

(De facto) historical ethnic borders and land tenure in Sub-Saharan Africa[☆]Emilio Depetris-Chauvin^a, Ömer Özak^{b,*}^a Instituto de Economía, Pontificia Universidad Católica de Chile, Santiago de Chile, Chile^b Department of Economics, Southern Methodist University, IZA and GLO, PO Box 0496, Dallas, TX 75275-0496, United States of America

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ABSTRACT

We study the role of proximity to historical ethnic borders in determining individual land ownership in Sub-Saharan Africa. Following an instrumental variable strategy, we document that individuals have a lower likelihood of owning land near historical ethnic borders. In particular, the likelihood of owning land decreases by 15 percentage points, i.e., about 1/3 of the mean rate of landownership, for rural migrants who move from 57 km (90th percentile) to 2 km (10th percentile) from the border. This result aligns with the view that competition for land is stronger and property rights are weaker close to historical ethnic borders in Sub-Saharan Africa.

1. Introduction

The study of land tenure in Sub-Saharan Africa is critical for comprehending the region's economic development. First, Sub-Saharan Africa possesses about half of the world's total usable uncultivated land, which holds enormous potential for agricultural growth (Byamugisha, 2013). Second, despite facing significant productivity challenges, agriculture remains a vital source of income for many households in the region. Third, economic theory suggests that land ownership is strongly linked to enhanced investment and higher agricultural productivity (yet, the empirical evidence for this effect is mixed, see, e.g., Goldstein and Udry, 2008; Fenske, 2011; Atwood, 1990; Jayne et al., 2010). Fourth, an unequal distribution of land ownership poses a threat to both political and economic stability in the region (Byamugisha, 2013). Paramount among the determinants of land tenure in

Sub-Saharan Africa are ethnicities and their cultural norms, rules, and institutions (i.e., ethnic customary laws Boone, 2014).¹

In this paper, we explore a particular dimension of ethnicity for the determination of individuals' land ownership: proximity to borders of ancestral ethnic homelands in precolonial times. In Depetris-Chauvin and Özak (2023), we show how the indeterminate nature of historical ethnic borders contributes to modern land disputes between ethnic groups. The crux of our argument centers on the significance of ethnic homelands in contemporary group identities, as they underscore ancestral land ownership (Horowitz et al., 1985; Fearon and Laitin, 2011). Yet, the delineation and enforcement of these borders during precolonial Africa lacked strict implementation due to the abundance of land and scarcity of population (Fanso, 1984; Herbst, 2000). However, the post-colonial era witnessed a significant shift, characterized by exponential population growth, resulting in land scarcity, intensified resource competition, and increased value attributed to marginal

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* Corresponding author.

E-mail addresses: edepetris@uc.cl (E. Depetris-Chauvin), ozak@smu.edu (Ö. Özak).

¹ The term "customary" pertains to the land ownership privileges that are enshrined and transmitted based on ethnicity, as well as to the role they assign to customary leaders in the resolution and implementation of land rights (Boone and Nyeme, 2015).

