Supporting Information

Continuity or Change?
(In)direct Rule in British and French Colonial Africa

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A1 Data

This appendix provides an overview over the data collected for the analyses of indirect rule in British and French colonies presented in the main text. Subsection A1.1 presents the data on precolonial polities and their lines of succession digitized from the encyclopedia of 'African States and Rulers' compiled by Stewart (2006). Subsection A1.2 presents the newly collected data on districts in British and French colonies and Subsection A1.3 presents data on the budgets of native treasuries in four British colonies. Finally, Subsection A1.4 briefly summarizes the correlations between the four main proxies of indirect rule in British colonies: the size of districts, the number of British administrators, the size of native treasuries, and the class of chiefs in Nigeria.

A1.1 Precolonial polities

Table A1: Summary of data on lines of succesion

Statistic	N	Mean	St. Dev.	Min	Max
British rule	5237	0.787	0.409	0	1
French rule	5237	0.213	0.409	0	1
Year	5237	1923.307	22.528	1830	2006
Population (log)	5208	3.736	1.498	0.000	7.769
Distance to coast (log)	5208	5.506	1.828	0.355	7.397
Distance to nav. river (log)	5208	4.637	1.451	−0.223	7.724
Polity age (log)	5237	5.573	0.752	2.197	7.096
Dependence on agriculture	5016	1.913	1.376	0	8
Dependence on husbandry	5016	5.644	2.380	0	9
Intensity of agriculture	4792	2.096	0.980	0	4
Precol. centralization	4790	1.882	1.095	0	4
Altitude (median)	5208	500.653	430.092	5	1745
Slope (median)	5208	3.978	1.607	1	9
Temperature (mean)	5208	25.072	3.679	14.590	29.860
Evapotranspiration	5208	1732.141	334.175	1133	2347
Precipitation	5208	974.456	491.265	16	3006
Evapotransp. / precipitation	5208	3.858	1.337	1	7
Suitability for agr.	4902	0.333	0.210	0.001	0.785
Cash crop suitability	5208	0.351	0.162	0.000	0.863

Table A1 summarizes the data on precolonial polities digitized from the encyclopedia on 'African States and Rulers' compiled by Stewart (2006) and the covariates attributed to them. The map in Figure A1 shows the spatial distribution of the polities' capitals. Table A5 at the end of this section contains the name and capital of each polity in the sample, its date of colonization by the British or the French, as well as the polity's last year in the sample, determined either by the end of its line of succession or the independence of the colony its capital is located in.

In addition to providing these summaries, this section aims to test the possibility

that the *observation* of polities by Stewart (2006) is biased, in particular by potential effects of precolonial centralization and the colonizing power on the probability of observing more (or less) polities in a certain area. As throughout the paper, the analysis is limited towards polities that were colonized by either the French or the British empire. I analyze the quality of information on precolonial polities in three ways:

First, since Stewart (2006) gives a short account of the history of polities, we can systematically assess the information available for each state. For each polity that was ever colonized, I thus code the simple length of the historical account in characters. Table A2 reports the results of simple linear models of the logged number of characters on a 'British' rule dummy, the level of precolonial centralization of the (last) capital of a polity, and additional controls. The results show that Stewart does not give more detailed accounts of polities that were colonized by the British than by the French. Not surprisingly, the grand kingdoms, those polities located in highly centralized areas, are described in more detail.

The second approach is based on Murdock's (1967) ethnic settlement areas and takes the colony-ethnic polygon as the unit of analysis. For each polygon, I count

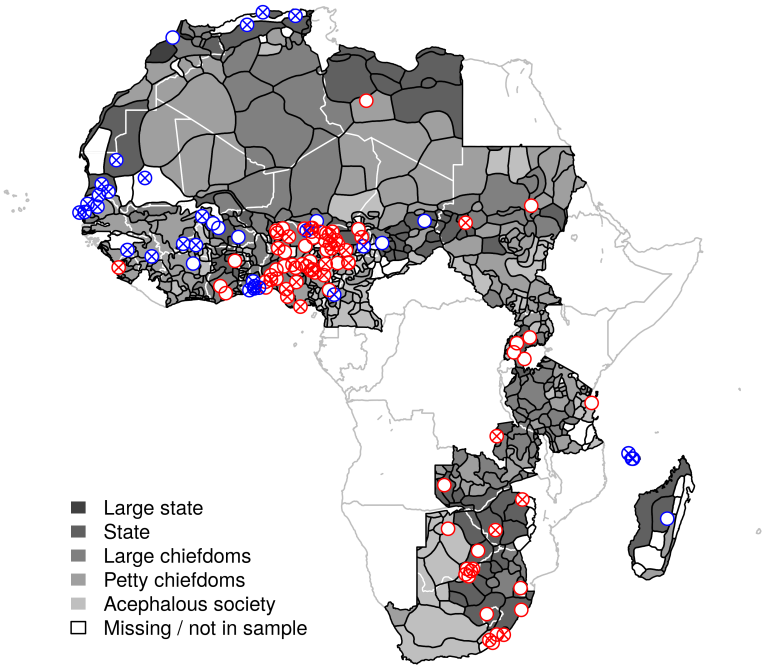


Figure A1: Polities colonized by the French or British empire in Africa.
The capitals of polities colonized by the French (British) are drawn in blue (red). Precolonial polities with lines of succession that ended before the end of the colonial period are marked with a cross.

Table A2: Information per polity

	log(Characters of historical account)		
	(1)	(2)	(3)
British colony	0.225	0.081	0.164
	(0.167)	(0.200)	(0.214)
Precol. centralization	0.303***	0.265***	0.255**
	(0.076)	(0.079)	(0.099)
Population/km^2 (1880; log)	0.037	0.055	0.020
	(0.047)	(0.117)	(0.120)
Distance to coast (log)	0.017	−0.013	
	(0.055)	(0.064)	
Distance to river (log)			−0.026
			(0.070)
Nature controls:	no	yes	yes
Ethnic controls:	no	no	yes
Mean DV	6.26	6.25	6.25
F-Stat:	8.85	3.81	3.21
Observations	104	100	100
Adjusted R^2	0.276	0.270	0.263

Notes: OLS models. Robust standard errors in parenthesis. Nature controls. consist of median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls consist of the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01

the number of years that polygon has featured a polity in all year before 1885. This count comes in three flavors: the first counts every unique polity-year. The second counts every year only once, even if there are multiple polities in the same settlement area. The third adds to that a simple discount rate of 5 percent per year, so as to not overweight long-lasting empires such as Bornu in Northern Nigeria. Lastly, a simple dummy encodes whether there has ever been a polity observed by Stewart in a particular polygon.

None these four variables is significantly related to British colonization (see Table A3). Highlighting the overlap between the polity data and Murdock's Ethnographic Atlas, the degree of precolonial centralization is highly correlated with the number of years an ethnic group is associated with a precolonial polity – no matter how the latter value is constructed. For example, Model 3 suggests that moving from an acephalous ethnic group to a centralized one (precolonial centralization = 3) adds 85 more 'state-years.' Figure A2 furthermore shows, that this relationship is non-linear and strongest for the highest degrees of precolonial statehood as coded by Murdock.

Table A3: Observed polity-history per ethnic group: Difference between French and British colonizers

	Years of precolonial data:			
	P(any year)	discounted	unique	all
	(1)	(2)	(3)	(4)
British colony	0.019	3.668	11.697	24.158
	(0.024)	(3.216)	(21.714)	(37.904)
Precol. centralization	0.057***	8.734***	28.901***	32.775**
	(0.011)	(1.383)	(9.339)	(16.303)
Population/km^2 (1880; log)	0.098***	12.420***	66.799***	105.719***
	(0.012)	(1.604)	(10.833)	(18.910)
Distance to coast (log)	0.012	0.347	14.279	26.332
	(0.014)	(1.829)	(12.347)	(21.554)
Distance to river (log)	−0.004	−1.238	−15.022*	−23.464*
	(0.009)	(1.193)	(8.056)	(14.063)
Area (km^2, log)	0.062***	7.240***	32.662***	47.822***
	(0.006)	(0.852)	(5.756)	(10.049)
Ethnic controls:	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes
Mean DV	0.12	12.98	47.95	63.87
F-Stat:	13.94	12.5	7.66	5.94
Observations	893	893	893	893
Adjusted R^2	0.198	0.180	0.113	0.086

Notes: OLS models. Robust standard errors in parenthesis. Nature controls consist of median. altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls consist of the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01

This underlines the quality of the data.

The third analysis (Table A4) builds on this approach, only exchanging the ethnic polygons with a simple raster of a resolution of 0.417 by 0.417 decimal degrees. The results underline the weak relationship between British rule and information on precolonial polities provided by Stewart: none of the counts of polity-years is significantly correlated with the British rule dummy. In contrast, the pattern that the Murdock coding of precolonial centralization is a significant correlate of Stewart's polity data is also prevalent when using raster cells as the units of analysis.

Table A4: Observed polity-history per raster cell

	Years of precolonial data:			
	P(any year)	discounted	unique	all
	(1)	(2)	(3)	(4)
British colony	0.003	0.151	−0.852	−0.438
	(0.003)	(0.374)	(1.700)	(2.009)
Precol. centralization	0.007***	0.773***	1.793**	1.876**
	(0.002)	(0.165)	(0.752)	(0.889)
Population/km^2 (1880; log)	0.039***	3.187***	15.335***	17.780***
	(0.002)	(0.191)	(0.868)	(1.025)
Distance to coast (log)	0.004**	0.072	0.212	0.376
	(0.002)	(0.196)	(0.889)	(1.051)
Distance to river (log)	−0.001	0.116	−1.312**	−1.729**
	(0.001)	(0.135)	(0.614)	(0.725)
Ethnic controls:	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes
Mean DV	0.02	1.41	5.16	5.62
F-Stat:	50.3	30.07	30.19	29.07
Observations	9,692	9,692	9,692	9,692
Adjusted R^2	0.075	0.046	0.046	0.044

Notes: OLS models. Robust standard errors in parenthesis. Nature controls consist of median. altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls consist of the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01

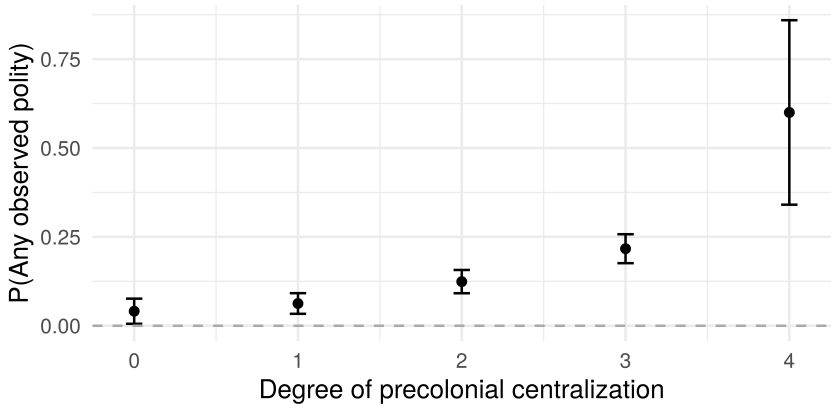


Figure A2: Probability of an ethnic group featuring a precolonial state as coded by Stewart (2006) by level of precolonial centralization.

Table A5: Polities colonized by France or Great Britain

Polity	Capital	Colonizer	Colonized in	End year
Abeokuta	Abeokuta	Great Britain	1893	1960 (I)
Abuja	Abuja	Great Britain	1902	1960 (I)
Adamawa	Yola	Great Britain	1901	1953 (E)
Adrar	Atar	France	1909	1932 (E)
Agaie	Agaie	Great Britain	1908	1953 (E)
Akim	Nsauoen	Great Britain	1899	1957 (I)
Algiers	Algiers	France	1830	1830 (E)
Allada	Allada	France	1894	1923 (E)
Andruna	Moroni [approx]	France	1852	1852 (E)
Anjouan	Domoni	France	1866	1912 (E)
Argungu	Argungu	Great Britain	1902	1960 (I)
Ashanti	Kumasi	Great Britain	1896	1957 (I)
Baguirmi	Massenya	France	1899	1960 (I)
Bakgatlaland	Mochudi	Great Britain	1885	1963 (E)
Bakwenaland	Molepolole	Great Britain	1885	1966 (I)
Bamaleteland	Gaberones	Great Britain	1885	1966 (I)
Bamangwatoland	Serowe	Great Britain	1885	1966 (I)
Bamoun	Bamoun	France	1920	1933 (E)
Bangwaketseland	Kanye	Great Britain	1885	1966 (I)
BaoI	Lambaye	France	1877	1894 (E)
Barlokwaland	Gaberones	Great Britain	1885	1966 (I)
Barolongland	Lobatsi	Great Britain	1885	1966 (I)
Barotseland	LeaIui	Great Britain	1891	1964 (I)
Batwanaland	Maun	Great Britain	1885	1966 (I)
Bauchi	Bauchi	Great Britain	1902	1960 (I)
Bedde	Gorgeram	Great Britain	1902	1945 (E)
Benin [i]	Usama	Great Britain	1897	1933 (E)
Biu	Biu	Great Britain	1900	1959 (E)
Bonny	Bonny	Great Britain	1885	1891 (E)
Bornu Empire	Yerwa	Great Britain	1902	1960 (I)
Brakna	Shamama	France	1904	1934 (E)
Brass	Brass town	Great Britain	1885	1936 (E)
Buganda	Nabulagala	Great Britain	1890	1962 (I)
Bunyoro	Mparo	Great Britain	1896	1962 (I)
Constantine	Qusantina	France	1837	1837 (E)
Dagomba	Yendi	Great Britain	1896	1957 (I)
Dahomey	Abomey	France	1891	1898 (E)
Damagaram	Zinder	France	1899	1960 (I)
Darfur	aI-Fasher	Great Britain	1916	1916 (E)
Daura	Daura	Great Britain	1903	1906 (E)
Daura-Baure	Baure	France	1903	1903 (E)
Daura-Zango	Zango	Great Britain	1903	1960 (I)

