Endogenous Colonial Borders: Precolonial States and Geography in the Partition of Africa

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Abstract

We revise the conventional wisdom that Africa's international borders were drawn arbitrarily. Europeans knew very little about most of Africa in the mid-1880s, but their self-interested goals of amassing territory prompted intensive examination of on-the-ground conditions as they formed borders. Europeans negotiated with African rulers to secure treaties and to learn about historical state frontiers, which enabled Africans to influence the border-formation process. Major water bodies, which shaped precolonial civilizations and trade, also served as focal points. We find support for these new theoretical implications using two original datasets. Quantitatively, we analyze border-location correlates using grid cells and an original spatial dataset on precolonial states. Qualitatively, we amass information from treaties and diplomatic histories to code causal process observations for every bilateral border. Historical political frontiers directly affected 60% of all bilateral borders. Water bodies, often major ones, comprised the primary border feature much more frequently than straight lines.

Keywords: Africa, borders, colonialism, geography, precolonial states

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1 INTRODUCTION

The modern political map of Africa reflects the European partition of Africa in the late nineteenth century. Small coastal settlements suddenly mushroomed into large colonies that, at least on paper, stretched nearly the entire continent. After independence, African state leaders largely retained the colonial-era international borders. Consequently, "the boundaries were, in many ways, the most consequential part of the colonial state" (Herbst 2000, 94). A large literature examines the consequences of external border formation in Africa for outcomes such as civil conflict (Englebert, Tarango and Carter 2002; Michalopoulos and Papaioannou 2016), international disputes (Touval 1972; Goemans and Schultz 2017), economic development (Alesina, Easterly and Matuszeski 2011; Michalopoulos and Papaioannou 2013), and political identities (Posner 2004; Robinson 2016). Numerous other studies analyze specific bilateral borders and premise their research design on the as-if randomness of border location (McCauley and Posner 2015). Across this literature, the well-established conventional wisdom is that external influence yielded arbitrarily located boundaries in Africa:

Claim 1. Process of forming borders. European actors knew very little about conditions on the ground when they determined Africa's borders. The Berlin Conference of 1884–85 was a pivotal event for border formation; at the Conference and afterwards, Europeans directed this process entirely from their capital cities without African input.

Claim 2. Arbitrarily located borders. This process resulted in arbitrarily located borders, a majority of which were straight lines, that neglected local features. Ethnic groups and historical states were partitioned via an as-if random process, in the sense that local features do not systematically correlate with the location of borders.[1]

We revise the conventional wisdom in this article. The location of borders in Africa cannot generally be characterized as arbitrary. Despite intense interest in African border formation and its consequences, the literature exhibits a crucial gap: the absence of systematic evidence about how

[1] Appendix A.1.1 provides citations for these claims.

colonial borders were actually formed. This historical process is important to study in its own right because it yielded the modern-day countries in Africa and, thus, its contemporary political map. Moreover, scholarly interest in studying the *consequences* of African borders showcases the need to understand the *process* by which these borders arose in the first place—which we show was a deliberate, rather than haphazard, process.

African borders were formed later-than-realized, as we document with new data. As late as 1887, European claims were largely limited to the coasts and few borders had taken their final form. This reflected the relative insignificance of the 1884–85 Berlin Conference for border formation. The Conference addressed the Congo region only and the boundaries it created for the Congo Free State were later revised. Among all bilateral borders, the median years of initial and final border formation were 1891 and 1906, respectively. The border formation process continued through the interwar period even though the rough spheres of influence were largely resolved by the late 1890s.

We provide an alternative theory to understand African border formation. Our new facts about late border formation matter because, in the interim, Europeans learned about and adjusted to realities on the ground. Their self-interested motives to defend and extend territorial claims required local knowledge. Precolonial states and water bodies were pivotal in this process. These features attracted European strategic interest and provided focal points, or "frontier zones" for precolonial states, for determining specific borders.[2]

To minimize intra-European conflict amid intense deliberations, European powers agreed on the principle of suzerainty: a power that signed a recognized treaty with an African ruler gained *all* the territory within their domain. This encouraged drawing borders around, rather than partitioning, precolonial states. This process of information gathering meant that African agency played an important role in determining the location of borders, even though the broader project of creating new states was directed (almost) entirely by Europeans. African rulers had greater knowledge of

[2]For IR research on focal points and borders, see Simmons (2005); Goemans (2006); Carter and Goemans (2011).

their claimed domains, which enabled them to influence European deliberations. In some cases, Africans directly participated in negotiations over colonial borders. Europeans were also intensely interested in major water bodies and their derivatives to facilitate trade. Multiple powers often competed for influence over specific rivers and lakes, which were focal for settling borders. The most frequently emphasized feature of African borders, straight lines, were expedient only in areas that lacked discernible local features, in particular low-population-density areas such as deserts. In sum, we expect that borders should align with the boundaries of precolonial states but not partition them, and water bodies should be used to form borders.

We find empirical support for these implications using two original datasets. Quantitatively, we conduct a statistical analysis using square grid cells. We show that border segments are more likely in cells with rivers, lakes, and the rough borders of precolonial states; but less likely in cells contained entirely within precolonial states. The findings for precolonial states incorporate an originally compiled spatial dataset based on detailed maps of African regions from Ajayi and Crowder (1985) and numerous additional historical maps for individual states (Appendix B.2 provides details). Our new data represent an important improvement over the commonly used map of ethnic groups from Murdock (1959). We agree with the descriptive claim in existing work that many ethnic groups were partitioned across international borders, which Michalopoulos and Papaioannou (2016) confirmed using the Murdock data. However, we contend that the Murdock data cannot be used to adequately assess the relationship between *precolonial states* and country borders (see Appendix A.3).

Our second original dataset is based on case studies of all 107 bilateral borders in Africa. We code three specific variables: primary and secondary physical features of the border, years of major border revisions, and whether a historical political frontier (usually a precolonial African state, but sometimes other frontiers such as white settlements) directly affected the border. We refer to the latter variable as "causal process observations" (Collier 2011) because it concerns the *process* of border formation. Our coding decisions are based on over 100 pages of notes, presented in

Appendix C.

Historical political frontiers directly affected 60% of all bilateral borders, 64 of 107; and precolonial African states directly affected 47 different bilateral borders. This finding contrasts with existing discussions, which dismiss any notable role for historical political frontiers in shaping African borders.[3] For precolonial states specifically, coding a direct effect requires us to find evidence that European powers deliberated among themselves or with African rulers about the boundaries of the historical state. In practice, this usually means that a border treaty specifically mentioned an African polity and that Europeans directly interacted with Africans to learn about the border. We also find that water bodies, often major ones, much more frequently comprised the primary element of a bilateral border than straight lines, 66% versus 37%.[4] This contrasts with commonly stated claims that overemphasize the prevalence of straight-line borders. We demonstrate that such borders are mostly confined to desert areas of lesser strategic importance.

Our findings reject both strong and weak versions of claims that the location of borders in Africa can generally be considered arbitrary. The strong version of this claim is that local features are systematically uncorrelated with the location of African borders. The weak version is that the only features systematically related to borders are orthogonal to human experiences on the ground. Our findings about precolonial states unambiguously reject both. The results for major water bodies clearly reject the strong version, although we contend they also reject the weak version. In contrast to astronomical lines, water bodies shaped human experiences by serving as bedrocks for precolonial civilizations, delimiting their reach, and shaping trade networks.

The idea that Africa's international borders are unusually arbitrary is as foundational as it is misguided. Overturning this conventional wisdom provides new insights into the origins of contemporary African countries and the resultant political map, which has subsequently influenced domestic and international political institutions. We conclude with implications for using African borders in

[3] See the references in Appendix A.1.1.

[4] The percentages exceed 100% because some borders are coding as having water bodies and straight lines as co-primary features.

regression-discontinuity designs and for studying legacies of precolonial states. We also highlight other ways in which externally imposed state formation produced harmful outcomes.

2 Historical Background: It Didn't Happen at Berlin

The conventional wisdom is that Europeans knew very little about conditions on the ground when they determined Africa's borders. Many characterize the Berlin Congo Conference of 1884–85 as a pivotal event in a process of border formation that was directed entirely from European capitals without African input. Countering this view, we demonstrate that border formation in Africa occurred later than realized. We provide novel quantitative evidence that supports a long-standing contention by many historians that the Berlin Conference was largely irrelevant for border formation; simply, "It didn't happen at Berlin" (Katzenellenbogen 1996). By the late 1880s, Europeans had yet to draw any borders, even preliminary, for most of Africa, in particular in the interior. Most borders were not initially created until the 1890s and a majority underwent major revisions in the twentieth century. In the years and decades following the Berlin Conference, Europeans raced to gather intelligence about conditions on the ground. Our theoretical framework, presented in the next section, explains how this improved knowledge impacted border formation.

For centuries, Europeans had participated in the African slave trade and some forms of legitimate commerce. As late as the 1870s, European-colonized areas in Africa were mostly limited to coastal trading posts, usually located in natural harbors (Ricart-Huguet 2022). Trading companies, missionaries, and colonial agents on the ground often petitioned the metropole for the resources to expand inward. However, they were constantly rebuffed because the metropole did not want to assume the costs of managing larger territorial areas of uncertain value.

This status quo changed suddenly in the early 1880s. For varied reasons across different regions of Africa, the major powers began to fear their exclusion from, as King Leopold II of Belgium phrased it, "a slice of this magnificent African cake." In the Congo region, exaggerated reports of untapped potential abounded in Europe in the 1870s and 1880s (Wesseling 1996, 73). These

accounts prompted competition among France, Portugal, and King Leopold to control the mouth of the Congo River. Given prospects for spiraling territorial claims to lead to conflict, the powers agreed to Germany's proposal to hold a conference in Berlin in 1884.

Although the Berlin Congo Conference exemplified European greed and shamelessness, it minimally impacted borders. Wesseling (1996, 126) contends, "Africa was not only not divided at Berlin, but the subject was not even on the agenda; indeed, the partition of Africa was explicitly rejected by the conference." Although many historians support this view, the proclaimed importance of the Berlin Conference for borders has proven to be a "stubborn myth" among non-specialists (Nugent 2019, 18).[5]

The scope of the Conference was limited and created frontiers for the Congo Free State only, most of which were later revised. Although the Congo Free State was not formally created until several months after the Conference ended, the Conference was undoubtedly the catalyst for creating this colony. The Conference (a) granted international recognition to the International Association of the Congo (IAC), the nominal governing body for the Free State; (b) defined the "Geographical" Congo Basin, which roughly circumscribed the Free State's eventual frontiers;[6] and (c) outside the official Conference proceedings, France, Portugal, and the IAC concluded a series of bilateral agreements that delimited territorial possessions from the mouth of the Congo River to Stanley Pool, or modern-day Pool Malebo (Crowe 1942).

But even for the Congo Free State, the borders created during and shortly after the Conference were *preliminary, not final*, as we illustrate in Figure 1. Its original borders were, other than the Congo-river portions, primarily straight lines. Later, in the west and north, the borders were shifted to the Ubangi and Mbomou rivers.[7] In the east, the frontier north of Lake Tanganyika was shifted to Lake Kivu and the Ruzizi river, which corresponded with the western limits of the traditional Rwandan

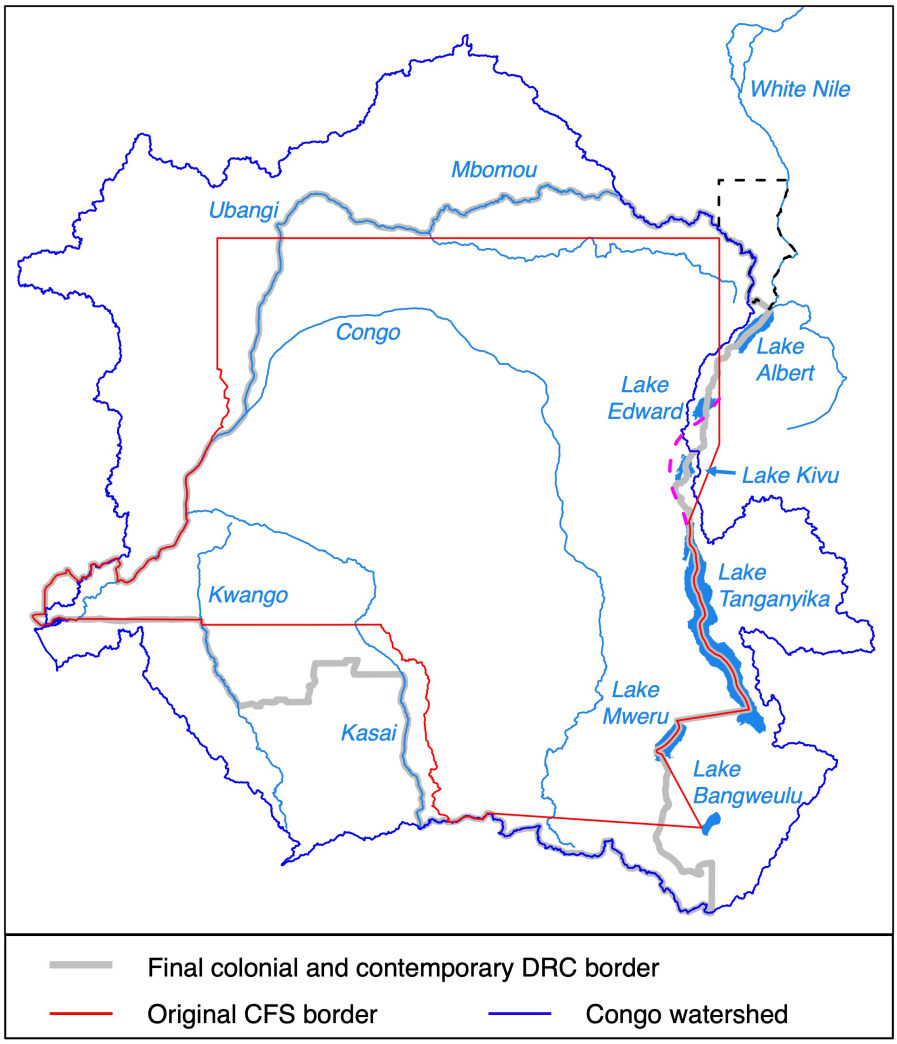
[5]Our Appendix A.1.1 provides some documentation of this "stubborn myth." For additional historical research that rejects the "myth," see Crowe (1942, 152); Crowder (1968, 55, 62–63); Katzenellenbogen (1996, 31); Boilley (2019, 4).

[6]The Conference also defined the "Conventional" Congo Basin, or Conventional Free Trade Area, which minimally affected borders.

[7]See Appendix C.3.1 and C.3.2.

state.[8] In the south, border revisions reflected the frontiers of states such as Lunda and Kazembe.[9] Thus, the supposedly paradigmatic case of arbitrary borders previews the types of local factors that we demonstrate were commonplace in border negotiations. Moreover, the Congo Conference largely failed to establish rules for claiming territory, another of its supposed purposes.[10]

Figure 1: Evolving Borders for the Congo Free State



Notes: For the 1884 arc in pink, see Appendix C.4.8. For the Lado Enclave in black, see Appendix C.5.2.

Beyond this single case, we provide novel evidence that most borders were not initially formed

[8] See Appendix C.4.8.
[9] See Appendix C.3.3 and C.3.5.
[10] Appendix A.1.2 provides details.

until after the 1884–85 Berlin Conference and that most did not take their final form until over two decades later. For all 107 bilateral borders in the final colonial map (circa 1960), we code the date of initial border formation and years of major revisions. A major revision constitutes transferring territory across colonies (either large tracts like entire provinces or smaller tracts like districts), forming a previously unformed segment of a border, or qualitatively changing the features of a border (e.g., replacing a straight line with a river).[11] We use this information in two ways. First, using bilateral borders as the unit of analysis in Figure 2, we track over time the cumulative fraction of the 107 borders that had been initially formed (red line) and that had undergone their final major revision (black). The median years for each are shown in dashed lines. Second, we digitized maps from the *Cambridge History of Africa* (Sanderson 1985) of formal European claims in Africa at different dates: 1887, 1895, and 1902. This enables us to compare earlier colonial borders to the final colonial borders circa 1960 as well as to assess the amount of territory Europeans had claimed at different points in time. In Figure 3, claimed territory is in gray. Using the detailed information we compiled for each border, we color segments of the boundaries shown in these maps either in black (indicating correspondence with a final colonial border) or red (not yet formed or later underwent major revisions).[12]

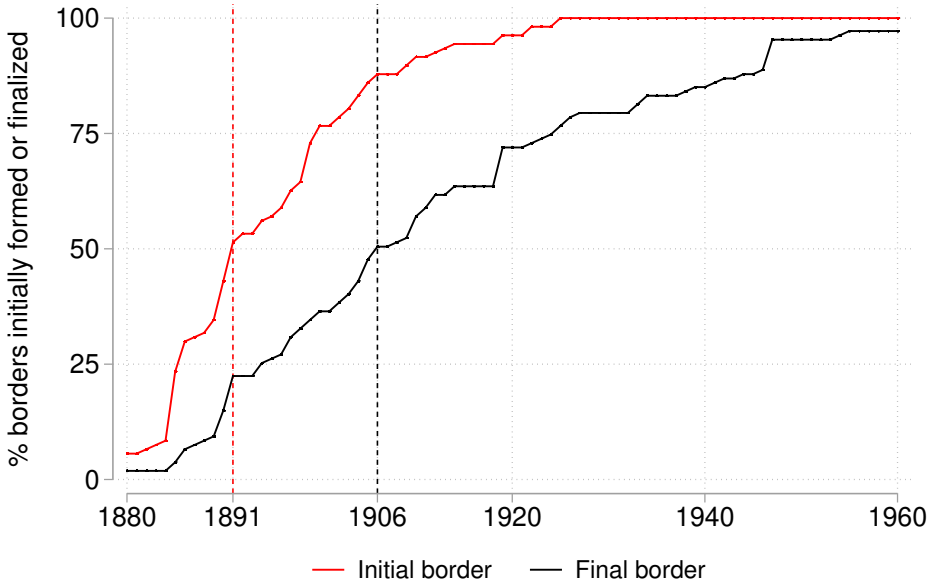
As of 1887, the colonial map was highly preliminary. A majority of coastal territory had been claimed (56% of territory within 300km of the coast), but not the interior (22% of territory farther inland, and only 14% when excluding the Congo Free State). The border formation process had clearly taken shape at the "macro level," that is, which European powers competed for territory in each broad region. Early trading posts influenced where borders would start at the coast (see Appendix Figure A.2). However, borders were almost entirely undetermined at the "meso" level, which concerns the main features that roughly round out spheres of influence; let alone the "micro" level, the exact location and features of borders.[13] Overall, 31% of bilateral borders had been

[11] In most cases, borders underwent minor revisions after the last major date we state as they were delimited more precisely, but we do not count these as major revisions.

[12] See details in Appendix A.1.3.

[13] We thank an anonymous referee for suggesting the macro/meso/micro distinction.

Figure 2: Border Formation Over Time in Africa

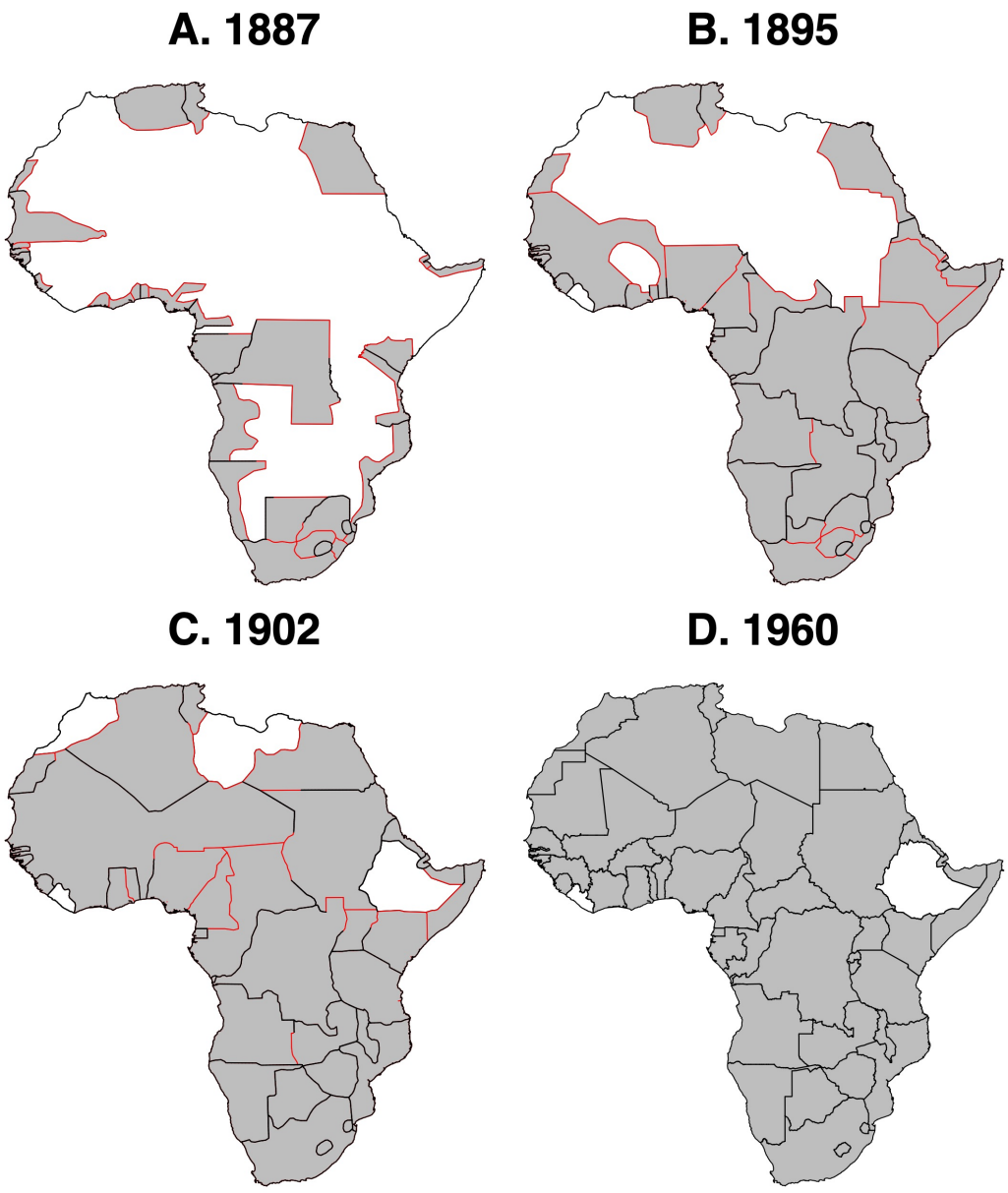


initially formed by 1887 but only 7% were in their final form (Figure 2). One quarter of the initial borders were in southern Africa, where British and Boer settlers had intensively interacted with (and fought) Africans for a half century.[14] Taking the total length of African borders in 1960, only 18% was finalized by 1887 (Figure 3, Panel A).

