La Ferrara, 2005; Spolaore and Wacziarg, 2016; Desmet

[8] A notable exception is Bazzi and Gudgeon (2021), which studies the role of changing administrative borders in Indonesia.

et al., 2017; Ray and Esteban, 2017). Fifth, 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). Sixth, we contribute to the literature on the interaction of ethnicity and landownership in Africa (Bubb, 2013; Boone and Nyeme, 2015). Seventh, our work adds to the literature on the historical drivers of contemporary conflict.[9] Finally, we contribute to the growing literature on the deep-determinants of economic development and the persistent effects of historical institutions (Diamond, 1997; Acemoglu et al., 2005; Galor and Özak, 2016; Guiso et al., 2009; Nunn and Wantchekon, 2011).

The remainder of the paper is organized as follows. In section **??** we provide a conceptual framework to understand the potential relationship between historical ethnic borders and contemporary conflict. In section 2 we present the data and outline the empirical strategy for our analysis. In section 3 we present our main empirical results and explore the robustness of our findings. In section **??** we explore the mechanisms behind our main results. Section 4 concludes. Additional results and our theoretical model for border location are presented in the appendix.

2 Data and Empirical Strategy

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. 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.[10] 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.[11]

2.1 Main Independent Variable: Historical Ethnic Borders

We exploit information on 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). This map has been widely and effectively used in economics, history, anthropology, and political science.[12] Although potentially mismeasured, since it is a historical map and ethnic borders are soft

[9] A number of studies have documented that modern conflict in Africa has deep historical roots due to the European partition (Michalopoulos and Papaioannou, 2016), precolonial conflict (Besley and Reynal-Querol, 2014), and exposure to centralized institutions (Depetris-Chauvin, 2014).

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

[11] 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.

[12] There are more than 1700 citations to Murdock (1959) on Google Scholar (verified on July 25, 2018).

and fuzzy, it has been shown that nonetheless it captures the relevant information (Michalopoulos and Papaioannou, 2013b; Moscona et al., 2020). For our analyses, we use the geocoded version introduced in Nunn (2008).[13] Figure 1 depicts the distribution of ethnic homelands in Murdock's map.

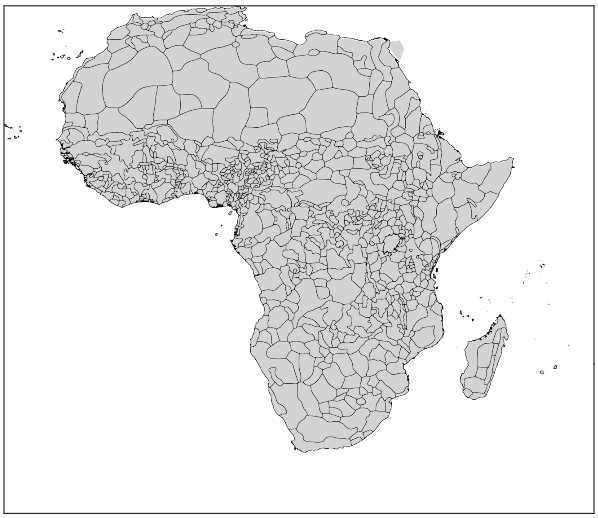


Figure 1: Historical Ethnic Borders in Africa (Murdock Map)

Given the Murdock map and our grids of cells of various sizes, we construct measures of presence and intensity 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. 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. Figures **??**-**??** depict these various measures.

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.[14] Additionally, we use 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). Although these Atlases do not provide the location of borders, they allow us to construct alternative instrumental variables based on those core locations.

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

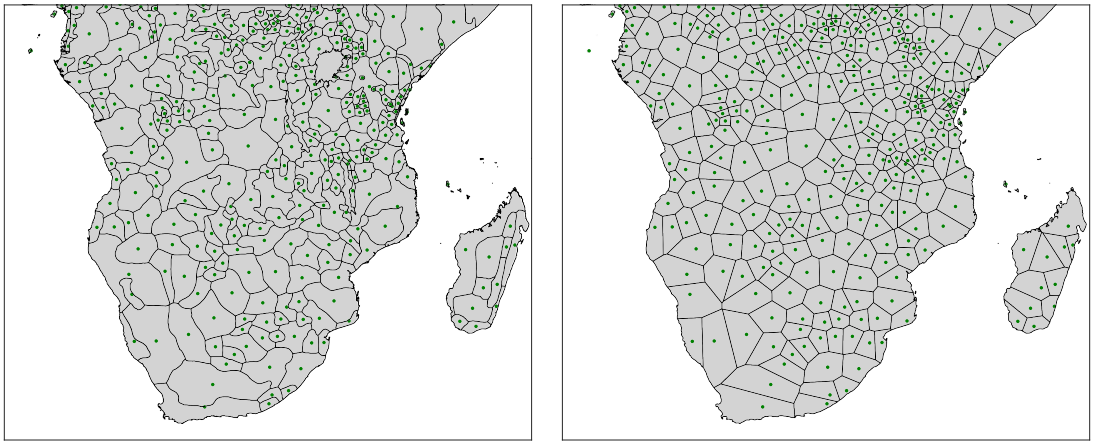
[14]GREG is constructed based on the Soviet Atlas Narodov Mira and focuses on politically relevant groups for the study of contemporary conflict. So, it may reflect a more modern distribution of ethnic borders, which may be subject to further concerns of endogeneity and reverse causality in the study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

