

Legacies of Islamic Rule in Africa: Colonial Responses and Contemporary Development

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Abstract

Colonial rule had long-lasting effects on economic and political development. However, colonial policies and investments varied across and within colonial territories, often in response to local geographic and political conditions. We argue that the religious basis of authority in pre-colonial societies was an important political factor shaping the colonial response in Africa. In particular, we argue the presence of Islamic rule affected long-term economic development through its impact on the investments made by colonial administrators and missionaries. Focusing on historical kingdoms in Africa, we find that areas governed by Islamic states in the pre-colonial period experience higher infant mortality, fewer years of education, and lower density of nightlights in the contemporary period in comparison to areas governed by traditional or Christian kingdoms or stateless areas. The evidence suggests that these long-run effects of Islamic rule are better explained by the location of missionaries and weak penetration of the colonial administration than by the influence of Islamic beliefs.

Keywords: Africa, Islamic rule, historical institutions, missionaries, education, health, economic development

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Introduction

European colonialism had a profound effect on economic and political development around the world. Existing work on the long-term effects of colonialism has examined how features of colonial rule – including direct versus indirect rule, identity of colonizer, the extent of forced labor and oppression, and investments in infrastructure and education – affect contemporary outcomes such as public goods provision (Iyer, 2010), educational attainment (Wantchekon, Klašnja and Novta, 2015), support for democracy (Lechler and McNamee, 2018), and interethnic trust (Blouin, 2021), among others.¹ Increasingly, this work examines within-country variation in colonial policy and investments, and in so doing identifies historical drivers of contemporary subnational economic and political development (Roessler et al., 2020; Ricart-Huguet, 2020). These institutions and investments were themselves shaped by underlying factors, including physical and political geography such as disease environment and population density in the pre-colonial period (Acemoglu, Johnson and Robinson, 2001; Herbst, 2000; Huillery, 2010; Jedwab, zu Selhausen and Moradi, 2018).

In this paper, we point toward a particular feature of pre-colonial political geography that has been relatively unexplored to date: the extent of Islamic political authority governing African societies in the pre-colonial period. We argue that the presence of Islamic political institutions influenced colonial-era investments and institutions, leading to lower levels of contemporary economic development in those areas previously governed by Islamic institutions compared to those that were not. The explanation for contemporary disparities in economic development has less to do with Islam or even the content of Islamic institutions than with how colonial agents *responded* to the presence of Islamic rule.

We suggest that the presence of Islamic rule affected the behavior of both colonial administrators and Christian missionaries. First, areas under Islamic rule experienced less interference by Christian missionaries. This meant that these areas experienced lower investments by missionaries in social services such as education and health. Second, areas under Islamic rule experienced relatively lower penetration by the colonial state in terms of administration and social services.

This was due in part, we suggest, to the relatively greater deference given to Islamic political authority as compared to traditional political authority, leading colonial administrators to practice a less interventionist form of colonial rule that left areas under Islamic rule economically worse off in the long-run.

To test this argument, we compile a geo-referenced dataset of state centralization that differentiates between pre-colonial states in Africa according to their religious basis of authority. Our data trace the territorial extent of traditional, Christian, and Islamic kingdoms in Africa from 1600CE until 1900CE. By states, we refer to political organizations in which territory was controlled by force and governed by a centralized authority. We define Islamic kingdoms as those states in which Islam provided a basis of political authority and legitimacy for the ruling elite. Approximately one third of the historical states we identify in Africa in the centuries leading up to colonial period meet the criteria of Islamic kingdoms for a substantial period of time.

As areas in Africa under Islamic rule were almost invariably centralized states, and given a growing body of research showing the long-term benefits of pre-colonial centralization (Michalopoulos and Papaioannou, 2013; Gennaioli and Rainer, 2007), our primary analysis compares the long-term effect on contemporary development outcomes of exposure to Islamic compared to non-Islamic states in the pre-colonial period. We find that people living in areas historically exposed to Islamic rule experience higher rates of infant mortality and fewer years of formal education today in comparison to comparable areas ruled by traditional or Christian kingdoms. We also find lower night light density, an indicator of economic development, in areas previously under Islamic rule, although the estimates for this outcome are more sensitive to the particular model specification.

We show that the persistent effects of Islamic rule are not a function of the initial conditions in areas where such states consolidated, nor a reflection of a shift in trade routes from the Sahara to the coast. We also demonstrate that Islamic religious beliefs do not explain the long-term effect of Islamic rule on contemporary development. Rather, we find evidence consistent with the idea that these effects are driven by colonial responses to Islamic rule. First, Christian missions were

less likely to be established in the territorial area of ethnic groups that had been ruled by Islamic kingdoms. Second, the distribution of ages in post-colonial censuses demonstrates more digit heaping in areas with Islamic kingdoms, suggesting that colonial-era governments invested less in developing administrative capabilities in these areas.

Together, our findings underscore the persistent legacies of historical institutions but also the important differences among pre-colonial states. In particular, the religious basis of political authority, a key feature which varies across centralized states in Africa, emerges as consequential not because of the *content* of religious beliefs, but instead because colonial powers engaged differently in areas ruled by Islamic political institutions.

While the extent of historical centralization has been shown to be an important driver of contemporary economic development, measured by nightlights (Michalopoulos and Papaioannou, 2013), public goods provision (Gennaioli and Rainer, 2007), and income per capita (Bandyopadhyay and Green, 2016), our findings demonstrate that centralized states themselves are quite diverse, and centralization itself is no panacea for long-term development. This point has been made in comparisons of long-run development in the Middle East and Europe, though not in a way that allows for the disentangling of regional from religious or institutional factors. Some have argued that the economic stagnation of Middle Eastern states is a result of the relationship between Muslim leaders and religious elites, as well as their inability to adapt to changing political and economic conditions (Blaydes and Chaney, 2013, 2016; Chaney, 2016; Kuran, 2011).

However, while the role of religious authority in Middle Eastern states is widely thought to have contributed to the stagnation of these economies, one limitation of the existing literature is that there is little variation in the type of religious authority within regions, while any cross-regional comparisons are plagued by potential confounders. By contrast, societies within Africa vary in both the extent of centralization and the type of religious political authority. Thus, we are able to examine both whether and how Islamic rule may impact long-term development, as well as the mechanisms through which religious authority operates.

Ultimately, our argument about the role of Islamic rule is different than those advanced in

the context of the Middle East. We suggest that Islamic rule mattered less due to the particular religious beliefs, institutions, or practices in these as compared to other areas, but rather in how colonial authorities reacted to the presence of Islamic authorities. Our findings offer a fresh perspective the trajectory of economic development in Africa and in particular the sources of persistent inequality (Platas Izama, 2016; Ricart-Huguet, 2020; Alesina et al., 2021), reinforcing a recognition of the long-lasting effects of the colonial encounter but also surfacing the central – and perhaps understudied – role of religion in shaping subsequent development trajectories.

Islamic Rule, Colonial Rule, and Long-term Development in Africa

Islam arrived in sub-Saharan Africa beginning around the 8th century CE, spread initially by North African traders who crossed the Sahara into West Africa and traders from the Arabian peninsula along the East African coast. The millennium preceding the European colonization of Africa can be characterized by successive periods of expansion and conquest by Islamic states, first from North Africa and then increasingly within the interior of West Africa (Sluglett and Currie, 2015). By the 19th century a series of reform movements established a new set of Islamic states across West Africa, the most successful of which was led by Usman dan Fodio, who established the Sokoto Caliphate, covering much of present-day Northern Nigeria.

In Africa, Islamic political authority took a variety of forms, ranging from a leader's self-identification as a Muslim to a ruling family claiming to be descendants of Prophet Mohammad. The latter was arguably a more powerful form of Islamic political authority because it meant that rule was divine, and necessitated that succession be hereditary. For example, the king of the Islamized Ghana state around 1100 AD claimed to descend from the Quraysh, an Arab tribe into which the Prophet Mohammad was born.² Even in the absence of a claim of descending from the Prophet, Islam could provide political legitimacy and earn political leaders the support of prominent Muslim communities, such as those involved in trade (Stride and Ifeka, 1971).