Doma	Doma	Great Britain	1901	1930 (E)
Dyolof	Linger	France	1889	1900 (E)
Fezzan	Sahha	Great Britain	1943	1951 (I)
Fika	Fika	Great Britain	1899	1960 (I)
Fingoland	Nqamakwe	Great Britain	1879	1879 (E)
Fulani Empire	Sokoto	Great Britain	1903	1960 (I)
Fura Toro	Podor	France	1877	1891 (E)
Futa Jallon	Timbo	France	1881	1912 (E)
Gobir	Alkalawa	Great Britain	1900	1960 (I)
Gombe	Gombe	Great Britain	1902	1936 (E)
Gran Comoro	Moroni	France	1893	1909 (E)
Gumel	Gumel	Great Britain	1903	1960 (I)
Gurma	Fada N'Gurma	France	1895	1960 (I)
Gwandu	Gwandu	Great Britain	1903	1954 (E)
Gwiriko	Bobo-Dioulasso [approx]	France	1890	1915 (E)
Hadejia	Hadejia	Great Britain	1903	1960 (I)
Ibadan	Ibadan	Great Britain	1893	1893 (E)
Ife	Ife	Great Britain	1900	1960 (I)
Igala	Idah	Great Britain	1901	1956 (E)
Ilorin	Ilorin	Great Britain	1897	1960 (I)
Jema'a	Kafanchan	Great Britain	1902	1960 (I)
Jemaari	Jemaari	Great Britain	1903	1960 (I)
Kano	Kano	Great Britain	1903	1960 (I)
Karagwe	Bukoba	Great Britain	1920	1961 (I)
Katagum	Azare	Great Britain	1903	1947 (E)
Katsina	Katsina	Great Britain	1903	1960 (I)
Kayor	Mbul	France	1885	1886 (E)
Kazaure	Kazaure	Great Britain	1906	1960 (I)
Kazembe	Kazembe	Great Britain	1899	1899 (E)
Keana	[unknown]	Great Britain	1900	1900 (E)
Keffi	Keffi	Great Britain	1902	1948 (E)
Kenedugu	Sikasso	France	1898	1898 (E)
Kom	Laikom	Great Britain	1920	1960 (I)
Kong	Kong	France	1893	1960 (I)
Kontagora	Kontagora	Great Britain	1901	1960 (I)
Kororofa	Kororofa	Great Britain	1901	1927 (E)
Koya-Temne	Robanna	Great Britain	1896	1899 (E)
Kreli's Country	Kenrani	Great Britain	1881	1910 (I)
Lafia	Lafia	Great Britain	1900	1960 (I)
Lafiagi	Lafiagi	Great Britain	1900	1960 (I)
Lagos	Lagos	Great Britain	1861	1960 (I)
Lapai	Badeggi-Lapai	Great Britain	1900	1960 (I)
Lesotho	Maseru	Great Britain	1868	1966 (I)

Little Popo	Little Popo	France	1920	1955 (E)
Madagascar	Antananarivo	France	1885	1960 (I)
Mandara	Mora	France	1920	1942 (E)
Mascara	Tiaret	France	1847	1847 (E)
Matabeleland	Bulawayo	Great Britain	1894	1894 (E)
Mayotte	Chingoni	France	1841	1841 (E)
Misau	Misau	Great Britain	1903	1926 (E)
Moheli	Fomboni	France	1886	1912 (E)
Morocco	Rabat	France	1907	1666 (I)
Muri	Jalingo	Great Britain	1901	1960 (I)
Mwene Mutapa Empire	Mount Fura	Great Britain	1888	1917 (E)
New Calabar	Elem Kalabari	Great Britain	1885	1900 (E)
Nkore	Mbarara	Great Britain	1896	1962 (I)
Opobo	Opobo	Great Britain	1884	1884 (E)
Oyo	New Oyo	Great Britain	1900	1960 (I)
Pondoland	Port St Johns	Great Britain	1844	1867 (E)
Porto-Novo	Porto-Novo	France	1863	1941 (E)
Potiskum	Potiskum	Great Britain	1901	1915 (E)
Rabih's Empire	Dikwa	Great Britain	1901	1901 (E)
Samory's Empire	Bissandugu	France	1898	1898 (E)
Sudan	Khartoum	Great Britain	1899	1956 (I)
Swaziland	Mbabane	Great Britain	1893	1968 (I)
Tagant	Tagant	France	1905	1918 (E)
Tembuland	Umtata	Great Britain	1885	1910 (I)
Trarza	Saint Louis , Trarza	France	1902	1932 (E)
Tukolor Empire	Bandiagara	France	1891	1891 (E)
Wadai	Abeche	France	1909	1960 (I)
Wagadugu	Dazuli	France	1897	1960 (I)
Walo	[unknown]	France	1855	1855 (E)
Wani	Ward	Great Britain	1884	1936 (E)
Wase	Wase	Great Britain	1898	1948 (E)
Whydah	Savio	France	1892	1898 (E)
Yatenga	Ouahigouya	France	1895	1960 (I)
Yauri	Yelwa	Great Britain	1901	1955 (E)
Zamfara	Anka	Great Britain	1902	1946 (E)
Zanzibar	Zanzibar-City	Great Britain	1862	1961 (I)
Zaria	Zaria	Great Britain	1902	1960 (I)
Zululand	Eshowe	Great Britain	1879	1910 (I)

Notes: Colonizing powers and dates only refer to colonization by France and Great Britain. The last column refers to the last year of a polity in the sample. (E) refers to the end of a line of succession during the colonial period. (I) refers to the independence of the colony whithin which a polity's capital is located.

A1.2 Districts and regions in British and French colonies

Table A6: Summary of sources of district maps

colony	Observations	year	source
Côte d'Ivoire	19	1925	Huillery (2009)
Dahomey	13	1960s	Central Intelligence Agency
Gold Coast	35	1927	British War Office
Guinée	18	1925	Huillery (2009)
Haute Volta	11	1925	Huillery (2009)
Kenya	34	1962	George Philip and Son
Mauretanie	9	1925	Huillery (2009)
Niger	10	1925	Huillery (2009)
Nigeria	96	1962	Central Intelligence Agency
Northern Rhodesia	22	1948	British War Office
Nyasaland	21	1936	Annual Report
Senegal	14	1925	Huillery (2009)
Sierra Leone	13	1932	British War Office
Soudan	20	1925	Huillery (2009)
Tanganyika	58	1962	George Philip and Son
Uganda	15	1957	Annual Departmental Reports

Table A6 enlists the sources for the district maps used in all analyses.

Please note that I have only been able to locate precise and labeled maps on the district-boundaries in Nigeria, Kenya, and Tanganyika for the year 1962, that is shortly after these countries' independence. It seems however unlikely that the results of the analysis are purely driven by quick territorial reforms directly after independence, in particular also because the names of districts can be matched with those of local colonial administrations without problems (see below). To digitize the available maps, I use current districts obtained form the FAO (2014) GAUL Database. Since the number of districts has sharply increased over the past 60 years, I can use current units and align them to the units observed in the past, recoding boundaries only when they significantly deviate from a modern boundary. This facilitates the tracing of boundaries over time and makes up for some lack of detail in the colonial maps. Districts are then clustered into regions, according to the historical map material. To each district and region, I then attribute a capital by recurring to a number of sources, first the maps from the colonial period, the `statoids.org` data base, and where the two sources do not provide the name of district or regional capitals, a Google search. The names of capitals are then geocoded trough the `geonames.org` gazetteer. Table A7 provides the summary statistics of the district-size data, and Figures A3 and A4 map all district boundaries used for the analysis.

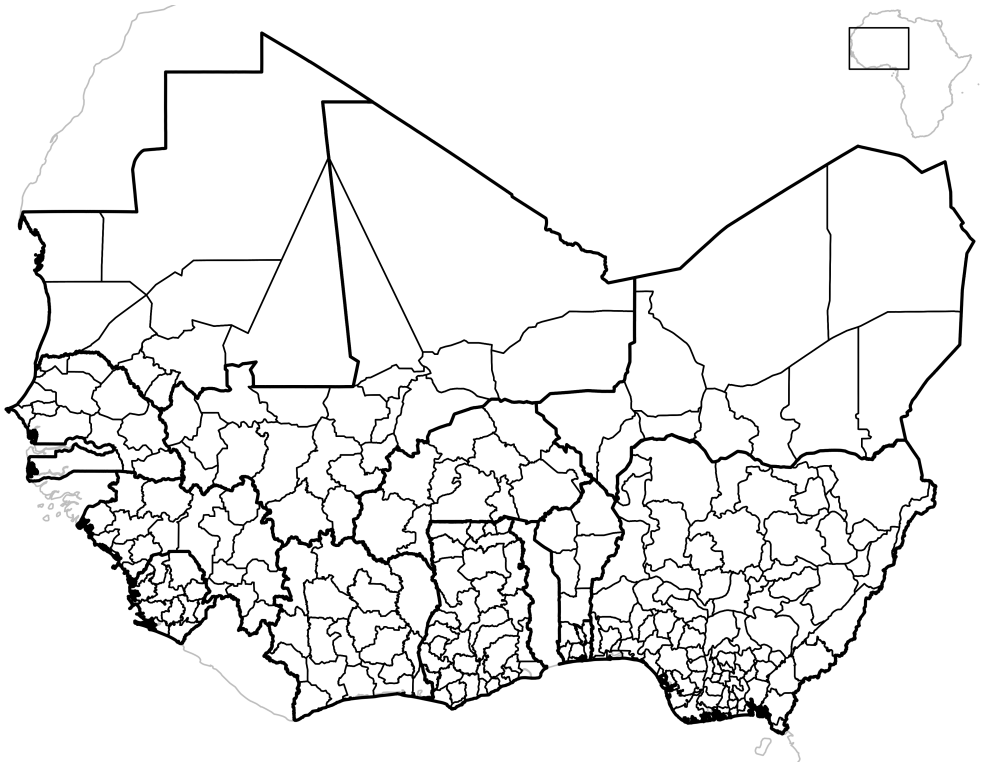


Figure A3: Districts in West Africa.

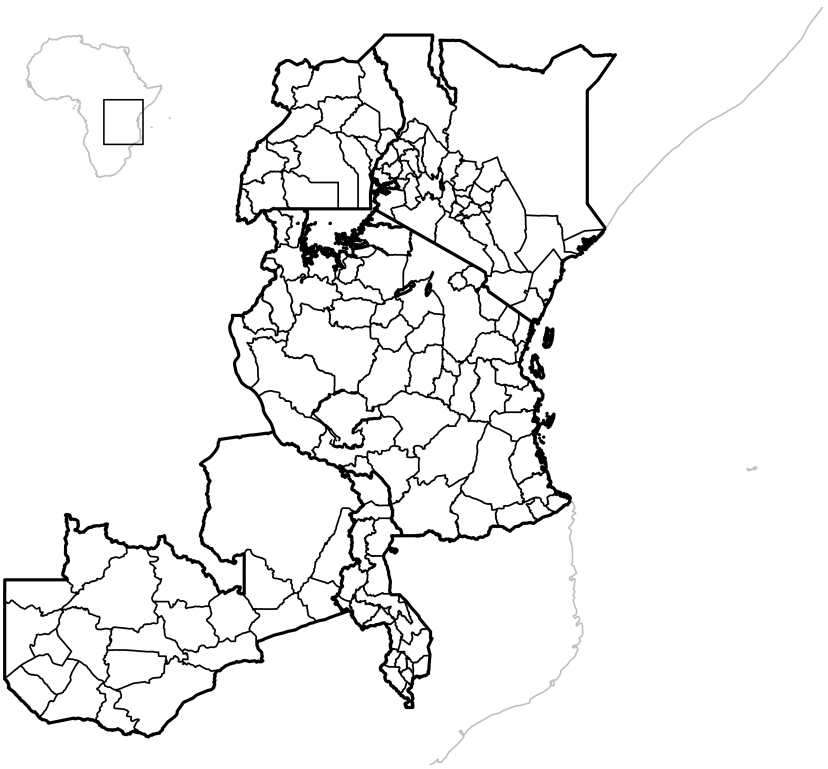


Figure A4: Districts in Southern and East Africa.

Table A7: Summary of district-area data

Statistic	N	Mean	St. Dev.	Min	Max
French	408	0.279	0.449	0	1
Area	408	20533.900	47162.950	42.942	520937.400
Precolonial centralization	405	1.521	0.772	0.000	3.000
Population density (log)	408	1.980	1.619	−5.029	7.475
Ethnic groups' population density (log)	406	1.973	1.449	−2.958	5.970
Distance to coast	408	4.190	3.155	−2.303	7.021
Distance to nav. river	407	4.824	0.962	2.394	6.748
Median altitude	408	529.020	526.416	3.000	2256.611
Median slope	408	3.815	1.160	1.000	9.000
Evapotranspiration	408	25.184	3.068	14.504	29.920
Precipitation	408	1652.711	253.904	1195.292	2414.136
Evapotranspiration/Precipitation	408	1258.852	598.442	56.293	3187.805
Mean temperature	408	4.535	1.462	1.000	8.000
Agricultural suitability	403	0.414	0.213	0.000	0.938
Cash crop suitability	407	0.371	0.130	0.000	0.721
Reliance on agriculture	406	2.012	1.509	0.000	8.507
Reliance on pastoralism	406	6.055	1.460	0.200	9.000
Intensity of agriculture	405	2.245	0.561	0.000	4.000

A1.3 Data on native treasuries in British colonies

The digitization of reports on native treasuries' budgets proceeds in two stages. I first process the scanned images of the respective pages in the colonial reports automatically to extract structured data from the tables they enclose. I then postprocess the results to correct errors. Subsection A1.3.1 provides details on this procedure, and Subsection A1.3.2 enlists the sources and provides an overview over the resulting data set.