Border-formation events accelerated shortly afterwards. Between 1889 and 1894, the major powers completed numerous bilateral treaties, such as the Anglo–French Agreement of 1889 (West Africa), the Anglo–German Agreement of 1890 (whole continent), and the Anglo–Portuguese Treaty of 1891 (southern Africa). These and other agreements allocated territory across most of the continental interior (meso level), excepting the Sahara, and formed at least preliminary bilateral borders throughout parts of the interior (micro level). At this point, Europeans claimed 83% of Africa's coastal territory and 58% of the interior. Yet many borders were still in flux; when we examine border length, only 43% of all borders in 1960 were in place as of 1895 (Figure 3, Panel B). Among bilateral borders, 55% were initially formed and 25% were finalized.

[14] See Appendices C.6.1, C.6.2, and C.6.3.

Figure 3: The Evolution of the European Political Map of Africa



By 1902, Europeans had claimed almost the entire continent (90% of interior territory), which finalized most macro- and meso-level components of border formation.[15] Thus, the political map in broad strokes resembled its postcolonial form. However, even at this late date, the micro-level process of forming specific borders was still ongoing. Measured by border length, 39% of bilat-

[15]The exceptions were Morocco and Libya (late colonies) and Ethiopia and Liberia (not colonized).

eral borders in 1960 were not finalized by 1902 (Figure 3, Panel C)—almost two decades after the Berlin Conference. Among bilateral borders, 70% were initially formed and only 36% were finalized. In the twentieth century, twenty-one large territorial transfers occurred.[16] This included Anglo-French divisions of formerly German territory after World War I, various transfers to reward Italy's participation on the Allied side in the war, several major transfers between Uganda and neighboring states, and territorial shuffling within the French empire. Numerous other borders were revised in other ways, such as changing straight lines to local features (14 cases), adding new segments (13), or specifying local features for previously ambiguous borders (19).[17]

3 Theory: The Process of African Border Formation

"It happened at Berlin" is not a compelling model of African border formation, nor is the broader idea that Europeans determined African borders from European capitals with minimal local knowledge. Yet other common contentions are correct. European statesmen had self-interested motives to claim territory while avoiding intra-European conflict in order to reduce the costs of imperial expansion (Herbst 2000, ch. 3; Christensen and Laitin 2019, ch. 8). We present a new theory of African border formation to explain why these premises created incentives to draw borders *conscientiously*, rather than haphazardly. Our theoretical implications differ from the conventional characterization that Africa's borders, for the most part, are arbitrarily designed (often straight lines), neglect local features, and indiscriminately partition historical states.

The Berlin Conference settled few borders and created only vague rules for "effective occupation" (see Appendix A.1.2). A self-enforcing scheme for claiming territory and settling borders would need to enable European states to gain large tracts of territory that they deemed valuable while also minimizing the possibility of conflict. This created a classic coordination problem: within the set of divisions that all sides prefer to war, numerous conceivable borders were possible. Build-

[16] See Appendix Table A.1. The median size of these territorial transfers was 84,000 sq.km., which exceeds the size of modern-day Sierra Leone.

[17] See Appendix Figure A.1.

ing upon previous research on IR border formation (Simmons 2005; Goemans 2006; Carter and Goemans 2011), we argue that state diplomats frequently used focal points to draw borders and settle territorial disputes. Two local features appear countless times in historical accounts to serve as focal points: historical political frontiers (mostly precolonial states) and major water bodies. To promote their territorial claims, Europeans gathered substantial intelligence about conditions on the ground through interactions with African rulers, which often facilitated African agency in negotiations.

3.1 Precolonial States and Historical Political Frontiers

Precolonial states served as important meso-level objects of contention. For centuries, Europeans had engaged in treaty-making with African rulers using documents that explicitly affirmed the sovereignty of the rulers with whom they contracted. This practice continued through the late nineteenth century; the main difference was that African rulers renounced sovereignty over external affairs in newer treaties. Because Europeans agreed that African rulers were legally sovereigns, as opposed to treating their territory as unoccupied *territorium nullius*, Europeans considered bilateral treaties as necessary to provide legal justification for acquiring African territory (Alexandrowicz 1973).

Consequently, treaties with local rulers were the agreed-upon currency to fill in the ambiguous rules of "effective occupation" laid out in Berlin, despite rarely corresponding with actual administrative occupation (Wesseling 1996, 127–28; Carpenter 2012, 116). These de facto rules prompted a rush in the 1880s to gain treaties with Africans in areas of strategic interest. Data from the British empire illustrates the frenetic pace of treaty signings. Britain engaged in some treaty-making with African rulers between 1808 and 1883, averaging 0.9 treaties per year. This activity spiked in the next decade, with an average of 59 treaties per year between 1884 and 1893.[18]

[18]Figures computed by authors by tallying treaties listed in Hertslet (1909). Although comprehensive information for other empires has yet to be compiled, Hertslet provides some information on French treaties (see pp. 634–41), France signed 118 between 1819 and 1880 and at least 126 more thereafter (M'Bokolo 2011, 363), and Alexandrowicz (1973, 139) lists sporadic sources for other empires. All powers used treaties to make territorial claims and that this activity accelerated in the 1880s (see Alexandrowicz 1973 and numerous examples in our Appendix C).

Precolonial states served as ideal meso-level features for determining the approximate limits of a European power's territorial claims. Securing treaties with rulers of sizable historical states yielded claims over large swaths of territory via the principle of suzerainty. A British official explicated this principle in a dispute with France in 1896: "We could not abandon the principle of suzerainty. This principle was recognized in all international negotiations and we held that, in treating with a suzerain, the rights conferred [...] extended to the whole of the territory under his dominion" (quoted in Anene 1970, 220; see also Nugent 2019, 20). By contrast, where one ruler was found to be subordinate to another, a treaty with the subordinate ruler could be challenged for lacking territorial rights (Alexandrowicz 1973, 141).

Capitalizing on the principle of suzerainty required self-interested European powers to gather intelligence about the frontiers of historical states and vassalage relations. Europeans were largely ignorant about on-the-ground realities in Africa when they convened the Berlin Conference. However, learning about local conditions thereafter enabled European powers to maximize their territorial claims—which were based, in part, on treaties with African rulers.

Gathering intelligence, in turn, necessitated continual interactions with local rulers and other types of local agents, such as translators. This facilitated African agency, a claim for which we provide extensive evidence later in the article and throughout the case studies in Appendices A.4 and C. Rulers strategically sought to preserve areas they controlled. Likewise, Europeans favored claims by rulers with whom they signed treaties and contested those by others to maximize their territory. This competitive process provided Europeans with detailed information about the domains of African rulers. Whereas competing European powers contested territorial claims based on fanciful descriptions of reality, they usually accepted territorial claims with unambiguous empirical backing—which depended upon continual interaction with African rulers. Also, very few Europeans learned African languages so African translators were important in the process of information gathering and treaty-signing (Beringue 2019, 104–7).

This process should yield two consequences. First, borders should not cut through areas governed

by precolonial states. This would violate the principle of suzerainty, assuming one power had an unambiguous claim over the historical state and its historical frontiers were agreed upon. As for intraimperial borders, more effective administration could be achieved by preserving a historical polity within a single colony.[19] Second, borders should often lie at the frontiers of historical states because a power's claim ended there. Historical frontiers were rarely precise enough to create specific focal points, but nonetheless created useful "frontier zones." Thus, we expect that Europeans took precolonial states into account not out of benevolence, but instead because this meso-level feature provided a convenient bargaining chip to extend territorial claims while minimizing the risk of intra-European conflict.

By contrast, we anticipate that colonial borders will often divide peoples in areas without major states. There, a European power would be hard-pressed to argue that treaties among loosely affiliated rulers constituted a basis for gaining control over an extended area (McGregor 2009, 57; Miles 2014, 22–29). For example, although all the major Yoruba states were preserved within Nigeria on the basis of British treaties, the broader Yoruba cultural area was politically fractured, which enabled France to make credible claims over Western Yorubaland (Asiwaju 1976, 9). Consequently, although many ethnic groups in Africa were partitioned amid the Scramble, we anticipate that this process was not arbitrary or as-if random. Historical states were systematically different than areas lacking political unity.

Not all historical frontiers were precolonial African states. Other frontiers included white settlements and states in southern Africa, Ottoman territories in the north, and the resettlement colony of Liberia. We also expect these historical political frontiers to shape borders, albeit under better-founded pretenses of effective occupation.

3.2 Major Water Bodies

Access to major water bodies was another common goal of European statesmen. Rivers could facilitate transportation and trade between the coast and the interior. Later, as Europeans "discov-

[19] Although this is well known for the British, in Appendix C we provide widespread evidence of similar practices among the French, Germans, and Belgians.

ered" inland lakes, they similarly sought access to facilitate trade. Major water bodies affected border formation at all three levels. At the macro level, major rivers that emptied into the ocean could entice European powers to compete over that general region (as we have already seen for the Congo).[20] Water bodies could also comprise general areas of strategic interest (meso-level) and/or be used as a specific feature of a border (micro-level). Unlike precolonial states, multiple powers could access the same water body if their common border shared this feature. And each power knew that others needed access to transportation hubs to make their colonies economically viable. Therefore, given the general desire to avoid intra-European conflict, we would usually expect them to yield to demands for access to the water bodies. Achieving this outcome was even simpler for intraimperial borders, as the same power controlled both sides. Although our strongest expectations are for longer rivers and larger lakes, less important rivers could serve similar purposes.[21]

As with precolonial states, claims to water bodies were more effective when accompanied by knowledge of conditions on the ground. For example, the original border that separated the Congo Free State and German East Africa was a meridian. In the mid-1890s, Germany realized that parts of the precolonial state of Rwanda were located west of this meridian. It sought to revise the border to Lake Kivu ("discovered" by Europeans in 1894) and the Ruzizi river, which Germans had learned were the historical limits of the kingdom. "In the long run the German case proved the most forceful—natural and ethnic frontiers, so far as possible, should not be violated . . . The Germans and British claimed to uphold natural frontiers, but if they appear as champions on the side of Africans, it is at least in part because it was to their advantage to press the Congo State for natural boundaries" (Louis 1963, 93–94).

[20]It was also possible, in principle, for precolonial states to serve as macro-level features. Wherever precolonial states facilitated early European coastal trade, this could subsequently influence which European powers competed for territory in that region. However, precolonial states usually served as meso-level objects; Europeans started at the coast and then determined their inland claims on the basis of treaties with traditional rulers.

[21]Other geographic features could serve as focal points simply because they were salient on maps, such as watersheds and mountains (Goemans and Schultz 2017, 43).

3.3 Straight-Line Desert Borders

Some parts of Africa lacked clear focal points or frontiers, in particular deserts and other areas of low population density. Europeans should more frequently draw (and retain) artificial borders, often based on parallels and meridians, that disregard conditions on the ground in areas without focal features. However, the stakes of border placement were lower because the territory was rarely perceived as valuable. Therefore, although the exact placement of a straight-line border is typically arbitrary, the decision to draw a straight-line border should be conscious and strategic—and, consequently, relegated to areas with low population density.

4 Quantitative Analysis of Border Location

We test our main theoretical implications with multiple forms of evidence. Quantitatively, using square grid cells, we assess the correlation between African borders and (a) precolonial states and (b) geographic features.

4.1 Variables

Precolonial states. We compiled new spatial data on precolonial states (PCS). Ajayi and Crowder's (1985) atlas provides the most extensive and detailed maps of which we are aware containing the territorial location of precolonial polities on the eve of European colonization. The atlas contains eight detailed regional maps for the nineteenth century, each of which is produced by a leading scholar on a particular region of Africa.

We do not classify every polygon in Ajayi and Crowder (1985) as a PCS. As discussed in Appendix B.1, we consulted additional sources to assess which candidate cases meet Fortes and Evans-Pritchard's (1940, 5) criteria for "Group A" societies, meaning they have "centralized authority, administrative machinery, and judicial institutions—in short, a government." This distinguishes cases in which a polity had a discernible ruler with whom Europeans could sign a treaty and whose political authority extended over a broader area corresponding with the territory in Ajayi and Crowder's (1985) maps, as opposed to petty chieftaincies or areas where rulers exerted

autonomous rule in individual villages. We consulted three sources that provide a continent-wide list of states in the nineteenth century: Stewart (2006), Paine (2019), and Butcher and Griffiths (2020).[22] Some cases are unambiguous because all three sources identify the polity as a state. For cases with disagreement among the three, we consulted additional sources. Finally, we restrict the sample to states that originated before 1850.

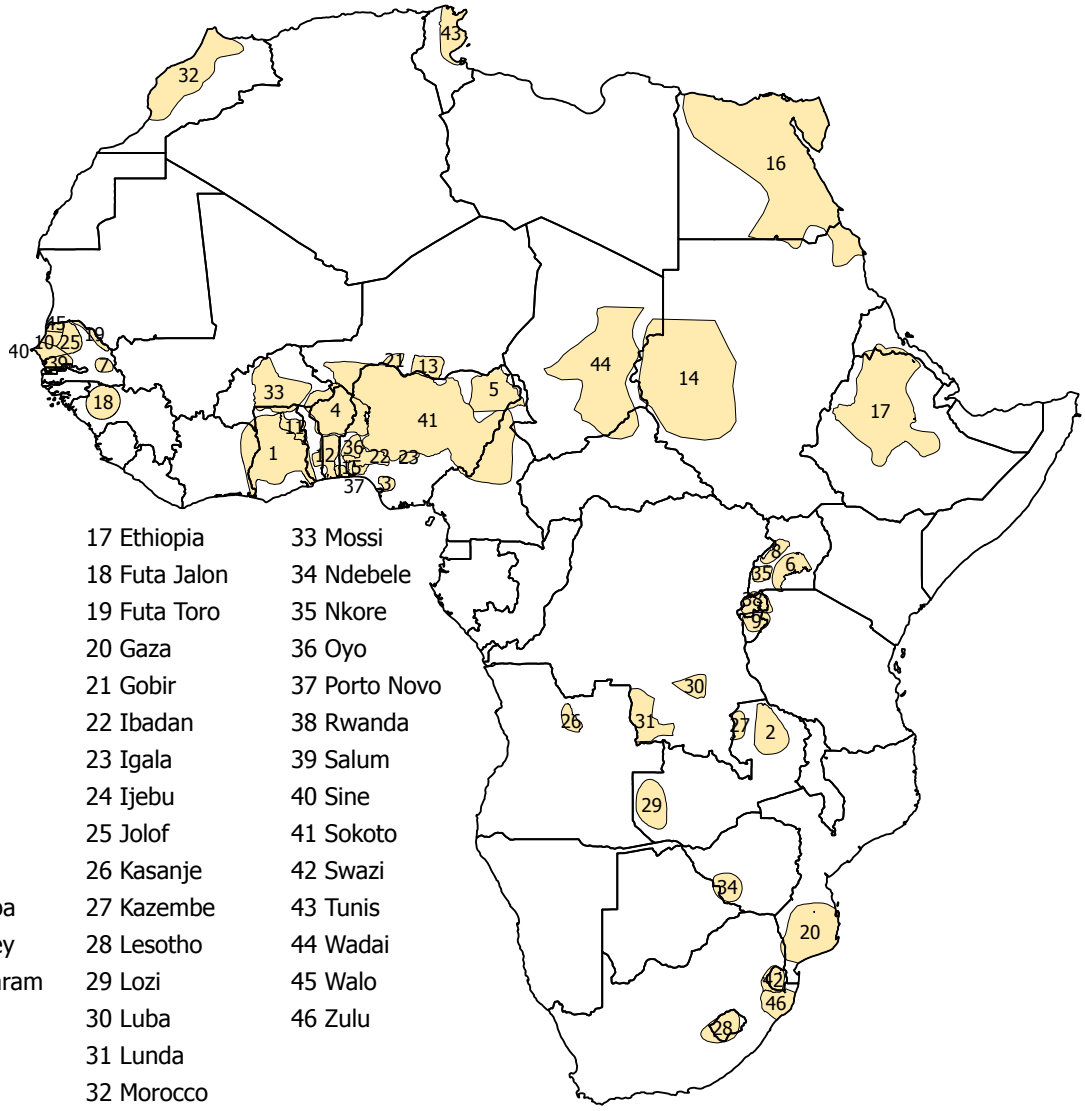
For all forty-six polities we classified as a PCS, we consulted Ajayi and Crowder's (1985) atlas and at least one historical monograph with a map and qualitative description of historical boundaries. We usually digitized a polygon from Ajayi and Crowder (1985), but sometimes used a more precise alternative map. The maps and polygons capture African states on the eve of colonization, usually from around 1885. However, in cases of earlier colonial penetration (e.g., Senegal, South Africa), we use polygons from the mid-nineteenth century.

Figure 4 depicts every PCS in our dataset and Appendix B.2 provides extensive supporting evidence for each polygon. African states generally had meaningful territorial limits, at least in the sense of discernible frontier zones, although measurement error is inevitable because of often-shifting territorial control throughout the nineteenth century and the general imprecision of frontier areas. Consequently, we perform a robustness check in which we "thicken" the frontier by creating a 0.25° buffer on each side of a PCS border (thus 0.5° in total).

Water bodies, watersheds, and deserts. We examine specifications with all rivers and with rivers disaggregated into major (top ten longest in Africa) and minor (all other rivers); and the same for lakes. We also assess major watersheds as derivatives of water bodies. Finally, we examine desert areas. Appendix A.2.1 provides the sources for each variable.

[22]These sources also confirm the comprehensiveness of Ajayi and Crowder's (1985) maps. See Müller-Crepon (2020) for another use of Stewart (2006) to indicate precolonial states across the continent.

Figure 4: Map of Precolonial States and Boundaries



International borders. We use international borders around the time of independence (1960) and exclude post-independence border changes.[23] Colonizers regularly readjusted the borders (see Figure A.1). We capture the end result of this protracted process. Furthermore, for many research questions, the final colonial map is most relevant for studying postcolonial legacies.

[23]We include Eritrea and Somaliland (British) as separate from Ethiopia and Somalia, respectively, given their distinct colonial status and territorial uncertainty as of 1960.

4.2 Unit of Analysis: Grid Cells

The unit of analysis is grid cells. Each cell is 0.5×0.5 decimal degrees (approximately 55 km at the equator), following standard practice (Tollefsen, Strand and Buhaug 2012; Kitamura and Lagerlöf 2020). This procedure yields slightly over 10,000 grid cells across the continent (excluding islands). To score the variables for each grid cell, we combine the spatial data described above with the grid cells. Most are indicator variables, for example, whether a cell includes a river segment. Grid cells enable us to be agnostic about the appropriate comparison group for precolonial states, as peoples living in decentralized communities usually lacked clear territorial limits.[24] Along with the exercise of "thickening" PCS borders, grid cells also make our results robust to some degree of measurement error in PCS borders.

We use our PCS dataset to distinguish each grid cell based on whether it includes a PCS border (PCS BORDER IN CELL); lies entirely within a PCS polygon (CELL INSIDE PCS); or contains no PCS.[25] Figure 5 uses the Nigeria–Niger border to visualize how we code grid cells. The map illustrates grid cells overlaid onto precolonial states (orange coloring and borders) and countries (black borders). Our outcome equals 1 whenever a country border exists in the cell (e.g., cell A). PCS BORDER IN CELL $= 1$ when a PCS border exists in the cell (B). In some cells, both variables equal 1 (C and D). Finally, CELL INSIDE PCS $= 1$ when a cell is fully within a PCS (A and E).

4.3 Regression Results

For the grid-cell analysis, we specify our hypotheses as follows:

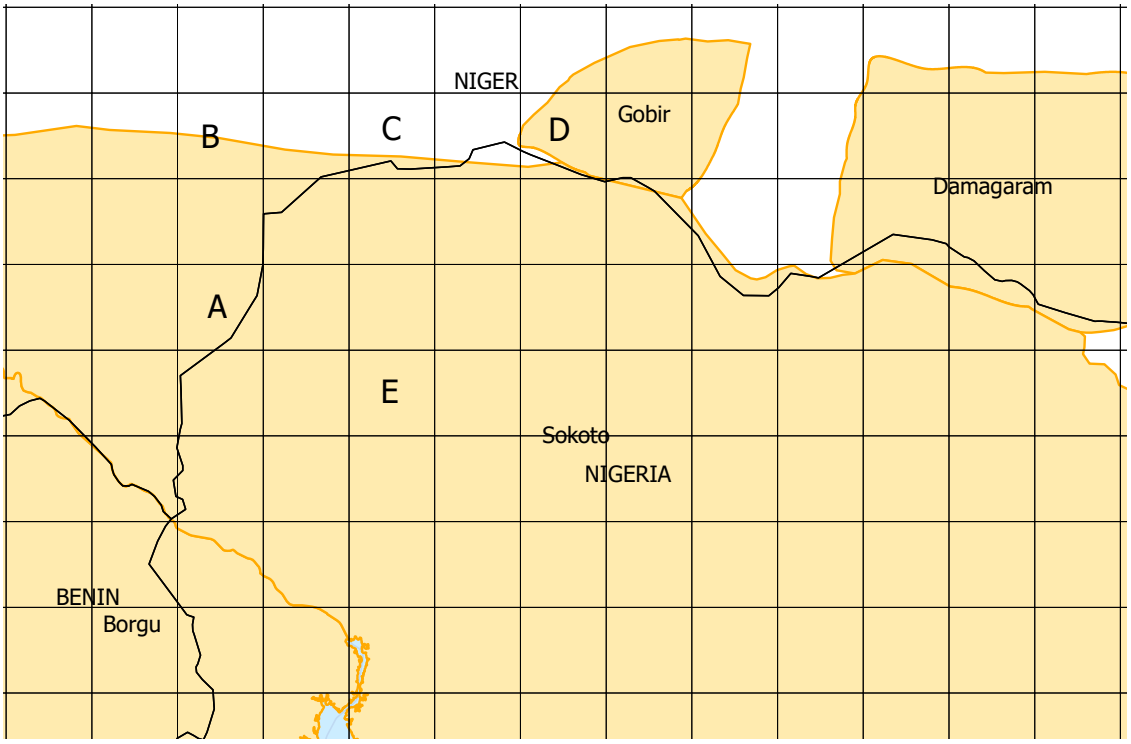
1. Grid cells with PCS borders (PCS BORDER IN CELL=1) should be more likely to have country borders than any other cells (either cells inside a PCS or non-PCS cells).