Rulers in Islamic states were able to earn legitimacy and produce stability by using religious beliefs and institutions to reinforce their political authority. In practice, this was often achieved through the incorporation of Islamic law and the active support of religious scholars. One political benefit of Islam was that it offered a means through which a leader could secure loyalty on the basis of religion from otherwise diverse groups (Stride and Ifeka, 1971, 136). Islam was also beneficial for governance in that it offered a common language and script, which served to help unify culturally diverse areas with respect to administration, commerce, and scholarship (Levtzion and Spaulding, 2003, ix).

While the role of religion in governance varied across Islamic states, collectively they shared common characteristics: rulers built centralized, hierarchical structures to control diverse geographic territories, and religious beliefs and religious scholars to bolstered political authority. Islamic states differ from other centralized polities in pre-colonial Africa that did not adopt Islamic institutions, experience widespread conversion to Islam, or employ Islam as a means of legitimizing rule. Some well-known examples of traditional or indigenous, as opposed to Islamic, states in pre-colonial Africa include the Zulu kingdom in South Africa, Kuba kingdom in Congo, Nyiginya kingdom in Rwanda, Buganda kingdom in Uganda, and Ashanti kingdom in Ghana.

Why would Islamic rule matter for long-term development? Our argument is not that Islamic beliefs or even Islamic institutions per se affected development, but rather that pre-colonial Islamic rule shaped the nature of the colonial encounter, with long-term political and economic effects. Upon their arrival and subsequent colonization of the African continent, Europeans encountered the diverse set of societies we have described above and shaped their strategies in response to political geography. In particular, we argue that Europeans responded to Islamic kingdoms differently from those without Islamic influences, with long-lasting effects on the extent of administrative presence and the availability of social services, particularly formal education.

First, Christian missionaries were given limited opportunities to operate in areas under Islamic rule. This matters because missionaries provided a large proportion of social services during the colonial period. Colonial governments had neither the interest nor financial means to

provide these services on a broad scale, so missionaries played a central role in establishing the first educational and health facilities (Abernethy, 2000). Second, we suggest that the penetration of the colonial state – separate from missionary work – was less extensive in Islamic states, in part because colonial administrators deemed Islamic rulers as more legitimate than traditional, “tribal” or “pagan” rulers. We elaborate on these two types of colonial responses – by Christian missionaries on the one hand and colonial administrators on the other – below.

Christian Missionaries and Social Services

We first propose that areas under Islamic rule had more limited exposure to Christian missionaries, which resulted in lower investments in social services, particularly education. The relative absence of missionaries also led to lower levels of religious competition, a factor which has been associated with greater public goods provision in colonial Africa (Gallego and Woodberry, 2010).

Colonial governments, especially in the early days of colonialism, were not in a position either financially or administratively to provide basic social services to the majority of inhabitants of African colonial territories. Christian missionaries began fulfilling this function, in part as a means to win over converts. Existing research has shown how the investments of missionaries affected long-term outcomes in education, income, and democratization (Woodberry, 2012; Nunn, 2014; Valencia Caicedo, 2018).

Allowing missionaries to provide services could promote stability, prevent disease, improve agricultural production, and provide the human capital necessary for staffing the colonial bureaucracy (Abernethy, 2000). On the other hand, missionaries could themselves be a source of conflict, either in their competition with one another, or when facing resistant African populations. Colonial authorities sought to balance these competing effects.

One way in which this was done was to limit the work of missionaries in predominantly Muslim areas. Colonial authorities anticipated that resistance to missionary activity would be stronger in areas ruled by Islamic authorities than authorities who derived their authority from hereditary lineages or traditionalist religions. For example, British administrators restricted mis-

sionary presence in Northern Nigeria and forbade missionaries from proselytizing among Muslims in Sudan (Sharkey, 2012).

Providing evidence to this claim, Lord Lugard, the first High Commissioner of Northern Nigeria and later Governor-General of the whole of Nigeria, and often termed the father of indirect rule, reflected in 1922 on his policies towards facilitating missionary activity in traditionalist and Islamic areas in that region:

“Every administrator would, I think cordially welcome the establishment of Missions among pagan tribes ... The case is otherwise when the missionary desires access to an advanced Moslem state, where his presence would be resented, and might be regarded as a breach of the pledge of non-interference with the religion of the people.” (Lugard, 1922)

As suggested by this historical anecdote, the religious basis of authority influenced both how local political elites reacted to Christian missionary activity as well as the compromises that colonial administrations were willing to strike with such authorities. In other cases, missionaries were not prevented from settling in Muslim areas by colonial authorities, but rather found these were areas in which they were not very successful either in converting Africans or enticing them to attend schools. For example, in southeastern Nyasaland (present-day Malawi), missionaries worked in fairly large numbers throughout the early nineteenth century in areas with large Muslim populations with little or nothing to show in terms of converts or school attendance.³

Thus, missionaries themselves may have directed less effort or given up missions in areas with substantial Muslim populations. Indeed, Jedwab, zu Selhausen and Moradi (2018) finds that distance to historical Muslims centers is positively correlated with missionary presence. Because missionaries provided such a large proportion of colonial schools – greater than 90 percent in territories like the Gold Coast (Ghana), Uganda, and Nyasaland (Malawi) (Berman, 1974) – and because they were less likely to operate in predominantly Muslim areas, there were many fewer missionary schools in these areas and inhabitants were thus less likely to attend school during the colonial period.

An early deficit in formal education could persist for a variety of reasons, including poor in-

frastructure, the inter-generational effects of education (Wantchekon, Klašnja and Novta, 2015), and lower prioritization of formal schooling. Several studies have linked missionary investments to contemporary educational attainment (Nunn, 2014; Okoye and Pongou, 2014; Alesina et al., 2019; Cagé and Rueda, 2016). Further, areas with Islamic states were also those most likely to have Islamic education systems already in place, and thus may have seen less of a need for an alternative educational system as well as higher costs of adopting new forms of education. For example, Dev, Mberu and Pongou (2016) find that in Nigeria, predominantly Muslim groups tended to invest heavily in Koranic as opposed to formal education.

At the same time, the implicit and explicit policies of isolating Muslim areas from Christian influence also meant that Muslim elites themselves were shielded from competition with missionaries providing these services. As a result, they faced little pressure to amend existing Islamic education to more closely reflect the curriculum in government or missionary schools.⁴ Given that competition has been shown, at least in the case of Catholics and Protestants, to increase long-term schooling outcomes, the absence of competition could also be another explanation for relatively lower educational attainment among Islamic states (Card, Dooley and Payne, 2010; Gallego and Woodberry, 2010). Research from the Middle East has also suggested that when the power of religious elites is high or increases – for example when they are shielded from competition or their place in society protected – they will more effectively block access to the types of education that might reduce their authority (Chaney, 2016). Thus, in addition to lower access to formal education as a result of more limited investments by Christian missionaries, less competition among religious elites in areas with Islamic states could also have reduced incentives to invest in or advocate for widespread formal education.

It should be recognized, however, that in some if not all Islamic states there already existed an education system which provided religious education and sometimes instruction in literacy and numeracy as well (Launay, 2016). Although Islamic religious education was not particularly valued as the colonial economy developed, it may have been costly to switch from this to an alternative education system or to dramatically reform existing curricula. Further, the skills and

teaching provided in Islamic schools, even if not particularly beneficial economically, were likely in demand from Muslim communities. At the same time, many Muslim communities were concerned about sending their children to missionary schools for fear of conversion (Izama, 2014). All of these factors could also have contributed to low uptake or demand for the formal education offered in government or missionary schools.

Limited Penetration of the Colonial State

The second mechanism through which the presence of Islamic institutions historically might translate into poor development outcomes today is through the extent of penetration of the colonial state. This mechanism focuses specifically on *non-missionary* colonial investments in administration and social services.