A1.3.1 Digitizing tables from British colonial reports

I automatically extract structured information from tables in the scanned pages of the British Blue Books and Annual Departmental reports, information which is cleaned by hand in a second step. To this end, I developed an algorithm that transforms an image of a printed table[134] into a machine readable matrix of strings which is then stored in a relational database. The algorithm proceeds as follows:

1. *Image pre-processing:* Transforming the images into binary black and white pixels and turning to maximize the horizontal alignment of rows.[135]

2. *Table cell detection:* Segmenting the image into rows and columns based on (1) vertical lines that delimit columns, and (2) clustering of the x- and y-

[134] It must be born in mind that conventional OCR programs fail at digitizing table from such deprecated scans as dealt with in the context of historical archives.

[135] Doing so is achieved by maximizing the standard deviation of the row-wise sum of black pixels in the image.

coordinates of connected image components retrieved by a horizontal blurring filter that produces probable text blocks. Warps in the image that stem from the physical wave of the pages of an open book are corrected by using horizontal (waved) lines as reverence lines to straighten the entire image.

3. *Optical character recognition (OCR):* Extracting text from the cell-images using the open source program Ocropy (Breuel, 2014). Ocropy is based on a recurrent neural network which is trained on 8000 cell images from the colonial Blue Books.

Although the automatic extraction of information from the scanned image is efficient, and the OCR attains an error rate of only about 3%, each page is post-processed by hand to correct remaining inaccuracies. Such errors are highly clustered, since they mostly stem from low-quality printing and scanning on certain pages or regions of a page. Where I extract numbers, such errors are in particular worrying, since they oftentimes introduce errors in the number of digits, thus altering a number's order of magnitude. Errors also emerge if pages are printed in a font for which the neural network used for the OCR is not trained.

A1.3.2 Budget data: sources and resulting data set

Table A9 enlists all Annual Colonial Reports from which I digitize financial information on the budgets of native administrations, with Figure A5 showing an exemplary report page. Table A9 provides the summary statistics of the digitized data, averaged by district and over all years in which a district is observed. Figure A6 provides and overview over the development of per-capita revenues of the native treasuries in each district in the sample. As apparent in the plots, most districts developed very much in parallel without much variance in their rank. This strengthens the validity of the approach of using the average revenue and expenditure within a district as the main dependent variable in the respective analysis. Lastly, Figure A7 maps the average revenue by district in each colony in the sample.

Table A8: Sources of native treasury data

Colony	Title	Pages	Microform ID
Gold Coast	Local Government Revenue and Expenditure, 1948-1951	6; 7; 11; 14; 15; 35; 36; 41; 42; 45; 46; 71; 73; 77; 78; 82; 83	73211B-13
Nigeria	Native Authority Estimates, North, 1929-1937	150; 160; 301; 302	73242B-22
Nigeria	Native Authority Estimates, North, 1934-1938	4; 147; 290; 435	73242B-23
Nigeria	Native Authority Estimates, North, 1938-1941	4; 266; 267	73242B-24
Nigeria	Native Authority Estimates, North, 1944-1946	135; 136; 425; 426	73242B-25
Nigeria	Native Authority Estimates, North, 1948-1950	345; 346; 675; 676	73242B-26
Nigeria	Native Authority Estimates, North, 1950-1952	334; 335; 336; 337; 340	73242B-27
Nigeria	Memoranda on Estimates, North, 1948-1960	43; 61; 80; 98; 113; 114; 115; 136; 156	73242B-35
Nigeria	Native Financial Statements, South, 1929-1937	98; 192; 193; 298; 299; 416; 417; 556; 557	73242B-36
Nigeria	Native Financial Statements, South, 1937-1939	143; 144; 342	73242B-37
Nigeria	Native Financial Statements, East, 1939-1943	157; 158	73242B-38
Nigeria	Native Financial Statements, West, 1939-1940	81; 82	73242B-40
Nyasaland	Native Affairs and Administration 1931-1945	214; 301; 334; 378; 414; 445; 484; 518; 548; 575; 613; 624; 637	73105A-01
Nyasaland	Native affairs and Administration 1946-1959	14; 31; 44; 61; 75; 91; 101; 114; 132; 150; 166; 189; 209; 225; 243; 262; 274; 285; 299; 309; 320; 335; 348; 360; 379; 391; 402; 417; 428; 441	73105A-02
Uganda	Provincial Commissioners, 1935-1938	7; 9; 10; 11; 12; 17; 18; 19; 20; 21; 22; 23; 24; 25; 26; 27; 28; 36; 55; 56; 57; 58; 59; 70; 71; 72; 73; 74; 75; 85; 98; 100; 101; 102; 103; 104; 116; 119; 120; 121; 133; 155; 157; 158; 159; 160; 161; 162; 173; 174; 185	73143A-01
Uganda	Provincial Commissioners, 1939-1946	30; 33; 34; 57; 58; 59; 60; 61; 62; 119; 120; 122	73143A-02
Uganda	Provincial Commissioners, 1947-1952	63; 97; 98; 116; 117; 142; 143; 181; 216; 233; 255; 256; 305; 368; 401; 453; 454; 487; 488; 511; 556; 557; 615; 616; 644; 676; 677; 715; 716; 762; 763; 804; 864	73143A-03
Uganda	Provincial Commissioners, 1953-1956	58; 59; 105; 106; 170; 223; 224; 270; 271; 316; 380; 433; 434; 484; 517; 518; 575; 576; 632; 696; 697	73143A-04

Microform ID denotes the 'Reference ID' used on www.britishonlinearchives.co.uk.

SUMMARY OF REVENUE, 1931-1932.

Treasury.	Tribute.	Jangali.	Native Courts. Fees & Fines	Interest on Investments.	Other Receipts.	Total.	Total of Province.
	£	£	£	£	£	£	£
ADAMAWA :—							
Adamawa	21,000	7,420	850	900	240	30,410	
Muri	6,300	1,400	500	290	63	8,553	
Numan	2,000	1,020	190	174	190	3,574	42,537
BAUCHI :—							
Bauchi	23,000	11,000	1,450	1,900	3,320	40,670	
Dass	640	180	10	150	...	980	
Gombe	10,900	6,233	1,100	1,300	304	19,837	
Jamaari	920	450	80	70	475	1,995	
Katagum	13,920	5,880	790	800	1,253	22,643	
Misau	4,850	1,930	395	170	433	7,778	
Ningi	1,900	655	210	450	5	3,220	
Tangale-Waja	2,900	300	200	550	25	3,975	101,098
BENUE :—							
Abinsi	11,500	...	1,750	440	690	14,380	
Idoma	4,250	...	500	120	110	4,980	
Keffi	3,300	700	245	50	139	4,434	
Lafia	2,400	...	215	80	174	2,869	
Nasarawa	5,900	170	320	175	269	6,834	
Wukari	7,300	20	690	180	280	8,470	41,967
BORNU :—							
Bedde	1,500	840	110	48	15	2,513	
Biu	5,460	1,330	645	200	65	7,700	
Bornu	40,000	26,700	2,900	2,288	3,430	75,318	
Dikwa	8,700	3,600	400	300	45	13,045	
Fika	3,400	1,110	325	102	40	4,967	103,543
ILORIN :—							
Bussa	1,560	400	70	192	61	2,283	
Ilorin	41,100	2,000	3,000	2,000	360	48,460	
Kaiama	1,280	550	120	199	376	2,525	
Lafiagi	3,520	325	190	90	68	4,193	
Pategi	2,662	30	270	62	30	3,054	60,515
KABBA :—							
Agbaja	1,070	...	230	90	50	1,440	
Ata Gala	14,250	30	1,950	900	1,720	18,850	
Igbirra	9,450	150	3,600	650	737	14,587	
Kabba	3,900	25	670	200	165	4,960	
Koton-Karifi	2,680	...	440	300	180	3,600	43,437
KANO :—							
Daura	6,650	2,450	450	300	85	9,935	
Gumel	3,850	2,100	355	300	50	6,655	
Hadejia	10,500	2,940	380	700	850	15,370	
Kano	177,100	30,000	4,100	4,850	14,780	230,830	
Kazaure	5,390	1,820	310	250	25	7,795	270,585
NIGER :—							
Abuja	8,860	160	200	319	277	9,816	
Agaie	2,560	...	180	90	156	2,986	
Bida	20,245	1,190	850	1,100	1,240	24,625	
Kontagora	5,950	1,680	285	235	285	8,435	
Kuta	3,800	600	630	250	470	5,750	
Lapai	2,800	7	190	260	80	3,337	
Zungeru	2,400	200	160	120	113	2,993	57,942
PLATEAU :—							
Akwanga	3,300	...	300	80	150	3,830	
Jemaa	4,800	500	600	180	196	6,276	
Jos	10,700	5,000	2,000	1,045	2,125	20,870	
Kanam	1,018	575	52	90	10	1,745	
Pankshin	4,432	3,655	600	100	220	9,007	
Shendam	3,970	270	375	110	60	4,785	46,513
SOKOTO :—							
Argungu	6,300	3,220	250	330	410	10,510	
Dabai	3,200	1,400	300	300	295	5,495	
Gwandu	24,000	7,200	830	1,000	1,310	34,340	
Sokoto	86,458	29,500	2,450	3,250	3,164	124,822	
Yauri	3,400	1,000	200	400	315	5,315	180,482
ZARIA :—							
Birnin Gwari	1,270	230	110	100	20	1,730	
Katsina	59,500	21,000	3,200	6,639	1,550	91,889	
Zaria	42,350	7,000	1,550	2,050	1,705	54,655	148,274
Total ... ... £	768,315	198,135	45,322	39,868	45,253	1,096,893	1,096,893

749,855 190,782 45,407 39,247 32,375 1,063,666

Figure A5: Detail of native treasuries' summary of revenues: Northern Nigeria, 1931-1932, Microform ID: 73242B-22, page 151.

Table A9: Summary of British budget data

Statistic	N	Mean	St. Dev.	Min	Max
Total revenue (log)	147	13.38	1.22	9.01	16.42
Revenue from: Taxes (log)	147	12.78	1.22	8.56	16.26
... Fees & fines (log)	147	11.48	1.35	7.88	15.22
... Transfers (log)	147	6.76	5.65	0.00	15.18
... Other (log)	128	10.99	1.49	4.94	14.37
Total expenitures (log)	127	13.60	1.12	8.85	16.47
Expenditures on: Administration (log)	127	12.25	1.20	6.92	15.54
... Order (log)	127	11.77	0.89	8.25	14.34
... Education & health (log)	127	11.42	1.66	0.00	14.44
... Agriculture (log)	127	9.13	2.19	0.00	13.99
... Public works (log)	127	12.13	1.31	7.47	15.49
... Other (log)	127	10.93	1.57	5.81	15.65
Precolonial centralization	146	1.55	0.71	0.00	3.00
Population (log)	146	12.25	0.77	9.71	14.89
Area (log)	146	2.16	0.11	1.89	2.43
Population density (log, 1880)	146	3.00	0.96	0.84	5.25
Ethnic groups' pop. density (log, 1880)	146	3.03	0.87	1.02	4.52
Distance to coast (log)	146	5.31	1.28	0.14	7.07
Distance to nav. river (log)	146	4.41	0.84	2.48	5.99
Median altitude	146	383.91	386.85	8.77	1756.29
Median slope	146	3.78	1.18	1.67	7.49
Mean temperature	146	25.77	2.20	18.58	28.97
Evapotranspiration	146	1572.15	257.01	1195.29	2318.16
Precipitation	146	1444.26	530.15	485.48	2835.08
Evapotranspiration/Precipitation	146	5.08	1.30	2.04	8.00
Agricultural suitability	146	0.45	0.19	0.01	0.89
Cash crop suitability	146	0.40	0.11	0.08	0.72
Reliance on agriculture	146	1.37	0.72	0.00	3.78
Reliance on pastoralism	146	6.71	1.13	3.12	9.00
Intensity of agriculture	146	2.14	0.29	2.00	3.00

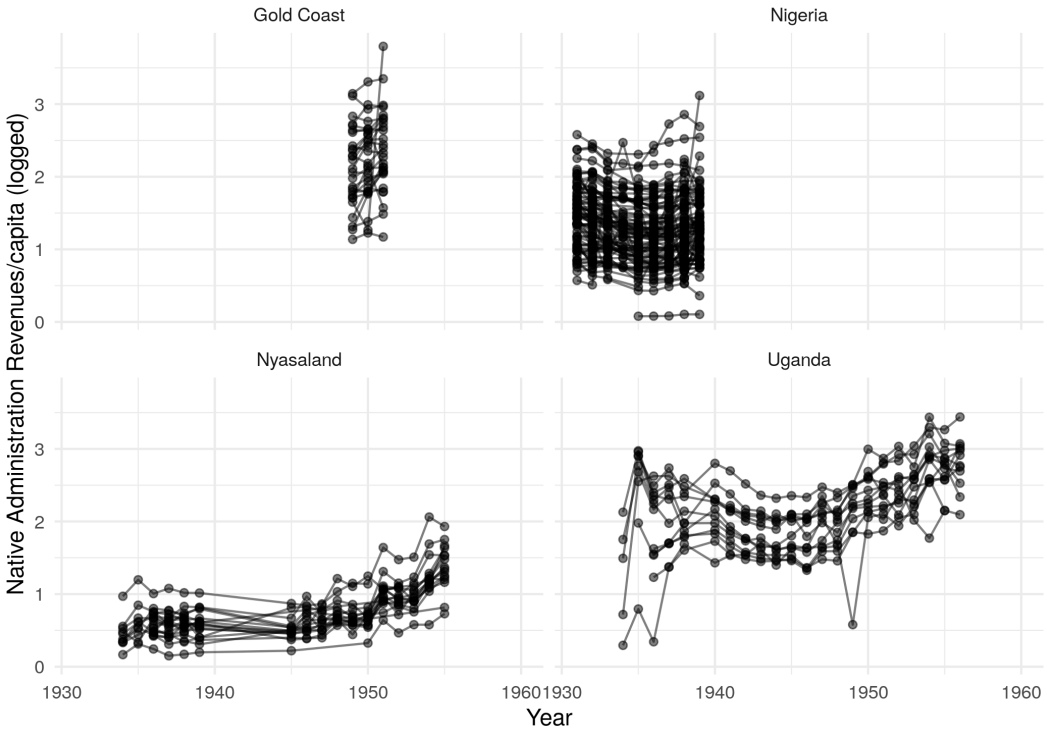
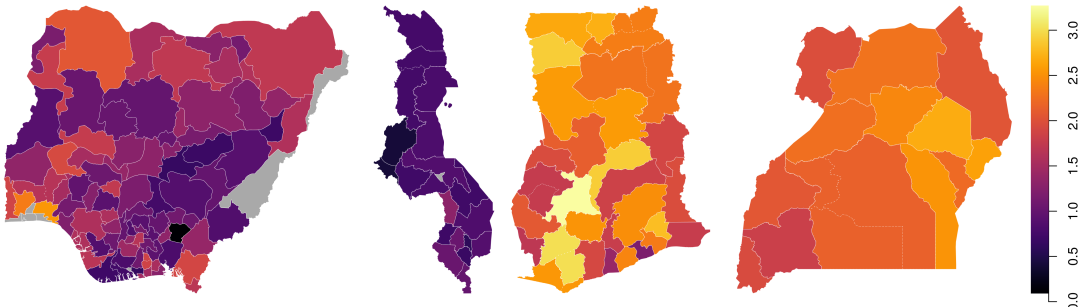


Figure A6: Per-capita revenues of native treasuries over time (logged; 2016 £). Aggregated to the district level.