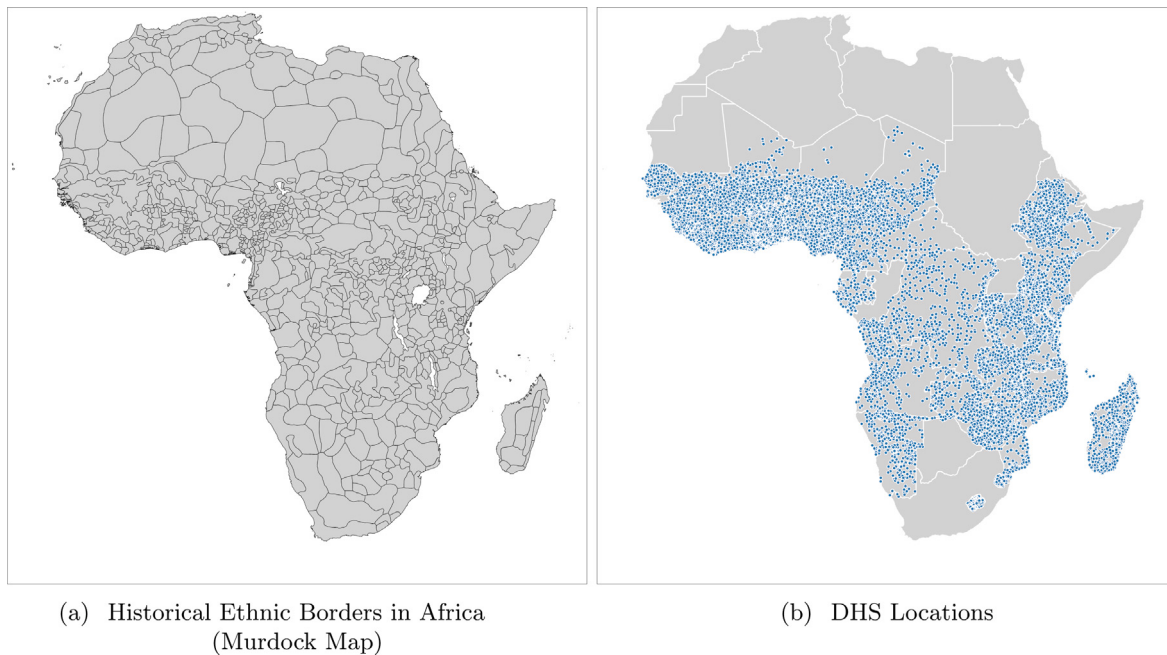


Fig. 1. Historical ethnic borders and location of individuals.

lands (Boone, 2017; Herbst, 2000). Therefore, we contend that the ambiguous and permeable nature of these historical borders serves as a catalyst for the emergence of land disputes and tensions between ethnic groups due to overlapping claims. As a corollary of this theory, we hypothesize that individuals who live close to historical ethnic borders may face larger competition for land between groups and may also have less secure ownership, which should result in lower land tenure rates. In particular, these weak “ethnic property rights” and the potential for conflict, induce uncertainty over private property rights, which may prevent individuals from trading or owning land, especially in rural areas and among migrants.

To test our hypothesis, we employ data from several waves of the Demographic and Health Surveys (DHS, from now on) and information on the spatial distribution of historical ethnic homelands from Murdock (1959). To explore the effect of proximity to historical ethnic borders on land ownership, we exploit two primary sources of variation. First, we compare the land ownership status of individuals at varying distances to borders within the same ethnic homeland and within the same year to account for differences in local ethnic-level institutions and time-varying shocks. Second, we incorporate an instrumental variable strategy, which we discuss below, to exploit exogenous variation and address potential measurement errors in Murdock’s map, as well as potential bias from omitted variables in a simple OLS estimate. We present strong evidence that land ownership systematically decreases in the proximity of historical ethnic borders. Importantly, we find that this effect is substantially larger for migrants who live in rural areas.

This research advances our understanding of land tenure in Sub-Saharan Africa by identifying the role of historical ethnic borders. It provides a novel mechanism linking ethnic level institutions to land tenure, conflict, and economic development. In particular, it contributes to the literature on the interaction of ethnicity and landownership in Africa (Bubb, 2013; Boone and Nyeme, 2015). It additionally contributes to the literature on the persistent effects of precolonial ethnic characteristics on African conflict and development (Moscona et al., 2020; McGuirk and Nunn, 2024; Fenske, 2013).

2. Data and empirical strategy

To test our hypothesis we use georeferenced data from 22 waves of the DHS in 30 Sub-Saharan African countries (ICF, 2004–2017, 2019)

and information on the spatial distribution of historical ethnic homelands (Murdock, 1959). Our sample consists of individuals situated across 602 distinct ethnic homelands. Among the data collected in these surveys, the respondents were asked whether the household owned land. The DHS Program distributes surveys separately for women and men; being the dataset larger and more comprehensive for the former. We then focus our analysis on about 570,000 women (albeit our results hold regardless of the gender of the individual interviewed, see appendix).