2. Grid cells contained within a PCS (CELL INSIDE PCS=1) should be less likely to have country borders than any other cells (either cells with a PCS border or non-PCS cells).

[24] In Appendix A.3, we run additional results to assess ethnic partition (as in Michalopoulos and Papaioannou 2016) and discuss limitations of this approach.

[25] Appendix Figure A.5 shows that our results are not sensitive to including two PCS variables in the same models while leaving the third as the reference category. We discuss the implications for our theory in Appendix A.2.3.

Figure 5: Niger–Nigeria Border with Overlaid 0.5°x0.5° Grid Cells



3. Grid cells with rivers and lakes should be more likely to have country borders.

To assess these hypotheses, we estimate the following models with OLS:

$$\text{Border}_i = \beta_0 + \beta_1 \text{Geog}_i + \epsilon_i \tag{1}$$

$$\text{Border}_i = \beta_0 + \beta_1 \text{PCS}_i + \text{Geog}_i^T \beta_2 + \text{X}_i^T \beta_3 + \eta_j + \epsilon_i. \tag{2}$$

In every regression, the dependent variable indicates whether each cell i contains part of a country border. We use Conley standard errors (Conley 1999; Hsiang 2010) to account for spatial dependence. We use a distance cutoff of 300 km (approximately six grid cells at the equator) in our main results, although the findings are robust to altering the cutoff.[26]

In our main specifications, we use bivariate models to assess each geographic feature. We purposely do not control for "post-treatment" variables such as the existence of a precolonial state.

[26] We discuss the advantages of Conley standard errors and various robustness checks in Appendix A.2.4.

However, we show in Appendix Tables A.3 and A.4 that the results in Figure 6 are robust to their inclusion and to including multiple geographic variables in the same model.

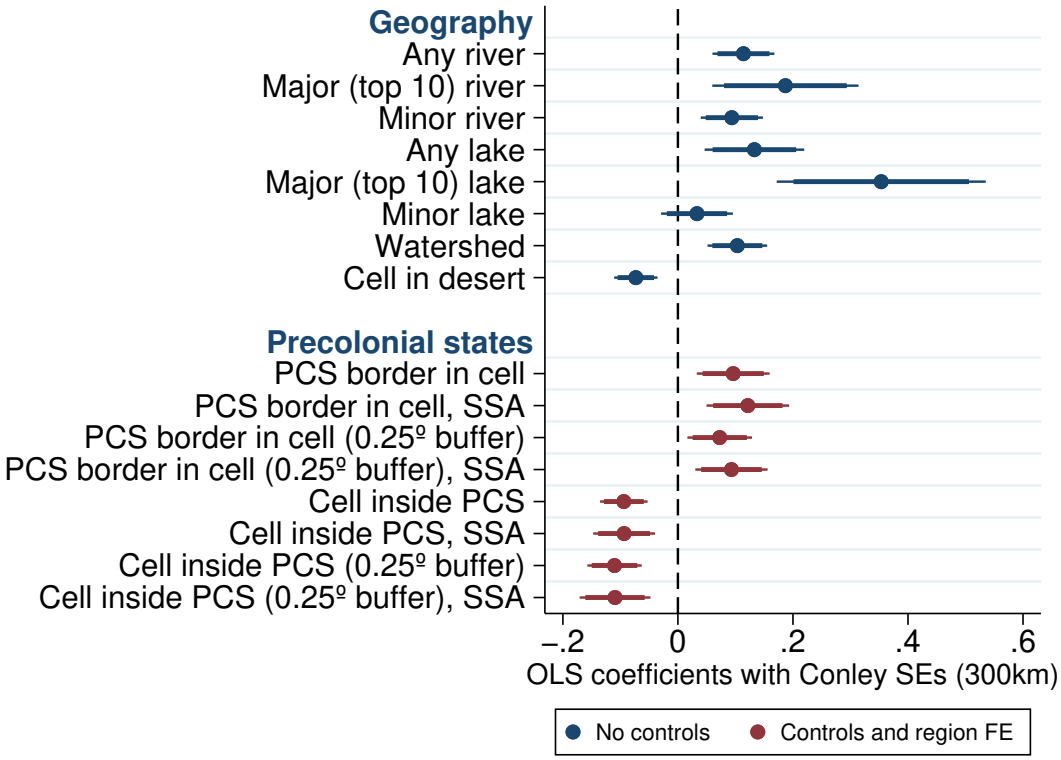
We estimate multivariate models for each PCS indicator, PCS BORDER IN CELL and CELL INSIDE PCS. To guard against potential omitted variable basis, we include a vector of the aforementioned geographic factors as covariates. We also add a vector of variables (X_i) to control for other factors that might have affected colonizers' propensity to draw borders in the area. One is an originally coded variable for areas located between precolonial trading posts or natural harbors that were claimed by different powers, extended up to 300km in the interior (see Appendix Figure A.2). Such areas have an elevated likelihood of having a colonial border (confirmed in Appendix Table A.4), given the need to separate competing European claims. Other covariates account for various other confounding concerns, such as geography (latitude, longitude, distance to the coast), climate (suitability for European settlement, TseTse fly suitability), historical natural resources, and various measures of historical ethnic geography (size of the ethnic group in cell, ethnic group border in cell, ecological diversity of the ethnic group in cell, population density in 1850, historical slave exports, agricultural intensity).[27] We also include region fixed effects (indexed by j in the estimating equations) to account for unobservables common to units in the same region.[28]

We summarize the regression estimates with a coefficient plot in Figure 6. The top part validates our third hypothesis: Across different measures of rivers and lakes, areas with major water bodies are more likely to have a nearby country border. The coefficient estimates are particularly large in magnitude for the longest rivers and largest lakes. The presence of a top 10 river in a cell increases the predicted probability that a border will exist in that cell from 14.2% to 31.3%, a 121% increase. For top 10 lakes, the probability increases from 14.4% to 50.0%, a 244% increase. Desert areas are less likely to have a country border, which reflects the typically large size of colonies in thinly populated areas (Green 2012).

[27] Some of these covariates are significantly associated with the formation of precolonial states, that is, with PCS BORDER IN CELL or CELL INSIDE PCS (see Appendix Table A.2).

[28] Appendix Figure A.3 shows that the results are qualitatively similar without covariates. Appendix Figure A.4 demonstrates that our results are robust to using PCS FE instead of region FE.

Figure 6: Correlates of African Borders



Notes: The figure summarizes coefficient estimates and confidence intervals at the 95% and 90% levels for the main explanatory variables. The appendix presents accompanying regression tables (A.3 and A.4). $n = 10,341$ for the full sample and $n = 7,135$ for the SSA sub-sample. Controlling for agricultural intensity in the bottom panel causes observations to drop to $9,913$ in the full sample and $6,816$ for SSA. The geography models do not contain any covariates. Most are bivariate, although major/minor rivers and major/minor lakes are each included in the same specification. Every model in the lower part controls for geography (variables in the top part) plus the aforementioned covariates.

The bottom part of Figure 6 supports our first and second hypotheses: cells containing PCS borders are more likely to contain country borders while cells in a PCS are less likely to contain country borders. With other variables held at their means, the presence of a PCS border in the cell raises the predicted probability that a country border will exist in that cell from 14.2% to 23.8%, a 68% increase. For cells inside PCS, the predicted probability decreases from 16.0% to 6.6%, a 59% decline.

Figure 6 also presents various robustness checks for the PCS variables. We restrict the sample to Sub-Saharan Africa (SSA, cells south of 18°N) and create a 0.25° buffer on each side of PCS

borders. The findings are qualitatively unchanged and the coefficients increase in magnitude for the SSA sub-sample, which excludes large Saharan areas of modest European interest. In addition to controlling for multiple covariates, we formally assess the sensitivity of our findings to unobserved covariates by estimating Oster bounds, which show that our results are very robust to potential omitted variables (Appendix A.2.5).

5 Qualitative Evidence for Bilateral Borders

The regression evidence demonstrates that precolonial states and water bodies systematically correlate with border location. In this section, we analyze qualitative evidence for all 107 bilateral borders in Africa to achieve two goals. First, our theory contains several implications about mechanisms that cannot be tested with correlational evidence alone. For the *process* of border formation, we expect that (a) precolonial states and water bodies were of intense strategic interest as meso-level objects,[29] (b) Europeans actively collected information about conditions on the ground, and (c) African agency affected the process. Second, our theoretical expectations are incompatible with existing assertions that the overwhelming majority of Africa's borders consist of straight lines. Consequently, we present new evidence about the *physical features* of African borders. Combined with the data on major border revisions, described earlier, these originally coded data for each bilateral border substantially revise our understanding of Africa's borders.

We compiled extensive qualitative evidence to support our claims, only a fraction of which we can present here. In Appendix A.4.1, we provide more detailed coding rules. In Appendix A.4.2, we provide overviews of the main macro- and meso-level factors that influenced borders in each region, and highlight the clearest examples of African agency affecting border formation. In Appendix A.4.3, we list and provide a brief summary of all twenty-nine precolonial states that we coded as directly affecting at least one bilateral border. Finally, Appendix C provides over 100 pages of notes to justify our coding decisions.

[29] The "null" hypothesis here is that Europeans used these objects solely as technical markers to delimit borders that were entirely determined by other factors.

5.1 Precolonial States and Historical Political Frontiers

The present consensus is that existing political realities played little to no role in the partition of Africa. By contrast, we find that a historical political frontier directly affected 64 of 107 bilateral borders (60%). Of the 64 borders, 47 involved at least one PCS in our quantitative dataset. These findings are based on "causal process observations" that assess, for each bilateral border, whether a historical political frontier directly affected the location of the border. For African precolonial states specifically, coding a direct effect requires us to find evidence that European powers deliberated among themselves or with African rulers about the boundaries of the historical state. In practice, this usually meant that a border treaty specifically mentioned an African polity and that Europeans directly interacted with Africans to learn information about the border. This is a stringent standard. It is not sufficient to find that Europeans had gained a treaty with a ruler and that the border is located close to that polity; instead, we require evidence that Europeans explicitly considered the frontiers of the polity when setting the border. For cases with more suggestive evidence that a precolonial state influenced the border (or did so for a preliminary border), we code a separate distinction of indirect effect. We apply the same standard to other types of historical political frontiers, which include diverse entities such as white settlements in southern Africa, Ottoman Empire territories in North Africa, and Liberia.

Europeans sometimes used the frontiers of precolonial states to draw borders without disputing those frontiers. These were usually predicated upon a treaty between European agents and a local ruler, as with the Bayol treaty that France secured with Futa Jalon in 1881.[30] The subsequent treaty among Europeans that established a colonial border stated, "Art. II.—His Majesty the King of Portugal and Algarves recognizes the French Protectorate over the territories of Fouta-Djallon ..." Consequently, the Bayol treaty became a foundation for France's claims despite its minimal effective presence in Futa Jalon (Carpenter 2012, 117), which it did not defeat militarily until 1896.

But Europeans often engaged in lengthy disputes about the limits of historical states; when one

[30] See Appendix C.2.6.

European power used African-signed treaties or other means of effective occupation to make territorial claims, another power sometimes challenged their claims. For example, Britain and France contested the limits of the Sokoto Caliphate when determining what became the border between Nigeria and Niger. This competition yielded several major revisions, shown in Panel A of Figure 7. Amid their northward expansion from the Niger Delta, British agents from the Royal Niger Company gained a treaty with the Caliph of Sokoto in 1885 (Hertslet 1909, 122–23). France accepted British suzerainty over Sokoto in an 1889 treaty, which stated that Britain would gain all the territory "that fairly belongs to the Kingdom of Sokoto" (quoted in Hertslet 1909, 739). At the time, neither power had an effective presence in the area;[31] consequently, they drew the border as a straight line that connected points on the Niger river and Lake Chad. But as the powers collected more intelligence about conditions on the ground, France sought to revise a line which they claimed granted Britain control over territories that lay north of Sokoto's historical frontiers. This contention had historical basis. Throughout the nineteenth century, flag bearers from the Caliphate conquered traditional Hausa states and converted them into Fulani-ruled emirates. Some Hausa dynasties fled, including the traditional ruling family of Katsina who moved north to Maradi (shown in our figure), and fought wars to preserve their independence.[32] Other states, such as Damagaram centered at Zinder (also in our figure), formed later in the nineteenth century and were independent of Sokoto.

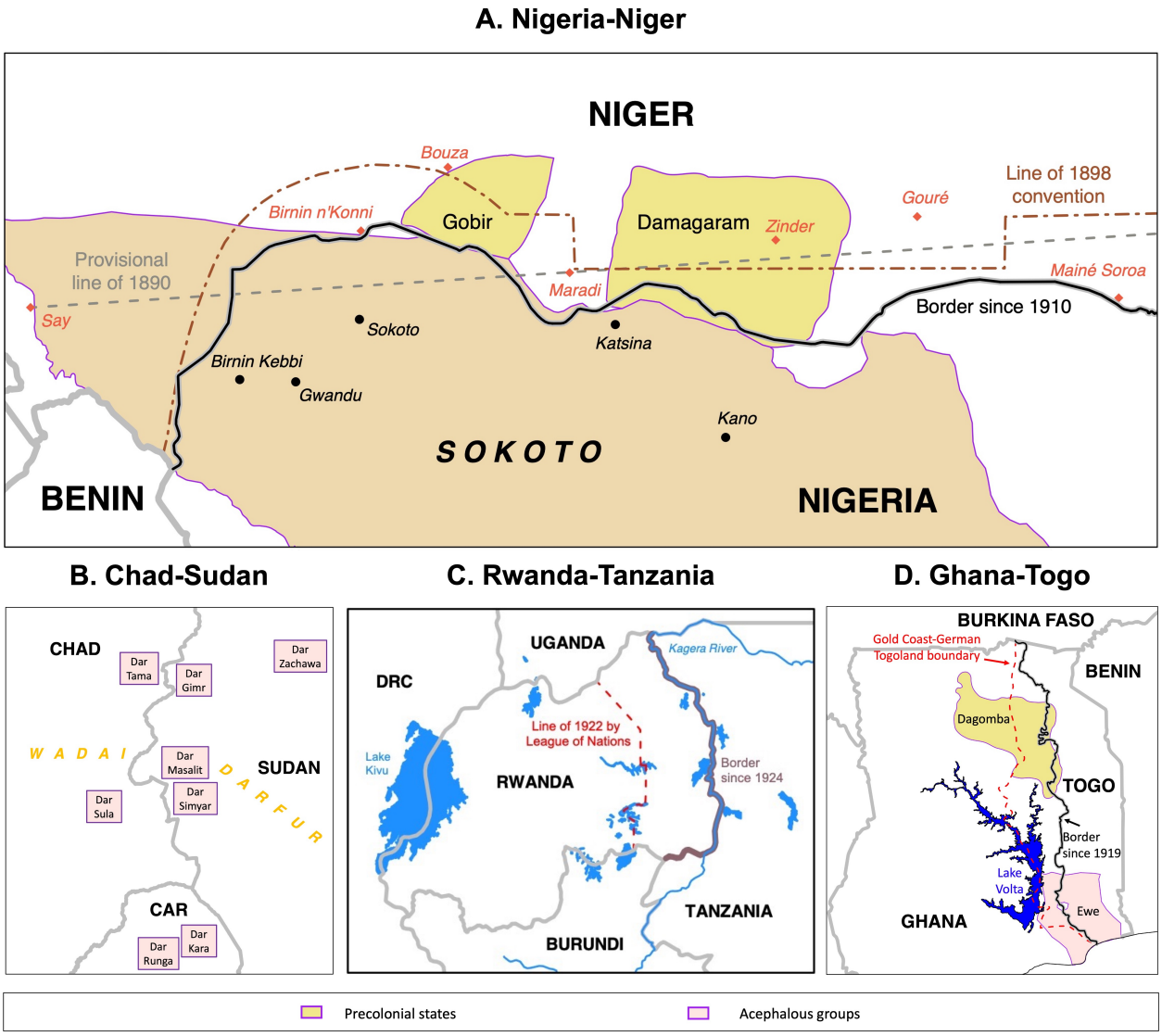
Britain and France established the broad contours of the present-day Nigeria–Niger border in 1904, following another ill-informed border drawn in 1898. The new border replaced arbitrary lines with a delimitation based precisely on the location of different towns and existing roads used to connect them. The 1904 treaty explicitly stated, "In order to avoid the inconvenience to either party which might result from the adoption of a line deviating from recognized and well-established frontiers, it is agreed that in those portions of the projected line where the frontier is not determined by the trade routes, regard shall be had to the present political divisions of the territories so that the

[31] Britain did not conquer Sokoto until 1903.

[32] Sokoto flag bearers conquered the original capital of Katsina, located farther south, which it repurposed as the capital of the Katsina emirate.

tribes belonging to the territories of Tessaoua-Maradi and Zinder shall, as far as possible, be left to France and ” (quoted in Hertslet 1909, 819); and one component of the border description was “a direct line to a point 15 kilometres south of Maradi . . . ” (p. 818).[33]

Figure 7: Borders Shaped by Precolonial States



African influence was even more direct in other cases. Farther east, Britain and France disputed the limits of the historical states of Darfur and Wadai, which were mentioned in an 1889 treaty to distinguish their respective spheres of influence. In this case, the Sultan of Darfur retained

[33] See Appendix C.2.11 for more details.

his army and fought the French for expansive limits to his frontier. The powers finally settled the Chad–Sudan border in the post-war settlement in 1919 by dividing several petty sultanates in dispute (Figure 7, Panel B).[34]

African agency sometimes prompted revisions of earlier partitions. After World War I, Britain and France partitioned former German colonies, which created opportunities for African rulers to pressure European powers. German East Africa was divided into two Mandate territories: Belgian Ruanda-Urundi and British Tanganyika. The original division between the new Belgian and British spheres proposed to separate a region (Gisaka) that had historically belonged to Rwanda to create a British Cape-to-Cairo railroad. In response, in 1922, "an alliance between Musinga [the Rwandan ruler], the Belgians and the Catholic Church (especially Cardinal Classe) defended the re-annexation of Gisaka to Rwanda" (Mathys 2014, 155). They "emphasize[d] the social, political, and economic harm caused by the imposition of this arbitrary division and they urge[d] the eastward extension of the boundary to the 'natural frontier' of the Kagera River" (McEwen 1971, 154–55). When the League of Nations' Permanent Mandates Commission reviewed the claims, they highlighted that the agreement separated "one of the richest and most civilised tracts of the Kingdom of Ruanda" and decried the "'deplorable moral effect' that the present arrangement had on the local population and their strong protests" (McEwen 1971, 154–55). In response to this pressure, British and Belgian officials agreed to alter the boundary to follow the Kagera River (Figure 7, Panel C).[35] In Dagomba, a petition by the traditional ruler (Ya Na) stimulated Britain to include its historical frontiers within the newly acquired British Togoland, which joined Ghana at independence. This reversed the earlier division of Dagomba between British and German territories (Figure 7, Panel D). The powers also discussed reversing the partition of the Ewe cultural area, but decided against doing so because the Ewe lacked discernible political frontiers.[36]

[34] See Appendix C.5.14.

[35] See Appendix C.4.13.

[36] See Appendix C.2.4. Borno provides another example. Assistance from the traditional ruler (Shehu) during WWI encouraged Britain to include its historical frontiers within the newly acquired Northern Cameroons, which joined Nigeria at independence; see Appendix C.3.6.

Ethiopia provided the starkest example of African agency affecting borders and of revising an earlier partition. This was the sole case of an African precolonial state that retained its independence for (almost) the entire colonial period. Originally allocated to the Italian sphere of influence, Ethiopia defeated Italy on the battlefield in 1896 and secured guarantees of its independence from other European powers. Earlier, in 1891, the Ethiopian emperor Menelik II made expansive claims about his territory, which Europeans ignored. However, after 1896, they took these claims seriously and Menelik ended up gaining substantial amounts of disputed territory in bilateral treaties with Italy, Britain, and France.[37] However, as we have shown, certain aspects of this seemingly exceptional case were in fact common: Europeans collected intelligence amid debates about the frontiers of a traditional state and Africans participated in the process. Nor was Ethiopia the only case in which Europeans directly negotiated with an African ruler over colonial borders. This also occurred with rulers in Buganda,[38] Lesotho,[39] and Swaziland.[40]

5.2 Physical Features of Borders: Water Bodies and Straight Lines

Summary of all borders. We coded the physical features of every bilateral border. The broad categories are water bodies, other local features, and straight lines; and each is disaggregated into different types.[41] For each bilateral border, we identify one or two features that are primary by constituting the plurality (and usually the majority) of the length of the border. Secondary features comprise smaller segments. Table 1 summarizes the frequency of each feature.

In 66% of Africa's bilateral borders, water bodies (rivers and lakes) or their watersheds comprise the primary feature. Few borders (8%) lack water bodies entirely as a feature. Major water bodies are an important component of these percentages because they are the primary feature of 24% of all

[37] See Appendix C.5.7 and the other Ethiopian border entries.
[38] See Appendices C.4.6 and C.4.10.
[39] See Appendix C.6.1.
[40] See Appendix C.6.2.
[41] Historical political frontiers are a distinct category from physical features per se. For example, a river could comprise the frontier of a historical state and also be used as a colonial border. In this case, the precolonial state directly affected the border (as determined using the standards described above) and the river is its main physical element.