We suggest that all else equal, areas under Islamic rule experienced a less interventionist form of indirect rule, where colonial authorities were more likely to leave intact Islamic systems of authority than those of traditional authority. This is in part because many colonial administrators viewed Islam as a more legitimate basis of authority than traditional religion, and often found it expedient to govern through existing Islamic political and legal systems. As a result, we suggest colonial administrators were less likely to invest in administrative capacity and social services in these areas. For example, colonial schools in these areas were designed to cater primarily to the ruling class rather than the broader population. Those areas under less interventionist forms of colonial rule may also have been less well positioned to access the post-colonial state and its resources.

Some supportive evidence for this mechanism is noted by, Huillery (2010), who finds that in French West Africa, colonial authorities were more likely to settle in areas that were prosperous in the pre-colonial period, except in cases when those areas were hostile. She further finds that kingdoms were more likely to be hostile and that there is likely a correlation between the degree of hostility and Islam, which is corroborated in colonial reports from the time (Huillery, 2010, 28). As a result, much colonial investment – for example in school infrastructure – was concentrated

along the coast, including capital cities.

Another indication of strategic placement of administration can be found in examining the location of colonial capitals. The rationale for the location of colonial capitals varied, but it is notable that despite the significant presence of Islam at the dawn of the colonial period, almost none of the colonial capitals in sub-Saharan Africa were located in Islamic kingdoms, while at least ten were located within a traditional or Christian kingdom according to our kingdoms dataset. This may reflect a more general inequality in the distribution of resources and access to the colonial state between Islamic kingdoms and other parts of the continent.

All coastal states in West Africa have capitals on the coast (Clarke, 1971), despite the long history of centralized states toward the interior of West Africa. Both early capitals of French West Africa, for example, Saint-Louis and Dakar, are located on the Senegalese coast, relatively far from Islamic kingdoms. By contrast, in East Africa, several major capitals of British territories, such as Nairobi, were located inland, while Islamic influence was concentrated along the coast. Inland East African capitals were often established earlier than their inland West African counterparts.⁵

Platas Izama (2016) uses the cases of the Nigerian Emirates and the Buganda kingdom – both centralized states in the pre-colonial period located hundreds of miles from the coast – to illustrate variation in colonial response in areas with and without a history of Islamic rule. She argues that the British adopted a less interventionist form of indirect rule in the Islamized Nigerian Emirates, shielding political elites there from both religious and political competition. In Buganda, the British effectively installed an Anglican king on the throne of the kingdom, and played an active role in the administration of Buganda for much of the colonial period. These differences in administration can be seen in the extent of the colonial footprint with respect to European settlement. In the early period of colonization in Northern Nigeria, the British had no more than 100 officers governing a territory of 500,000 square kilometers with 9 million people (Loimeier, 2013). By contrast, by 1919 there were 557 Europeans living in Buganda, an area of only 22,000 square miles (Protectorate, 1919). Buganda came to be the seat of the government of Uganda Protectorate, while Northern Nigeria remained an outpost of the colonial regime with far fewer

administrative posts even when compared to southern Nigeria (Perham, 1968). Like Platas Izama (2016), we suggest that the presence of Islamic political authority shaped colonial responses and investment.

This geographical disparity in colonial investments was compounded by a human capital shortfall, which may have further isolated areas with Islamic kingdoms. Both the colonial and post-colonial state required skilled bureaucrats who would have needed to attend formal schooling, which often required learning the language of the colonizer. Limited access to this type of education would have meant that the average person living in an Islamic kingdom would have had a lower likelihood of being eligible for a bureaucratic position than those with better access to formal education. Even though some Muslim elites in Islamic states did attend European-style schools, they would likely have done so in relatively smaller numbers than elites elsewhere. The human capital gap likely affected access to political power into the post-independence period, both in staffing bureaucratic roles and leading political movements. Those who took power in the post-independence period were often Christian, even in Muslim-majority countries.

For both mechanisms, the proposed effect of Islamic rule is not a feature inherent to religious institutions or practice but rather how a history of Islamic rule shaped the colonial encounter and thus long-term development outcomes.

Empirical Predictions

We expect to observe lower levels of contemporary economic development in areas that were exposed to Islamic kingdoms. Our main hypotheses are as follows:

H1a Contemporary economic activity should be lower for ethnic groups ruled by Islamic kingdoms than those ruled by traditional or Christian kingdoms.

H1b Contemporary health outcomes should be worse for ethnic groups ruled by Islamic kingdoms than those ruled by traditional or Christian kingdoms.

H1c Contemporary educational attainment should be should be lower for ethnic groups ruled

by Islamic kingdoms than those ruled by traditional or Christian kingdoms.

We also test two observable implications of our proposed mechanisms. First, regarding missionary presence, we expect the number of Christian missions during the colonial era should be lower for ethnic groups ruled by Islamic kingdoms than those ruled by traditional or Christian kingdoms (H2). Second, the limited penetration of the colonial state in areas governed by Islamic rule may affect long term state capacity, including the provision of social services. We operationalize state capacity using the measure of legibility from Lee and Zhang (2017), which provides an assessment of quality of information gathering by the state using censuses. Specifically we hypothesize that areas governed by Islamic kingdoms should see more distortion in the distribution of self-reported ages than other areas, indicating lower state capacity in these areas (H3).

Measuring Historical Legacies

We introduce a new measure of state history that reflects the spatial and temporal bounds of every kingdom in Africa from 1600CE to 1900CE. This time frame reflects the influence of kingdoms that pre-dated extensive colonial interaction by several hundred years and whose influence is likely to be strongest on contemporary outcomes. We compiled this dataset through an extensive review of the Encyclopedia Britannica's regional historical survey articles. We define a kingdom as a politically organized community or major territorial unit having a monarchical form of government headed by a hereditary ruler. We cross-checked the comprehensiveness of this list against several sources and additional kingdoms were added.⁶ Our survey revealed 71 historical kingdoms during this time period, a more comprehensive list than found in previous work. The full list of kingdoms and ethnic group within each kingdom is provided in SI, Section 5, and a description of the coding scheme can be found in SI, Section 5.1.

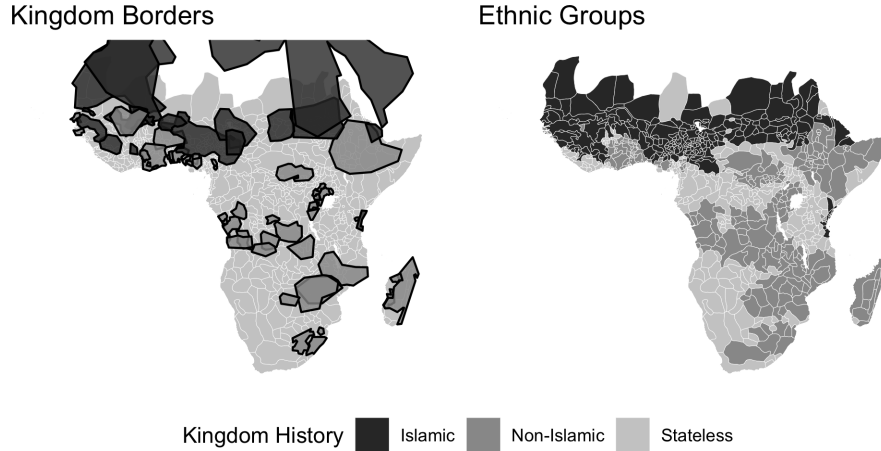
For each kingdom, we code the approximate start and end dates, territorial boundaries, and the basis of political authority as either Islamic or non-Islamic. Where documents referred to political

authority as “monarchical” without an explicit mention of religion, we assume that authority was traditional-dynastic in nature. Maps of territorial boundaries were taken from Encyclopedia Britannica, museum websites, the Library of Congress, and online historical articles. Given the sparsity of data on the territorial extent of historical kingdoms, we rely on a snapshot of the state’s boundaries at one point in time, usually corresponding to its maximal spatial extent.