To identify the location of the historical ethnic borders and compute our measure of proximity to them, we use the so-called Murdock map introduced in Nunn (2008) which presents the location of ethnic homelands in Africa at the eve of colonization (Murdock, 1959). Although potentially mismeasured, it has been shown that it captures deeply rooted ethnic-level relevant information (Michalopoulos and Papaioannou, 2013; Moscona et al., 2020). In Depetris-Chauvin and Özak (2023), we show that these historical borders have persisted and remain relevant to ethnic groups. Fig. 1 depicts the distribution of ethnic homelands in Murdock’s map and locations of surveyed individual in DHS.

To test our main hypothesis, we estimate different versions of the following equation:

$$Ownership_{i,l(h),t} = \alpha + \beta Distance_l + \gamma' X_i + \delta' G_l + \Theta_{h,t} + \epsilon_{h,t}, \quad (1)$$

where $Ownership_{i,l(h),t}$ measures land ownership as reported by individual i living in location l situated in historical ethnic homeland h and interviewed in the year t . $Distance_l$ 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., education, age, and squared age). The vector G_l is a set of geographic and climatic variables including absolute latitude, longitude, elevation above sea level, mean temperature, mean precipitation, and the caloric agricultural suitability of the land. We computed these measures for a 25 km buffer around the location l . Further, $\Theta_{h,t}$ refer to a full set of ethnic homeland $\times$ year fixed effects. The presence of ethnic homeland $\times$ year fixed effects means that, when estimating Eq. (1), we identify our main effect of interest by comparing respondents interviewed close to the borders with all other respondents interviewed far from the border, but within the same ethnic homeland and during the same round of the

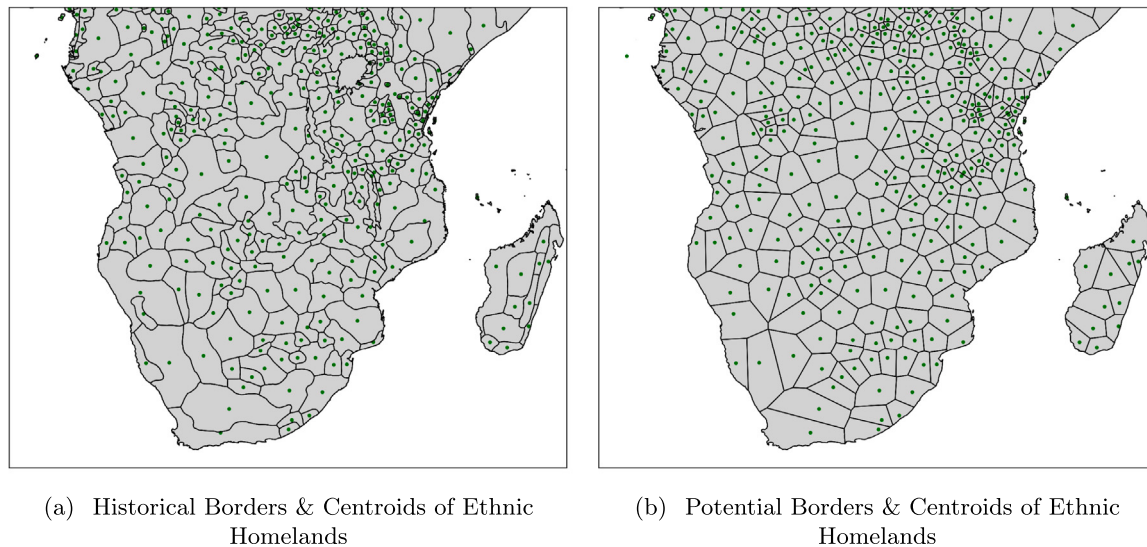


Fig. 2. Historical ethnic borders, centroids and potential (Voronoi) borders in Africa.