(a) Nigeria 1931-1939 (b) Nyasaland, 1934-1955 (c) Gold Coast, 1949-1951 (d) Uganda 1934-1956

Figure A7: Per-capita revenues of native treasuries (logged; 2016 £). Aggregated to the district level and averaged over all observed years.

A1.4 Correlations between indicators of British indirect rule

In order to gauge in how far the various measures of indirect rule used as dependent variables in the main analysis correlate with each other and thus consistently capture "indirect rule," Figure A8 displays the correlation matrix of all four measures. All outcomes are correlated with each other, but not perfectly. This supports the view that they capture varying aspects of indirect rule.

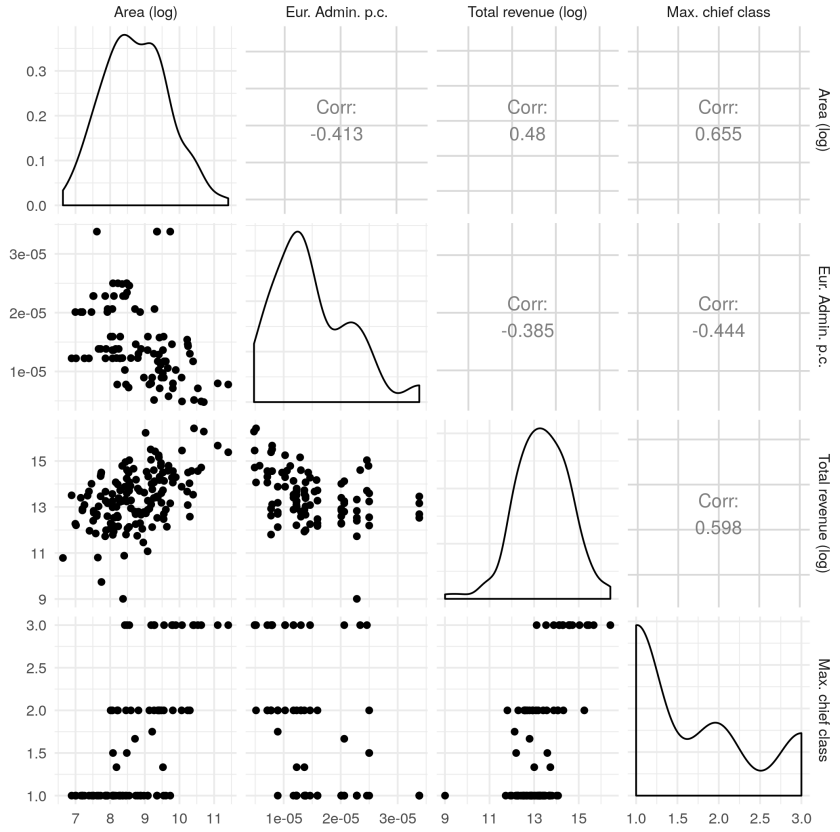


Figure A8: Correlations between four main measures of British indirect rule.

A2 Evidence from the survival of lines of succession

This section presents a set of supplementary analyses of the effect of French and British rule on the demise of precolonial polities in Africa. Subsection A2.1 discusses the robustness checks to the baseline models mentioned in the main text. In Subsection A2.5, I exploit variation within West Africa and along its coast to increase the internal validity of the research design. Lastly, Subsection A2.1 shows how British and French colonization led to the death and deposition of individual rulers, mainly right after colonization.

A2.1 Main robustness checks

Three types of robustness checks are applied to the baseline model including all control variables in Table 2 of the main text. First, Models 1 and 2 in Table A10 address the imbalance in the sample with regards to the number of polities from the French and British empires as well as from the various colonies therein. Weighting observations such that each empire (Model 1) and colony (Model 2) receives equal weight substantially increases the coefficient associated with British rule from 1.8 to 2.4 and 2.9, respectively. This suggests that giving the British empire and the colony of Nigeria more weight in the baseline specification leads to more conservative estimates.

Model 3 stratifies the data by year[136] in order to avoid that different timings of the French and British colonization bias the results. Doing so does not change the the baseline coefficient but increases its standard error ($p < .1$). Thus, variation in the timing of colonization does not explain the difference between the French and British style of colonial conquest. Lastly, Model 4 adds additional control variables for the local disease environment measured through the local suitability for the transmission of the malaria vector between mosquitoes (Gething et al., 2011) and an estimate of the local suitability for the Tsetse fly (Programme Against African Trypanosomosis, 1999). Including the two additional controls slightly increases the estimated effect of British colonial rule.

Table A10: British vs. French rule and the demise of precolonial polities: Robustness checks

	End of line of succession			
	(1)	(2)	(3)	(4)
British rule	-2.397^{***}	-2.916^{**}	-1.815^{*}	-2.357^{***}
	(0.846)	(1.266)	(1.035)	(0.711)
Robustness check:	empire weights	colony weights	stratified by year	desease controls
Baseline controls:	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes
Ethnic controls:	yes	yes	yes	yes
Observations	4,581	4,581	4,581	4,581
R^2	0.00001	0.001	0.006	0.010
Max. Possible R^2	-0.00003	0.002	0.014	0.055
Log Likelihood	0.091	-2.248	-19.910	-105.428

Notes: Cox Proportional Hazard models. Standard errors are clustered on the polity-level. Baseline controls consist of the 1880 population density (logged), the distance to the coast (logged), the age of a polity (loged), and a linear time trend. Nature controls consist of median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls consist of the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

[136] This is equivalent to adding year fixed effects.

Lastly, the uncertainty associated with the results might vary with the level on which standard errors are clustered – so far on the level of individual polities. To gauge the effect of such clustering, Table A11 clusters standard errors (1) not at all, (2) the level of polities (the baseline specification), (3) on the level of colonies, and (4) ethnic groups (from Murdock's Atlas, 1959). The results show that the baseline clustering on the level of polities produces the most conservative standard errors.

Table A11: British vs. French rule and the demise of precolonial polities: Standard error clustering

	End of line of succession			
	(1)	(2)	(3)	(4)
British rule	-1.787^{***}	-1.787^{***}	-1.787^{***}	-1.787^{***}
	(0.544)	(0.600)	(0.507)	(0.600)
SE clusters:	none	polity	colony	ethnic group
Baseline controls:	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes
Ethnic controls:	yes	yes	yes	yes
Observations	4,581	4,581	4,581	4,581
R^2	0.009	0.009	0.009	0.009
Max. Possible R^2	0.055	0.055	0.055	0.055
Log Likelihood	-108.471	-108.471	-108.471	-108.471

Notes: Cox Proportional Hazard models. Standard errors are clustered on the polity-level. Baseline controls consist of the 1880 population density (logged), the distance to the coast (logged), the age of a polity (loged), and a linear time trend. Nature controls consist of median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls consist of the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

A2.2 Linear models

Table A12 presents the results of a linear probability model of the rate of survival of colonized polities until their respective countries' independence. The table substantiates the insights from the raw correlation of British rule with a higher survival rate plotted in Figure 4 in the main text. The coefficient British rule in Models 1-3 shows that polities under British rule had a 25–32 percentage points higher chance of surviving colonial rule than those under French rule.

In a similar vein and to check whether the choice of estimating Cox Proportional Hazard Models drives the results, Table A13 presents the results of liner hazard models. The models take the following specification:

$$\mathsf{h}_{i,t} = \alpha_t + \beta_1 \mathsf{British}_i + \boldsymbol{X}_1\boldsymbol{\Lambda}_i + \boldsymbol{X}_2\boldsymbol{\Omega}_i + \boldsymbol{X}_3\boldsymbol{\Psi}_i + \epsilon_i,$$

where the hazard h of polity i to experience the end of its line of succession is

Table A12: British vs. French rule and the demise of precolonial polities: OLS

	Reaches independence		
	(1)	(2)	(3)
British rule	0.318***	0.312**	0.251*
	(0.097)	(0.123)	(0.135)
Baseline controls:	yes	yes	yes
Nature controls:	no	yes	yes
Ethnic controls:	no	no	yes
Observations	116	112	102
R^2	0.129	0.221	0.269
Adjusted R^2	0.081	0.108	0.111

Notes: Linear probability models. Standard errors are clustered on the polity-level. Baseline controls consist of the 1880 population density (logged), the distance to the coast (logged), the age of a polity (loged), and a linear time trend. Nature controls consist of median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls consist of the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

dependent on the baseline hazard in a given year after colonization t, the identity of the colonizer (British), and the series of control variables (see above). Sequentially adding the vectors of control, the results show that, in any given year, polities under British rule had a 1.6 percentage points lower hazard of experiencing the end of their line of succession. Although the uncertainty associated with this estimate increases as more control variables are added to the model, the point estimate does not change. If we aggregate this difference in the yearly hazard up to the total duration of colonial rule ($\approx$ 80 years), we arrive at almost the same difference in the average probability of surviving colonial rule than estimated above in Table A12: $(1 - .016)^{80} = .275$. Hence, the linear models reaffirm the main insight from the Hazard Models, namely that polities under French rule were 30 percentage points less likely to survive colonial rule than those under British rule.

Table A13: British vs. French rule and the demise of precolonial polities: OLS

	End of line of succession		
	(1)	(2)	(3)
British rule	-0.016^{***}	-0.016^{**}	-0.017^{*}
	(0.006)	(0.007)	(0.009)
Year since conquest FE:	yes	yes	yes
Baseline controls:	yes	yes	yes
Nature controls:	no	yes	yes
Ethnic controls:	no	no	yes
Observations	5,208	4,902	4,581
R^2	0.078	0.086	0.066
Adjusted R^2	0.059	0.065	0.042

Notes: Linear probability models. Standard errors are clustered on the polity-level. Baseline controls consist of the 1880 population density (logged), the distance to the coast (logged), the age of a polity (loged), and a linear time trend. Nature controls consist of median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls consist of the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

A2.3 Colony-level jackknife

In order to assess in as how far the results are driven by precolonial polities located in different colonies conquered by either the British or the French, I re-estimate the three baseline models in Table 2 in the main text, iteratively dropping observations in each colony. The results of this exercise are plotted in Figure A9. They show point estimates that are robust to dropping each colony, indicating that the results are not driven by observations from any single colony. The only exception consists in the fully specified model that includes all 'nature' and 'ethnic' control variables, which features a considerably larger standard error of 'British rule' once polities in Nigeria are dropped ($p = .24$) but a point estimate (-1.08) not far removed from that of the baseline model. This deviation is in large part due to the drastically decreased sample size caused by dropping the 52 polities located in Nigeria which make up 42 percent of the entire sample of polities observed. In addition, the fact that the results remain stable in the models on the sample without Nigeria and without 'ethnic covariates' speaks to the robustness of the results. Furthermore and as explained in Subsection A2.5 below, polities in Nigeria are crucial for the comparison between French and British polities which is best identified in coastal West Africa where French and British colonies featured very similar conditions. This comparison is naturally not captured in the jackknife models when Nigerian cases are dropped from the sample.