The boundaries of the historical kingdoms included in our survey are presented in Panel A, Figure 1. Of the 71 historical states in our survey, 20 had Islamic bases of political authority and 51 had traditional or Christian bases. Islamic kingdoms were concentrated in northern and western Africa and along the eastern coast, corresponding with historical Muslim trade routes, while states in southern Africa were almost exclusively traditional or Christian. In subsequent analyses, we take several steps to account for this spatial clustering.

We used this geo-referenced dataset of historical kingdoms to code whether each of the 773 sub-Saharan African ethno-linguistic groups recorded by the anthropologist George Murdock were ruled at any point in time by an Islamic or non-Islamic kingdom. Data on the territorial boundaries of these ethnic groups comes from a 1959 map of ethnographic regions for Africa produced by Murdock and has been used frequently in the literature on state centralization (Michalopoulos and Papaioannou, 2010). Ethnic groups ruled by both Islamic and non-Islamic states are coded as having an Islamic basis of political authority because these institutions were present in at least some of the ethnic group’s territory. We find 313 ethnic groups were not included within the boundaries of any historical states, 243 were within traditional or Christian states, 179 were within Islamic states, and 55 had both Islamic and non-Islamic states.

Figure 1: Historical State Centralization



Our measure of historical ethnic centralization in Africa contrasts with existing work which usually relies on an Ethnographic Atlas compiled by Murdock in 1967. The data cover 1267 ethnolinguistic groups across the globe (392 of which are in Africa) and provide a wealth of group-level variables, including a measure of political complexity. While this data has become standard in recent quantitative work on state development in Africa, it has numerous shortcomings. Importantly, the Atlas explicitly codes only “legitimate” institutions, rather than institutions imposed by military force. For example, the Atlas codes the Bambara people of West Africa as having no central organization despite building a powerful martial kingdom along the Niger river in the early eighteenth century and being incorporated into the Tukulor empire in 1855 (Vandervort, 2001). While the degree of ethnic group centralization may also have an influence on contemporary development outcomes, in this paper we are interested in whether and how state institutions had long-run effects, even when they were imposed on groups by rival ethnic groups through territorial expansion.

Our measure also has several analytic advantages, including the transparency of the coding process and the exhaustive coding of all ethnic groups. The Ethnographic Atlas provides little detail on how cases are coded and there are prominent historical errors. For example, the Atlas codes the Kongo ethnic group as a petty chiefdom (the lowest level of centralization) despite the consolidation of states into the Kingdom of Kongo sometime in the late 1300s which lasted

until the mid 1600s with the invasion of the Portuguese (Thornton, 1977, 2001). Without a clear coding criteria, it is hard to determine whether this coding intentionally reflects some aspect of the group's centralization, is the result of a simple typographical error, or reflects the historical knowledge available five decades ago when the Atlas was compiled. Further, the Atlas is based on the earliest available sources, which, for many groups in Africa, are sources compiled during the colonial period. This is problematic as it is an ex-post measure of "pre-colonial" centralization, which itself may be in part a product of colonial rule. Finally, it is difficult to determine how the Atlas addresses change in an ethnic group's degree of centralization over time, as it treats centralization as a fixed attribute of ethnicities rather than an attribute which has changed in response to political and social pressures.

Beyond coding criteria, the list of ethnic groups in Murdock's Atlas are not exhaustive. Of the 773 ethnic groups in sub-Saharan Africa, only 369 have associated data on political centralization. We are not aware of an explicit random sampling strategy, and the exclusion of entire regions, such as the Horn of Africa, suggest that no such strategy was in place. The significant degree of missing data poses serious selection concerns for existing analyses of state centralization and contemporary development as ethnic groups with lower levels of economic development (as measured by night light density) were less likely to have their degree of state centralization recorded in the Ethnographic Atlas. By selecting on the dependent variable, these analyses could be excluding a large number of disconfirming cases.

How much of a difference does our alternative measure of state centralization make? Examining the data, there is a positive correlation of .17 between Murdock's measure of ethnic group centralization and our measure of state centralization, indicating significant divergence between these two measures. Differentiating between these two measures of centralization is important. As the following empirical sections show, the existing narrative that historical centralization has unambiguously positive effects is complicated by our analysis of the basis of political authority.

Outcome Measures and Empirical Analysis

We study the long-run impact of historical institutions on several important contemporary development outcomes: economic activity, health, and education. For each of these measures, we aggregate geo-located data to the ethnic group level. Because reliable, disaggregated data on economic activity are not available for most of sub-Saharan Africa, we follow the literature in using the density of light at night as a proxy (Michalopoulos and Papaioannou, 2013). This measure has been shown by numerous studies to be a reliable indicator of economic activity (Elvidge et al., 1997; Doll, Muller and Morley, 2006; Mellander et al., 2015). As with existing work, we measure the average luminosity recorded within the boundaries of each ethnic group and adjust by $\ln(x + .01)$ to account for the prevalence of low-luminosity areas.

For measures of health and education, we rely on data on infant mortality and years of schooling which come from the nationally representative Demographic and Health Survey (DHS) administered across much of sub-Saharan Africa by USAID. We collected 118 geo-referenced surveys conducted by DHS from 1990 to 2017. Individual-level responses are spatially aggregated to the ethnic group level. Infant mortality is measured as the proportion of infant deaths under 1 year of age per 1,000 live births. For each ethnic group, we calculate the total number of infant deaths and live births reported by respondents in the group's spatial boundaries. Educational attainment is measured as average years of schooling. We analyze educational attainment because it is a particularly important pathway contributing to variation in economic development that is known to have been affected by the nature of interaction with colonial powers. Average years of schooling does not necessarily reflect the quality of the education, but does reflect the relative emphasis placed on education and beliefs about the returns to education.

The primary threat to inference that we face in estimating the effect of Islamic states on long-term development is selection into particular state types as a function of pre-existing local conditions. For example, existing work argues that Islam was more likely to spread to arid regions containing pockets of fertile land (Michalopoulos, Naghavi and Prarolo, 2014). These geographic conditions could affect the long-run economic development of these regions, inducing a spurious

negative correlation between Islam and economic development. To account for potential alternative drivers of contemporary outcomes, we collect a number of controls derived from the relevant literature on the effects of state centralization.

First, lacking direct measures of historical economic activity, we rely on two proxies measured by the History Database of the Global Environment (HYDE) (Klein Goldewijk, Beusen and Janssen, 2010): historical population density and land suitability for agriculture. We use this same land suitability measure to create a measure of inequality in land conditions, a potential driver of the spread of Islam, using the Gini coefficient (Michalopoulos, Naghavi and Prarolo, 2014).

Because waterways may facilitate trade and economic activity, we measure the total length of rivers within the ethnic group's homeland with data from from the Natural Earth Project. To account for the potential economic impact of the shift from overland trade routes (beneficial to Islamic kingdoms) to Atlantic trade routes (beneficial to non-Islamic kingdoms), we measure both distance from overland trade routes (Michalopoulos, Naghavi and Prarolo, 2014) and the distance from the coast (Natural Earth). Because other geographic features of an ethnic group's homeland may matter for economic development, we include a measure of average elevation and the standard deviation of elevation, a measure of rough terrain, both of which come from the U.S. Geological Survey's GTOPO30 global digital elevation model as well as the number of oil wells and diamond mines in the ethnic group's territory (Hay and Snow, 2006; Lujala, Ketil Rod and Thieme, 2007; Gilmore et al., 2005).

Given that disease vectors are known to have long run effects on development (Alsan, 2015), we include climatic susceptibility to malaria from the Malaria Atlas Project. To account for the economic and social consequences of the slave trade, we include controls for the total number of slaves exported through the Atlantic and Indian trade routes for each ethnic group (Nunn and Wantchekon, 2011). To measure the amount of colonial investment, we include the length of colonial railroads in the ethnic group's territory which are measured by Nunn and Wantchekon (2011). Because including colonial railroads might introduce a source of post-treatment bias, we provide results excluding this variable, which are unchanged (SI, Section 2.6). Finally, we include

the total size of the ethnic group's territory and latitude and longitude.