Table 1: Features of African bilateral borders

Category	*Feature*	*Primary feature*	*Any feature*
Water bodies	Any river	50%	89%
	Major river	11%	17%
	Any lake	7%	24%
	Major lake	7%	19%
	Any watershed	8%	21%
	Major watershed	6%	9%
	Other water bodies	1%	10%
	Total: any water body	**66%**	**92%**
	Total: major water body	**24%**	**37%**
Other local features	Topography	5%	39%
	Towns/villages	3%	23%
	Infrastructure	1%	17%
	Total	**8%**	**54%**
Straight lines	Parallels/meridians	19%	34%
	Non-astronomical	19%	45%
	Total	**37%**	**65%**

Notes: In addition to rivers proper, minor rivers also include streams and oueds (although these derivatives of rivers are rarely used in borders). Other water bodies include wells, oases, and water holes. Topography is mainly mountains, but also hills, valleys, plateaus, passes, rock formations, and dunes. Infrastructure is mainly roads, but also caravan routes and forts. We count short segments of straight-line borders that connect local features, which biases in favor of counting straight lines as secondary features. The sum of primary features for the main categories exceeds 100% because some borders are coded as having two co-primary features (e.g., both a river and a straight line).

borders and are used in some form in 37% of all borders. Numerous borders comprised primarily of water bodies were also directly affected by a precolonial state (31 cases), but many others were not (36 cases). This summarizes what can be gleaned from studying individual cases: water bodies sometimes formed the limits of historical states and became colonial borders for that reason, but sometimes were used on their own.

Straight lines are the primary feature of 37% of bilateral borders, with a total of 19% for each of latitude/longitude lines and non-astronomical straight lines. These percentages, although not trivial, are appreciably smaller than commonly cited statistics, which overstate the degree to which straight lines were used in African borders. Barbour (1961, 305) asserts that 44% of African borders are parallel/meridian lines, 30% are mathematical (i.e., non-astronomical) lines, and 26% are relief features.[42] Barbour bases his calculations solely on information from Hertslet (1909), thereby ig-

[42]For references to Barbour's estimates, see Appendix A.1.1.

noring the many major border revisions that happened subsequently (see Figure 2 and Appendix Figure A.1); and explicitly qualifies his calculations as "very approximate." Our summary statistics, based on rigorous definitions and extensive supporting information, more accurately account for the features of Africa's bilateral borders.[43]

Straight lines not only comprise the primary feature of a lower fraction of bilateral borders than commonly claimed, but the location of straight-line borders is highly correlated with desert areas. Desert territories have low population density, fewer local features to use in the borders, and were of lesser strategic interest to Europeans. Among the twenty-seven borders located largely within deserts, straight lines are the primary feature of 78%, compared to 24% for the eighty non-desert borders. The corresponding figures are 44% and 10% for borders comprised specifically of parallel/meridian lines.

Non-astronomical straight-line borders, unlike parallels/meridians, are usually specified in relation to local features. Outside of desert areas, every bilateral border for which the primary feature is non-astronomical straight lines incorporated at least one local feature. These include minor rivers, towns, and roads as secondary elements. Thus, many straight-line segments of borders cannot be treated as entirely arbitrary in their precise location. Even some straight-line Saharan borders hide conscientious design. Boilley (2019, 7–8) argues that "the [French] colonial logic [in the Sahel] was to preserve the old limits in order to manage the conquered territories more easily [. . .] Lines replaced zones, but these zones were effectively old borders." For example, Mali's borders with each of Algeria and Niger are mostly straight, but these lines were deliberately placed to separate distinct Tuareg groups.[44]

Interpreting water-body borders. Our findings for water bodies clearly defy a strong version of the arbitrary borders thesis. If Europeans systematically incorporated local features, then the bor-

[43] Our units of analysis differ; we analyze bilateral borders whereas Barbour (1961) analyzes the total length of border lines. We would expect his calculations to be somewhat higher because of the straight-line borders that separate large Saharan states. Nonetheless, his figures appear to be a substantial overestimate.

[44] Appendices C.1.3 and C.2.23 provide details.

ders are not as-if random. However, our expectation also defies a weaker version of the arbitrary borders thesis. Major water bodies were important macro- and meso-level objects of strategic interest, as opposed to purely micro-level markers; and borders following rivers or lakes are, typically, not orthogonal to human experiences on the ground.[45]

Europeans competed for access to water bodies across the continent. Competition over the Congo River spurred the Berlin Conference, as discussed earlier. France and Britain alternated possessions at the mouth of the Senegal and Gambia rivers, respectively.[46] The British South Africa Company deliberately split its possessions (which became Southern Rhodesia/Zimbabwe and Northern Rhodesia/Zambia) along the Zambezi;[47] and farther west, Germany's desire to access the river resulted in the geographically absurd Caprivi Strip.[48]

Rivers sometimes affected macro- and meso-level claims even when they did not, ultimately, become a micro-level border feature. Among the major rivers, the two least important for borders are the Nile (only its watershed is a primary feature of any border) and the Niger (used only for the short intraimperial Benin–Niger border). Yet these "null" cases in fact reflected a systematic process—British interests in controlling both rivers were strong enough to risk war with France to uphold claims to exclusivity. In the 1890s, Britain granted leases along the Nile river to the Congo Free State and supported Italy's early claims to Ethiopia, mainly to create buffers against French encroachment on the Nile.[49] This competition famously ended with British and French military units meeting at Fashoda in 1898.[50] Earlier, in the 1880s and 1890s, France challenged Britain's supremacy on the Niger, which almost resulted in war amid the "Race for Nikki" in 1894.[51]

Later, as Europeans "discovered" inland lakes, they similarly sought access to facilitate trade. For example, Cecil Rhodes, moving northward from southern Africa, strove "to gain access to Lake

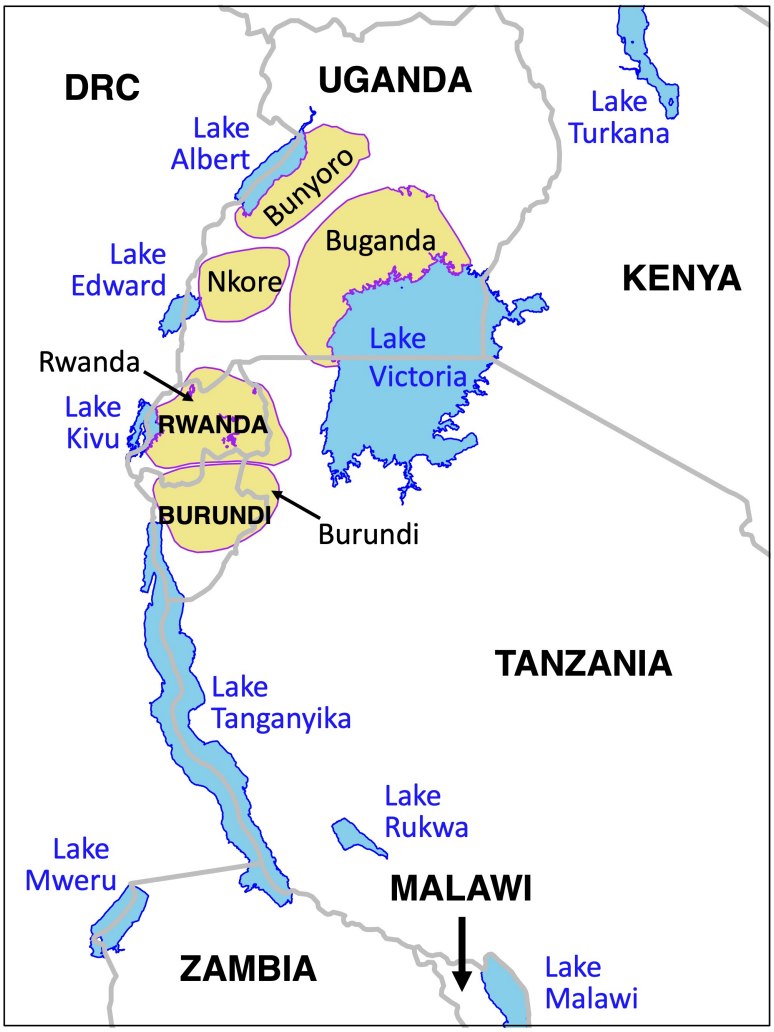
[45] Water-body borders also affect outcomes. Goemans and Schultz (2017) demonstrate that such borders have been, since independence, significantly less likely to be associated with territorial disputes.
[46] See Appendix C.2.10.
[47] See Appendix C.6.6.
[48] See Appendix C.6.16.
[49] See Appendices C.5.2 and C.5.10.
[50] See Appendix C.5.14.
[51] See Appendix C.2.8.

Tanganyika, the great waterway to the north" (Roberts 1976, 157).[52] Britain also sought access to Lake Tanganyika from the north by extending their domains south of Uganda.[53] In 1894, they secured a treaty with King Leopold that granted to Britain a thin strip of territory between the Congo Free State and German East Africa that connected to the lake. However, Germany strongly opposed this concession that would facilitate an "all-red route" from Cape to (eventually) Cairo, which resulted in Britain withdrawing this article of the treaty. Later in the 1890s, Germany began pressuring the Congo Free State to shift their mutual border eastward to incorporate Lake Kivu, the traditional limit of the Rwandan state.[54] Farther south, Britain issued an ultimatum to Portugal in 1890 to cease military operations in areas including the Shire Highlands and Lake Malawi, where British missionaries had established posts.[55]

Nor is choosing borders that follow rivers or lakes orthogonal to Africans' experiences on the ground (Reid 2012, 2–3). In the Great Lakes region (see Figure 8), economic transformation through farming and agriculture in the region's fertile forests began centuries ago because of favorable altitudes, adequate rainfall, and water bodies (Curtin et al. 1995, 107, 132). "Lake Victoria was crisscrossed by a network of trade ties" (ibid., 370), and the most important nod in the network was arguably the Kingdom of Buganda. Reid (2002, 227) discusses "the enormous significance of Buganda's lakeside location," including the invention of sophisticated canoes in the nineteenth century to foster trade and, with it, economic and political development. As Figure 8 shows, every major historical state in the region clustered around a Great Lake. The consequent colonial borders (albeit after numerous revisions) reflected the geography and the political economy of the region. In some cases, water-body borders also incorporated the frontiers of precolonial states, whereas elsewhere (Lakes Tanganyika, Malawi, and Mweru) they were used independently of precolonial states. Rivers and lakes also shaped the precolonial development of peoples with decentralized institutions, including where they settled and the trade patterns among them. Population settlements

[52] See Appendix C.4.1.
[53] See Appendix C.5.2.
[54] See Appendix C.4.8.
[55] See Appendix C.6.11.

Figure 8: Borders in the Great Lakes Region



in western Equatorial Africa, for example, corresponded neatly with rivers and vegetation zones in the precolonial period (Curtin et al. 1995, 217).

The ways in which water bodies affected human and political development in the long-run are complex and variegated. In the Great Lakes region, water-body borders typically united historical states, whereas elsewhere they sometimes divided groups with cultural similarities.[56] But in either case, important water bodies are not orthogonal to social realities on the ground. In East Africa,

[56]In general, we anticipate that rivers would be likely to unite peoples when they are shallow, narrow, and navigable (e.g., Nile); and more likely to divide when they are deep, wide, and hard to navigate because of waterfalls or currents (e.g., Boyoma Falls along the Congo; formerly Stanley Falls). Future work could attempt to rigorously measure and test this idea.

creating new, large colonial states was undoubtedly artificial relative to precolonial precedents. However, the borders themselves are anything but arbitrary.

6 Conclusion

According to conventional wisdom, European statesmen drew African borders in ignorance of local conditions, exemplified by the Berlin Conference of 1884–85. This resulted in arbitrarily-located borders. We overturn this convention. Most African borders were not in fact settled for decades after the Berlin Conference, during which time Europeans gathered extensive information about conditions on the ground. We provide an alternative theory to explain why European statesmen used the boundaries of precolonial states and water bodies as focal points to determine borders. Quantitatively, grid-cell regressions demonstrate that these local features correlate with the location of borders, including results based on an original spatial dataset of precolonial states. Qualitatively, historical political frontiers directly affected 60% of bilateral borders. In many cases, Europeans learned about and intensively debated the limits of precolonial states, among themselves and also with African rulers, which facilitated an underappreciated role for African agency. Europeans also frequently revised initial borders to reflect local realities. Water bodies, often major ones, comprised the primary border feature much more frequently than straight lines, which are mostly confined to desert areas.

The idea that Africa's international borders are unusually arbitrary is foundational. As Boilley (2019, 5) puts it, "The cliché of Berlin has endured, in spite of efforts of historians to destroy it." Our article provides a coherent alternative theory of border formation in Africa with strong empirical backing that should help destroy that cliché. We contribute a new understanding of how modern-day countries were created in Africa and of the resultant political map. This map and borders have subsequently influenced domestic and international political institutions. Here we discuss three broader implications of our findings.

First, we raise important questions about the growing research agenda that exploits as-if random-

ness in African borders for regression discontinuities and related research designs (McCauley and Posner 2015 review this literature). We heed Kocher and Monteiro's (2016, 952) call that "qualitative historical knowledge is essential for validating natural experiments." Dunning (2012) discusses the relevance of what policymakers knew when choosing a certain policy. The more they knew, the less credible are claims of as-if randomness. Although we do not question the findings of any particular study, we caution against characterizing Africa's borders generally as as-if random. Over half of all African bilateral borders experienced a major revision in the twentieth century, when European knowledge of the continent was far greater than during the 1884–85 Berlin Conference. For cases in which a particular feature (e.g., river) was chosen over another without much justification, a claim of conditional randomness may be justified. But making such an assessment requires consulting the history and features of the borders. We do so for every bilateral border in Appendix C, which we hope will advance this important research agenda.

Second, many scholars examine how precolonial states affected the directness of colonial rule (Gerring et al. 2011; Letsa and Wilfahrt 2020; Müller-Crepon 2020). Colonialism is a key intervening period in related studies of the long-term consequences of precolonial states for outcomes such as economic development (Michalopoulos and Papaioannou 2013; Dasgupta and Johnson-Kanu 2021), civil war (Wig 2016; Paine 2019), and democracy (Baldwin 2016; Neupert-Wentz, Kromrey and Bayer 2022). By showing that colonial borders largely preserved, rather than dismembered, precolonial states, we can better account for their persistence as important elements of colonial governance (indirect rule) and for affecting postcolonial outcomes. Furthermore, our new georeferenced dataset of African precolonial states should be a useful resource for scholars.

Third, our findings force us to rethink what exactly is exceptional about African states and borders. The specific features of African borders are not distinct in a cross-regional perspective. Historical political frontiers were a key determinant of borders in Europe (Goemans 2006; Abramson and Carter 2016) and elsewhere (Carter and Goemans 2011). Rivers routinely determined borders between European states (Kitamura and Lagerlöf 2020) and between states in the United States.

Low population densities are the common denominator between straight-line borders in the Sahara and in many states/provinces in the western parts of the United States and Canada.

Instead, the exceptional aspect of African states and borders is the paramount role of external influence in the broader process of forming states. We suggest that the overwhelming focus in the literature on borders misunderstands why the broader process of externally imposed state formation was harmful. We revisit the distinction between "dismemberment," or partitioning groups across international boundaries, and "suffocation," or forcing disparate groups that lack a shared history into the same country (Englebert, Tarango and Carter 2002; see also Christensen and Laitin 2019, Ch. 9).

Colonial borders frequently dismembered ethnic and cultural groups across international boundaries (Asiwaju 1985; Miles 2014). Borders clearly created deleterious human consequences in these cases, even if they incorporated natural features. Our contribution with regard to dismemberment is to demonstrate that which groups were partitioned followed a systematic process, contrary to existing assertions. Areas with precolonial states were rarely dismembered because incorporating their territorial limits created an agreed-upon method for self-interested Europeans to allocate territory. Furthermore, frequent migration and intermingling among peoples of different ethnicities, cultures, and languages ensured that *any* regional system that enshrined fixed territorial borders would divide groups with fractured polities or decentralized institutions.

Suffocation was another inevitable consequence of colonial state formation, yet receives too little attention relative to dismemberment. Precolonial states were too small in number and in size to form the basis of most colonial states across the continent. European administrators focused on creating economies of scale and sometimes used wealthier parts of their territories to subsidize poorer and sparsely populated areas (Gardner 2012; Green 2012). These goals induced Europeans to merge disparate peoples who lacked a shared political history into artificially large states, relative to historical precedents. This created difficulties for post-independence rulers to broadcast power throughout their national territory (Herbst 2000). Furthermore, combining precolonial states into

larger countries with stateless groups against whom they had previously fought wars and raided for slaves created conditions for postcolonial conflict (Paine 2019).

The conventional wisdom on Africa's bad borders suggests the following counterfactual: Taking as given the general contours of the European colonial occupation and externally created states, certain negative outcomes would have been less likely if Europeans had been more conscientious when determining the location of borders. Our evidence suggests strongly that this counterfactual is wrong. Imposing *any* set of fixed borders would have suffocated precolonial states within larger colonial states (at least without creating hundreds of states) and dismembered fractured groups across borders. Although colonial *states* in Africa were largely artificial with respect to historical antecedents and geographic considerations, the *borders* between these states were not. Africa's borders reflect a negotiated and systematic process that scholars and popular accounts have largely overlooked and misunderstood.

REFERENCES

Abramson, Scott F and David B Carter. 2016. "The Historical Origins of Territorial Disputes." *American Political Science Review* 110(4):675–698.

Ajayi, JF Ade and Michael Crowder. 1985. *Historical Atlas of Africa*. Longman.

Alesina, Alberto, William Easterly and Janina Matuszeski. 2011. "Artificial States." *Journal of the European Economic Association* 9(2):246–277.

Alexandrowicz, C.H. 1973. The Partition of Africa by Treaty. In *Foreign Relations of African States*, ed. Kenneth Ingham.

Anene, Joseph. 1970. *The International Boundaries of Nigeria, 1885-1960*. Humanities Press.

Asiwaju, A.I. 1976. *Western Yorubaland under European Rule, 1889–1945: A Comparative Analysis of French and British Colonialism*. Longman.

Asiwaju, A.I. 1985. *Partitioned Africans*. C. Hurst & Co.

Baldwin, Kate. 2016. *The Paradox of Traditional Chiefs in Democratic Africa*. Cambridge.

Barbour, Kenneth M. 1961. A Geographical Analysis of Boundaries in Inter-tropical Africa. In *Essays on African Population*, ed. K.M. Barbour and R.M. Prothero.

Beringue, Yves. 2019. *La frontière entre Soudan français (Mali) et Guinée: d'une limite intra-impériale vers une frontière interétatique (1878-1956)*. Université Paris 1 Panthéon-Sorbonne.
URL: *https://theses.hal.science/tel-02440629/*

Boilley, Pierre. 2019. "Nord-Mali: les frontières coloniales de l'Azawad." *Canadian Journal of African Studies* 53(3):469–484.
URL: *https://doi.org/10.1080/00083968.2019.1667840*

Butcher, Charles R and Ryan D Griffiths. 2020. "States and their International Relations since 1816: Introducing Version 2 of the International System(s) Dataset (ISD)." *International Interactions* 46(2):291–308.

Carpenter, Nathan Riley. 2012. Sovereignty along a West African Frontier: The Creation of the Guinea–Senegal Border, 1850–1920 PhD thesis.

Carter, David B and Hein E Goemans. 2011. "The Making of the Territorial Order: New Borders and the Emergence of Interstate Conflict." *International Organization* 65(2):275–309.

Christensen, Darin and David D Laitin. 2019. *African States since Independence*. Yale.

Collier, David. 2011. "Understanding Process Tracing." *PS: Political Science & Politics* 44(4):823–830.

Conley, Timothy G. 1999. "GMM Estimation with Cross Sectional Dependence." *Journal of Econometrics* 92(1):1–45.

Crowder, Michael. 1968. *West Africa under Colonial Rule*. Northwestern University Press.

Crowe, S.E. 1942. *The Berlin West African Conference 1884–1885*. Negro Universities Press.

Curtin, Philip, Steven Feierman, Leonard Thompson and Jan Vansina. 1995. *African History: From Earliest Times to Independence*. Pearson.

Dasgupta, Aditya and Ada Johnson-Kanu. 2021. "Pre-colonial States and Development: Evidence from African Agriculture.". https://osf.io/preprints/socarxiv/8sejb.

Dunning, Thad. 2012. *Natural Experiments in the Social Sciences*. Cambridge.

Englebert, Pierre, Stacy Tarango and Matthew Carter. 2002. "Dismemberment and Suffocation." *Comparative Political Studies* 35:1093–1118.

Fortes, Meyer and Edward Evan Evans-Pritchard. 1940. *African Political Systems*. Oxford.

Gardner, Leigh A. 2012. *Taxing Colonial Africa*. Oxford.

Gerring, John, Daniel Ziblatt, Johan Van Gorp and Julián Arévalo. 2011. "An Institutional Theory of Direct and Indirect Rule." *World Politics* 63(3):377–433.

Goemans, Hein E. 2006. "Bounded Communities: Territoriality, Territorial Attachment, and Conflict." *Territoriality and Conflict in an Era of Globalization* pp. 25–61.

Goemans, Hein E. and Kenneth A. Schultz. 2017. "The Politics of Territorial Claims: A Geospatial Approach Applied to Africa." *International Organization* 71(1):31–64.

Green, Elliott. 2012. "On the Size and Shape of African States." *International Studies Quarterly* 56(2):229–244.

Herbst, Jeffrey. 2000. *States and Power in Africa*. Princeton.

Hertslet, E. 1909. *The Map of Africa by Treaty*. H.M. Stationery.

Hsiang, Solomon M. 2010. "Temperatures and Cyclones Strongly Associated with Economic Production in the Caribbean and Central America." *Proceedings of the National Academy of Sciences* 107(35):15367–15372.

Katzenellenbogen, Simon. 1996. It Didn't Happen at Berlin: Politics, Economics and Ignorance

in the Setting of Africa's Colonial Boundaries. In *African Boundaries: Barriers, Conduits, and Opportunities*, ed. Paul Nugent and A.I. Asiwaju. Pinter pp. 21–34.