2.2 Empirical Strategy

In order to explore the association between historical ethnic borders and contemporary non-civil conflict in Africa, we estimate a linear probability model of the form:

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

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 one of our three indicators of ethnic borders: a dummy for whether at least one ethnic border intersects the grid, the number of ethnic borders in the grid, and the total length of those borders (in logs). 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. Finally, ε_{ice} is an error term, 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.[15]



(a) Historical Borders & Centroids of Ethnic Homelands

(b) Potential Borders & Centroids of Ethnic Homelands

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

Figure 2(a) depicts for each ethnic group in the southern part of Africa its historical ethnic border and centroid. Additionally, Figure 2(b) depicts the centroids and the unique potential (Voronoi) ethnic borders associated with them. Our analysis uses these potential borders as an instrument for historical ethnic borders. 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 section **??**, as well as the association between the length and number of potential borders and historical borders.

[15] 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 **??**).

3 Empirical Results

3.1 Population Pressure

While relatively low population density and land abundance characterized Africa in pre-colonial times (Herbst, 2000; Englebert et al., 2002; Austin, 2008), 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). In fact, it has been argued that increasing pressure over land due to high population growth underlied large violent conflicts such as Darfur and Rwanda (André and Platteau, 1998; Faris, 2009).

Table 1: 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)
Growth Population Density at Border	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 **??**. Growth in population density at the border based on a small buffer around the border within a cell. See text for construction and discussion.

We next analyze the potential role of population pressure at historical ethnic borders. 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 particular, in Table 1, we explore the effect of historical ethnic borders and population growth on non-civil, local, ethnic, land-related, and border & territory conflicts. In all columns we now also account for the level of population density

in 1960, as well as the growth in population density between 1960 and 2005. The results suggest 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 **??** 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.[16]

3.2 Proximity to Ethnic Borders and Individual Land Ownership

In this section we explore whether the pattern of landownership differs close to the border, especially among recent migrants. Our results suggest that conflict is more prevalent in borders with larger recent population pressures, driving especially territorial conflict. Thus, we may expect land ownership to be less equal close to the border. To explore this issue, we use data from two different geocoded datasets: several waves of the Demographic and Health Survey (DHS) in 33 countries and the first two waves of Livings Standard Survey (LSS) of Ghana and Ivory Coast (rounds 1 and 2). Both surveys provide georeferenced location data for respondents which allows us to compute the distance of each respondent to the closest historical border, as well as the geographical characteristics of her location. Importantly, both datasets allow us to assign each respondent to an historical ethnic homeland. Among the data collected in these surveys, the respondents were asked whether they owned land. Moreover, in most cases, individuals report their ethnic affiliation. The key advantage of DHS is its larger coverage and sample size while for the case of the LSS is its information about internal migratory status. In order to analyze how proximity to historical ethnic borders impact land ownership we estimate different versions of the following equation:

$$Ownership_{i,e,l(h,c)} = \alpha + \beta Distance_l + \gamma' X_i + \delta' G_l + \Phi_e + \Theta_h + \Pi_c + \epsilon_h, \tag{2}$$

where $Ownership_{i,e,l(h,c)}$ is our measure of land ownership as reported by individual i from (self-reported) ethnic group e living in location l situated in historical ethnic homeland h and country c. $Distance_l$ is the logged distance from the location of the respodent to the closest historical ethnic border. X_i is the vector of basic individual controls (i.e., gender, age, and squared age) whereas the vector G_l includes the basic set of geographic and climatic variables exploited in previous regressions (computed for 25km buffer around the location l). Φ_e, Θ_h, and Π_c refer to a full set of (self-reported) ethnicity, ethnic homeland, and country fixed effects, respectively. Finally, ϵ_h is an error term, which is allowed to be heteroskedastic and correlated at the ethnic homeland level.

While our prefered econometric analysis (as reflected in (3)) compare individuals within the same

[16] 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."