Empirical Strategies

We employ three complementary empirical strategies to address the important selection concerns. First, we leverage the full sample of ethnic groups and control for a wide range of potential confounding variables. This analysis relies on the assumption that our statistical model captures all of the relevant potentially confounding variables. To relax this assumption, we next narrow our scope to a small sample of neighboring ethnic groups where the assignment into Islamic or non-Islamic kingdoms can reasonably be thought to be random and analyze the same development outcomes. Finally, we use a matching strategy to select a sample of ethnic groups that balance across our set of covariates, approximating the random assignment of institutional types. This matching process is a compromise between the strong restrictions imposed by the neighbors analysis and the broad cross-sectional regression. In all analyses, we find strong evidence that historical Islamic kingdoms are associated with higher rates of infant mortality and fewer years of formal education. Estimates of the impact of historical institutions on the density of night lights are more sensitive to the particular model specification, but are estimated to be lower in areas under Islamic rule in all three of our empirical strategies.

Cross-national regression

Our first empirical strategy is to compare all ethnic groups in sub-Saharan Africa and includes a battery of controls using data on pre-colonial conditions. In this analysis, we rely on the “selection on observables” assumption which states that there are no unobserved factors affecting both the likelihood that an ethnic group falls under an Islamic state and also affect contemporary development outcomes. By controlling for the most plausible confounds, we increase our confidence that any observed correlation is due to the long-run impact of Islamic states on access to education and the provision of public goods. We estimate the impact of Islamic and non-Islamic state institutions on contemporary development outcomes with the following regression model:

$$y_i = \alpha_0 + \beta_1 \cdot \text{Islamic}_i + \beta_2 \cdot \text{Stateless}_i + \delta_i \cdot \text{Controls} + \epsilon_i$$

The unit of analysis is each of 773 sub-Saharan ethnic groups identified in Murdock's 1959 map of ethnographic regions for Africa. The dependent variable y_i is one of several indicators of contemporary development outcomes measured in the historical homeland of the ethnic group i . α_0 is the intercept which captures the mean development outcomes in traditional and Christian areas when all other control variables are zero. *Islamic* is an indicator for whether an ethnic group's homeland was within an Islamic kingdom. β_1 measures the difference in the average value of the outcome variable in ethnic groups that were part of Islamic kingdoms in comparison to non-Islamic kingdoms, which serve as the base case. *Stateless* is an indicator denoting that there were no historical kingdoms overlapping with the ethnic group's homeland.

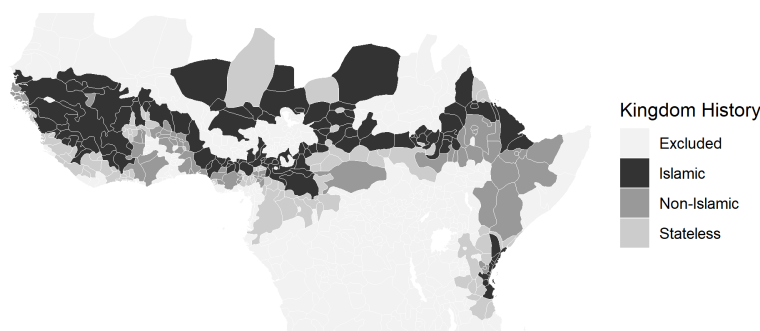
We include a battery of controls that address potential selection into state type, including estimated population in 1800CE, land suitability for agriculture, land suitability inequality, the length of internal rivers, distance to the coast, distance to overland trade routes, the length of colonial railways, total area, average elevation, rough terrain, malaria suitability, the presence of oil wells and diamond mines, total slave exports, latitude and longitude, and fixed effects for the country in which most of the ethnic group's territory falls. Models using DHS data also include controls for the number of surveys in the ethnic group's territory. Finally, to account for the spatial auto-correlation present in our dependent variables, we use Conley standard errors which account for spatial correlation in the data (Conley, 1999).⁷

Neighboring Ethnic Groups

The second strategy focuses on a subset of ethnic groups under Islamic kingdoms that neighbor ethnic groups without such kingdoms. Our identification assumption is that neighboring ethnic group pairs were as-if randomly assigned to historical rule under either Islamic or non-Islamic rule. Our analysis assumes that the expansion of competing historical kingdoms was halted for reasons that were exogenous to contemporary development outcomes, such as the presence of

natural barriers separating the territory of two ethnic groups. Given the clustering of Islamic kingdoms in West Africa, these ethnic group neighbors only appear in a very particular band along the equator and along the eastern coast in what is now Tanzania. The spatial distribution of our ethnic neighbors appears in Figure 2. We count ethnic groups as neighboring if their borders are touching or less than 100km apart. Given our identification assumptions, our analysis identifies the local average treatment effect (LATE) of being assigned to an Islamic kingdom for ethnic groups along this band. We cannot rule out the possibility that consolidation under Islamic states had a different effects for groups that were located further north or south. In this analysis, we compare only the difference in the mean outcome of our three dependent variables for neighboring ethnic groups with and without Islamic kingdoms. Because ethnic groups appear multiple times across neighbor-dyads, we use cluster-robust variance estimation for dyadic data (Aronow, Samii and Assenova, 2015).⁸

Figure 2: Ethnic group neighbors

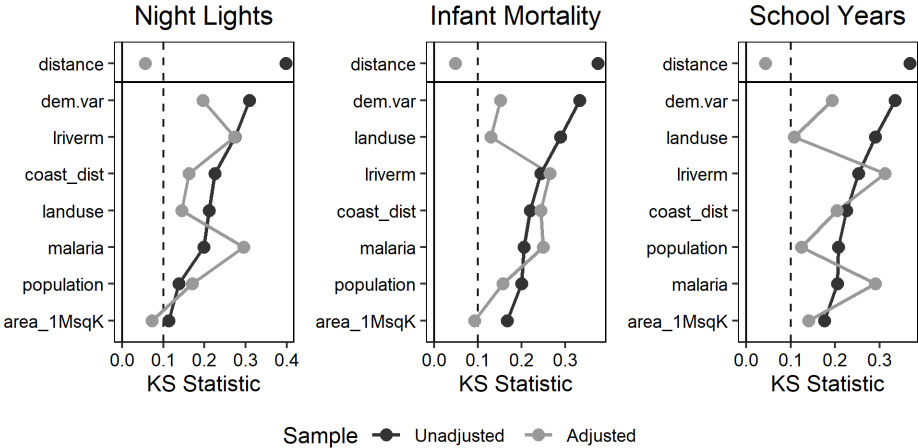


Matched Ethnic Groups

Our third empirical strategy uses a subset of matched ethnic groups chosen to improve balance across the observed covariates. Matching helps replicate a randomized experiment by balancing treatment and control groups across covariates (Stuart, 2010). As in the neighbors analysis, we drop all ethnic groups without histories of state centralization and focus only on the comparison of groups with Islamic states to non-Islamic states. We use “nearest neighbor” matching which

matches each treated unit with the “closest” control unit across several covariates. We select these covariates from our battery of control variables and choose a combination which yields the greatest improvement in the Kolmogorov-Smirnov statistic, a standard test for equality between two distributions, shown in Figure 3. Because not all ethnic groups have data on infant mortality and schooling, we show separate balance tests for each subsample of the data. Our covariates are population in 1800CE, land suitability for agriculture, the length of internal rivers, the distance to the coast, the total area, rough terrain, and malaria suitability. Matching helps improve balance on rough terrain and land suitability in particular. Because the algorithm excludes control units which are not matched to treated units, the estimand for this analysis is the average treatment effect for the treated (ATT) rather than the average treatment effect (ATE). Matching is performed using the MatchIt statistical package (Ho et al., 2013). Imbalance is significantly improved by this procedure as the total distance between the observations falls below the conventional .10 threshold.