Kitamura, Shuhei and Nils-Petter Lagerlöf. 2020. "Geography and State Fragmentation." *Journal of the European Economic Association* 18(4):1726–1769.

Kocher, Matthew A. and Nuno P. Monteiro. 2016. "Lines of Demarcation: Causation, Design-Based Inference, and Historical Research." *Perspectives on Politics* 14(4):952–975.

Letsa, Natalie Wenzell and Martha Wilfahrt. 2020. "The Mechanisms of Direct and Indirect Rule: Colonialism and Economic Development in Africa." *Quarterly Journal of Political Science* 15(4):539–577.

Louis, William Roger. 1963. *Ruanda-Urundi, 1884-1919*. Clarendon Press.

Mathys, Gillian. 2014. "People on the Move: Frontiers, Borders, Mobility and History in the Lake Kivu Region, 19th–20th Century." Ph.D. dissertation, Universiteit Gent.

M'Bokolo, Elikia. 2011. *África negra. História e cvilizaçoes*. Sao Paulo: Casa das Áfricas.

McCauley, John F. and Daniel N. Posner. 2015. "African Borders as Sources of Natural Experiments." *Political Science Research and Methods* 3(2):409–418.

McEwen, Alexander C. 1971. *International Boundaries of East Africa*. Clarendon.

McGregor, JoAnn. 2009. *Crossing the Zambezi: The Politics of Landscape on a Central African Frontier*. James Currey.

Michalopoulos, Stelios and Elias Papaioannou. 2013. "Pre-Colonial Ethnic Institutions and Contemporary African Development." *Econometrica* 81(1):113–152.

Michalopoulos, Stelios and Elias Papaioannou. 2016. "The Long-Run Effects of the Scramble for Africa." *American Economic Review* 106(7):1802–1848.

Miles, William F.S. 2014. *Scars of Partition: Postcolonial Legacies in French and British Borderlands*. Nebraska.

Müller-Crepon, Carl. 2020. "Continuity or Change?(In) direct Rule in British and French Colonial Africa.". International Organization, forthcoming.

Murdock, George Peter. 1959. *Africa: Its Peoples and their Culture History*. McGraw-Hill.

Neupert-Wentz, Clara, Daniela Kromrey and Axel Bayer. 2022. "The Democraticness of Traditional Political Systems in Africa." *Democratization* 29(2):296–319.

Nugent, Paul. 2019. *Boundaries, Communities and State-making in West Africa*. Cambridge.

Paine, Jack. 2019. "Ethnic Violence in Africa: Destructive Legacies of Pre-Colonial States." *International Organization* 73(3):645–683.

Posner, Daniel N. 2004. "The Political Salience of Cultural Difference: Why Chewas and Tumbukas are Allies in Zambia and Adversaries in Malawi." *American Political Science Review* 98(04):529–545.

Reid, Richard. 2002. *Political Power in Pre-colonial Buganda*. James Currey.

Reid, Richard J. 2012. *Warfare in African History*. Cambridge.

Ricart-Huguet, Joan. 2022. "The Origins of Colonial Investments in Former British and French Africa." *British Journal of Political Science* 52(2):736–757.

Roberts, Andrew D. 1976. *A History of Zambia*. Africana Publishing Company.

Robinson, Amanda Lea. 2016. "Nationalism and Ethnic-based Trust: Evidence from an African Border Region." *Comparative Political Studies* 49(14):1819–1854.

Sanderson, G.N. 1985. The European Partition of Africa: Origins and Dynamics. In *The Cambridge History of Africa Vol. 6: from 1870 to 1905*, ed. Roland Oliver and G. N. Sanderson. New York, NY: Cambridge University Press pp. 96–158.

Simmons, Beth A. 2005. "Rules over real estate: trade, territorial conflict, and international borders as institution." *Journal of Conflict Resolution* 49(6):823–848.

Stewart, John. 2006. *African States and Rulers*. McFarland.

Tollefsen, Andreas Forø, Håvard Strand and Halvard Buhaug. 2012. "PRIO-GRID: A unified spatial data structure." *Journal of Peace Research* 49(2):363–374.

Touval, Saadia. 1972. *The Boundary Politics of Independent Africa*. Harvard.

Wesseling, H.L. 1996. *Divide and Rule: The Partition of Africa, 1880–1914*. Praeger.

Wig, Tore. 2016. "Peace from the Past: Pre-Colonial Political Institutions and Civil Wars in Africa." *Journal of Peace Research* 53(4):509–524.

Appendix for "Endogenous Colonial Borders: Precolonial States and Geography in the Partition of Africa"

We organize the supplementary material into three distinct sections. The main appendix is Appendix A, which is 28 pages. Here we provide supporting information to establish the conventional wisdom and summarize our data on major border revisions (Appendix A.1), for the regressions using grid cells (Appendix A.2), for the regressions using ethnic groups (Appendix A.3), and for the bilateral-border analysis (Appendix A.4).

The remaining appendices are supplemental and provide extensive notes to justify the coding decisions for our two original variables. We believe this information is essential to establish the validity of our new data. In the article, we reference specific entries that reviewers may be interested in, but we stress that this additional material is not required for reviewers. Appendix B is the first supplemental appendix with extensive coding notes for our polygons of precolonial states (20 pages). Appendix C is the second supplemental appendix with a brief case study for all 107 bilateral borders in Africa (113 pages). All references appear at the end of the appendix.

A Main Appendix

A.1 Supporting Information for "It Didn't Happen at Berlin"

A.1.1 Conventional Wisdom on Arbitrary African Borders

- Encyclopedia of Africa (Appiah and Gates 2010): "Rivalry between Great Britain and France led Bismarck to intervene, and in late 1884 he called a meeting of European powers in Berlin. In the subsequent meetings, Great Britain, France, Germany, Portugal, and King Leopold II negotiated their claims to African territory, which were then formalized and mapped."

- Michalopoulos and Papaioannou (2016, 1803) consider the "Scramble for Africa as a 'quasi-natural' experiment." "During the 'Scramble for Africa,' that starts with the Berlin Conference of 1884–1885 and is completed by the turn of the twentieth century, Europeans partitioned Africa into spheres of influence, protectorates, and colonies. The borders were designed in European capitals at a time when Europeans had barely settled in Africa and had limited knowledge of local conditions. Despite their arbitrariness, boundaries outlived the colonial era" (p. 1802). On the basis of their statistical analysis of ethnic groups, they conclude, "[w]ith the exceptions of the land mass of the historical ethnic homeland and the presence of lakes, there are no significant differences between split and non-split homelands along a comprehensive set of covariates ... These results offer support to a long-standing assertion within the African historiography regarding the largely arbitrary nature of African borders, at least with respect to ethnic partitioning" (p. 1803).

- Christensen and Laitin (2019): "The infamous Berlin Conference of 1884–85 set administrative boundaries in Africa and granted vast territories to the leading European powers ... Berlin set the colonial boundaries and determined, in large stretches, the borders of contemporary African states" (p. 167–68, 174). They also cite Michalopoulos and Papaioannou's evidence as establishing "the arbitrariness—statisticians would say as-if randomness—with which borders were drawn in Berlin ..." (p. 173).

- Herbst (1989) and Herbst (2000, Ch. 3): "[t]he overwhelming importance of imperial military and geopolitical interests in the scramble for Africa meant that the Europeans necessarily ignored factors that are generally considered relevant to the partitioning of land." He also supports the view that "[t]he arbitrary division of the continent by the European powers [exhibited] little or no respect for preexisting social and political groupings, or even, sometimes, for 'natural' geographical features" (Herbst 1989, 675).

- Scholars commonly cite an estimate by Barbour (1961, 305) that 44% of African borders are parallel/meridian lines, 30% are mathematical (i.e., non-astronomical) lines, and 26% are geographical features (Herbst 2000, 75; Englebert 2002, 88; Abraham 2007). Similarly, Alesina, Easterly and Matuszeski (2011, 246, 251) assert, "[e]ighty percent of African borders follow latitudinal and longitudinal lines ... Africa is the region most notorious for arbitrary borders"; and Yakemtchouk (1971) claims, "Some eight-tenths of African borders are unrelated to traditional and ethnic boundaries" (p. 70).

- Englebert (2002, 84–88): "With borders inherited from the colonial scramble for Africa ... they usually lack geographical congruence with the institutions of the precolonial era." In

the Democratic Republic of the Congo, he mentions that "several precolonial kingdoms and states . . . [were] partitioned with neighboring colonies . . . These are not exceptional cases . . . Colonial partition seemed to be the norm rather than the exception. In many cases, the existence of an integrated precolonial system did not prevent partition by colonials."

- Abraham (2007): "A 'tea and macaroon' approach to boundary delimitation during the process of colonisation—culminating in the Berlin Conference of 1884-1885—rendered [territorial disputes] inevitable" (p. 62).
- Examples from popular press: "In 1885 European leaders met at the infamous Berlin Conference to divide Africa and arbitrarily draw up borders that exist to this day."[1] "The Partition of Africa began in earnest with the Berlin Conference of 1884-1885, and was the cause of most of Africa's borders today."[2] "The Berlin Conference spanned almost four months of deliberations, from 15 November 1884 to 26 February 1885. By the end of the Conference the European powers had neatly divided Africa up amongst themselves, drawing the boundaries of Africa much as we know them today."[3] "At the Berlin Conference, the European colonial powers scrambled to gain control over the interior of the continent. The conference lasted until February 26, 1885 — a three-month period where colonial powers haggled over geometric boundaries in the interior of the continent, disregarding the cultural and linguistic boundaries already established by the indigenous African population."[4]

A.1.2 Did the Berlin Conference Matter in Other Ways?

Our evidence on the timing of border formation rules out claims that the Berlin Conference played an important role in determining specific borders (e.g., Appiah and Gates 2010 and Christensen and Laitin 2019; see Appendix A.1.1). But the Berlin Conference may have affected later borders by affecting macro-level claims or by determining rules for claiming territory. Neither appears well supported, which further raises the need for a new model of African border formation.

The Berlin Conference undoubtedly influenced some macro-level claims. For example, to bolster their positions at the Conference, Britain accelerated its process of gaining treaties along the Niger river and Germany claimed territories in various parts of the continent in 1884 (Craven 2015, 40–41). However, many macro-level claims in place as of the mid-1880s cannot be attributed to Berlin, such as Britain's in southern Africa and France's in Algeria. More important, micro-level borders are not mere derivatives of macro-level claims, and most later borders did not exhibit an obvious path dependence with earlier ones.[5] Europeans followed a rough notion of a hinterland doctrine: a power with claims to the coast had a right to its hinterland.[6] However, this principle was too

[1] https://www.dw.com/en/130-years-ago-carving-up-africa-in-berlin/a-18278894.
[2] https://www.blackpast.org/global-african-history/partition-africa.
[3] https://www.sahistory.org.za/article/berlin-conference.
[4] https://www.thoughtco.com/berlin-conference-1884-1885-divide-africa-1433556.
[5] An exception was West Africa, where many later borders extended initially short rays that emanated from the coast. However, even in these cases, most initial borders were later revised to replace straight lines with water bodies and roads.
[6] France used this policy to determine intraimperial spheres: "The French postulate that the inland regions of Sudan have different outlets depending on their proximity to the coast. Each of the four French colonies bordering the Atlantic is therefore assigned the hinterland for which it is the logical outlet" (San-

imprecise to determine even rough spheres of influence at the meso level, let alone specific borders at the micro level (Wesseling 1996, 127). For example, in the late 1880s in East Africa, Britain and Germany agreed not to annex territory located in the "rear" of the other's coastal territory (Hertslet 1909, 888–89), but the vagueness of the idea "left considerable room for misunderstanding in the future" and was explicitly rejected by statesmen such as Prime Minister Lord Salisbury (Louis 1963*a*, 9–10). The ensuing Anglo–German Agreement of 1890 yielded, among other concessions, British control over Uganda. This agreement reflected Germany's desire to gain the small island of Heligoland in the North Sea, as opposed to an inevitable extension of its coastal possessions (some of which, such as Witu, it relinquished).

In its concluding General Act, the Conference decreed rules of effective occupation for claiming territory (Hertslet 1909, 484–85). Such rules, even if successful, would not predict micro-level border features. Nonetheless, the formal rules appear to have simply acknowledged that Europeans were claiming territory without discernibly altering this behavior. The standards for effective occupation were vague, a product of British resistance to this principle, and applied only to coastal settlements—many of which were already occupied (Crowe 1942, 190–91; Wesseling 1996, 124–30). In practice, as we highlight, "effective occupation" came to mean treaties with local rulers. This created scope for African participation, despite their lack of representation at Berlin.

Despite minimal impact on specific borders, the Berlin Conference may have influenced the eventual annexation of African territory. Whereas treaties with local rulers where protectorates (i.e., they granted Europeans control over external but not internal affairs), Europeans later ignored these limitations and imposed local governance institutions. Alexandrowicz (1973, 148) interprets the stipulations of the Berlin Conference as an agreement among the powers to permit such rights of annexation (see also Craven 2015, 42–49).

A.1.3 Major Revisions to Colonial Borders

In the article, we describe our standards for coding the initial year of border formation and major revisions for all 107 bilateral borders in Africa. In Figure A.1 we plot the frequency of different types of revisions over time. Within the main categories, territorial transfers can be either large (45 total cases, 43 in the 20th century), small (17, 17), or a transfer only of an enclave (3, 2); changing the features of the border can entail switching from lines to local features (22, 14), clarifying what the local features are (28, 19), altering the local features (4, 2), or changing the location of a straight-line border (4, 3); and new segments were added 26 times (including 13 in the 20th century). In Table A.1, we list every large territorial transfer.

We also digitized colonial maps of 1887, 1895, and 1902 from Sanderson (1985*a*). We combined these maps with our detailed notes on each bilateral border to code which border segments in each year corresponded with the final colonial borders. This process allows us to correct inevitable inaccuracies in historical maps. We then calculated two sets of figures for each map to quantify how colonial claims and borders evolved over time. First, we computed (suing polygons of claimed territories) the percentage of all African territory claimed by Europeans, disaggregating by coastal and interior (300 km from coast). Second, we computed (using polylines of borders) the total length of borders in their final form as a percentage of the total length of borders in 1960.

douno 2015, 20–21).

Figure A.1: Major Border Revisions Over Time

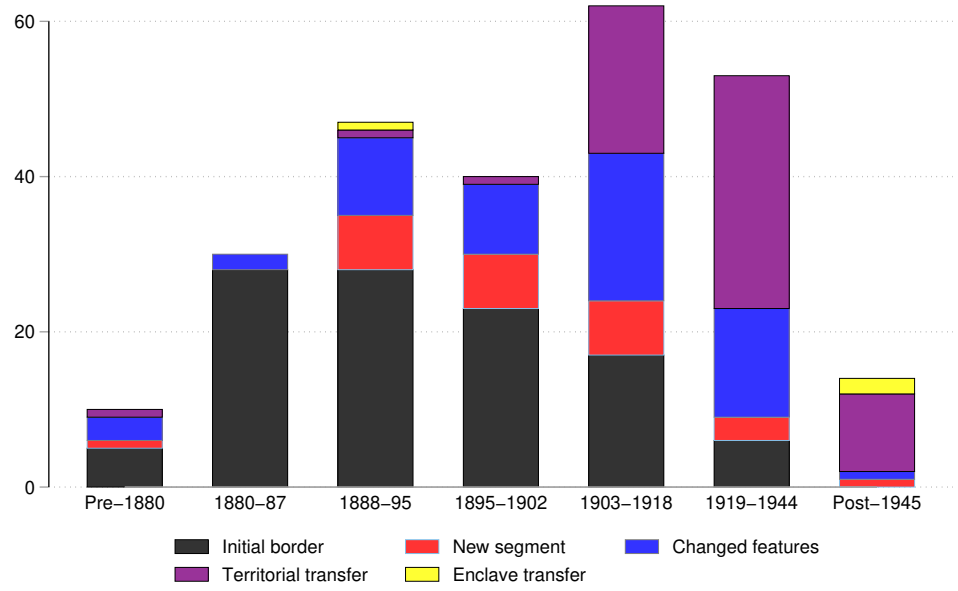


Table A.1: Large Territorial Transfers Since 1900

Gaining state	Losing state	Year	Territory	Approx. sq.km.
Kenya	Uganda	1902	Eastern Province	84,000
Zambia	Angola	1905	Lozi territory	88,000
Ethiopia	Kenya	1907	Menelik's claims	225,000
Sudan	DRC	1910	Lado Enclave	39,000
Cameroon	AEF	1911	Neukamerun	295,000
Western Sahara	Morocco	1912	Cape Juby	33,000
Uganda	Sudan	1914	Part of Lado Enclave*	47,000
Ghana	Togo	1919	British Togoland	34,000
Nigeria	Cameroon	1919	British Cameroons	53,000
AEF	Cameroon	1919	Neukamerun	295,000
Rwanda	Tanzania	1924	Gisaka district	7,000
Somalia	Kenya	1925	Jubaland	110,000
Kenya	Uganda	1926	Rudolf Province	37,000
Chad	Niger	1931	Tibesti mountains	134,000
AOF**	Burkina Faso	1932	Upper Volta	274,000
Libya	Sudan	1934	Sarra Triangle	72,000
Somalia	Ethiopia	1936	Ogaden	327,000
Burkina Faso	AOF**	1947	Upper Volta	274,000
Ethiopia	Somalia	1954	Ogaden	327,000
Morocco	Western Sahara	1958	Cape Juby	33,000
Cameroon	Nigeria	1961	Southern Cameroons	43,000

* Other parts of northern Uganda were transferred to Sudan (see Sudan–Uganda).

** Upper Volta was split between three AOF colonies in 1932 (Niger, Soudan/Mali, and Cote d'Ivoire) and reconstituted in 1947 (see Burkina Faso–Ivory Coast and Burkina Faso–Mali).

A.2 Supporting Information for Grid-Cell Regressions

Section A.2.1 presents data sources for variables. Section A.2.2 presents the corresponding regression tables for Figure 6 and related robustness checks. Section A.2.3 changes the reference category in the PCS regressions by including both PCS variables (both PCS border cells and PCS interior cells) in the same model. Section A.2.4 discusses issues related to spatial dependence, assesses robustness checks for Conley SEs, and performs an alternative procedure for calculating SEs using the wild bootstrap. Section A.2.5 computes Oster bounds to assess the sensitivity of our estimates to unobservables using information from observables.

A.2.1 Data Sources for Variables

1. **Top 10 River**: Equals 1 for grid cells/ethnic homelands with any of the 10 longest rivers in Africa; 0 otherwise. Top 10 rivers are Nile, Congo, Niger, Zambezi, Ubangi, Kasai, Orange, Limpopo, Senegal and Blue Nile. *Source: "Rivers and lake centerlines" shapefile from Natural Earth (2023).*

2. **Any River**: Equals 1 for grid cells/ethnic homelands with a river; 0 otherwise, *Source: "Rivers and lake centerlines" shapefile from Natural Earth (2023).*

3. **Minor River**: Equals 1 for grid cells/ethnic homelands with a river but not a top 10 river; 0 otherwise, *Source: "Rivers and lake centerlines" shapefile from Natural Earth (2023).*

4. **Watershed**: Equals 1 for grid cells/ethnic homelands with a major watershed; 0 otherwise. We only code major watersheds because almost all cells contain minor watersheds. *Source: constructed using FAO maps of Hydrological basins in Africa from Food and Agricultural Organization of the United Nations (2022) and cross-referencing with maps from Vivid Maps (2001).*

5. **Top 10 Lake**: Equals 1 for grid cells/ethnic homelands with any of the 10 largest lakes in Africa; 0 otherwise. Top 10 lakes: Lake Victoria, Tanganyika, Malawi, Chad, Turkana, Albert, Mweru, Tana, Kivu, and Edward. *Source: "Rivers and lake centerlines" shapefile from Natural Earth (2023).*

6. **Any lake**: Equals 1 for grid cells/ethnic homelands with a lake; 0 otherwise. *Source: "Rivers and lake centerlines" shapefile from Natural Earth (2023).*

7. **Minor lake**: Equals 1 for grid cells/ethnic homelands with a lake but not a top 10 lake; 0 otherwise. *Source: "Rivers and lake centerlines" shapefile from Natural Earth (2023).*

8. **Share of Desert**: Percentage of the surface area classified as non-vegetated or sparsely vegetated for each ethnic group. For grid cells, we code a dummy variable indicating whether a cell resides in non-vegetated or sparsely vegetated areas. *Source: UNESCO Vegetation Map of Africa by White (1983).*

9. **Logged Land Area**: Logged surface area of each ethnic homeland in $1000s$ of km^2. For grid cells, the same value of the ethnic group containing the cell. If a cell falls into multiple groups, we compute the average weighted by the land area of each group in cell. *Source:*

Michalopoulos and Papaioannou (2016). Original Source: Global Mapping International, Colorado Springs, Colorado, USA.

10. **Distance to the Coast**: The shortest geodesic distance of the centroid of each grid cell/ethnic homeland from the coast, measured in 1000s of km.

11. **Suitability for European Settlement**: The index takes into account climate, rainfall, elevation and tsetse fly prevalence that influenced prospects for European settlement. For ethnic groups, we use the average suitability index. For grid cells, we code a dummy variable indicating whether the cell is suitable or not. *Source: Alsan (2015).*

12. **Agricultural Intensity**: $1-6$ scale index reflecting the intensity of agriculture for each ethnic group. 1 means a "complete absence of agriculture", 2 for "casual agriculture", 3 for "extensive or shifting cultivation", 4 for "horticulture", 5 for "intensive agriculture on permanent fields", and 6 for "intensive cultivation where it is largely dependent upon irrigation". For grid cells, we use the value for the ethnic group containing the cell. If a cell falls into multiple ethnic groups, we calculate the average weighted by group area in cell. *Source: Murdock (1967); variable* `v28`.

13. **Population Density in 1850**: Average population density of each cell/ethnic homeland in 1850. *Source: Utrecht University (2022).*

14. **Population Count in 1850**: Total population of each ethnic homeland in 1850. Constructed using population density in 1850 and areas of ethnic homelands.