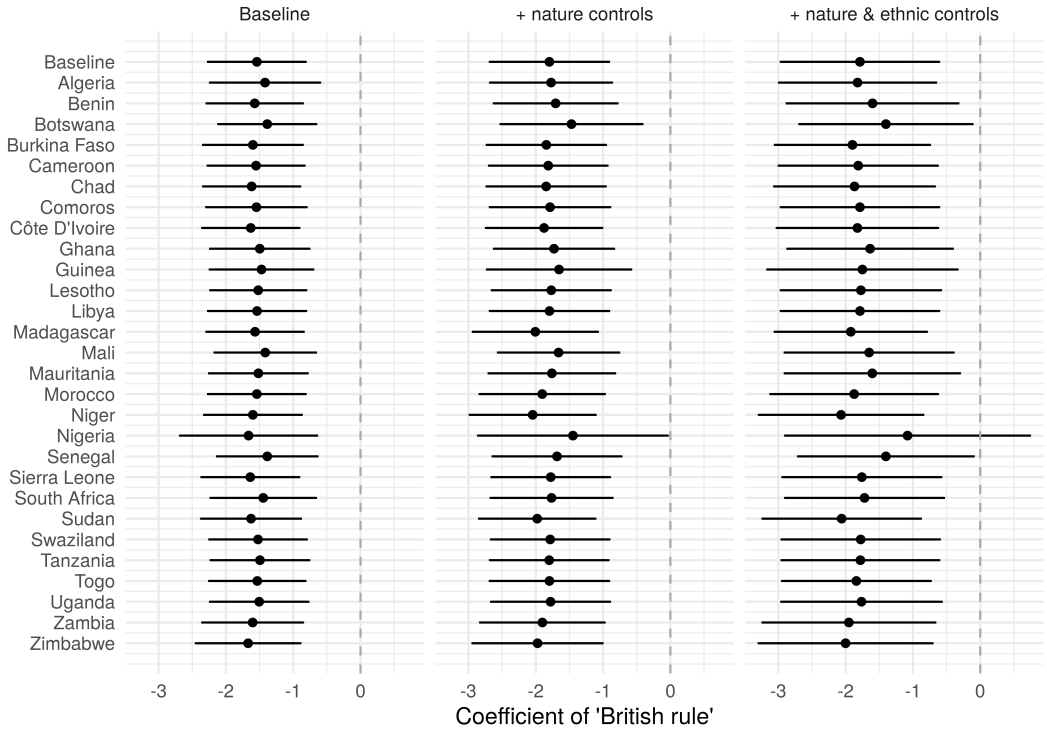


Figure A9: Colony-level jackknife: Estimated effects estimated when iteratively dropping each colony from the sample.

A2.4 Survival of rulers before and after colonization

The data gathered from Stewart's (2006) encyclopedia on states and rulers in Africa allows us to further zoom into the demise of polities. Using the tenure time of each individual ruler for which Stewart provides us with data,[137] we can compare the average tenure lengths of rulers of the same polity before and after colonization by either the British, the French, or another colonizer. By restricting the analysis to variation within a polity, I control for all polity-specific attributes that might affect the length of rule of one ruler – in particular its political system and natural (disease) environment.

Figure A10 plots the basic intuition behind the approach. It shows descriptively how up to the point of colonization, the probability of a ruler to be deposed in a given year does not change much. However, it rises sharply with colonization by either the British or the French although substantively more so in the case of the latter. In the first year of colonization by the French almost 50% of all rulers got deposed. In the case of British colonization, that percentage stands at 35%, as compared to a baseline probability of around 10%.

Modeling the data in a Cox Proportional Hazard Models stratified by each

[137] 10 % of all rulers are associated with missing start or end dates.

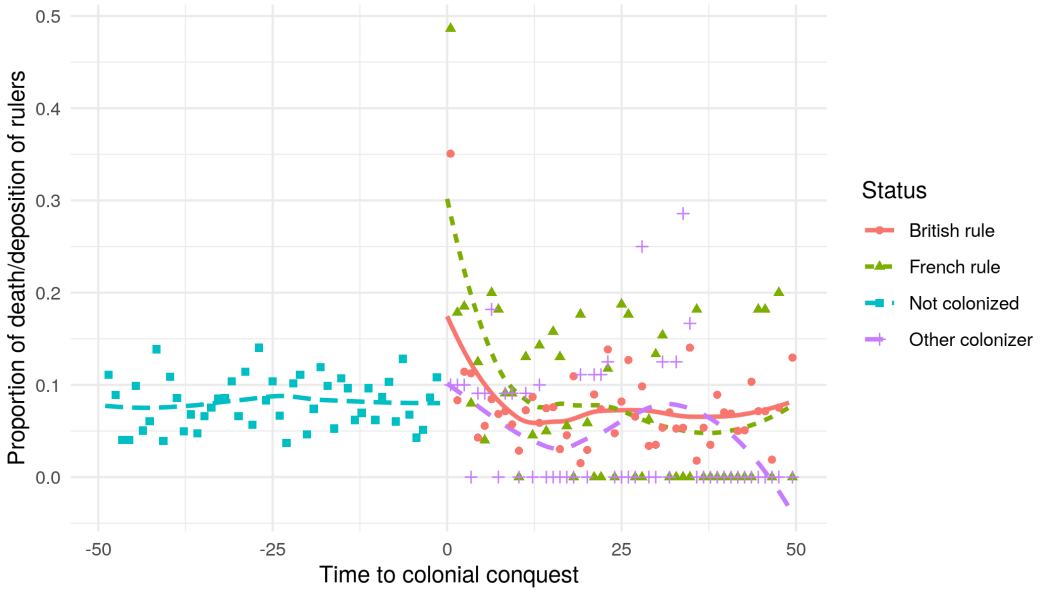


Figure A10: Colony-level jackknife: Estimated effects of British rule on the risk of the end of lines of succession when iteratively dropping each colony from the sample.

polity's capital[138] in Table A14 shows that the difference between the effect of British and French colonization on ruler's deposition is indeed statistically significant and of meaningful size. Model 1 compares the average deposition probabilities within polities before and after colonization, in a sample restricted to observations post-1500. Colonization by the French is treated as the reference category to ease the interpretation of the coefficient of British rule which is statistically significant and of meaningful size: In a given year, rulers under British rule are 73% as likely to get deposed as under French rule. To identify the effect of colonization right when it began, Model 2 then adds linear pre- and post-trends for each of the four states in which polities can be: either not colonized, or colonized by the British, the French, or another colonizer (see Figure A10). Model 3 adds also quadratic terms of these. Because they pick up the non-linear increase in survival rates in the years after colonization (see Figure A10), the models with trends yield larger differences between the French and the British colonization: with quadratic trends, rulers under British rule are only 62% as likely as French rulers to be deposed or killed in the year of colonization. Lastly, by adding a dummy for the demise of a ruler's polity to the estimation, Model 4 shows that these difference are mostly due the comparatively heavy hand of the French towards the colonized polities and not only to their rulers. While the coefficient of the demise of a polity is (naturally) highly significant, the difference between the French and the British is now associated with a smaller

[138]Stratifying by polity-capital rather than polity has the advantage that doing so holds all environmental variables constant.

coefficient that is statistically insignificant.

Table A14: Death/deposition of rulers before and during colonial rule (1500–): Cox Proportional Hazards

	Death/deposition of ruler			
	(1)	(2)	(3)	(4)
British rule	−0.323**	−0.431**	−0.468**	−0.275
	(0.158)	(0.200)	(0.230)	(0.235)
Other colonizer	0.327	0.057	−0.337	−0.126
	(0.308)	(0.367)	(0.441)	(0.443)
Not (yet) colonized	−0.278**	−0.600***	−0.766***	−0.472**
	(0.139)	(0.164)	(0.189)	(0.192)
Polity age (log)	0.001***	−0.003	−0.005	−0.006**
	(0.0003)	(0.003)	(0.005)	(0.003)
End of line of succession				2.615***
				(0.284)
Strata:	capital	capital	capital	capital
Running linear:	no	yes	yes	yes
Running quadratic:	no	no	yes	yes
Sample:	post-1500	post-1500	post-1500	post-1500
Observations	25,328	25,328	25,328	25,328
R^2	0.001	0.002	0.002	0.005
Max. Possible R^2	0.240	0.240	0.240	0.240
Log Likelihood	-3,460.952	-3,454.023	-3,448.067	-3,420.846

*p<0.1; **p<0.05; ***p<0.01. Standard errors are clustered on the ruler-level.

A2.5 The demise of polities in (coastal) West Africa

One question the previous analyses cannot fully answer is whether the results are driven by endogenous colonization choices of the French and British conquerors. Although the ruler-level analysis above (Subsection A2.4) exploits within polity variation, it might still be that various local (e.g. environmental) factors make a certain area more or less difficult to colonize. If the British systematically colonized areas in which indirect rule was inherently easier to carry out, the results above might be solely due to that choice rather than due to the fact that the *British* rather than the *French* conquered a certain precolonial polity. In order to further zoom in on that relevant counterfactual, I exploit variation in the demise of polities first in West Africa and particularly along its coast, where the regions which were colonized by the British and the French are arguably exogenous. In that regard, Models 1 ad 2 in Table A16 restrict the sample to all French and British colonies in West Africa. Models 3 and 4 only rely on polities observed in colonies along the

West African coast.

Finally, Models 5 and 6 exploit only variation across French-British borders that run perpendicular to the West African coast.[139] Because they resulted from the race of the colonizers towards the inner parts of the continent (Cogneau and Moradi, 2014; Wesseling, 1996), these borders run at an angle of 90° from the coast and come closest to a "natural experiment" that allows us to draw counterfactual inferences. These last two specification thus stratify the Cox Proportional Hazard estimate by the perpendicular border closest to each polity. Stratified baseline hazards are estimated as a conditional logistic regression, avoiding the incidental parameter problem. The models thus compare polities only across these borders, similar to a linear model with border and year-since-colonization fixed effects. Because the relatively few polities around the perpendicular borders are unevenly distributed in space, I cannot estimate a sharp discontinuity at the borders.

Indeed, the balance Table A15 shows that the strategy of sequentially narrowing the range of comparisons to polities in ever closer geographical areas is successful in reducing the imbalance of the sample on pre-treatment covariates of polities. However, significant imbalances of polities' distance to the costs and navigable rivers as well as of their agricultural suitability remain so that even the cross-border sample is not perfectly balanced. This underlines the need to control for observed covariates.

The results of this analysis point towards even greater differences in the probability of polities' demise in the British and French colonies than estimated at baseline. While the size of the estimated hazard ratios ranges significantly – in particular once covariates are added in Models 2, 4, and 6 – but mostly smaller than the one estimated at baseline (.23).[140] Once the model is stratified across borders, the estimates are less precise $p < .1$). In sum, these patterns suggest that the baseline results are not caused by endogenous choices of the French and British which areas of the African continent to colonize.

[139] From West to East: Côte d'Ivoire–Gold Coast–French Togo Mandate–Dahomey–Nigeria–Cameroon.

[140] This means that, in a given year, a polity is a quarter as likely to be demised under British than under French rule.

Table A15: Balance test, standardized coefficients

	All	West Africa	West African Coast	X-Border
Indep. variable Dep. variable	British	British	British	British
Population (log)	0.055	0.789***	0.779*	0.092
	(0.268)	(0.286)	(0.436)	(0.411)
Distance to coast (log)	0.524*	0.163	0.928**	1.068**
	(0.307)	(0.345)	(0.412)	(0.480)
Distance to river (log)	−0.263	0.196	−0.049	−0.358***
	(0.316)	(0.345)	(0.294)	(0.137)
Polity age (log)	−0.453**	−0.358*	−0.114	0.060
	(0.202)	(0.211)	(0.194)	(0.257)
Dependence on agriculture	−0.407*	−0.532	−0.706	0.408
	(0.229)	(0.329)	(0.589)	(0.345)
Dependence on husbandry	−0.222	0.742**	0.772	0.131
	(0.185)	(0.299)	(0.512)	(0.502)
Intensity of agriculture	−0.845***	−0.507	−1.094*	−0.831
	(0.274)	(0.379)	(0.579)	(0.569)
Precol. centralization	−0.741***	−0.641**	−0.291	0.235
	(0.241)	(0.255)	(0.319)	(0.247)
Altitude (median)	0.484**	0.114	0.467	0.241
	(0.224)	(0.257)	(0.336)	(0.423)
Slope (median)	0.315	0.364	0.687*	0.768
	(0.250)	(0.309)	(0.403)	(0.576)
Temperature (mean)	−0.285	−0.636**	−0.177	0.157
	(0.302)	(0.252)	(0.335)	(0.297)
Evapotranspiration	0.071	0.114	0.493**	0.441
	(0.256)	(0.251)	(0.251)	(0.269)
Precipitation	0.145	0.598**	0.288	−0.221
	(0.249)	(0.257)	(0.361)	(0.284)
Evapotransp. / precipitation	0.171	0.490*	0.142	−0.273
	(0.261)	(0.275)	(0.378)	(0.281)
Suitability for agr.	0.258	0.533**	0.340	−0.798**
	(0.272)	(0.271)	(0.396)	(0.374)
Cash crop suitability	0.396**	0.426*	0.741**	0.151
	(0.194)	(0.251)	(0.306)	(0.406)
X-Border FE	no	no	no	yes
Obs	5208	3424	3026	2845
British	0	0	0	0
French	0	0	0	0

*p<0.1; **p<0.05; ***p<0.01. Standard errors are clustered on the polity-level.

Table A16: British vs. French rule and the demise of precolonial polities in West Africa

	End of line of succession					
	All West Africa		Coastal West Africa		x-Border Coastal W. A.	
	(1)	(2)	(3)	(4)	(5)	(6)
British rule	-1.28^{**}	-2.18^{***}	-1.66^{**}	-2.53^{**}	-1.45^{*}	-5.56^{*}
	(0.55)	(0.83)	(0.74)	(1.21)	(0.86)	(3.07)
Strata:	–	–	–	–	Border	Border
Baseline controls:	yes	yes	yes	yes	yes	yes
Nature controls:	no	yes	no	yes	no	yes
Ethnic controls:	no	yes	no	yes	no	yes
Observations	3,424	3,144	3,026	2,746	2,845	2,611
R^2	0.01	0.01	0.01	0.01	0.003	0.01
Max. Possible R^2	0.06	0.06	0.06	0.06	0.03	0.03
Log Likelihood	-100.93	-82.78	-81.42	-64.53	-34.84	-20.79

Notes: Cox Proportional Hazard models. Standard errors are clustered on the polity-level. Baseline controls consist of the 1880 population density (logged), the distance to the coast (logged), the age of a polity (loged), and a linear time trend. Nature controls consist of median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls consist of the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

A3 Evidence from colonial districts

This section presents additional results for the analysis of the first dimension of indirect rule: the administrative effort employed by the colonial governments. This effort is proxied by two main variables: the size of colonial district, and the number of European administrators deployed at the local level. The main focus of the analysis lies on the size of districts for which data is more abundant and comparable across the French and British empires. Subsection A3.1 presents the main robustness checks and Subsection A3.3 discusses the more controlled comparisons of districts' sizes in the French and British colonies along the West African coastline. Lastly, Subsection A3.4 presents the results of the analysis of the association of precolonial centralization and the number of local British administrators.