Figure 3: Covariate Balance



Main Results

The patterns of development across sub-Saharan Africa broadly align with the expectations of our argument. Table 1 breaks down our primary variables of interest by state history across all 773 ethnic groups. Ethnic groups ruled historically by Islamic kingdoms exhibit a lower density

of night lights than areas that had traditional or Christian states or areas that had no history of state consolidation. Of these three types, areas with traditional or Christian kingdoms have the highest night light density today. The rate of infant deaths is significantly higher than in traditional or Christian areas or areas without states, with about 82 infant deaths per 1,000 live births in comparison to about 65 infant deaths elsewhere. Finally, average years of schooling recorded by the DHS is also significantly lower in areas ruled by Islamic kingdoms by almost 1.5 years.

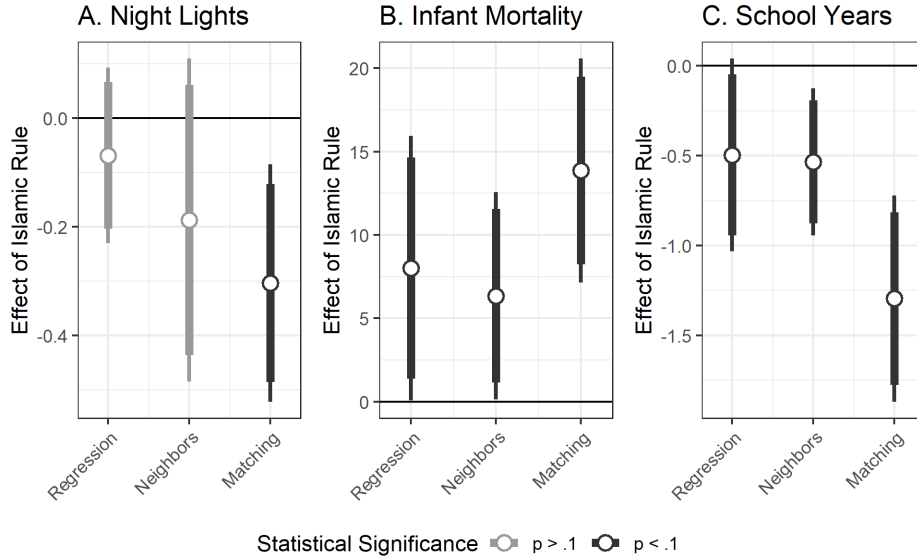
Table 1: Descriptive Statistics

Kingdom History	N	Night Lights	Infant Mortality	School Years
Non-Islamic	243	0.24	65.00	4.42
Islamic	234	0.16	82.22	3.05
Stateless	296	0.20	67.22	4.89
Total	773	0.20	71.06	4.19

This simple descriptive analysis, however, does not take the various selection mechanisms into account that could introduce bias. The effect of Islamic rule on our three primary dependent variables is shown in Figure 4, and as tables in SI Section 1, for each of our three empirical strategies. We find empirical support for Hypotheses 1a, 1b, and 1c in almost all of the empirical analyses: contemporary development outcomes are worse today in areas that were ruled by Islamic kingdoms compared to comparable areas ruled by non-Islamic kingdoms. In particular, the density of night lights is lower in areas with Islamic states than non-Islamic states, infant mortality is significantly higher, and average years of schooling are also much lower.

Figure 4, Panel A shows the impact of Islamic rule on the density of night lights. The correlation is in the expected negative direction across all three empirical strategies, ranging between estimates of a reduction in logged night light density of -0.1 to -0.3, but is only significant in one of the three specifications. A 0.1 reduction in logged night light density corresponds to about one-third of a standard deviation of average night light density across the ethnic groups in the study. Aggregating the data to the national level shows that this effect corresponds to an average

Figure 4: Main Results



Note: Thick bars indicate confidence intervals at the $p < .1$ level, while thin bars indicate the $p < .05$ level.

reduction in GDP per capita of about 50 USD using country level night lights and GDP data from 2000 provided by the World Bank.

We find that infant mortality rates are significantly higher in areas ruled by Islamic kingdoms in all three of our empirical analyses, supporting Hypothesis 1b. The point estimates are shown in the second element of Figure 4, Panel B. Depending on the empirical strategy used, infant mortality rates are between 4.5 and 15 points higher for ethnic groups that lived under Islamic states rather than non-Islamic states. Infant mortality across all ethnic groups was 81 per 1,000 on average, so Islamic states are associated with between a 6% and a 17% increase in infant mortality, depending on the empirical strategy. To use another metric, the estimates indicate that there were between 3,663 and 10,757 additional infant deaths among the 779,460 births recorded in areas under Islamic kingdoms, as compared to the expected rate of infant deaths under traditional or Christian kingdoms. The estimated association between Islamic rule and infant mortality was lowest in the neighbors analysis, which may be controlling for other unobserved confounders. These differences are statistically significant in all of the analyses and in the expected direction.

We find similar results when we analyze infant mortality across decades (SI, Section 2.2).

Finally, we find that the average years of schooling is also much lower in areas ruled by Islamic kingdoms, as shown in 4, Panel C, supporting Hypothesis 1c. The average number of school years was about 4 years. Across our empirical strategies, respondents from areas with Islamic kingdoms completed between 0.5 and 1.25 fewer years of formal education than respondents in areas with traditional and Christian kingdoms, a reduction of about 12% and 31% respectively. These differences were statistically significant at least at the $p < .1$ level and in the expected direction in each of the empirical models. We also find similarly sized reductions in average schooling when we disaggregate by gender, indicating that the results are not due to beliefs about the value of education for women, and when we disaggregate by age, indicating that the effects did not come from a particular cohort of students (SI, Section 2.2).

We conduct a number of robustness checks, summarized in brief here, and presented in full in SI, Section 2. The results demonstrate that the relationships established in the paper are found across a broad range of possible analyses. First, sensitivity analysis reveals that almost all of the observed covariates in the infant mortality and schooling models lie outside the threshold of statistical significance, which means that any unobserved confounding variable would have to have a stronger correlation with both the presence of Islamic kingdoms and the dependent variables than any of the controls included in the model to reverse our findings (SI, Section 2.1). In performing this analysis, we use the sensitivity analysis derived by Imbens (2003) and implemented by Carnegie, Harada, and Hill through the `treatSens` statistical package (Dorie et al., 2016).

Second, we find similar results when we include only states that survived until the 19th century and would therefore see direct interactions between Islamic authorities and colonial administrations (SI, Section 2.3). Third, we compare Islamic kingdoms against stateless areas rather than against non-Islamic kingdoms and find similar patterns (SI, Section 2.4). Fourth, we disaggregate stateless areas between those that had no Islamic influence and those that were within the cultural and economic sphere of Islamic kingdoms even if not formally within their territories, where measures of Islamic influence are taken from Sluglett and Currie (2015). We find that de-

velopment outcomes are worse today in areas that were formally within Islamic Kingdoms rather than simply within their influence (SI, Section 2.5).

Testing Mechanisms

In this section, we test a set of empirical predictions regarding the mechanisms linking Islamic rule to contemporary development outcomes. Our focus is on demonstrating how these historical institutions have had persistent effects through these two causal pathways, both related to European responses to Islamic rule during the colonial period. Before turning to pathways, however, we first provide suggestive evidence that the divergence we see today reflects a reversal of fortune and not long running differences in outcomes.

Unfavorable Conditions for Development

Our argument maintains that the gap in contemporary development outcomes is a relatively recent product of the interaction between colonial administration and historical states rather than a function of persistent and long-running under-development in these areas. Indeed, the qualitative evidence is consistent with this intuition: Islam provided a legal framework by which to resolve conflicts and Islamic kingdoms flourished before the arrival of European colonists, often conquering territory controlled by kingdoms with traditional religious bases of authority (Lovejoy, 2016).