15. **Ecological Diversity**: An index between 0 and 1 that measures how ecologically diverse each ethnic homeland is. For grid cells, the same value of the ethnic group containing the cell. If a cell falls into multiple groups, we compute the average weighted by the land area of each group in cell. We compute the index for major lakes not included in Fenske (2014) following his method using White's vegetation data. *Sources: Fenske (2014); White (1983).*

16. **TseTse Suitability Index (TSI)**: The standardized Z-score of the potential steady-state TseTse population that takes into account temperature and humidity requirements for TseTse viability. The underlying spatial data are a collection of points. We compute the average TSI for the points in each ethnic homeland/grid cell. Some coastal cells do not contain any point and we take the value of the nearest point for those cells. *Source: Alsan (2015).*

17. **Contested Areas**: Dummy variable that equals 1 for grid cells/ethnic homelands containing contested coastal areas; 0 otherwise. Contested coastal areas are areas along the coast between two natural harbors or precolonial trading posts claimed by distinct powers by 1887. We first code colonial claims over natural harbors and precolonial trading posts, then identify two neighboring points claimed by different powers and extend from these points 90° inland for 300km to identify contested areas (see Figure A.2). *Source: Ricart-Huguet (2022), which we extend to the whole continent.*

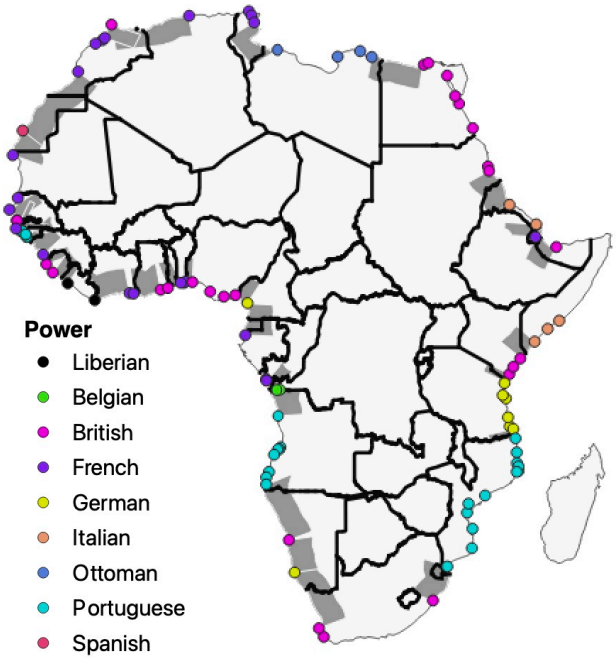
18. **Jurisdictional Hierarchy**: The number of jurisdictional levels beyond the local community, with 1 representing stateless societies, 2 for petty chiefdom, 3 for larger paramount chiefdom or their equivalent, and 4 or 5 for large states. Organizations not held to be legitimate, e.g., imposed colonial regimes, are excluded. *Source: Murdock (1967); variable* `v33`.

19. **Slave Exports**: For ethnic groups, the logged number of slave exports scaled by land area of the ethnic group (log(1+ exports/km^2)). For grid cells, the same value of the ethnic group containing the cell. If a cell falls into multiple groups, we use the average weighted by the land area of each group in cell. *Source: Nunn (2008).*

20. **Historical Natural Resources**: For ethnic groups, the number of historical natural resource sites scaled by group land area. For grid cells, a dummy variable indicating whether a cell contains any historical natural source cite. *Source: Ricart-Huguet (2022), which we extend to the whole continent.*

21. **Regions**: For ethnic groups, we use five conventional regions of Africa based on existing country borders. For grid cells, we construct five regions based on latitudes and longitudes. North: cells north of 18° N, roughly everything at or north of the Sahara desert (excludes Sahel); South: cells south of 15° S, roughly everything south of Lake Malawi; West: cells between 18° N and 14.5° S and west of 14° E, roughly everything West of Lake Chad that is not Northern Africa; East: cells between 18° N and 15° S and east of 14° E, roughly everything east of Lake Tanganyika that is not Northern or Southern Africa; Central: all remaining cells.

Figure A.2: Contested Coastal Areas (Trading Posts and Natural Harbors)



Note: Precolonial trading posts and natural harbors in colored dots; country borders in black lines. In gray, areas within 300km of the coast between two natural harbors or precolonial trading posts that were claimed by two distinct powers by 1887. We use these areas to code the variable CONTESTED AREAS. Appendix Table A.4 shows that cells in contested areas are more likely to contain colonial borders.

A.2.2 Regression Tables for Figure 6 and Robustness Checks

Table A.2: Correlates of Precolonial States

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	Full	SSA	Full	SSA	Full	SSA	Full	SSA
Dependent Variable	PCS BORDER IN CELL				CELL INSIDE PCS			
Top 10 river	0.04*	0.06**	0.03+	0.05**	0.04*	-0.02	0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)
Minor river	0.02**	0.03**	0.03**	0.04**	-0.01	-0.02**	0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Watershed	0.03**	0.03**	0.02*	0.02+	0.04**	0.01	0.04**	0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Top 10 lake	0.12**	0.13**	0.17**	0.18**	-0.07**	-0.07**	0.01	0.02
	(0.03)	(0.03)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)
Minor lake	0.15**	0.13**	0.13**	0.12**	-0.05**	-0.07**	-0.05**	-0.04**
	(0.02)	(0.02)	(0.02)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
Cell in desert	-0.07**	-0.05**	-0.06**	-0.05**	-0.03**	-0.03**	-0.01	-0.05**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Latitude			0.00**	0.00**			0.01**	0.01**
			(0.00)	(0.00)			(0.00)	(0.00)
Longitude			0.00**	0.01**			0.01**	0.01**
			(0.00)	(0.00)			(0.00)	(0.00)
Contested areas			0.06**	0.08**			-0.00	-0.01
			(0.01)	(0.01)			(0.01)	(0.01)
Logged group area			-0.03**	-0.03**			-0.03**	-0.04**
			(0.00)	(0.00)			(0.00)	(0.00)
Distance to the coast			0.01	0.02+			0.01	0.02*
			(0.01)	(0.01)			(0.01)	(0.01)
Hist. natural resources			0.01	0.02			0.03+	0.02
			(0.02)	(0.02)			(0.02)	(0.02)
Logged slave exports			0.00+	0.01**			0.01**	0.01**
			(0.00)	(0.00)			(0.00)	(0.00)
Suitability for			0.01	-0.01			-0.04**	-0.07**
European settlement			(0.01)	(0.01)			(0.01)	(0.01)
Agricultural intensity			-0.00	0.01*			-0.01*	-0.01*
			(0.00)	(0.00)			(0.00)	(0.00)
Population density in 1850			1.36**	1.90*			0.57	0.47
(in 1000s/km^2)			(0.41)	(0.74)			(0.40)	(0.46)
Ecological diversity			0.02	0.02			0.03+	0.05**
			(0.02)	(0.02)			(0.01)	(0.02)
Tsetse suitability index			-0.02**	-0.03**			-0.03**	-0.05**
			(0.00)	(0.01)			(0.00)	(0.01)
Constant	0.10**	0.10**	0.11**	0.04	0.10**	0.11**	0.10**	0.04+
	(0.00)	(0.00)	(0.02)	(0.03)	(0.00)	(0.00)	(0.02)	(0.02)
Region FE	NO	NO	YES	YES	NO	NO	YES	YES
N	10341	7228	9913	6816	10341	7228	9913	6816
Adjusted R^2	0.03	0.02	0.10	0.08	0.01	0.00	0.13	0.14

Note: The table reports regression results for correlates of precolonial state formation in Africa. The dependent variables are PCS BORDER IN CELL and CELL INSIDE PCS. We include a wide range of geographic variables and socioeconomic variables as covariates. All models are OLS with robust standard errors in parentheses. Our goal is to explore variables correlated with PCS borders that might also affect colonial border formation, thus we report less conservative standard errors to avoid Type II errors.
$^+ p < 0.10$, $^* p < 0.05$, $^{**} p < 0.01$

Table A.3: Regression Table for Figure 6: Geography (Top Panel)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: COUNTRY BORDER IN CELL							
Any river	0.11**							
	(0.03)							
Major (top 10) river		0.19**					0.18**	0.19**
		(0.06)					(0.06)	(0.06)
Minor river		0.09**					0.08**	0.07**
		(0.03)					(0.03)	(0.03)
Any lake			0.13**					
			(0.04)					
Major (top 10) lake				0.35**			0.34**	0.33**
				(0.09)			(0.09)	(0.09)
Minor lake				0.03			0.01	0.01
				(0.03)			(0.03)	(0.03)
Watershed					0.10**		0.10**	0.10**
					(0.03)		(0.03)	(0.02)
Cell in desert						-0.07**	-0.04+	-0.03
						(0.02)	(0.02)	(0.02)
Distance to the coast								0.00
								(0.02)
Suitability for European settlement								0.05+
								(0.03)
Tsetse suitability index								0.04**
								(0.01)
Constant	0.13**	0.13**	0.14**	0.14**	0.13**	0.18**	0.12**	0.13**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)
Lat & lon	NO	NO	NO	NO	NO	NO	NO	YES
Region FE	NO	NO	NO	NO	NO	NO	NO	NO
N	10341	10341	10341	10341	10341	10341	10341	10341
Adjusted R^2	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.06

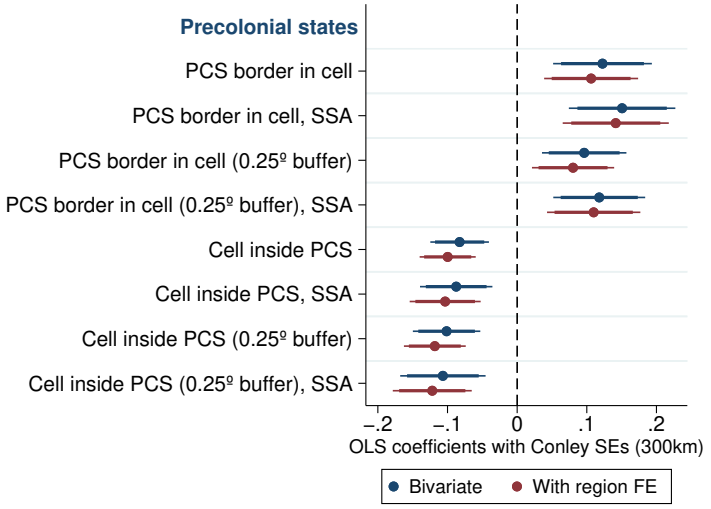
Notes: This regression table accompanies the top panel of Figure 6. All models are OLS with Conley standard errors in parentheses with a distance cutoff of 300 km. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table A.4: Regression Table for Figure 6: Precolonial States (Bottom Panel)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	Full	Full	Full	Full	SSA	SSA	SSA	SSA
Dependent Variable	COUNTRY BORDER IN CELL							
PCS border in cell	0.10**				0.12**			
	(0.03)				(0.04)			
PCS border in cell (0.25° buffer)		0.07*				0.09**		
		(0.03)				(0.03)		
Cell inside PCS			-0.09**				-0.09**	
			(0.02)				(0.03)	
Cell inside PCS (0.25° buffer)				-0.11**				-0.11**
				(0.02)				(0.03)
Top 10 river	0.20**	0.20**	0.20**	0.20**	0.22**	0.22**	0.22**	0.22**
	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)
Minor river	0.07*	0.07*	0.07**	0.07**	0.07**	0.07**	0.08**	0.08**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Top 10 lake	0.29**	0.28**	0.30**	0.30**	0.29**	0.28**	0.31**	0.31**
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Minor lake	0.00	0.01	0.01	0.01	-0.00	0.00	0.01	0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Watershed	0.09**	0.09**	0.10**	0.10**	0.10**	0.10**	0.10**	0.10**
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Cell in desert	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04	-0.05+	-0.05+
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Contested areas	0.09**	0.09**	0.09**	0.09**	0.08*	0.08*	0.08**	0.08**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Ethnic group border in cell	0.01	0.01	0.01	0.02+	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Logged group area	-0.01	-0.01	-0.01	-0.01	-0.01	-0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Distance to the coast	0.03	0.03	0.03	0.03	0.01	0.01	0.02	0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Historical natural resources	-0.05*	-0.06*	-0.05*	-0.05*	-0.06+	-0.06*	-0.05+	-0.06+
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Logged slave exports	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Suitability for European settlement	0.05	0.05	0.04	0.04	0.05+	0.06+	0.05	0.05
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Agricultural intensity	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Population density in 1850 (in 1000s/km^2)	-0.84*	-0.81*	-0.66*	-0.66*	-1.26*	-1.23+	-0.98	-0.99
	(0.34)	(0.34)	(0.31)	(0.31)	(0.63)	(0.65)	(0.65)	(0.65)
Ecological diversity	-0.07	-0.07	-0.06	-0.07	-0.10*	-0.10*	-0.10+	-0.10+
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Tsetse suitability index	0.04**	0.04**	0.04**	0.04**	0.04**	0.04**	0.03**	0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	0.14*	0.13*	0.15*	0.15*	0.18*	0.18*	0.19**	0.19**
	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)
Lat & lon	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES
N	9913	9913	9913	9913	6816	6816	6816	6816
Adjusted R^2	0.07	0.07	0.07	0.07	0.09	0.08	0.08	0.08

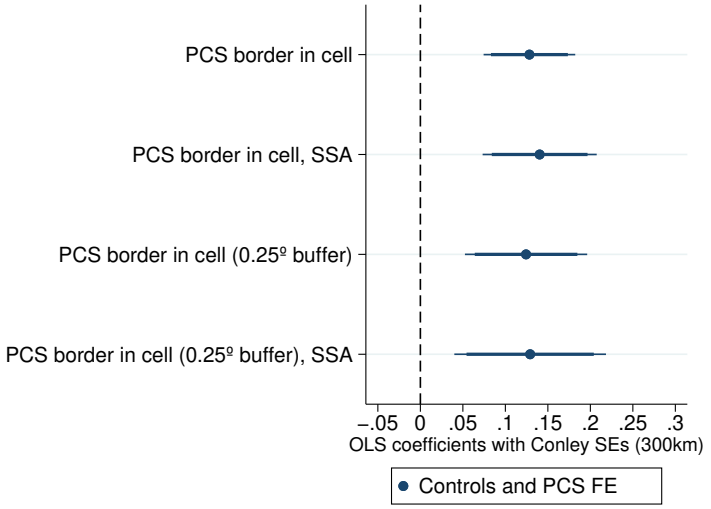
Notes: This regression table accompanies the bottom panel of Figure 6. OLS coefficients with Conley standard errors in parentheses (distance cutoff = 300 km). This table contains fewer observations than Table A.3 because Agricultural intensity contains missing values; the results do not change. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Figure A.3: Precolonial States and African Borders without Controls



Notes: This figure presents a series of coefficient plots similar to those in the bottom part of Figure 6 but without the battery of control variables.

Figure A.4: Correlates of African Borders with PCS FE

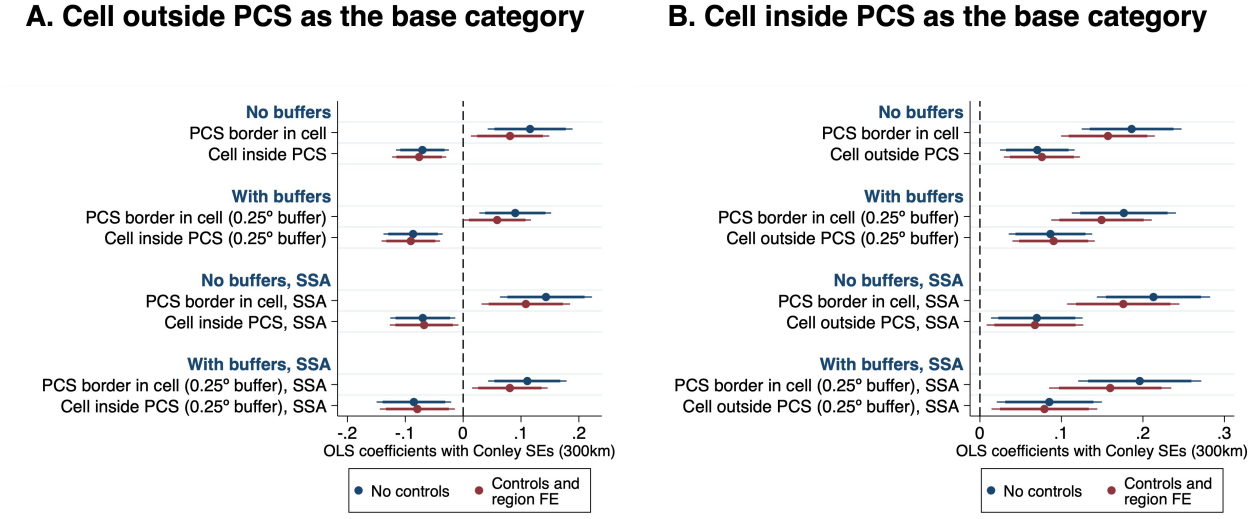


Notes: This figure presents coefficients from models that add fixed effects for PCS to the specification. Using PCS FE causes cells outside PCS to drop and essentially compares cells with PCS borders to cells inside PCS while stratifying on the PCS, which guards against any source of omitted variable bias common to each PCS.

A.2.3 Changing the PCS Reference Category

We use our PCS dataset to divide grid cells into three categories: cells containing a PCS border, cells inside a PCS, and cells outside a PCS. Figure A.5 includes two PCS variables in the same models while leaving the third as the base category. In Panel A, the base category is Cell outside PCS. In Panel B, the base category is Cell inside PCS. Panel B shows that both cells with a PCS border and cells outside of a PCS are more likely to contain a colonial border than cells inside PCS, consistent with our theoretical implication that colonizers left precolonial states unsplit. Additionally, Panel A shows that cells with PCS borders are more likely to contain colonial borders than cells outside PCS in all specifications. Overall, these results suggest that the positive and significant coefficients for PCS border in cell in Figure 6 are not driven only by differences between cells containing PCS borders and cells inside PCS.

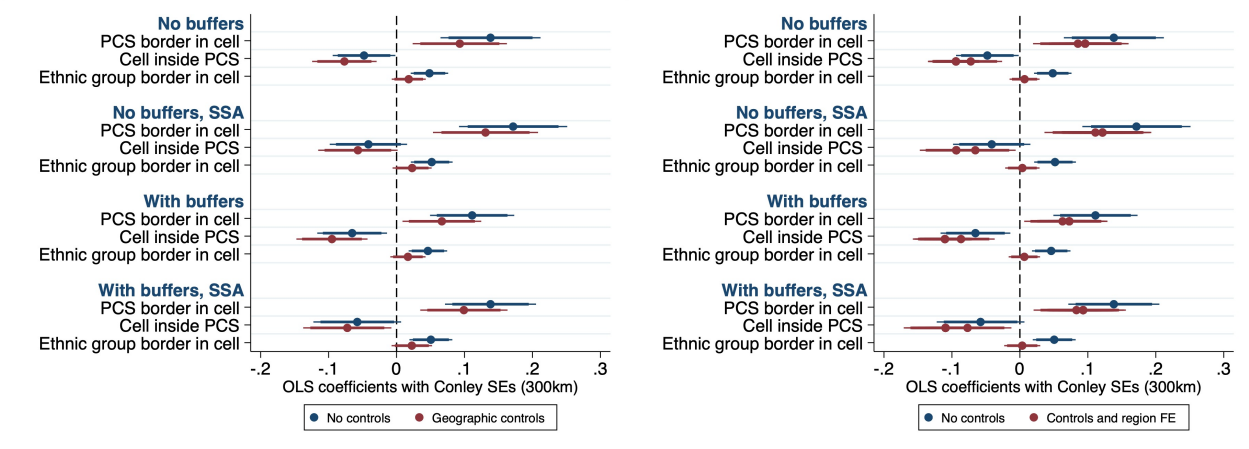
Figure A.5: Correlates of African Borders with both PCS Variables



Notes: This figure presents a series of coefficient plots similar to Figure 6 but with two PCS variables in the same models leaving Cell outside PCS as the base category in Panel A and Cell inside PCS as the base category in Panel B.

We conduct another robustness check to directly incorporate borders of ethnic homelands. We further divide cells outside PCS into cells that contain the borders of a Murdock ethnic homeland (ETHNIC BORDER IN CELL) and those that do not, include the former in the same regressions with PCS BORDER IN CELL and CELL INSIDE PCS, and leave the later as the reference category. The results are shown in Figure A.6, where the left panel reports models with no controls and with only geographical covariates, and the right panel reports models with the full set of covariates and region FE. Although non-PCS Murdock borders are positively associated with borders in the bivariate specifications, this correlation is not robust to adding either geographic or all covariates. However, we caution that this specification is somewhat difficult to interpret because of the incongruity between our polygons and Murdock's.