A3.1 Districts' size: Robustness checks

Table A17 presents the robustness checks to the main analysis of the effect of precolonial centralization on districts' size (main text, Table 5). It addresses a number of issues which might bias the baseline results. First, Model 1 drops all outliers from the sample, some of which might drive the relationship between precolonial centralization and size in British colonies. Outliers are defined as very small and large districts in the upper and lower 2.5 percentiles of the data. Dropping them does not change the positive relation between precolonial centralization and districts' size in

the British colonies. In the French colonies, this relation is slightly less negative than at baseline but significantly different from that in the British sample (see the interaction term). In order to avoid excessive weight for the large colonies – in particular Nigeria – which might bias the results, Model 2 weights each observation by the inverse of the number of observations from the colony it belongs to. Giving each colony equal weight leads to very similar results as at the baseline.

I then proceed as with the analysis of the survival of precolonial polities and add a districts' disease environment (Malaria and Tsetse suitability), both of which might have reduced the administrative effort of the British. These additional control variables do not change the results (Model 3). Model 4 replaces the measure of precolonial centralization provided by Murdock (1959) with a dummy for whether a district featured a capital in 1885 of one of the polities listed in Stewart's (2006) encyclopedia of African states and rulers (see Appendix A1.1 above) or not. The emerging pattern is consistent with the previous results: Districts in the British empire that featured a capital in 1885 are about 65 percent bigger than those that did not.[141] This pattern is not discernible in French West Africa. This shows that the results are not due to arbitrary codings which might bias Murdock's data. Model 5 replace the the mapping of Murdock's Ethnographic Atlas (1967) to his ethnic map (1959) conducted by Nunn and Wantchekon (2011) with the slightly different coding from Michalopoulos and Papaioannou (2013). While their data lead to five more missing values, the results are very similar to the baseline estimates.

[141] This percent estimate results from the following equation: $(exp(\beta) - 1) * 100$

Table A17: Precolonial centralization and the size of districts: Robustness checks

	log(District Area)				
	No outlier	Col.-weight	Disease	Cap. 1885	Alt. PCC
	(1)	(2)	(3)	(4)	(5)
Precol. centralization	0.14**	0.13***	0.13***		
	(0.05)	(0.05)	(0.05)		
Precol. centr. × French	−0.29***	−0.27***	−0.33***		
	(0.11)	(0.10)	(0.10)		
Capital 1885				0.50***	
				(0.14)	
Capital 1885 × French				−0.36**	
				(0.18)	
Precol. centr. (MP)					0.17***
					(0.05)
Precol. centr. (MP) × French					−0.30***
					(0.11)
Colony FE:	yes	yes	yes	yes	yes
Colony weights:	no	yes	no	no	no
Desease controls:	no	no	yes	no	no
Baseline controls:	yes	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes	yes
Ethnic controls:	yes	yes	yes	yes	yes
Mean DV	9.11	9.14	9.14	9.14	9.15
Observations	383	400	400	400	395
Adjusted R^2	0.69	0.81	0.72	0.73	0.74

Notes: OLS models. Standard errors are clustered on the province-level. Baseline controls include the local population density, ethnic groups' population density, and the distance to the coast as well as the closest navigable river. Nature controls consist of the local altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls are the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Additionally, all covariates are interacted with 'French rule'. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

A3.2 Colony-level jackknife

As in the polity-survival analysis, I check the robustness of the results in the main district-size analysis presented in Table 5 in the main text to iteratively excluding every single colony in the sample. The results of this jackknife model are plotted in Figure A11. The plot shows that the results are not driven by observations from any single colony in the sample, including Nigeria.

There are a few, although unsystematic deviations from the baseline patterns observed in some specifications. Depending on the vector of covariates, the negative estimate for the effect of precol. centralization × French rule seems to be partly driven

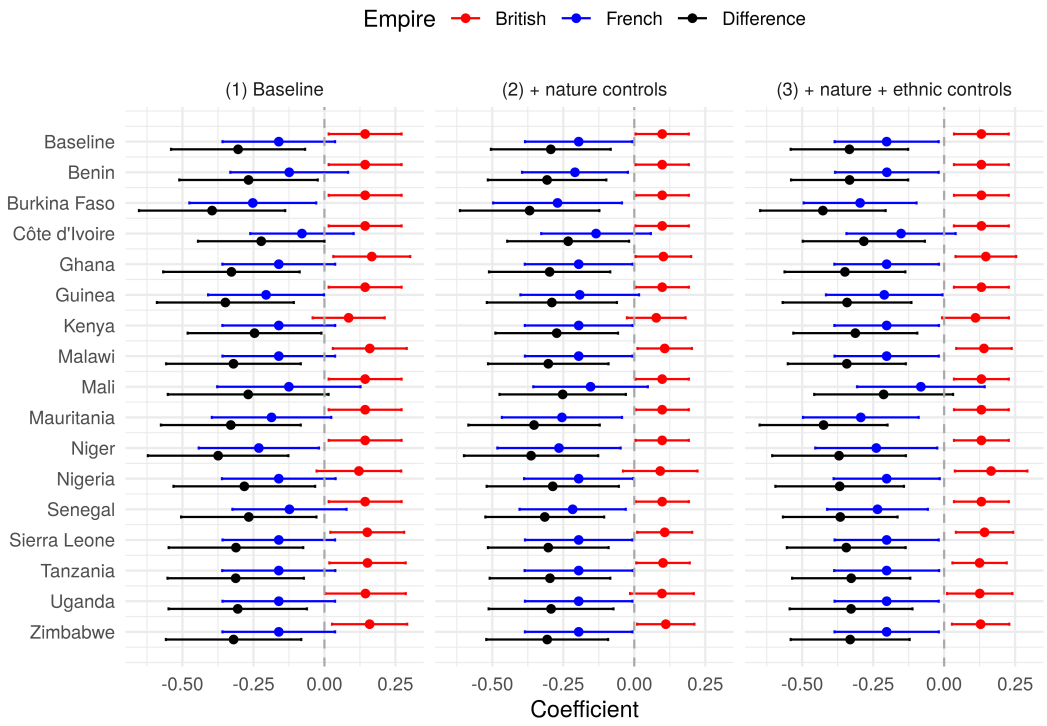


Figure A11: Colony-level jackknife: Estimated effects of precol. centralization on districts' size in British and French colonies when iteratively dropping each colony from the sample.

by observations from Mali (French Sudan) and becomes larger when we drop Burkina Faso (Upper Volta) and Niger. Similarly, in the Model without any covariates, the estimate of precol. centralization × British rule slightly drops when we exclude Kenya, and its standard errors becomes larger when Nigeria with its 96 districts (24% of all observations) is excluded, although this does not affect the point estimates. The difference between the estimated effect of precol. centralization becomes less precisely estimated ($p < .1$) when Mali is dropped from the sample in the fully specified model. In all, the lack of systematic influence of any colony on the estimates across specification speaks to the robustness of the baseline results. This is in particular the case since those colonies that affect the point estimates (Mali, Niger, Burkina Faso, and Kenya) are not part of the regression discontinuity analysis along French-British borders perpendicular to the West African African coast line presented below. This analysis accounts for omitted variables that may cause the variation observed in the jackknife analysis.

A3.3 Districts' size across French-British borders

In the baseline specification, the identification of differences in districts' sizes within colonies and the difference of these patterns across the two empires rests on the assumption that there are no omitted variables. We can weaken this assumption and focus only on the *difference* of the effect of precolonial centralization on district sizes between the French and British empire. The identification of this difference rests on the assumption that French and British rule resembled a natural experiment, which is clearly not the case when comparing colonies across the entire continent. I therefore turn towards plausibly exogenous variation in the assignment of the ruling empire, the Nigeria-Benin and Gold Coast-Côte d'Ivoire borders in West Africa. Both borders are perpendicular to the coast line and emerged from a race of both colonizers towards the inner part of the continent (Wesseling, 1996). They can therefore be treated as-if random (Cogneau and Moradi, 2014) to identify the difference in the effect of precolonial institutions on administrative effort under French direct and British indirect rule.

In order to exploit the change in the effect of precolonial centralization on districts' size at the border, I turn towards an approach based on the centroids of grid cells. Using grid cell centroids as the main unit of the regression discontinuity design is warranted by the need to balance the number of observations across the French-British borders. Such balance is not achieved if one compares districts of varying size (which is the dependent variable), because larger districts are observed less often. Grid-cells in the main analysis[142] have a size of .0833 decimal degrees or about 10km at the equator. Each cell centroid is associated with the size of its district, the precolonial centralization of the ethnic group settling in it (from Murdock, 1959), as well as its distance to the next border. Because I am interested not in the pure effect of British or French colonial rule at the border, but its effect on the marginal effect of precolonial centralization, I estimate the following regression discontinuity:

$$\begin{aligned} y_i = \alpha_c + \gamma_b + \beta_1 \mathsf{precol.\ centr.}_i \times \mathsf{French}_i + \tau_1 \mathsf{Empire}_i \times \Delta_i + \\ \tau_2 \mathsf{precol.\ centr.}_i \times \mathsf{Empire}_i \times \Delta_i + \tau_3 \mathsf{precol.\ centr.}_i \times \mathsf{Border}_i + \epsilon_{i,p} \end{aligned} \tag{2}$$

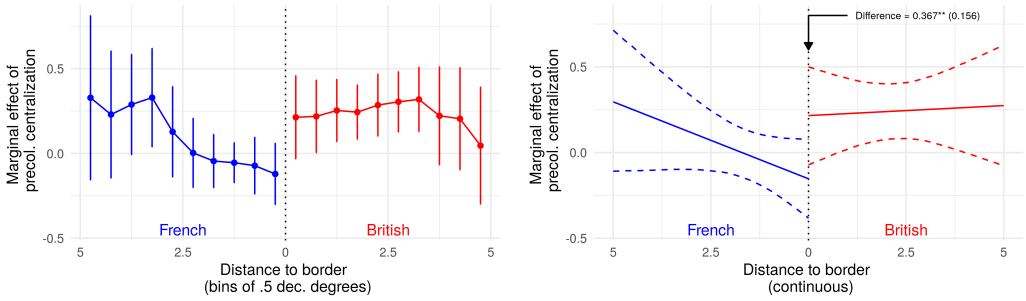
The logic of this RD-design is illustrated in Figures A12a and A12b. The first figure plots the coefficient of precol. centralization on districts' size left and right of French-British borders in intervals of .5 decimal degrees. The second plots the marginal effect of centralization as a linear function of the distance to the border. As in common RDDs, we notice the trends in the effect of centralization on district sizes on both sides of the border. With Δ_i denoting the distance to the border, the absolute trends in district sizes are controlled for by the term $\mathsf{Empire}_i \times \Delta_i$, while

[142] See Figure A14 for a robustness check that varies the size of grid cells.

Table A18: Balance test: Grid-cell level

	All	RDD	RDD
Indep. variable	Centr. × French	Centr. × French	Centr. × French
Dep. variable			
Distance to coast (log)	−0.429***	−0.177*	−0.060
	(0.109)	(0.101)	(0.100)
Distance to nav. river (log)	−0.140	−0.236	−0.350
	(0.116)	(0.302)	(0.214)
Population density (log)	0.345***	0.194	0.147
	(0.100)	(0.167)	(0.120)
Ethnic groups' pop. dens. (log)	0.490***	0.240	0.065
	(0.108)	(0.184)	(0.124)
Dependence on agriculture	−0.257*	0.064	0.331
	(0.150)	(0.361)	(0.327)
Dependence on husbandry	0.113	−0.491	−0.503
	(0.138)	(0.441)	(0.436)
Intensity of agriculture	0.401	0.208	0.368
	(0.261)	(0.350)	(0.338)
Altitude	−0.064	−0.441**	−0.617***
	(0.087)	(0.220)	(0.167)
Slope	0.195*	−0.283	−0.065
	(0.101)	(0.179)	(0.136)
Temperature	0.058	0.149	0.418***
	(0.072)	(0.231)	(0.153)
Evapotranspiration	−0.089	0.059	0.135*
	(0.091)	(0.066)	(0.073)
Precipitation	0.183**	0.087	−0.073
	(0.072)	(0.173)	(0.159)
Evapotransp. / precipitation	0.153**	0.125	−0.098
	(0.071)	(0.125)	(0.144)
Suitability for agr.	0.063	−0.366**	0.021
	(0.074)	(0.152)	(0.164)
Cash crop suitability	0.156**	0.074	−0.461**
	(0.062)	(0.193)	(0.191)
RD-Design	no	yes	yes
Cutoff (dec. degrees)	–	5	2.5
Obs	92954	13455	6456
British	0	0	0
French	0	0	0

*p<0.1; **p<0.05; ***p<0.01. Standard errors are clustered on the province-level.



(a) RDD-plot discrete

(b) RDD-plot continuous

Figure A12: Marginal effect of precolonial centralization left and right of French-British borders.