DHS. Therefore, we are accounting for all observable and unobservable factors specific to an ethnic homeland (and even to deeply-rooted fixed characteristics of the main ethnic group), in a short period of time (say a year), that may affect land ownership. Finally, ϵ_h is an error term, which we allow to be heteroskedastic and correlated at the ethnic homeland level.²

Simply estimating (1) via OLS is not enough, however, as the coefficient of interest (i.e., β) may still be biased due to measurement error and omitted variables, even after conditioning on our set of control variables. To mitigate these concerns, we exploit an instrumental variable approach that accounts for the distance to the potential location of historical ethnic borders, constructed based on the basic prediction of our ethnic border formation model in Depetris-Chauvin and Özak (2023). Our theoretical model predicts that the location of ethnic borders generates a Voronoi partition of the world (i.e., the homeland of a particular ethnicity is composed of regions that are closer to its center than to the center of any other ethnicity). This predicted partition is based solely on the location of the centers and some notion of distance and is independent of any local characteristics of the region where the border is located. For our main analyses, we use the geographical centroid of each historical ethnic homeland (i.e., the average latitude and longitude of all points inside it), as centers for the construction of the Voronoi partition.³ Fig. 2 shows the historical ethnic borders, their centroids, and the Voronoi borders. Given the location of these potential ethnic borders (i.e., Voronoi borders), our instrument is the logged minimum distance from a given location to these borders. Note that our instrument can be seen as another (mismeasured) proxy of the location of historical ethnic borders, allowing us to address bias due to mismeasurement (Hausman, 2001; Black et al., 2000). Importantly, since our instrument is based on Voronoi borders, which are a global property of the spatial distribution of these geometric centroids, which in turn are a global property of each ethnic homeland (polygon), our instrument should not be affected by characteristics of specific locations in the homeland (i.e., survey clusters in our analysis). Moreover, since we account for ethnic fixed effects, the instrument can be expected to be conditionally exogenous to location-specific characteristics that may also affect land ownership. Thus, we expect our approach to lessen the

influence of very local factors, such as historical disputes, unmeasured geographic features, and other potentially omitted variables, on our estimates.

Fig. 3 provides evidence on the validity of our strategy. It shows that, conditional on ethnic homeland $\times$ year fixed effects, our instrument does not predict a wide range of potential drivers of land ownership. This includes individual characteristics such as age, education, partner's education, work status, number of children in household, wealth, and rural status, as well as location measures such as distances to national borders, cities, rivers, and the country's capital (to account for the potential remoteness of these locations), and factors important for agricultural productivity, such as land quality, mean precipitation, mean temperature, and elevation.⁴ The small standardized associations between our instrument and these covariates provide strong evidence of the plausible exogeneity of our instrument. Additionally, the same figure depicts the first-stage (standardized) coefficient showing a very strong and significant association between our instrument and distance to the closest historical ethnic border. In particular, increasing the distance to the closest Voronoi border by one standard deviation is associated with a 0.33 standard deviation increase in the distance to the nearest historical ethnic border.

3. Results

In Table 1, we present our main analysis in three panels. Panel A shows the first-stage relationship, whereas Panels B and C show estimations of Eq. (1) by OLS and Instrumental Variables, respectively. We focus on four different samples: all women for whom landownership data is available (columns 1 and 2), the subset living in rural areas (column 3), the subset who are migrants (column 4), and the subset of migrants living in rural areas (column 5). We focus on these subsamples since we expect the effect of weak and contested ethnic property rights on land tenure to be more salient in rural settings, affecting especially recent migrants. On the one hand, land is more central to economic activity in rural areas, which tend to also have weaker state presence. On the other hand, migrants may be more affected since they are less able to claim ancestral attachment or ownership of the land, while also facing more obstacles to acquiring it through market mechanisms.

² We performed various robustness analyses in the Online Appendix.

³ See Depetris-Chauvin and Özak (2023) for further discussion of the properties of these Voronoi borders, as well as robustness to choice of central locations and methods of construction.

⁴ Moreover, when using both males and females, our instrument does not predict gender of the respondent.