Figure A.6: Correlates of African Borders with PCS Variables and Ethnic Borders



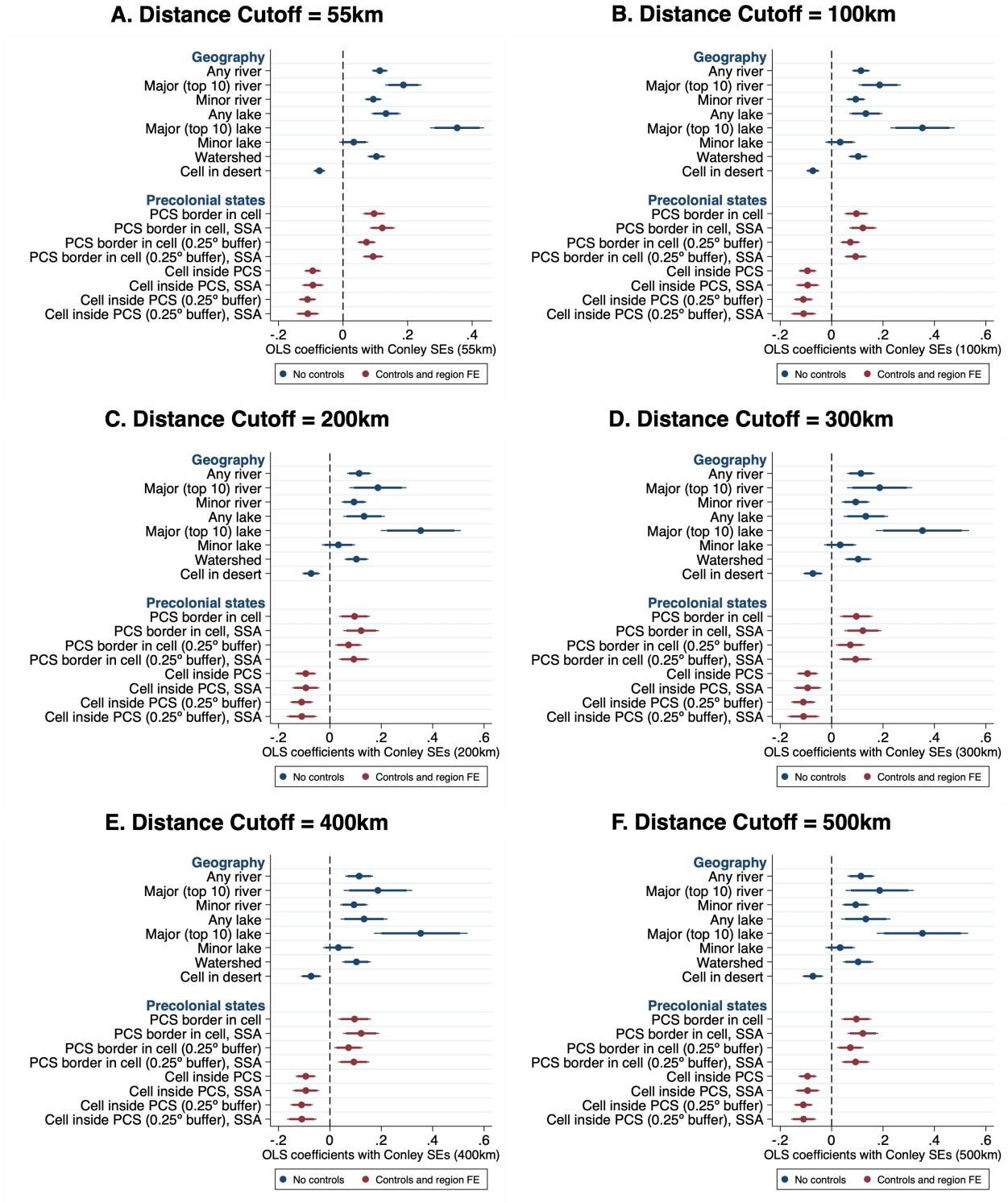
A.2.4 Spatial Dependence and Conley Standard Errors

Spatially proximate units may be highly correlated in their unobservables; but, as the distance increases, the correlation gradually dissipates. In our analysis, any cell proximate to a cell containing a country border is itself highly likely to contain a country border. Conley standard errors, which we use in all specifications, account for such spatial dependence. This method adjusts the variance-covariance matrix by incorporating information about the spatial distance between observations. To compute the variance-covariance matrix, the method uses a uniform kernel function to weight pairs of observations such that the weight equals 1 if two observations are within a specified distance threshold, and 0 otherwise. The kernel function thus distinguishes between observations that are near and those that are far. The choice of the cutoff distance affects the standard error estimates; in Appendix Figure A.7, we verify that our results are robust to various distance thresholds.

One assumption inherent to calculating Conley SEs that cannot, formally, be relaxed is uniform spatial dependence. That is, the covariance measure depends on distance but not direction. This assumption might be violated because our outcome and main explanatory variables are lines. For example, if a country border is horizontal in a cell, then the cells north and south of it are less likely to contain a border than cells west and east of it. We address this possibility in two ways.

First, if violations of uniform spatial dependence within a given radius have a significant impact, then standard error estimates should vary drastically upon varying the radius. However, as shown in Appendix Figure A.7, this is not the case. Our results are qualitatively unchanged for any distance cutoff ranging from 55km, capturing a single neighboring cell, up to 500km, which corresponds with large tracts of territory.

Figure A.7: Correlates of African Borders with Various Distance Cutoffs

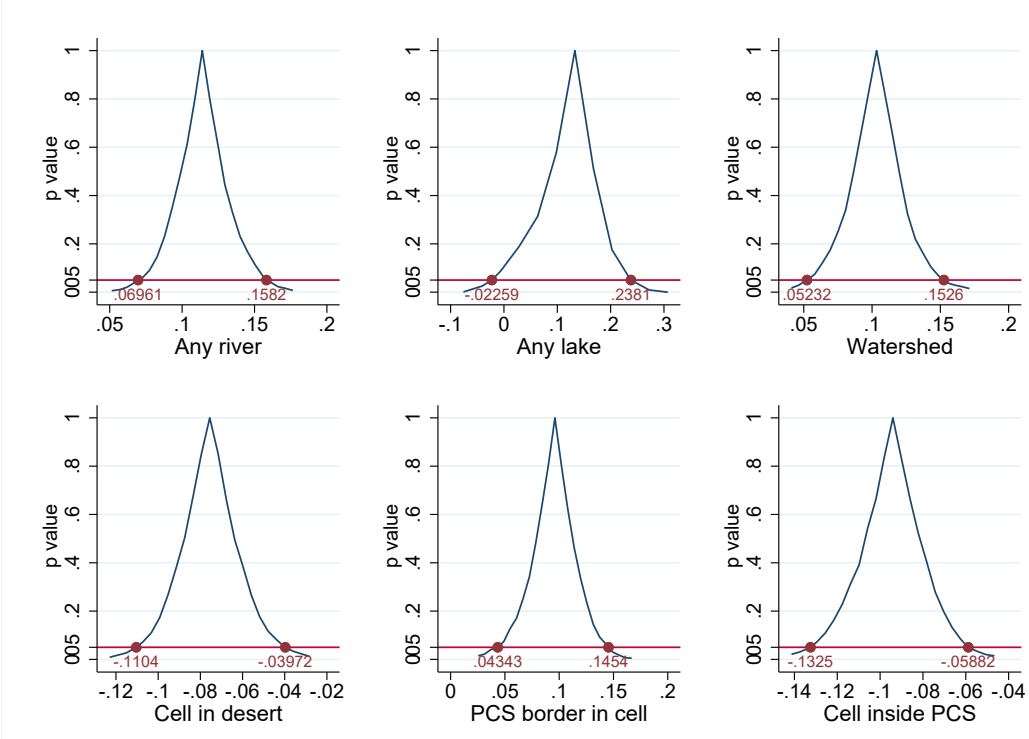


Notes: This figure presents a series of coefficient plots similar to Figure 6 but with varying distance cutoffs.

Second, in addition to Conley standard errors, we also cluster our observations by artificially-constructed rectangular regions, because neighboring cells may be related in many ways. Technically, the off-diagonals in the variance-covariance matrix are unlikely to be 0 for grid cells that are sufficiently near each other. We are conservative and create large clusters of roughly 10ºx10º (roughly 550 km at the equator). We compute standard errors using the wild bootstrap, a method designed "for regression models with heteroskedasticity of unknown form" (Roodman et al. 2019, 1) with a small number of large clusters, precisely our case here. This allows us to account for flexible forms of spatial correlations among neighboring cells not restricted by the uniform spatial dependence assumption.

Our results, reported in Figure A.8, present the "confidence set"[7] at the 95% level for each main explanatory variable in Figure 6. For example, our main model in Figure 6 yields an estimated coefficient of 0.10 for PCS border in cell. Table A.4 shows that 95% confidence set for PCS border in cell fall within the range of 0.07 to 0.16. The same is true for any river, watershed, cell in desert and cells inside PCS; any lake is the only variable with a wide 95% confidence set that hoovers just below 0. The results suggest that our main results are robust to alternative ways of modeling spatial dependence.

Figure A.8: Distribution of p-values Using Wild Cluster Bootstrapped Standard Errors



[7]The confidence set consists of all values of estimated coefficient for which the bootstrapped p-value for the test of the null is equal to or greater than 0.05.

A.2.5 Oster Bounds

We assess how likely it is that unobserved confounding variables account for the effect of pre-colonial states. Oster's (2019) test computes the share of variation that unobservables would need to explain, relative to the observables included in the model, in order to reduce the coefficient of interest to zero. This share is denoted by δ. For instance, $\delta = 2$ indicates that unobservables would need to be twice as important as observables for the coefficient to be zero (Oster 2019, 195).

The implementation of the Oster (2019) test requires specifying a value of R^2_{max}, which denotes the R^2 from a hypothetical regression that included both observed and unobserved controls. For example, $R^2_{max} = 1.5R^2$ means that including unobservables would increase the observed R^2 by 50%.

To bias against our results, and because our setting is observational, we use very large values of R^2_{max}: 1.5, 2, and 3 (Oster 2019 uses 1.3 in her article). That is, we assume that our R^2 could be up to three times as large due to unobserved confounders even though all models in Table A.5, just as in Figure 6, already include a battery of controls and region fixed effects.

Table A.5 shows that our main explanatory variables in Figure 6 (PCS border in cell and cell in PCS) are very robust to unobservables. We observe that $\delta > 1$ even when $R^2_{max} = 3 * R^2$.

We also calculate the bounds on the effect of each variable (β) on the likelihood of having a country border in that cell assuming $\delta = 1$ (that is, assuming that unobservables explain as much variation as observables). The range excludes 0 for all values of R^2_{max}. The two results convey the same idea: unobservables would need to be more than three times as important as observables for the effect of our main explanatory variables to become zero.

Table A.5: Assessing Possible Bias from Unobservables

PCS border in cell	$R^2_{max} = 1.5R^2$ $= 0.11$	$R^2_{max} = 2R^2$ $= 0.14$	$R^2_{max} = 3R^2$ $= 0.21$
δ (unobservables/observables)	5.00	2.71	1.41
Bounds on β (for $\delta = 1$)	(0.10, 0.09)	(0.10, 0.07)	(0.10, 0.04)
Cell in PCS	$R^2_{max} = 1.5R^2$ $= 0.10$	$R^2_{max} = 2R^2$ $= 0.14$	$R^2_{max} = 3R^2$ $= 0.21$
δ (unobservables/observables)	57.82	30.84	15.98
Bounds on β (for $\delta = 1$)	(-0.09, -0.10)	(-0.09, -0.11)	(-0.09, -0.13)

Notes: The bounds are (β, β'), where β is the effect estimated from the main regression model and β' is the effect with $\delta = 1$ and the R^2_{max} specified in the column. Bounds are calculated using the STATA package `psacalc` (Oster 2019).

A.3 Supporting Information for Ethnic Partition Regressions

We conducted supplementary regressions using ethnic groups as the unit of analysis. We also discuss the important shortcomings of using the Murdock data for assessing the relationship between precolonial states and ethnic partition.

A.3.1 Data and Results

Data. We largely follow Michalopoulos and Papaioannou's (2016) setup for assessing the correlates of ethnic partition. They identify partitioned groups using Murdock's Ethnolinguistic Map (1959), digitized by Nunn (2008), that describes and geo-locates ethnic groups in Africa at the time of European colonization. There are 825 ethnic homelands after dropping uninhabited areas and small islands. Given inevitable error in the Murdock-drawn "ethnic homeland" boundaries, they (and we) code as partitioned any group for which at least 10% of their territory falls into more than one country. We additionally coded, for each partitioned group, whether the border segment that split the group was primarily squiggly or a straight line (following the conceptual distinction in Alesina, Easterly and Matuszeski 2011).

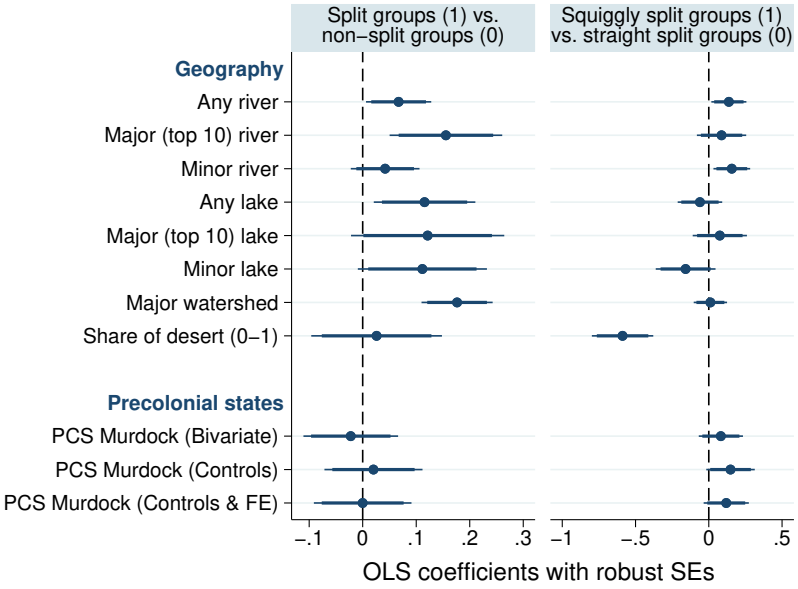
Our measure of precolonial states is based on Murdock's jurisdictional hierarchy variable and we refer to it as PCS MURDOCK. We count as a precolonial state any group that scores three levels or higher, which correspond with what Murdock labels as "states." Given our theoretical assessments, a binary variable is easier to interpret than the original ordinal measure used in the literature, although the patterns of significance are the same if we use the original ordinal measure (not reported). We do not anticipate differential rates of partition for polities with less developed hierarchies because the absence of reasonably credible traditional claims to rule a broad territory should prevent European colonizers from identifying focal points.

Rivers and lakes are possibly the most important geographic focal points because they are highly visible and fixed. We measure whether each ethnic homeland contains a TOP 10 RIVER, a MINOR RIVER, or ANY RIVER (Michalopoulos and Papaioannou's 2016 measure). Many international borders also involve segments of smaller rivers that are locally salient. We also measure whether an ethnic homeland contains a TOP 10 LAKE, a MINOR LAKE or ANY LAKE (Michalopoulos and Papaioannou's 2016 measure). Different measures allow us to capture rivers and lakes of varied importance and conduct a more comprehensive assessment of their role in border formation. To assess our theoretical expectations about border formation in areas lacking clear focal points, we include SHARE OF DESERT.

Results for geography. Figure A.9 presents a series of linear models examining the impact of physical and political geography on ethnic group partition. The left panel compares ethnic groups split across international borders with non-split groups. The right panel compares groups split by a squiggly border with those partitioned by a straight line. Across the entire sample, 229 of the 825 ethnic groups (28%) are partitioned across multiple countries. In 78% of the 229 split groups, a majority of the border is squiggly.

The top panel presents OLS estimates for geography. The regressions for major river (minor river) control for Minor (major) river, and likewise for lakes, to create more sensible comparison groups. All other geographic models are bivariate. Visible geographic focal points—rivers, lakes, and

Figure A.9: Correlates of Ethnic Partition



Notes: This figure summarizes a series of OLS estimates with explanatory variables in rows and the DVs in columns. It presents point estimates and both 95% and 90% confidence intervals calculated with robust standard errors. Left panel: 229 split groups and 596 non-split groups. Right panel: 178 squiggly-split groups and 51 straight-split groups. The top panel shows estimates for geographic variables. The disaggregated rivers and lakes regressions include controls for both major/minor. Other models in the top panel are bivariate. The bottom panel presents three estimates for precolonial states: bivariate, same set of control variables from the grid cell analysis, those plus region FE. Including agricultural intensity causes 53 observations to drop in the left panel and 6 observations in the right panel.

major watersheds—covary with an elevated likelihood of ethnic group partition, consistent with our theoretical expectations. Ethnic homelands containing a river or a lake are more likely to be partitioned: 31% of groups with any river in their territory were partitioned compared to 24% among groups lacking this feature, and the figures are similar for lakes (38% vs. 26%). The effect of river on partition is primarily driven by major rivers as opposed to minor ones: 40% of groups with a top 10 river were partitioned compared to 28% among groups with only minor rivers in their territory. Major watersheds affect the likelihood of partition: 39% of groups with a major watershed in their territory were partitioned compared to 22% among groups without a major watershed. Rivers also affect the *type* of partition. The presence of any river increases the likelihood of a squiggly split (80% versus 66% otherwise). Lakes, on the other hand, do not affect the type of split. Unlike inherently squiggly river borders, some international borders involving lakes follow the squiggly median line between shores (e.g., Lake Tanganyika) whereas others cut across the lakes with straight lines (e.g., Lake Victoria), leading to a null aggregate effect. Overall, the statistical results suggest that water bodies influenced border formation.

As expected, an ethnic group's percentage of desert area does not affect the likelihood of partition. However, a larger desert area increases the likelihood of ethnic partition via a straight-line border. These results are consistent with the expectation that European powers competed for better-quality land and drew borders more carefully in those areas while dividing territories haphazardly

in deserts, where there was a lack of both economic interests and focal points.

Results for precolonial states. The bottom panel of Figure A.9 shows results for PCS MURDOCK. We first present the bivariate result. Since PCS MURDOCK is endogenous, next we control for the same set of geographic and other covariates used in the grid cell analysis. Finally, we control for region fixed effect to compare groups within similar regions of Africa.

In our main analysis with grid cells, we demonstrate that precolonial states are less likely to be partitioned. We do not replicate this finding with Murdock ethnic groups. The coefficients for PCS MURDOCK on the left panel are close to 0 and insignificant. Furthermore, the raw magnitudes are small: 27% of groups with PCS MURDOCK=1 were partitioned compared to 29% with PCS MURDOCK=0. The coefficients on the right panel are positive but insignificant, suggesting that PCS MURDOCK may not affect the type of split.

A.3.2 Shortcomings of the Murdock Data

The Murdock data are too noisy to use for assessing the relationship between precolonial states and partition. This helps to account for why we find strong correlations in the paper using our data but null correlations using Murdock's. We offer two criticisms of Murdock: (1) Ethnic groups exhibit a conceptual mismatch with the spatial reach of historical states, and (2) Murdock's jurisdictional hierarchy variable exhibits considerable measurement error.

Table A.6: Partitioned Ethnic Groups with Precolonial States: Murdock

Murdock group	Country	Our assessment		Murdock group	Country	Our assessment
Delim	Western Sahara	Not a state		Regeibat	Mauritania	Not a state
Esa	Somalia	Not a state		Ronga	Mozambique	Not a state
Fon	Benin	Not partitioned (Dahomey)		Ruanda	Rwanda	Not partitioned
Gil	Morocco	Not a state		Rundi	Burundi	Not partitioned
Hamama	Tunisia	Not a state		Runga	Chad	Not a state
Hiechware	Botswana	Not a state		Songhai	Mali	Not a state
Imragen	Western Sahara	Not a state		Sotho	South Africa	Agree
Ishaak	Somalia	Not a state		Subia	Namibia	Not a state
Jerid	Tunisia	Not a state		Swazi	Swaziland	Agree
Kgatla	South Africa	Not a state		Tabwa	Congo DRC	Not a state
Mandara	Nigeria	Not a state		Tama	Sudan	Not a state
Manga	Niger	Not a state		Tienga	Nigeria	Not a state
Masalit	Sudan	Not a state		Tlokwa	South Africa	Not a state
Mashi	Zambia	Not a state		Tripolitanians	Libya	Not a state
Mpezeni	Zambia	Not a state		Tunisians	Tunisia	Not partitioned
Popp	Benin	Not a state		Wakura	Nigeria	Not a state

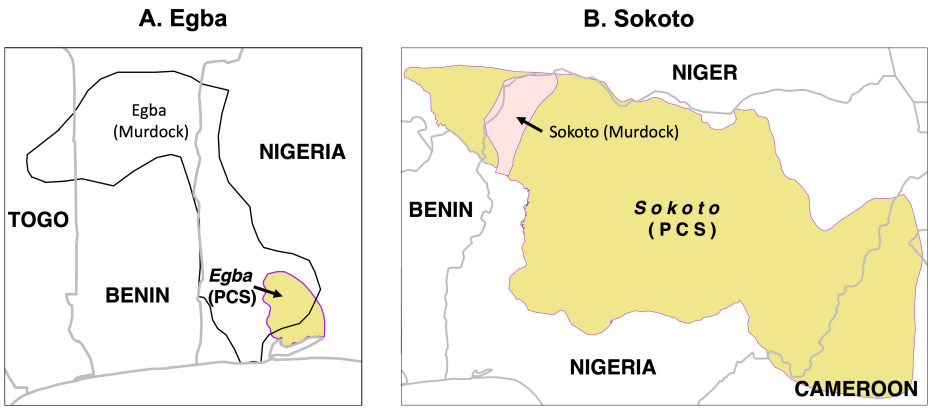
Notes: This table lists every ethnic group for which Murdock codes the ethnic group with a jurisdictional hierarchy score of 3 or above, and Michalopoulos and Papaioannou (2016) code the group as partitioned. The assignment to countries is from Michalopoulos and Papaioannou (2016).

To substantiate these points, in Table A.6, we sample every "positive-positive" case from the regressions presented above, that is, every case with PCS MURDOCK=1 and the ethnic group is partitioned according to the criterion in Michalopoulos and Papaioannou (2016). For only two of the

32 cases do we find evidence that members of the ethnic group indeed created centralized political institutions *and* the core area of the historical state was partitioned across international borders. To make this assessment, we first compare the Murdock groups with high jurisdictional hierarchy scores to the list of states from our coding exercise. We conclude that 26 of these ethnic groups did not belong to historical states. Among the groups that belonged to precolonial states, we then assessed that only two of the six corresponding states were partitioned in the sense of core areas of the state were divided across colonial borders (based on the data and historical information we compiled on PCS). Thus, the large number of positive-positive cases that drive the null findings for precolonial states and ethnic partition almost entirely reflect noise.

To further highlight the conceptual mismatch between ethnic groups and states, amid more general concerns about measurement error in Murdock's polygons, we present two examples. In Panel A of Figure A.10, we present the Murdock polygon for Egba in white and ours in yellow. As we discuss in Appendix B.2, we incorporate the historical state governed by the Alake of Egba; as we note, if anything, our polygon is too big. But Murdock instead measures the location of members of ethnic groups, which he suggests is much larger—hence yielding a false positive if the goal is to assess whether the historical state was partitioned. There are two other problems with the Murdock in this case, as well. First, Murdock codes Egba as two levels of political hierarchy above the village level, that is, a paramount chieftaincy rather than a state. However, historical sources argue that Egba was the most powerful state to emerge in Yorubaland following the collapse of the Oyo Empire early in the nineteenth century (see Appendix B.2). Second, Murdock's Egba polygon is undoubtedly too large even given the goal of measuring ethnic groups (see the map in Forde 1951).