Point estimates in (a) and liner trends in (b) results from estimating Equation 2. For point estimates in (a), the continuous measure of the distance to the border Δ_i is cut into categorical bins of a size of .5 decimal degrees.

the trend in the effect of centralization is captured by the term precol. centr.$_i$ $\times$ Empire$_i$ $\times$ Δ_i. To account for different levels in the effect of centralization in the two border-regions, I include the fixed slopes precol. centr.$_i$ $\times$ Border$_i$. Adding colony and border-segment fixed effects[143] α_c and γ_b, the main coefficient of interest, β_1 is driven by the jump in the marginal effect of precolonial centralization right at the border. To account for interdependencies between grid-cells and districts that are part of the same region, standard errors remain clustered on the level of provinces.[144]

Figure A12a shows that the trend in the effect of centralization on both sides of the border is reasonably smooth and well approximated by a linear term. Also, the plot shows a discrete jump of centralization's marginal effect on districts' size at the border. Lastly, the RD-design requires that precolonial centralization has no such jump in its marginal association with any other pre-treatment variable. If that is the case, these pre-treatment variables, rather than precolonial centralization might drive the results. Table A18 shows few signs of such a jump. Choosing different distance cutoffs for the analysis at 5 and 2.5 decimal degrees (≈500 and 250 km) balance is best for the wider bandwidth. Here, precol. centr.$_i$ $\times$ French$_i$ is only significantly related to cells altitude and agricultural suitability. Because this imbalance might drive the results, I estimate models with and without all co-variates as well as their interaction with French rule.

Table A19 presents the results. The first two columns show that precolonially centralized cells in the whole sample have become part of larger districts in the British, but not the French colonies. This suggests that the results from the district

[143] Note that I cut borders into segments according to distance-bins to the coastline of 100 km in order to increase the balance in the sample. This avoids that points in the North of Nigeria are compared with those in the South of Dahomey (Benin).

[144] Note that clustering on the level of districts leads to slightly smaller standard errors.

level analysis carry over to the cell-level analysis. Models 3 and 4 then implement the RDD with a bandwidth of 5 decimal degrees, Models 5 and 6 with one of 2.5 decimal degrees, each time first without and then with all covariates. They all show that, at the border, the effect of precolonial centralization on district sizes decreases by about .35 log-points as one crosses from a British to a French colony. This effect of French rule on the marginal effect of precolonial centralization on district sizes is insignificantly bigger than that estimated at the baseline (.29-.33). The results are robust to the choice of bandwidth and adding the vectors of covariates. The latter suggests that the remaining and observed imbalances do not drive the results and further support the baseline estimates.

Table A19: Precolonial centralization and the size of districts: Grid-cells, RDD at French-British borders

	All cells		Regression Discontinuity Design			
	(1)	(2)	(3)	(4)	(5)	(6)
Precol. centralization	0.266***	0.184***				
	(0.087)	(0.045)				
Precol. centr. × French	−0.472***	−0.154**	−0.367**	−0.351**	−0.370**	−0.331*
	(0.133)	(0.075)	(0.156)	(0.154)	(0.178)	(0.175)
Colony FE:	yes	yes	yes	yes	yes	yes
Border-region FE:	no	no	yes	yes	yes	yes
Dist2border × French:	no	no	yes	yes	yes	yes
Dist2border × French × Precol. centr.:	no	no	yes	yes	yes	yes
Dist. cutoff (dec. degr.):	–	–	5	5	2.5	2.5
Baseline controls:	no	yes	no	yes	no	yes
Nature controls:	no	yes	no	yes	no	yes
Ethnic controls:	no	yes	no	yes	no	yes
Mean DV	1.51	1.52	0.17	0.19	0.17	0.19
Observations	92,954	92,065	13,455	13,141	7,899	7,745
Adjusted R^2	0.574	0.823	0.687	0.767	0.696	0.793

Notes: OLS models. Standard errors are clustered on the province-level. Baseline controls include the local population density, ethnic groups' population density, and the distance to the coast as well as the closest navigable river. Nature controls consist of median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls are the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Additionally, all covariates are interacted with 'French rule'. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

I implement three robustness checks to this analysis. First, I continuously vary the distance-to-border cutoff between .1 and 5 decimal degrees. Figure A13 shows no statistically significant discontinuity in the effect of precolonial centralization on district sizes once when I restrict the sample to units very close to the border. The discontinuity becomes statistically significant with the sample of cells closer to 1.5

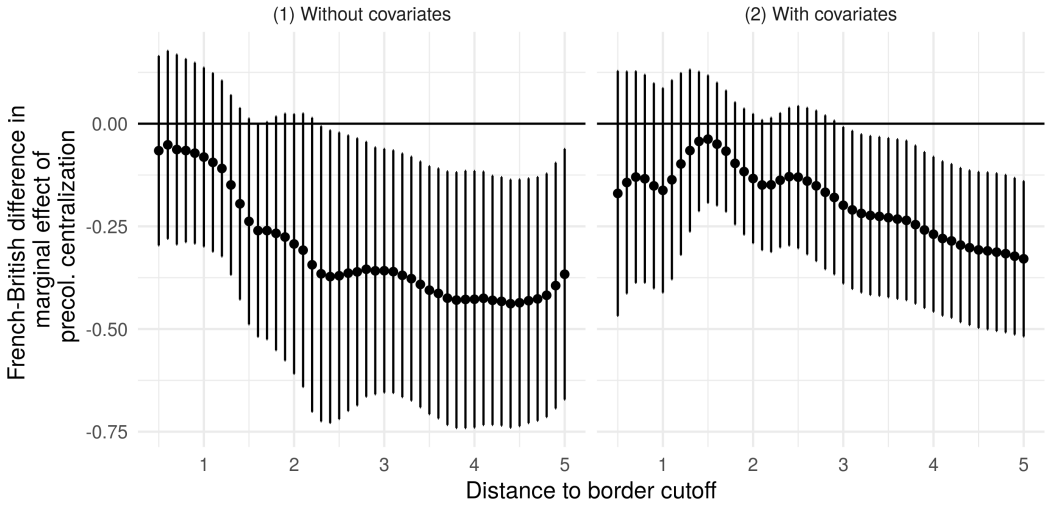


Figure A13: French-British difference in the marginal effect of precolonial centralization with varying cutoffs of the maximum distance to the closest border.
Point estimates with 95% confidence intervals represent β_1 from Equation 2 estimated with varying distance-to-border cutoffs.

(2) decimal degrees in the Model without (with) covariates. The second robustness check tests whether the choice of the size of grid cells affects the analysis. Figure A14 suggests the results to be robust to variation in the size of grid cells. It plots the results from RDD-estimates based on the the centroids of grid cells of a resolution of .083 (the baseline), .17, .25, and .33 decimal degrees. The estimated difference in the effect of precolonial centralization on district sizes at the French-British border hardly varies between the models.

The third robustness check addresses the caveat that parts of the two borders might have been locally adjusted to prevailing socio-demographic conditions and might therefore not be locally as-if-random. Griffiths (1986) for example points to the 1906 French-British agreement on the border between Nigeria and Dahomey which allowed small indentations of up to 8km for towns and villages (see also Brownlie, 1979, 165-189). Assuming that the approximate location of the border was still as-if-randomly determined by the race of the colonial powers towards the continent's interior, we can drop all observations very close to the border, were they would be affected by endogenous local adjustments. If the estimates would be driven by such adjustments, coefficient sizes would decrease and approach zero. Table A20 presents the results from this 'donut'-RDD for which I drop all grid-cells closer to 10km to the borders. This yields coefficients that are larger than the ones estimated in the baseline model. The results are thus not driven by potentially endogenous local adjustments of colonial borders.

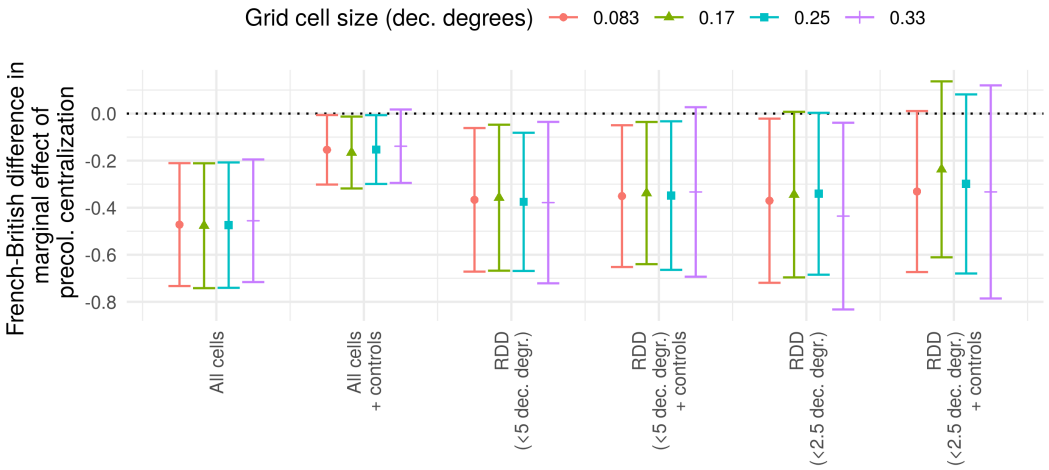


Figure A14: Re-estimating all models in Table A19 with varying sizes of centroids' grid cells.
Point estimates with 95% confidence intervals represent β_1 from Equation 2.

Table A20: Precolonial centralization and the size of districts: RDD at French-British borders, donut specification

	Regression Discontinuity Design			
	(1)	(2)	(3)	(4)
Precol. centr. × French	−0.397**	−0.353**	−0.449**	−0.395**
	(0.163)	(0.160)	(0.196)	(0.193)
Colony FE:	yes	yes	yes	yes
Border-region FE:	yes	yes	yes	yes
Dist2border × French:	yes	yes	yes	yes
Dist2border × French × Precol. centr.:	yes	yes	yes	yes
Min. dist. (dec. degr.):	0.1	0.1	0.1	0.1
Dist. cutoff (dec. degr.):	5	5	2.5	2.5
Baseline controls:	no	yes	no	yes
Nature controls:	no	yes	no	yes
Ethnic controls:	no	yes	no	yes
Mean DV	0.17	0.19	0.17	0.19
Observations	13,140	12,830	7,584	7,434
Adjusted R^2	0.688	0.770	0.694	0.795

Notes: OLS models. Standard errors are clustered on the province-level. Baseline controls include the local population density, ethnic groups' population density, and the distance to the coast as well as the closest navigable river. Nature controls consist of median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls are the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Additionally, all covariates are interacted with 'French rule'. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

A3.4 British administrators

Table A21: Local-level European Administrators: Nigeria and Uganda

	European administrators per million			
	(1)	(2)	(3)	(4)
Precol. centralization	−2.395**	−0.701	−3.597**	−1.330
	(1.157)	(1.760)	(1.551)	(1.929)
Colony FE:	yes	yes	yes	yes
Baseline controls:	yes	yes	yes	yes
Nature controls:	no	yes	no	yes
Ethnic controls:	no	no	yes	yes
Mean DV:	15	15	15	15
Observations	34	34	34	34
Adjusted R^2	0.495	0.506	0.497	0.446

Notes: OLS models. Standard errors are clustered on the district-level. The sample consists of the colonies of Nigeria and Uganda. Baseline controls consist of the logged 1880 population density of the district and its ethnic groups, the logged distance to coast and closest navigable river, and, for per-capita outcomes, the logged district area and population. Nature controls are the median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls include the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

In order to test whether precolonial centralization affects not only the size of British districts, but also directly the administrative effort exerted by the British colonial government, Table A21 presents models of the association between the centralization of precolonial polities and the number of British administrators per million inhabitants in 34 Nigerian and Ugandan provinces and districts. Although the number of observations is very small, the correlation is substantive. Without the vectors of controls added in Models 2–4, one additional level of centralization is associated with 2.4 administrators per million – a variables with a mean of only 14.8 in the sample. Adding the vector of ethnic control (Model 3) increase the size of the coefficient of precolonial centralization. However, adding the vector of 'nature' controls renders the association smaller and insignificant. While this casts doubt on the stability of the results, cautious interpretation is necessary here. First, none of the additional variables is either significant or improves the fit of the model by much. Furthermore, with 34 observations in the sample, the addition of the rather long vector of eight and later eleven controls in Model 4 likely causes multicolinearities that may render the coefficients meaningless.

A4 Evidence from native administrations

The following section presents additional analyses on the effect of precolonial centralization on the indigenous side of local governance, in particular native authorities' budgets. Subsection A4.1 presents all robustness checks highlighted in the main text. Subsection A4.3 discusses the results of an analysis of public finance data from French West Africa. And lastly, Subsection A4.4 presents analysis on the association between precolonial centralization and the status of chiefs in colonial Nigeria.

A4.1 Robustness checks

Following the robustness checks conducted in the analyses of polities' survival and district sizes, I test whether the results are driven by (1) potential omitted variables, specifically the disease environment (Malaria and Tsetse suitability), (2) the unequal weight of colonies, and (3) outliers. Furthermore, I test whether collapsing the original panel data on budgets into a cross-sectional data set biased the results. To that intent, I (4) estimate a district-weighted panel model. Furthermore, I (5) model the data in a hierarchical manner, including colony fixed effects and district random effects. As Table A22 demonstrates, none of these changes the estimated effect of precolonial centralization on native treasuries' revenues. The estimated association between revenues per capita and precolonial centralization remains stable in size and statistical significance.