Because historical data on economic activity, health outcomes, and educational attainment are scarce, we cannot directly test how the outcomes studied in this paper diverged over time between Islamic and non-Islamic kingdoms, nor directly validate the characterizations made by the qualitative literature. However, scholars have invested significant effort in gathering and imputing historical data on other outcome measures such as population density and land suitability for agriculture which can be used to analyze the general economic well-being of these areas as far back as 1800CE (Klein Goldewijk, Beusen and Janssen, 2010). We present these results in Table 2.

Table 2: Evidence for Reversal of Fortune

	Islamic	Non-Islamic	Difference	T statistic	P value
Population	666.73	628.92	37.81	-0.37	0.71
Land suitability	5.13	3.14	1.98	-3.03	0.00
Land inequality	0.54	0.55	-0.01	0.65	0.52
River length	0.41	0.67	-0.26	2.50	0.01
Coast distance	7.49	6.26	1.23	-3.05	0.00
Trade distance	1.79	6.93	-5.14	14.43	0.00
Elevation	432.48	768.73	-336.25	9.20	0.00
Rough terrain	104.01	197.87	-93.85	7.75	0.00
Malaria Index	0.45	0.45	0.00	-0.09	0.93

Consistent with our expectations, we find that estimated historical population density in 1800CE was slightly higher in Islamic kingdoms than non-Islamic kingdoms, although the differences are not statistically significant. Land suitability for agriculture, measured using data on population density, distance to water, elevation, and climate and soil conditions, was also about a third of a standard deviation higher in Islamic kingdoms than non-Islamic kingdoms, a difference which is statistically significant. Islamic kingdoms were also flatter, less likely to be at high altitudes, and were located closer to overland trade routes, facilitating the penetration of state institutions and the provision of public goods. Other factors, however, might predispose these areas to slower long-term economic growth, such as fewer miles of internal rivers and further distance from coastal trade routes.

Missionary investments

Turning to our first mechanism, we find strong evidence that missionary investments were lower in areas ruled by Islamic states than areas ruled by non-Islamic kingdoms or areas without states (H2). We use the presence of Christian missions as a proxy for missionary investments, as missionary schools and health centers were frequently built near mission stations. Data on the location of missions comes from a map produced by William Roome showing the location of Protestant and Catholic missions in 1924. These data present only the location of European missionaries,

rather than African missionaries and do not therefore demonstrate the full extent of missionary activity (Jedwab, zu Selhausen and Moradi, 2018). Other scholars have used these data to show that the presence of missions impacted the degree of religious conversion, supporting their use as a proxy (Nunn, 2010).

To control for potential confounders, we regress the number of Christian missions on kingdom type and the same controls used in previous analyses. As shown in Table 3, the coefficient on Islamic kingdom is negative in all specifications, and significant in all but the model with country fixed effects. In the model without controls, there are approximately 2 fewer missions in areas with Islamic kingdoms compared to those with non-Islamic kingdoms. Introducing controls accounts for about half of this variation, reducing the impact of Islamic kingdoms to about 1 fewer mission per ethnic group.

These results provide relatively strong evidence that missionaries were less likely to operate in Islamic kingdoms. As missionaries provided much of the formal education in many African countries during the colonial period, this likely had a direct effect on educational attainment, as suggested by Platas Izama (2016). The downstream effects of education may also explain the negative correlations found between Islamic kingdoms and economic development as well as infant mortality.

Table 3: Christian Missions

	No Controls (1)	Controls (2)	Fixed Effects (3)
Islamic Kingdom	-2.05*** (0.31)	-0.71** (0.33)	-0.64 (0.39)
Stateless	-1.06*** (0.29)	-0.40 (0.25)	-0.20 (0.28)
Constant	2.58*** (0.22)	0.78 (0.97)	-0.61 (1.56)
Observations	773	770	770
R ²	0.05	0.38	0.50

Note: *p<0.1; **p<0.05; ***p<0.01

Penetration of the Colonial State

Next we examine whether areas with Islamic kingdoms experienced lower penetration in general by the colonial state. We have already established that missionary presence was lower in areas with Islamic kingdoms, but was there also less investment by the colonial state in these areas? While systematic measures of colonial-era investment are difficult to come by and subject to various sources of bias, one particularly robust measure of state presence is the accuracy of census counts (Lee and Zhang, 2017).

For centuries, states have conducted regular censuses, in part to promote effective taxation, and sought to make their populations legible by documenting births and deaths as well as by providing identification documents. In many areas, these state documents are the only precise documentation of an individual's age. Similarly, state investment in schooling increases numeracy and may affect self-reported age. The extent of state penetration therefore can be observed in the distribution of self-reported ages in national censuses. When individuals lack formal documents, they may only be able to provide census takers with a rough approximation of their age, which is known to demonstrate various forms of digit preference (Myers et al., 1940). For ex-

ample, respondents are more likely to report their ages as round numbers (i.e. 50 instead of 49) which leads to “digit heaping”. The exact pattern that this bias takes depends on culture, such as through which digits are considered unlucky (Nagi, Stockwell and Snavley, 1973), but the deviation of reported ages from the smooth expected distribution can be used as a measure of state capacity (Lee and Zhang, 2017).⁹

To measure the penetration of colonial state capacity in sub-Saharan Africa, we rely on the accuracy of the earliest sub-national survey data collected for each of 26 countries in our study areas which cover 580 of our 773 ethnic groups (for specific census dates, see SI, Section 3). Measures of digit heaping were computed at the sub-national (usually province) level by Melissa Lee and Nan Zhang. For each of these 580 ethnic groups, we recorded which sub-national unit was located at the centroid of the ethnic group’s geographic area. We then compared the extent of digit preference for groups with histories of Islamic rule compared to groups ruled by non-Islamic kingdoms or without histories of centralized rule in the earliest usable sub-national survey data. While these censuses were all conducted after independence, the ability of individuals to account for their precise age depends on the infrastructure in place at the time of their birth and thus reflects state capacity up to many decades prior to the census. The results are shown in Table 4 below.

Table 4: Digit Heaping

	No Controls (1)	Controls (2)	Fixed Effects (3)
Islamic Kingdom	11.64*** (0.91)	6.64*** (0.90)	2.60** (1.05)
Stateless	-1.51 (0.94)	0.35 (0.78)	-1.04 (0.83)
Constant	18.64*** (0.68)	3.35 (2.87)	-3.09 (5.71)
Observations	580	579	579
R ²	0.31	0.61	0.74

Note: *p<0.1; **p<0.05; ***p<0.01

These results provide suggestive evidence that colonial investment was lower in Islamic areas than other areas (H3). The extent of digit heaping is significantly higher in Islamic areas than other areas. These results hold in the baseline specification as well as in specifications including our standard set of controls and country fixed effects. In the baseline specification, the extent of digit heaping is 50% greater in areas with Islamic kingdoms than other areas.

As noticed in several other tests, we see little difference between areas governed by traditional or Christian kingdoms versus areas with no history of state centralization. While these results are consistent with the idea that colonial investment was lower in Islamic areas, other factors may also play a role. In particular, the extent of digit heaping may also be explained by variation in the administrative capabilities of other local governance structures. For example, missions may supplement some of the administrative capabilities of centralized state bodies and provide similar functions, particularly relating to births and deaths. The results may therefore reflect, at least in part, the previously demonstrated negative correlation between Islamic kingdoms and the density of missions.

Alternative Explanations

An important alternative explanation emphasizes the role of Islamic beliefs rather than Islamic institutions as an impediment to long-run development. Indeed, previous studies have shown that Islamic religious endowments had a negative effect on the provision of public goods and economic development (Kuran, 2001, 2013). Other research has examined how Islamic cultural beliefs interact with contemporary educational systems to affect enrollment in public schools (Meyersson, 2014). If our results are due to the influence of the population's beliefs rather than the role of religious authorities in political institutions, we would expect to see variation in development outcomes between ethnic groups ruled by Islamic states as a function of contemporary religious observance. Specifically, our three development outcomes should be worse for ethnic groups with a greater proportion of Muslims, and it should not vary according to state history.