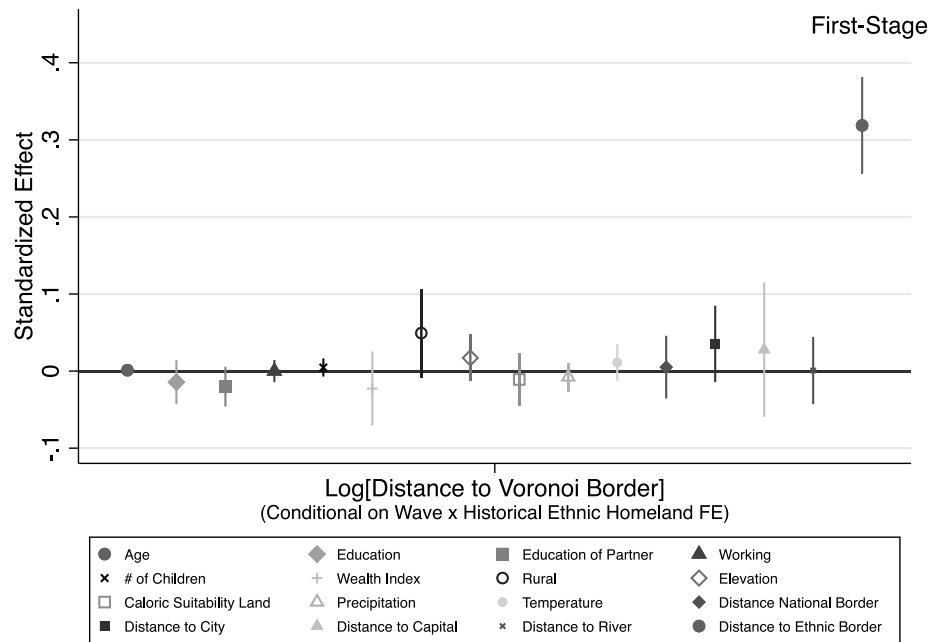


Fig. 3. Plausible exogeneity and relevance of instrument.

Table 1
Historical ethnic borders and land ownership.

	Panel A: First-stage				
	Log[Distance historical ethnic border]				
	Full sample		Rural	Migrants	Rural migrants
	(1)	(2)	(3)	(4)	(5)
Log[Distance to Voronoi border]	0.33*** (0.03)	0.31*** (0.03)	0.24*** (0.03)	0.22*** (0.03)	0.20*** (0.03)
Adjusted-R ²	0.41	0.43	0.36	0.37	0.34
	Panel B: OLS - Land ownership				
	Full sample				
	(1)	(2)	(3)	(4)	(5)
Log[Distance to historical ethnic border]	0.007* (0.004)	0.006* (0.003)	0.004* (0.002)	0.009 (0.007)	0.007 (0.005)
Adjusted-R ²	0.17	0.25	0.26	0.23	0.22
	Panel C: IV - Land ownership				
	Full sample				
	(1)	(2)	(3)	(4)	(5)
Log[Distance to historical ethnic border]	0.023*** (0.008)	0.021*** (0.008)	0.035*** (0.009)	0.031 (0.021)	0.051* (0.026)
First-stage F-statistic	99.04	102.57	86.69	43.71	43.07
Wave × Historical ethnic homeland FE	Yes	Yes	Yes	Yes	Yes
Geographical controls	No	Yes	Yes	Yes	Yes
Individual controls	No	Yes	Yes	Yes	Yes
Observations	569 971	569 971	397 469	109 115	81 807
Mean land ownership rate	0.36	0.36	0.42	0.43	0.50
Δ land ownership (90-10 percentile change distance)	0.07	0.07	0.10	0.09	0.15

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. Geographical controls include absolute latitude, longitude, elevation, precipitation, temperature, and caloric suitability for agriculture (CSI). Individual controls include age and its squared, and education.

Two main patterns emerge from Panel A (First-Stage). First, regardless of the sample we focus on, we find a very strong and statistically significant relationship between the logged distance from the location of the respondent to the closest historical ethnic border and our instrument based on a Voronoi partition. In particular, the elasticity of distance to border with respect to our instrument is 0.2–0.3, while the Kleibergen–Paap rk Wald F-statistic ranges between 43 and 103

for all the specifications. Second, upon comparing columns 1 and 2, it becomes evident that the inclusion of individual level and location specific controls has a negligible effect on the first-stage.