(self-reported) ethnic group, for approximately 30 percent of the DHS respondents ethnic affiliation is not reported. This could introduce some concerns regarding selection in our sample. Nonetheless, to asses the validity of this concern, we report in the first three columns of Table 2 our estimates without including (self-reported) ethnic fixed effect. In column 4 to 6 of Table 2 we present the main results of our prefered econometric specification for the whole sample of all respondent as well as for male and female, separately. Regardless of the gender of the respondent, we find that proximity to the historical strongly reduce the likelihood of land ownership. The estimated effect is quite large and implies that moving an individual in the lowest decil of distance (i.e., 2km from the border) to the highest decil of distance (i.e., 58km from the border) will increase the probability of land ownership by 24 percentage points.

We next exploit information from an indepedent dataset (i.e., LSS) for which we have information on immigration status. Table 3 shows that after accounting for country, ethnic homeland, and ethnicity fixed effects, as well as individual controls, the probability of owning land increases as one moves further away from a historical ethnic border. Moreover, this association is driven by migrant households. The estimated effect is quite large and implies that moving from the farthest locations from the border to the border, can lower the probability of land ownership by about 40 percentage points.

Table 2: Historical Ethnic Borders and Land Ownership (IV)

	Land Ownership					
	Full Sample			Self-Reported Ethnicity		
	All	Women	Men	All	Women	Men
	(1)	(2)	(3)	(4)	(5)	(6)
Log[Distance to Ethnic Border]	0.018***	0.020***	0.014	0.033***	0.036***	0.028**
	(0.007)	(0.007)	(0.009)	(0.009)	(0.010)	(0.012)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Homeland FE	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Self-Reported Ethnicity FE	No	No	No	Yes	Yes	Yes
Mean Prevalence	0.37	0.34	0.43	0.37	0.33	0.43
First-stage F-statistic	123.10	112.74	128.74	55.65	50.71	61.61
Adjusted-R^2	0.13	0.09	0.23	0.12	0.06	0.23
Observations	874415	595662	278752	600668	408667	191936

Notes: Heteroskedasticity robust standard error estimates clustered at the ethnic homeland-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 **??** (computed for a 25km buffer around the respondent location).

Table 3: Historical Ethnic Borders and Land Ownership

	Land Ownership			
	All		Non-Migrants	Migrants
	(1)	(2)	(3)	(4)
Log[Distance to Ethnic Border]	0.016	0.021	-0.022	0.072***
	(0.023)	(0.022)	(0.032)	(0.019)
Country FE	Yes	Yes	Yes	Yes
Ethnic Homeland FE	Yes	Yes	Yes	Yes
Geographical Controls	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes
Self-Reported Ethnicity FE	No	Yes	Yes	Yes
Mean Prevalence	0.84	0.84	0.91	0.74
First-stage F-statistic	52.87	54.65	30.11	86.87
Adjusted-R^2	0.02	0.02	0.01	-0.00
Observations	5860	5860	3391	2466

Notes: Heteroskedasticity robust standard error estimates clustered at the ethnicity-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.

3.3 Proximity to Ethnic Borders and Individual Land Ownership

In this section we explore whether the pattern of landownership differs close to the border. Our results suggest that conflict is more prevalent in borders with larger recent population pressures, driving especially territorial conflict. Thus, we may expect lower prevalence of land ownership close to the border. To explore this issue, we use data from several waves of the Demographic and Health Survey (DHS) in 33 countries. These surveys provide georeferenced location data for respondents which allows us to compute the distance of each respondent to the closest historical border, as well as the geographical characteristics of her location. Importantly, we are able to assign each respondent to a historical ethnic homeland. Among the data collected in these surveys, the respondents were asked whether they owned land. Moreover, in most cases, individuals report their ethnic affiliation. In order to analyze how proximity to historical ethnic borders impact land ownership we estimate different versions of the following equation:

$$Ownership_{i,e,w,l(h,c)} = \alpha + \beta Distance_l + \gamma' X_i + \delta' G_l + \Phi_e + \Theta_h + \Omega_w + \Pi_c + \epsilon_h, \quad (3)$$

where $Ownership_{i,e,l(h,c)}$ is our measure of land ownership as reported by individual i from (self-reported) ethnic group e living in location l situated in historical ethnic homeland h and country c. $Distance_l$ is the logged distance from the location of the respondent to the closest historical ethnic border. X_i is the vector of basic individual controls (i.e., gender, age and its square) whereas the vector G_l includes the basic set of geographic and climatic variables exploited in previous regressions (computed for a 25km buffer around location l). Φ_e, Θ_h, Ω_w, and Π_c refer to a full set of (self-reported) ethnicity, ethnic homeland, wave, and country fixed effects, respectively. Finally, ϵ_h is an error term,

which is allowed to be heteroskedastic and correlated at the ethnic homeland level.