Noting that the measurement of precolonial centralization might be imperfect, I also reestimate the main model using the alternative proxies for precolonial centralization in Table A23. First, I use the Murdock-mapping of Michalopoulos and Papaioannou (2013) (Models 1–2) which differs slightly from the mapping produced by Nunn and Wantchekon (2011) used in the main analysis. This does not affect the estimated effect of pre-colonial centralization. I then draw on a dummy for whether a district comprises a polity's capital in 1885, based on the data on precolonial polities collected for the first empirical part of this study. Districts with a capital in 1885 exhibit 76 percent larger budgets (Model 3), but not on a per-capita basis (Model 4). This might be indicative of differential effectiveness of indirect rule in rural and urban(izing) areas that developed around the old centers of society. However, it must be noted that a simple "capital in 1885" dummy is not precise enough to mirror variation in the level of centralization of precolonial polities and does not provide information about the spatial extent of its polity. Because of the resulting measurement error, the results might also biased towards zero. Also, in order to gauge the consistency of the budget data with that on the power of chiefs (see Subsection A4.4, Models 5 and 6 finally test whether, in Nigeria, the class of the most powerful chief in a district is indeed associated with the size of native treasuries. It

Table A22: Per-capita revenues: Robustness checks

	Revenues p.c. (log)				
	Desease	Col.-weight	No outlier	Wght. panel	HLM
	(1)	(2)	(3)	(4)	(5)
Precol. centralization	0.24***	0.24***	0.19***	0.23***	0.20**
	(0.09)	(0.07)	(0.07)	(0.07)	(0.08)
Fixed effect:	colony	colony	colony	col.-year	col.-year
Baseline controls:	yes	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes	yes
Ethnic controls:	yes	yes	yes	yes	yes
Mean DV:	1.1	1.1	1.2	1	1.2
Observations	146	146	138	1,315	1,765
Adjusted R^2	0.62	0.79	0.64	0.64	
Log Likelihood					-588.62
Akaike Inf. Crit.					1,345.24
Bayesian Inf. Crit.					1,805.22

Notes: OLS models in 1–4, hierarchical linear model in 5. The sample includes the colonies of the Gold Coast (Ghana), Nigeria, Nyasaland (Malawi), and Uganda. Standard errors are clustered on the province-level. Baseline controls are the logged 1880 population density of the district and its ethnic groups, the logged distance to coast and closest navigable river, and the logged district area and population. Nature controls include the median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls are the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

emerges that treasuries were 130 (58) percent bigger in absolute (per-capita) terms in districts with a "first class" as compared to those with a "second class" chief.

Lastly, detailed information on budget lines retrieved from the official reports allows me to further explore the implications of precolonial institutions on the financial governance of native treasuries. Although standardizing budget items across many and changing formats adds uncertainty and noise to the data,[145] it is of substantial interest to know whether the above reported patterns are driven by only a few or all budget lines. All respective results are reported in Tables A24 and A25. Disaggregating the revenue side shows that all revenue items are positively related to precolonial institutions, while the largest effects are visible for per capita revenues from 'fees and fines' and a category of 'other' revenues, which, inter alia, includes revenues from interests on savings. Unfortunately, the financial reporting of taxation was such that it is impossible to disentangle the amount of collected taxes from the amount of rebated taxes, which is ultimately reported in the budgets. On the expenditure side reported in Table A25, we see significant and positive effects of precolonial centralization across almost all items, in particular items relating to

[145] I standardize the varying items into their smallest common denominator in order to derive the most consistent data set possible.

Table A23: Revenues (2016 £): Alternative specifications

	Revenues (log):					
	Total	Per capita	Total	Per capita	Total	Per capita
	(1)	(2)	(3)	(4)	(5)	(6)
Precol. centr. (M&P)	0.55***	0.21***				
	(0.13)	(0.07)				
Capital 1885			0.57**	0.13		
			(0.22)	(0.15)		
Chief class					0.85***	0.46***
					(0.15)	(0.09)
Colony FE:	yes	yes	yes	yes	yes	yes
Baseline controls:	yes	yes	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes	yes	yes
Ethnic controls:	yes	yes	yes	yes	yes	yes
Mean DV:	13	1.1	13	1.1	13	0.87
Observations	144	144	146	146	86	86
Adjusted R^2	0.58	0.61	0.52	0.60	0.50	0.24

Notes: OLS models. Standard errors are clustered on the province-level. The sample includes the colonies of the Gold Coast (Ghana), Nigeria, Nyasaland (Malawi), and Uganda. Baseline controls consist of the logged 1880 population density of the district and its ethnic groups, the logged distance to coast and closest navigable river, and, for per-capita outcomes, the logged district area and population. Nature controls are the median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls include the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

per capita spending on administration, social services such as education and health, as well as expenditure for agricultural development. The one insignificant but also positive coefficient is estimated for lines spent on 'law and order'. This might be of substantive importance, given that a reading of historical accounts suggests that areas under direct control were more prone to violent resistance against British rule (e.g. Martin, 1988).

Table A24: Native treasury revenues per capita by type (2016 £)

	Revenues/capita (log)			
	Taxes	Fees & fines	Transfers	Other
	(1)	(2)	(3)	(4)
Precol. centralization	0.168**	0.272***	0.285	0.382**
	(0.081)	(0.103)	(0.607)	(0.164)
Colony FE:	yes	yes	yes	yes
Baseline controls:	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes
Ethnic controls:	yes	yes	yes	yes
Mean DV:	0.53	-0.77	-5.5	-1.4
Observations	146	146	146	127
Adjusted R^2	0.412	0.707	0.680	0.473

Notes: OLS models. Standard errors are clustered on the province-level. The sample includes the colonies of the Gold Coast (Ghana), Nigeria, Nyasaland (Malawi), and Uganda. Baseline controls consist of the logged 1880 population density of the district and its ethnic groups, the logged distance to coast and closest navigable river, and, for per-capita outcomes, the logged district area and population. Nature controls are the median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls include the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

Table A25: Native treasury expenditures per capita by type (2016 £)

	Expenditures/capita (log)					
	Admin.	Order	Educ. & Health	Agric.	Works	Other
	(1)	(2)	(3)	(4)	(5)	(6)
Precol. centralization	0.27**	0.13	0.38**	0.94***	0.29**	0.35***
	(0.10)	(0.09)	(0.17)	(0.26)	(0.11)	(0.12)
Colony FE:	yes	yes	yes	yes	yes	yes
Baseline controls:	yes	yes	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes	yes	yes
Ethnic controls:	yes	yes	yes	yes	yes	yes
Mean DV:	-0.098	-0.57	-0.94	-3.2	-0.23	-1.4
Observations	126	126	126	126	126	126
Adjusted R^2	0.51	0.27	0.53	0.35	0.41	0.75

Notes: OLS models. Standard errors are clustered on the province-level. The sample includes the colonies of the Gold Coast (Ghana), Nigeria, Nyasaland (Malawi), and Uganda. Baseline controls consist of the logged 1880 population density of the district and its ethnic groups, the logged distance to coast and closest navigable river, and, for per-capita outcomes, the logged district area and population. Nature controls are the median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls include the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

A4.2 Colony-level jackknife

In line with the main analyses on polities' survival and districts' sizes, I again check the robustness of the results to iteratively dropping each of the four colonies from the sample. In the case of the data on native administrations' budgets, this test comes with the limitation that the sample for a large part consists of observations from Nigeria ($N = 86$, 59% of the sample), whereas the Gold Coast ($N = 29$), Nyasaland ($N = 19$), and Uganda ($N = 13$) contribute much less power to the analysis. Given the much reduced statistical power, I therefore re-estimate the baseline models of the effect of precol. centralization with and without colony fixed effects. The comparison of the resulting specifications with the full sample in the top row of Figure A15 reveals that the colony fixed effects do not have a systematic or large effect on the results.

The results are presented in the remaining rows of Figure A15. They show an unsurprising large effect of observations from Nigeria which increases as more and more covariates are added. Nigeria drives the entirety of the results with the full set of covariates. However, given that dropping Nigeria leaves us with only 61 observations in a model with 17 covariates (20 covariates with the fixed effects). The results of the models without the fixed effects indicate, in the two specifications without the 'ethnic controls' that correlated significantly with the indicator for precol. centralization that there is an effect of more centralized districts having access to more revenues. This result relies in part on the comparison of the comparatively centralized Gold Coast and Uganda with less centralized Nyasaland.

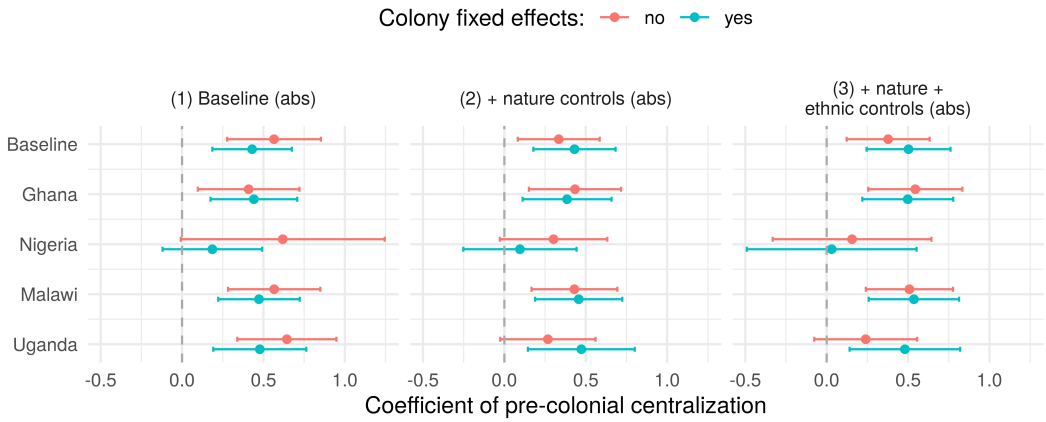


Figure A15: Colony-level jackknife: Estimated effects of precol. centralization in British colonies on the absolute amount of expenditures of native administration when iteratively dropping each colony from the sample.

A4.3 French West Africa

To explore whether district finances in French colonies were marked by similar or opposite dynamics, I make use of Huillery's (2010) data on tax collection, public investments, and the number of teachers and doctors in 109 French West African cercles. Unfortunately, the data are not of the same format as those collected from the British colonies. They do neither contain total local revenues and expenditures, nor do they allow for a breakdown of local budgets. With that limitation in mind, I proceed in parallel to the analysis of the British budget data, reporting results of analyses of absolute outcomes in Table A26 and of per-capita outcomes in Table A27. The results show that precolonially centralization had, if at all, a negative effect on the size of district budgets in French West Africa. They are thus similar in direction but not precision to those of the analysis of districts' sizes. Centralized districts had no differential tax collection, but featured lower rates of investments and numbers of teachers and doctors employed by the French. This is similar to results previously reported by Huillery (2010). In per-capita terms, only the number of doctors is significantly lower in centralized districts than elsewhere. All other indicators yield statistically insignificant results. The negative or insignificant associations highlight once again the different pattern of local governance by direct and indirect means apparent in the British and French colonies.

Table A26: Precolonial centralization and absolute local revenues & expenditures (logged): French West Africa

	Taxes	Public works	Teachers	Doctors
	(1)	(2)	(3)	(4)
Precol. centralization	0.012	−0.347	−0.200**	−0.343***
	(0.180)	(0.215)	(0.098)	(0.112)
Colony FE:	yes	yes	yes	yes
Baseline controls:	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes
Ethnic controls:	yes	yes	yes	yes
Mean DV:	13	13	1.8	2.2
Observations	109	109	109	109
Adjusted R^2	0.682	0.839	0.521	0.325

Notes: OLS models. Standard errors are clustered on the province-level. The sample consists of all French colonies in West Africa. Baseline controls consist of the logged 1880 population density of the district and its ethnic groups, the logged distance to coast and closest navigable river, and, for per-capita outcomes, the logged district area and population. Nature controls are the median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls include the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

Table A27: Precolonial centralization and local revenues & expenditures per-capita (logged): French West Africa

	Taxes	Public works	Teachers	Doctors
	(1)	(2)	(3)	(4)
Precol. centralization	0.153	−0.143	−0.117	−0.274**
	(0.186)	(0.189)	(0.084)	(0.104)
Colony FE:	yes	yes	yes	yes
Baseline controls:	yes	yes	yes	yes
Nature controls:	yes	yes	yes	yes
Ethnic controls:	yes	yes	yes	yes
Mean DV:	1.6	1.4	-9.6	-9.2
Observations	109	109	109	109
Adjusted R^2	0.701	0.901	0.776	0.651

Notes: OLS models. Standard errors are clustered on the province-level. The sample consists of all French colonies in West Africa. Baseline controls consist of the logged 1880 population density of the district and its ethnic groups, the logged distance to coast and closest navigable river, and, for per-capita outcomes, the logged district area and population. Nature controls are the median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls include the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.

A4.4 Chiefs' class in colonial Nigeria

Table A28 summarizes the results from an analysis of the association between the level of precolonial centralization and the highest class of chiefs in Nigerian districts. The results point to a significant correspondence of the two: The most powerful chief in a district has a class (ranging from 1 to three, the highest) that increase between .28 and .48 points with each level of hierarchy featured in the districts' precolonial institutions (0-3). This is further evidence that the British devolved more power to local authorities that could build on pre-existing institutions.

Table A28: Highest class of chief in district: Nigeria (1924/1929)

	Highest class of chief (1-3)		
	(1)	(2)	(3)
Precol. centralization	0.477***	0.288*	0.276*
	(0.088)	(0.146)	(0.139)
Colony FE:	yes	yes	yes
Baseline controls:	yes	yes	yes
Nature controls:	no	yes	yes
Ethnic controls:	no	no	yes
Mean DV:	1.6	1.6	1.6
Observations	86	86	86
Adjusted R^2	0.427	0.454	0.470

Notes: OLS models. Standard errors are clustered on the district-level. The sample consists of the colony of Nigeria. Baseline controls consist of the logged 1880 population density of the district and its ethnic groups, the logged distance to coast and closest navigable river, and, for per-capita outcomes, the logged district area and population. Nature controls are the median altitude and slope, mean annual temperature, precipitation and evapotranspiration, the ratio of the two, agricultural suitability, and soils' suitability for cash crop production. Ethnic controls include the reliance on agriculture and pastoralism, as well as the intensity of agricultural activities. Significance codes: *p<0.1; **p<0.05; ***p<0.01.