OLS results in Panel B of Table 1 show a positive conditional association (albeit somewhat statistically weak under the standard levels of confidence) between distance to historical ethnic borders and land ownership. Nonetheless, this suggests that, when comparing

individuals living in the same homeland and interviewed in the same year, those living further from the historical ethnic border have a greater likelihood of land ownership. IV estimates in columns 1 and 2 of Panel C suggest that proximity to the historical ethnic border strongly reduces the likelihood of land ownership. Interestingly, accounting for the set of individual and location specific controls alters little our main estimate. The estimated effect is economically important and implies that moving an individual from a location in the lowest decile of distance (i.e., 2 km) from the border to one in the highest decile of distance (i.e., 57 km) from the border, will increase their probability of land ownership by 7 percentage points (which is equivalent to 1/5 of the mean land ownership in our sample). When compared with its OLS counterpart, this IV point estimate is roughly three times larger. This inflation in the IV coefficient is consistent with our presumption that attenuation bias due to measurement error in our historical ethnic borders from Murdock's map was likely to be sizable (Depetris-Chauvin and Özak, 2023). Moreover, omitted historical factors that could have influenced the location of ethnic boundaries and the underlying factors that facilitated land ownership (including land abundance or proximity to a central political authority) may further introduce a bias towards zero in our OLS estimates.

Our estimated effect increases by roughly 50% when we focus on the sample of females living in rural areas (column 3). Moreover, we find qualitatively similar results for the sample of female migrants (column 4), and female migrants living in rural areas (column 5). While the results are quantitatively larger for the subgroup of migrants, they are also somewhat less precise due to significantly smaller sample sizes which result in less variation within fixed effects (since we have fewer observations in each fixed effect, and also a smaller number of fixed effects). In particular, the estimated effect doubles for the subgroup of migrant women living in rural areas: moving an individual from the lowest decile of distance (i.e., 1 km) from the border to the highest decile of distance (i.e., 55 km) from the border will increase their probability of land ownership by 15 percentage points (which represents almost 1/3 of the mean land ownership in this subgroup). The results are quantitatively similar but statistically stronger when including males in the regression (which increases the sample size by about 1/3 as shown in the appendix). This result is consistent with the findings presented in Fenske (2010), who demonstrated that migrants in Côte d'Ivoire have weaker land property rights compared to local residents.⁵

4. Concluding remarks

There is an extensive literature on land ownership in Sub-Saharan Africa. While most of it focuses on the effects of land tenure on development, little attention has been paid to studying its determinants. Our paper provides strong evidence for a significant driver of land tenure in the region. In particular, we explore the role of proximity to historical ethnic borders in determining individual land ownership. Employing an instrumental variable strategy, we document that individuals are less likely to own land near historical ethnic borders.

Consistent with a large and vibrant literature, our results support the view that historical ethnic borders have persisted and remained relevant in contemporary Sub-Saharan Africa. Yet, unlike the previous

literature, our analysis highlights the direct impact of these precolonial boundaries on socio-economic outcomes. We argued that the effect of these de facto borders could originate in their fuzzy and porous nature. This begs the question whether the interaction of these borders with geographical, institutional, and legal features may change their effect. In particular, it may be essential to understand how their effect might change as they become better defined (e.g., by becoming de jure borders).

Data availability

The authors do not have permission to share data.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.econlet.2024.111921>.

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⁵ In appendix B, we show that these results are robust to various alternative specifications: (i) the inclusion of a more extensive set of fixed effects, (ii) inclusion of men and women in the sample, (iii) varying clustering methods to account for spatial autocorrelation, and (iv) distances to populated places and centroid used for the construction of the instrument. Importantly, this latter analysis ensures that our analysis is not confounding the effect of borders with the potential effect of population centers and remoteness, especially from national institutions, i.e., state capacity. Since these controls can be considered endogenous to border location and conflict, we do not include them in our main specification.