Figure A.10: Comparing Murdock Polygons



In Panel B, we examine the Sokoto Caliphate. In this case, our polygon is much bigger, and corresponds with the extent of the historical state. This is an odd entry in Murdock. The Sokoto Caliphate was governed by ethnic Fulani, and many of the new emirates displaced historical Hausa states. Sokoto was a state, not an ethnic group, and thus should not appear in his data set at all. Further, his Sokoto polygon corresponds roughly with the Sokoto emirate only, not the entire empire. Finally, and strangely, Murdock incorrectly codes Sokoto as exhibiting only one level of hierarchy above the village level. In sum, in both this and the Egba case, even if we correct the jurisdictional hierarchy score, the Murdock polygon is simply too inaccurate for empirical purposes.

A.4 Supporting Information for Bilateral-Border Analysis

We present a case study for all 107 bilateral borders in Africa in Appendix C. We use the information from these case studies to code three original variables: (a) the year of initial border formation and all years with subsequent major revisions, (b) the primary and secondary physical features of each border, and (c) causal process observations that assess whether a historical political frontier affected the border. We discussed the first variable in Section 2, and we provide coding rules for the latter two in Section A.4.1. These case studies also provide narratives to understand the macro- and meso-level elements of border formation, in addition to micro-level features of the border. We provide regional overviews of these broader factors in Section A.4.2. Finally, in Section A.4.3, we provide summaries for all twenty-nine PCS that we code as directly affecting a border.

A.4.1 Sources and Coding Rules

Our main general sources are Hertslet (1909) and Brownlie (1979). The first, published by the British War Office in 1909, contains text for every inter-European treaty and every intra-British arrangement, through the mid-1900s. Brownlie (1979) also contains passages from many of these treaties; the value-added of this encyclopedia relative to Hertslet (1909) is to provide information on (a) events occurring after 1909, (b) intraimperial borders within the French empire (although we also consulted numerous additional French-language sources), and (c) the actual alignment and delimitation of borders (for which we also consulted Google Maps). Wesseling (1996) provides a detailed history of the period and McEwen (1971) provides detailed information on bilateral borders in East Africa. We consulted over 100 additional sources, cited throughout Appendix C, that provide more detailed histories of specific empires, regions, colonies, and historical states.

We assess the physical features that comprise each border. The most common features are rivers, lakes, watersheds,[8] mountains, and straight lines (both parallels/meridians and non-astronomical). For each bilateral border, we identify one or two features that are primary in the sense of constituting the plurality (and usually the majority) of the length of the border. In some cases, this is obvious. For example, the Zambia–Zimbabwe border consists entirely of the Zambezi River. In Botswana–Namibia, there are two primary features, but these are also unambiguous: parallel and meridian lines comprise the entire east-west border, the Zambezi River determines the entire north-south border, and both segments of the border are roughly equal in length. Other cases lack an obvious primary feature(s) and we make a more subjective assessment based on the length of the different features, the frequency with which the treaty documents mention different features, and historical context (usually putting more weight on features that were discussed earlier by European statesmen as more important). Secondary features are ones that comprise smaller segments of the border.

We also code causal process observations (CPO) for the effect of historical political frontiers (HPF). According to Collier (2011), a CPO is distinct from a standard entry in a data set (e.g., to use in regression analysis) because a CPO is an assessment about the causal *process*, rather than a descriptive fact. Thus, by asserting that a HPF directly affected a border, we make a counterfactual claim that the border would likely have been located elsewhere were it not for the presence

[8] Sometimes called watershed boundaries or drainage divides, these are land ridges that separate water flowing into different rivers.

of the HPF. Our standards for making such an assessment are that local agents were actively involved in the negotiations about the border and/or the foundational documents for the borders explicitly mentioned the particular historical political frontier. By incorporating information from both the treaties themselves and the assessments of historians, we uncover substantial amounts of information about this causal process. Many HPF that we identify as directly affecting borders are precolonial African states (PCS). We have a denominator for this type of HPF because of our quantitative data set. This enables us to discuss PCS that we *do not* code as affecting borders in the case studies. Other HPF include white settlements (mainly in southern Africa); Ottoman territories in North Africa; Liberia; and Africans who lived either in decentralized polities or more state-like ones that, for various reasons, are not included as PCS in our quantitative data set. We coded a separate category of indirect effect for cases in which Europeans competed over a particular historical state but we lack direct evidence that this competition ultimately affected the border in any discernible way (e.g., territory allotted to the Sultan of Zanzibar along the coast of East Africa), or a border alteration was derivative to an HPF-affected border revision elsewhere. For example, when Europeans deemed that Barotseland (PCS) was larger than previously assessed, a substantial amount of territory was transferred from Angola to Northern Rhodesia (Zambia), which in turn affected each of their borders with German South West Africa (Namibia).

A.4.2 Region-by-Region Summaries

North East Africa and the Nile. Competition over the Nile River was the main macro-level factor that shaped borders in the region construed broadly as North East Africa, stretching from Egypt to the northern limits of the DRC and Uganda and, in the east, to the Horn of Africa. The key meso-level objects of contention were precolonial states (Egypt, its historical dependency of Sudan, the Mahdist state, Ethiopia, Darfur, and Wadai) and the Nile Valley. Ironically, the Nile itself ultimately played a minimal role as a micro-level border feature because Britain eventually monopolized control over the Nile Valley.

In 1882, plans for joint British-French rule over Egypt fell through and Britain gained sole control over Egypt. Subsequently, France's challenges to British suzerainty over the Nile and actions by militarily powerful African states shaped territorial claims. Britain could not occupy Sudan, Egypt's historical dependency located farther up the Nile, because of the rise of the Mahdist state. To create a buffer against French expansion, Britain supported Italian paramountcy over the Horn of Africa (including over Ethiopia) and territorial expansion by the Congo Free State along the Nile. In response, France blocked much of Leopold's dream of controlling the Nile in 1894; and supported the Emperor of Ethiopia, who militarily defeated Italy in 1896. Ethiopia's victory forced Europeans to reconsider their territorial claims throughout the Horn and removed a key barrier against France marching to the Nile. After Britain militarily defeated the Mahdist state in 1898, advancing British and French troops met at Fashoda, a town along the Nile. France backed down, which resulted in the settlement of Anglo-French borders throughout Africa.

North Africa. Proximity to southern Europe, combined with declining Ottoman control, were the macro-level factors that shaped European involvement in North Africa. France became the dominant European power in coastal North Africa and the Sahara, although Spain and Italy were also present in the region.

Historical political frontiers were a key meso-level feature that affected spheres of influence in the coastal regions: PCS Morocco, PCS Tunisia (nominally Ottoman), and Ottoman Tripoli. Farther south, the Sahara Desert was the most important meso-level feature. All these states stretched into the desert; however, even when powers claimed limits on the basis of historical states, these frontiers were more inherently ambiguous in desert areas. Because of the vast desert territory in North Africa, borders in this region consist primarily of straight lines. Yet even in the desert, the micro-level border lines are less arbitrary than commonly assumed. The location of straight-line borders was often affected by the presence of streams (wadis, *oueds*), wells, and caravan routes. These local features mattered greatly for Africans on the ground. French administrators took into account the homelands of nomadic groups, notably the Tuareg, to determine the location of intraimperial borders. In general, "the [French] colonial logic was to preserve the old limits in order to manage the conquered territories more easily [...] Lines replaced zones, but these zones were effectively old borders."[9] In fact, "This colonial appropriation of borders was so strong that it ended up making the military and colonial administrators, as well as the societies concerned themselves, forget that their origin was most often local, regional and negotiated with the populations and the political authorities."[10]

West Africa. From Senegal to Nigeria, Europeans had extensively traded with coastal West Africans; until the nineteenth century, most notoriously in slaves. Precolonial states such as Asante, Dahomey, and Yoruba polities intimately shaped both slaving and legitimate commerce. Four European powers (Britain, France, Portugal, Germany)[11] and Liberia competed to secure preferential trading arrangements. This macro-level competition resulted in control over various natural harbors and historical trading posts (see Figure A.2). Consequently, West African states tend to be smaller and narrower than elsewhere.

Political and economic geography along the coast shaped only the broad contours of West African colonies. Precolonial states and rivers were meso-level objects of interest that shaped micro-level border formation. Throughout the region, Europeans signed treaties with local rulers to establish their claims on the coast and farther inland. For example, Britain and France competed to control the Niger River. British agents from the Royal Niger Company secured treaties throughout modern-day Nigeria. These actions led to disputes with France about the limits of the Sokoto Caliphate and Borgu states, which affected the borders with Niger and Benin, respectively. Elsewhere, states such as Futa Jalon, Samori's empire, and Ouagadougou (Mossi) determined the limits of French claims as they expanded west from their long-standing stronghold at the mouth of the Senegal River. As France militarily defeated these groups, they also used their frontiers to guide intra-French colonial borders. As in North Africa, French administrators intensely gathered information about their territories to determine internal administrative frontiers that would minimize costs of administration, which required incorporating local political and economic realities.

Equatorial Africa. At the macro level, European competition to control the Congo and its basin resulted in the Berlin Congo Conference of 1884–85, following exaggerated claims of potential

[9] Boilley 2019, 4.

[10] Lefèbvre 2015.

[11] This excludes powers, such as the Dutch, who had relinquished their claims earlier in the nineteenth century.

wealth by famous explorers such as Henry Morton Stanley and Pierre Savorgnan de Brazza. The Congo Free State gained immense territorial in Equatorial and Central Africa as a result of complicated jockeying among the major powers and their respective desires for a neutral buffer state. In total, six European powers (Britain, France, King Leopold/Belgium, Germany, Portugal, Spain) occupied territory in Equatorial Africa and the Congo region, spanning from Cameroon in the northwest to the southeastern frontiers of the Congo Free State.

The Congo and its watershed affected borders not only at the macro level, but also the meso level (circumscribing the frontiers of the Congo Free State) and micro level (specific segments of the Congo Free State's borders). Other major rivers, such as the Ubangi and Kasai, also mattered at the meso and micro levels. Precolonial states were less important than elsewhere simply because much of the region lacked states in the 1800s, although various PCS along the Cameroon–Nigeria border and on the southern frontiers of the Congo Free State were important meso-level objects of contention. Early treaties secured by the French explorer Brazza with local-level rulers (not coded as PCS) were also used to settle territorial claims with German Kamerun.

East Africa. Europeans had little interaction with East Africa until the 1880s. The dominant non-European power in the region to this point was the Sultanate of Zanzibar. Britain had established treaty relations with the sultan in the 1860s, which Germany challenged in the 1880s. Early borders along the coast reflected these macro-level factors; in fact, the Sultan was granted a long stretch of territory along the coast, although later border revisions erased this frontier. Beyond the coast, borders in East Africa also reflect macro-level competition over the eastern frontier of the Congo Free State and British efforts to expand northward from their territories in Southern Africa.

Precolonial states and major lakes were the meso-level factors that determined most non-coastal borders. Buganda, located along Lake Victoria, was the territorial core of British Uganda; and Bunyoro and Nkore rounded out British claims vis-à-vis the Congo Free State and Germany. Rwanda and Burundi, clustered along Lakes Kivu and Tanganyika, were administered differently than the rest of German East Africa, and later separated as their own colony under Belgian rule. Other Great Lakes, including Albert, Edward, Malawi, and Tanganyika are each primary features of a border, and Lake Turkana was previously the primary component of the Kenya–Uganda border. Europeans sought access to these lakes to stimulate trade. This is exemplified by Britain's failed attempts to access to Lake Tanganyika from the north via a narrow corridor between the Congo Free State and German East Africa; hence complementing gains by the British South Africa Company to access Lake Tanganyika from the south.

Southern Africa. Three European powers shaped the macro dynamics of border formation in southern Africa. Britain was the main power in the region, dating back to its conquest of Cape Town in the early nineteenth century. From this port city, British and Boer settlers expanded in a northwest direction throughout modern-day South Africa. Portugal had long-standing territorial claims along the east and west coasts, including a relatively concrete claim to Delagoa Bay (modern-day Maputo Bay). Germany entered the region later, in 1884, and annexed parts of South West Africa not previously claimed by Cape Colony or Portugal. Early claims were largely confined to the coasts, although white settlers had moved farther north. In the late 1880s, Britain and Portugal began to compete for interior territory in Central Africa, with Britain ultimately gaining

control over much of the disputed territory.

Throughout the region, precolonial states, frontiers of white settlement, and major water bodies often determined precisely or at least roughly where a power's claims ended. Therefore, these local features constituted the main meso-level objects of contention. As white settlers expanded throughout modern-day South Africa, they came into contact with traditional Sotho, Swazi, and Zulu states. The former two states lost territory to Europeans, but African agency in the form of strategic alliances with Britain secured their status as colonies distinct from white-controlled states. The Zulu were militarily defeated, but their homeland rounded out territories claimed by Britain vis-à-vis Portugal. This territory was of strategic interest to Britain to block the Boer republics from gaining access to the sea. When Britain (and its main agent, Cecil Rhodes' British South Africa Company; BSAC) sought to expand farther north, alliances with the Tswana, Ndebele, and Lozi were pivotal for blocking Boer and Portuguese expansion.[12] These rulers were not duped into treaties they did not understand. Instead, given threats posed by other African states and by Boer expansion, they strategically sought to ally with Britain to secure their territory; although the Ndebele were later defeated militarily by BSAC. Opportunities for white settlement shaped not only the frontiers of South Africa, but also expansion into Zimbabwe (via BSAC) and Britain's claim to Malawi (missionaries in the Shire Highlands). Major water bodies often shaped the frontiers of these settlements, including the Orange and Limpopo Rivers in South Africa and Lake Malawi in Malawi. Britain, Portugal, and Germany each sought access to the Zambezi River, which shaped both inter- and intraimperial borders.

Table A.7: African bilateral borders: region-by-region

Region	**# borders**	**HPF (direct effect)**		**Water body*** **(primary feature)**		**Straight line (primary feature)**		**Border formation (median year)**	
		Any	*PCS*	*Any*	*Major*	*Any*	*Lat/long*	*First*	*Final*
Northeast	17	76%	59%	35%	18%	59%	24%	1897	1908
North	14	64%	36%	7%	0%	79%	36%	1905	1916
West	27	63%	48%	74%	7%	22%	19%	1895	1911
Equatorial	17	24%	24%	82%	29%	18%	12%	1886	1919
East	14	64%	57%	93%	50%	14%	0%	1890	1910
Southern	18	67%	39%	94%	50%	44%	22%	1890	1891
Total**	**107**	**60%**	**44%**	**66%**	**24%**	**37%**	**19%**	**1891**	**1906**

*Includes watersheds as derivatives of water bodies.

**Tallies can exceed 100% because some borders are coding as having water bodies and straight lines as co-primary features.

[12]Of these, only the Tswana are not included as a PCS in our data set because they lack a discernible polygon for us to digitize. BSAC also secured a treaty with the Gaza, but London blocked annexation in support of long-standing Portuguese territorial claims.

A.4.3 Summarizing PCS and Direct Effects on Borders

- **Asante:** Britain fought wars with the Asante empire throughout the nineteenth century. The British Gold Coast was explicitly divided from French territories to incorporate Asante within British territory. See Ghana–Ivory Coast.
- **Borgu:** France challenged Britain's suzerainty over Borgu territory. The "Race for Nikki" in 1894 and consequent interactions with African rulers made clear that Borgu consisted of distinct states. In 1898, they settled by dividing Bussa (Britain) and Nikki (France). See Benin–Nigeria.
- **Borno:** Following the collapse of its traditional ruling dynasty in the 1890s, Borno was originally divided between Nigeria and Cameroon. During WWI, the restored Shehu of Borno aided the British war effort. Afterwards, Britain set the borders of Northern Cameroons (governed as part of Northern Nigeria) to incorporate Borno, which officially joined Nigeria at independence. See Cameroon–Nigeria.
- **Buganda:** Britain's treaty with the *Kabaka* of Buganda was the foundational document in Britain's establishment of the Uganda Protectorate and its initial borders. Treaties with the rulers of **Bunyoro** and **Nkore** rounded out British claims in southwest Uganda. The distinctiveness of Buganda from coastal areas and lobbying by PCS elites were cited by British officials as crucial considerations for not merging Uganda into Kenya. See Tanzania–Uganda and Kenya–Uganda.
- **Dagomba:** Dagomba was originally divided between Gold Coast and Togoland. After WWI and lobbying by the Ya Na against the partition, Britain set the borders of British Togoland (governed as part of the Gold Coast) to incorporate Dagomba, which officially joined Ghana at independence. See Ghana–Togo.
- **Dahomey and Egba:** France contested Britain's control over Yorubaland; after the collapse of the Oyo Empire, no African ruler controlled the entire region. They settled in 1889 with Britain controlling Egba (the western-most major Yoruba state) and Britain recognizing French control over Dahomey. See Benin–Nigeria.
- **Darfur and Wadai:** Britain and France contested the Darfur/Wadai boundary. The Sultan of Darfur pressed for expansive territorial limits and used his army (which Britain had not disbanded) to fight France over contested claims. In 1919, the powers settled dividing the disputed petty sultanates. See Chad–Sudan.
- **Egypt:** Britain's conquest of the nominally Ottoman province of Egypt was key to its claims over the Nile Valley, the driving macro-level factor that influenced borders throughout this region. Britain explicitly aimed to recreate frontiers of Egypt and Egyptian-controlled Sudan when determining the borders for both colonies. See Egypt–Sudan.
- **Ethiopia:** Ethiopia expanded its empire throughout the 1890s and militarily defeated Italy's attempt at colonization in 1896. Ethiopia gained recognition of its expanded frontiers from multiple European powers, reversing their earlier dismissals of the emperor's territorial claims. See all the Ethiopia entries, especially Eritrea–Ethiopia.

- **Futa Jalon:** France's 1881 treaty with Futa Jalon secured its control over western Guinea from competing British and Portuguese claims; see Guinea–Guinea-Bissau. After France militarily defeated the state, its frontiers became internal administrative borders; see Guinea–Mali.
- **Gaza:** The ruler of Gaza signed a treaty with the British South Africa Company to obtain guns. London rejected this treaty to pacify Portuguese claims, which were used to split Mozambique from Southern Rhodesia. See Mozambique–Zimbabwe.
- **Lozi:** The Lozi king sought a British alliance to protect against attacks by the Ndebele. Portugal agreed that Lozi lay within the British domain, but the two powers disagreed about its limits. International arbitration over this question yielded a major border revision in 1905. See Angola–Zambia.
- **Lunda and Kazembe:** The Congo Free State (CFS) thwarted other European powers to establish military control over the collapsing Lunda state, and Britain gained a treaty with Kazembe. A major border revision in 1894 divided CFS from the British sphere along the frontiers between these states. See Congo (Bel.)–Zambia.
- **Morocco:** Following the Agadir crisis with Germany in 1911, the core areas of the PCS Morocco were incorporated into the French sphere. However, successive Sultans of Morocco have argued for expansive historical territorial limits that spanned into Spanish (Western) Sahara. See Morocco–Western Sahara.
- **Mossi:** France's military occupation of Ouagadougou and other Mossi states thwarted competing British and German claims; see Burkina Faso–Ghana. The distinctiveness of the Mossi and their strategic alliance with France helps explain why the French created the Mossi-dominated colony of Upper Volta; see Burkina Faso–Mali.
- **Ndebele:** British control over the feared Ndebele state provided the territorial platform for northern expansion into present-day Zimbabwe. Settling the contested frontier between the Ndebele and the Bamangwato* (a Tswana group who sent a deputation to London in 1895 to lobby against a proposed transfer from crown rule to the BSAC) formed the basis of the Botswana–Zimbabwe border. See Botswana–Zimbabwe.
- **Porto Novo:** France's treaty with the coastal state of Porto Novo was explicitly used to separate its territory from British Lagos. See Benin–Nigeria.
- **Rwanda and Burundi:** The original CFS borders incorporated part of Rwanda. Germany challenged this border and established military control in Ruanda-Urundi. An official border settlement in 1910 recognized German control; see Congo (Bel.)–Rwanda. After WWI, German East Africa was separated into Belgian (Ruanda-Urundi) and British (Tanganyika) mandates. The original border would have partitioned Rwanda to facilitate a British railroad, but lobbying (including by the Rwandan mwami) yielded a revision; see Rwanda–Tanzania. In the 1960s, lobbying by elites from each country at the United Nations yielded separate independence for Rwanda and Burundi; see Burundi–Rwanda.
- **Sokoto:** France accepted British suzerainty over the Sokoto Caliphate, but contested the limits of the Caliphate. This contention had historical basis, as African leaders continually

fought against the expanding Caliphate. After several unsatisfactory borders, they settled in 1904 with France gaining control over smaller polities to to the north (Damagaram, Gobir) not controlled by Sokoto. See Niger–Nigeria.

- **Sotho:** The Sotho state allied with the British against Boer incursions. The Sotho ruler participated in various boundary agreements between the 1840s and 1860s that established the contemporary frontiers. Later, lobbying by Sotho leaders (deputations to London, petitions) influenced the decision to not incorporate Lesotho into the Union of South Africa. See Lesotho–South Africa.
- **Swazi:** The Swazi state allied with whites to guard against the Zulu and to prevent wars that could have dismantled the kingdom. The Swazi ruler participated in various boundary agreements, although it lost parts of its claimed territory. Later, lobbying by Swazi leaders influenced the decision to not incorporate Swaziland into the Union of South Africa. See South Africa–Swaziland and Mozambique–Swaziland.
- **Tunis:** France's conquest of the nominally Ottoman province of Tunis established its paramountcy in North Africa, and explicitly used Tunisia's historical frontiers to set colonial borders. See Algeria–Tunisia.
- **Zulu:** Britain fought wars with the Zulu throughout the nineteenth century. At the end of the century, it annexed Zulu territory to block Boer republics from gaining access to the sea, which also split British and Portuguese claims. See Mozambique–South Africa.