The DHS Program distributes surveys separately for women and men; being the dataset larger and more comprehensive for the former. While we focus our analysis on women, we also show in the appendix that results are very similar regardless of the gender of the individual interviewed. Nonetheless, when in cohabitation, women are also asked about ownership of the land for their partners or other family members. Therefore, our measure of land ownership reflects ownership of the land of any household member.

Although our preferred econometric analysis (as reflected in (3)) compares individuals within the same (self-reported) ethnic group, DHS data does not report ethnic affiliation for approximately 30 percent of our sample. Thus, in Table 4 we show the results of IV estimations for the sample of individuals for whom landownership data is available, as well as for those for whom self-reported ethnic affiliation is reported. Further, we also restrict our analysis for different samples: individuals living in rural areas, migrants living in rural areas, and rural migrants living in rural areas (i.e, rural-rural migrants). Focused on females, in column 5 to 6 we present the main results of our preferred econometric specification for all, rural resident, rural migrants, and rural-rural migrants. We find that proximity to the historical ethnic border strongly reduces the likelihood of land ownership. The estimated effect in column 5 is quite large and implies that moving an individual in the lowest decile of distance (i.e., 2km from the border) to the highest decile of distance (i.e., 58km from the border) will increase the probability of land ownership by 24 percentage points. We find quantitatively similar results for the sample of females living in rural areas (column 6). Further, we document a larger effect for migrant living in rural areas (column 7), particularly those identified as rural-rural migrants.[17]

4 Concluding Remarks

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[17] In Table 2 we also include males in our sample and find very similar results.

Table 4: Historical Ethnic Borders and Female Land Ownership in Africa (IV)

	Female Land Ownership							
	Full Sample				Self-Reported Ethnicity			
	All	Rural	Rural Migrant	Rural-Rural Migrant	All	Rural	Rural Migrant	Rural-Rural Migrant
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log[Distance to Ethnic Border]	0.019***	0.028***	0.036*	0.050*	0.035***	0.045***	0.073*	0.100**
	(0.007)	(0.008)	(0.021)	(0.027)	(0.010)	(0.015)	(0.042)	(0.043)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Homeland FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Self-Reported Ethnicity FE	No	No	No	No	Yes	Yes	Yes	Yes
Mean Prevalence	0.37	0.44	0.54	0.54	0.36	0.43	0.55	0.56
First-stage F-statistic	113.92	101.85	58.34	45.50	50.41	44.11	19.07	22.06
Adjusted-R^2	0.08	0.08	0.03	0.01	0.06	0.05	-0.01	-0.04
Observations	629283	443611	96343	60772	427170	297198	61085	42659

Notes: Heteroskedasticity robust standard error estimates clustered at the ethnic homeland-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 **??** (computed for a 25km buffer around respondents' location).

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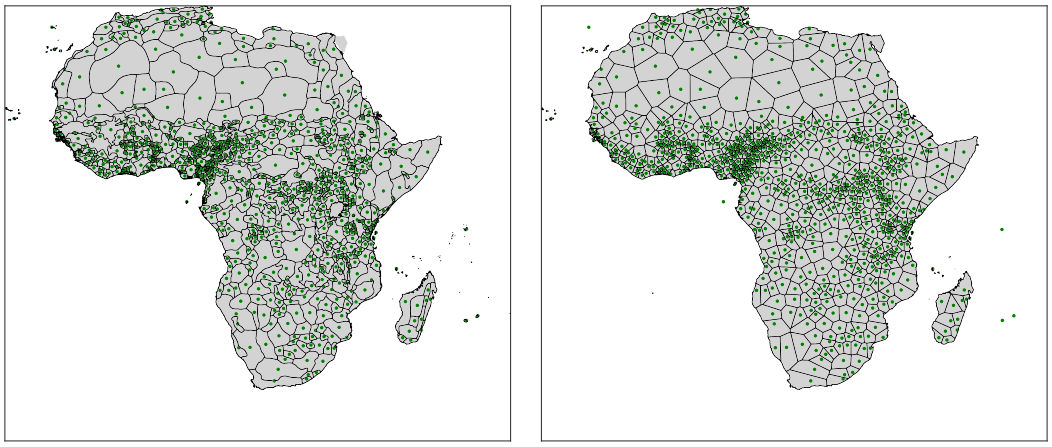
Online Appendix (Not for Publication)

Available for download here

Appendix (For Online Publication)

A Additional Figures

A.1 Historical Ethnic and Voronoi Borders



(a) Historical Borders & Centroids of Ethnic Homelands

(b) Potential Borders & Centroids of Ethnic Homelands

Figure A.1: Historical Ethnic Borders, Centroids and Potential (Voronoi) Borders in Africa