To test this possibility, we leverage the high resolution of the DHS surveys to compare our development outcomes in villages with similar contemporary religious practices but different influence of historical kingdoms. We aggregate 1.3 million individual-level DHS surveys to the village-level, creating 46,806 village observations. For each of these observations, we record the percentage of respondents who identified themselves as Muslim, the density of night lights at that location, the village-level infant mortality, the average years of schooling within the village, and whether the village fell within the historical boundaries of an Islamic kingdom, a non-Islamic kingdom, or no kingdom at all. We construct our control variables in the same way as in the cross-sectional regression. All variables that measure a count or an average within a spatial area (i.e., the number of missions, the variance of the elevation, the length of rivers) use a 50km buffer around the village.

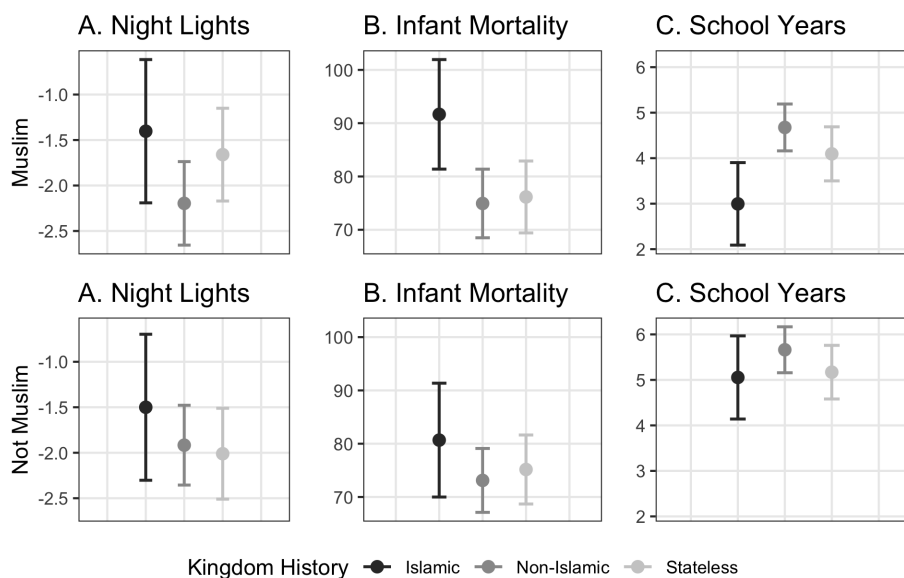
We analyze these data using a multi-level linear regression including random effects intercepts for each kingdom, as the treatment is assigned at the kingdom level and not at the village level. Because stateless areas would otherwise be a single large geographic unit, we divide stateless areas at national borders into separate units, yielding 95 kingdom-level clusters. The results are the same if we add random effects for the country instead of the kingdom.

The results, shown in Figure 5, demonstrate that historical kingdoms have an impact on contemporary development outcomes even after comparing villages with similar religious practices. The first row compares the predicted level of our three dependent variables in predominantly (> 50%) Muslim villages located in Islamic, non-Islamic, or stateless areas, shown as respectively as black, grey, and light-gray bars. While the difference in the density of night lights is not statistically significant, we see that infant mortality is significantly higher in Muslim villages located within the boundaries of historical Islamic kingdoms in comparison to non-Islamic kingdoms or stateless areas. Similarly, average years of schooling was about 1.5 years lower in predominantly Muslim villages within the boundary of Islamic kingdoms.

These results are shown in tabular form in SI Table 12. Of these outcomes, night lights are subject to significantly more measurement error than infant mortality or school years (which are

calculated directly from the DHS surveys) because the precise village location is purposefully obscured by the DHS and the resolution may not be fine enough to distinguish light sources from neighboring villages.

Figure 5: Islamic Beliefs v.s Islamic Institutions



These differences are less pronounced when examining non-Muslim villages within the boundary of Islamic kingdoms, suggesting an important interplay between the religious practices of a community and the historical processes traced in this paper. Examining outcomes from non-Muslim villages in the second row of Figure 5, we see that infant mortality is slightly higher and average years of schooling are slightly lower for villages within the boundaries of Islamic kingdoms than non-Islamic kingdoms, but these differences are not statistically significant.

Finally, comparing between the rows of the figure, we observe the strongest independent effect of village-level religion on years of schooling. As documented in other empirical work, years of schooling are significantly lower in ethnic groups with a higher proportion of Muslims (Platas Izama, 2016), a trend that holds for groups with both exposure to Islamic kingdoms and non-Islamic kingdoms. The differences in infant mortality rates and the density of night lights between Muslim and non-Muslim villages is much smaller and not statistically significant, while the effect of Islamic kingdoms is pronounced.

Conclusion

Colonialism has left a seemingly indelible mark on the economic and political development of African countries. While it is widely recognized that Europeans encountered in Africa not a tabula rasa but a diverse patchwork of social and political institutions, as well as physical geography, exactly how and why these factors shaped colonial rule and long-term development is still an area of active research. We contribute to this work by examining a particular feature of the political geography of pre-colonial Africa that has been relatively understudied to date: Islamic political institutions.

In doing so, we build on existing work that has shown the long-term benefits of centralization. However, drawing on insights from comparative work on Middle Eastern and European states, we argue and demonstrate that centralization was not uniformly beneficial for long-term development. Ethnic groups subject to Islamic rule historically experience worse economic development outcomes in the long-run as compared to those that lived under traditional or Christian kingdoms or in decentralized societies.

We demonstrate empirically that the most likely reason for the relationship between historic Islamic rule and economic underdevelopment in the contemporary period is not a function of Islamic institutions themselves or the content of Islamic beliefs and practices. Instead, the relationship reflects how Europeans – both administrators and missionaries – responded to the presence of Islamic political institutions. We argue that both administrators and missionaries interfered less in areas under Islamic rule, resulting in lower levels of investment in administration and social service. The relatively low presence of Christian missionaries may have influenced the long-term provision of social services, especially education, and the relatively low penetration of the colonial state may have led to reduced state capacity in these areas. Together, these factors shaped development trajectories into the contemporary period.

Pre-colonial Africa was home to expansive kingdoms and booming trade. Areas ruled by Islamic kingdoms were, if anything, better off than areas that were not, as Islamic kingdoms were centers of trade and scholarship. Today, by contrast, the situation is reversed. Our argument

and findings help illuminate and make sense of this stunning transformation by showing how the religious basis of authority that was once advantageous became a detriment to long-term development with the advent of colonial rule.

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Notes

¹A summary of recent empirical literature on the legacies of colonial rule can be found in Michalopoulos and Papaioannou (2020).

²In Gomez (2018), citing Muhammad al-Idrisi's Kitab Rujar.

³Archival and census records show that in one Malawian district, after 20 years of effort by five separate missionary bodies, including the construction of 109 schools, only 3000 out of more than 55,000 people – of whom more than half were Muslim – had converted to Christianity. Zomba National Archives, S1-1067-28, “Educational Facilities for Mohammedans,” 1932.

⁴It should be noted that many missionary schools were themselves of very poor quality, and it should not be assumed that all or even most mission schools provided a solid foundation in subjects such as literacy and numeracy.

⁵In French West Africa, Bamako in French Sudan (Mali) was established in 1908, Ouagadougou in Upper Volta (Burkina Faso) in 1919, and Niamey in Niger in 1926. Nairobi in Kenya (1899), Kampala and Entebbe in Uganda (1890 and 1905, respectively), and Zomba in the British Central Africa Protectorate (1890) (Clarke, 1971).

⁶These additional sources included the University of Iowa Museum of Art, the Heilbrunn Timeline of Art History from the Metropolitan Museum of Art, and *African Kingdoms: An Encyclopedia of Empires and Civilizations*.

⁷We use code from Fiona Burlig at the Harris School of Public Policy at the University of Chicago and a distance cutoff of 500km.

⁸To create these standard errors, we use code from Christian Fong at the University of Michigan, see Fong (2020)

⁹We are not very concerned that the use of the Islamic rather than Gregorian calendar will affect this measure as it captures not an individual's birth year but rather her age.