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## Colonial origin, ethnicity, and intergeneration mobility in Africa

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**Abstract:** This paper estimates the relationship between differences in skills measured among within-country ethnic groups and individual human capital accumulation in eight African countries. Our results show that the skills of an individual in these countries depends more on the human capital levels of their parents' ethnic group (ethnic capital) than on parental investment. Therefore, differences in initial levels of ethnic capital may explain the persistence of ethnicity-based differences in educational attainment over time. Birth cohort analysis and the results from an interaction effects model show that ethnic capital has a persistent effect, and that this effect is higher in former British colonies than former French colonies. Using historical religion-based data from the colonial and independence periods as instruments for ethnic capital, we demonstrate large effects of parental ethnicity on an individual's human capital skill level and show that colonial origin may be important in understanding intergenerational mobility in African countries.

**Keywords:** Africa, colonial origin, education, ethnicity, human capital, intergenerational mobility

**JEL classification:** C21, I24, J62, N37

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## 1 Introduction

Decades after the end of colonial rule in Africa, ethnic belonging remains one of the key attributes by which individuals are identified in society. Ethnic identity is a salient factor, and for Africa has historically been linked to bouts of within-country conflict and strife. Ethnicity has also been used as a means of grouping individuals for political and/or socioeconomic advantage and its importance in understanding the African landscape is unquestionable (Bates et al. 1972). Understanding the historical dimensions of the inter-relationships between different ethnic groups is important as the majority of African ethnic tribes and the countries they reside in resulted from transformations that took place during episodes of foreign domination and slavery or as a result of specific colonial administrative policies (Stavenhagen 1996). Colonialism, in particular, led to population movements across countries, the setting up of new public and private institutions and the development of new behaviours in these institutions, notions of citizenship and the state (in a place where beforehand countries had not existed), and civil order. It fundamentally and radically transformed the economy, including the structures of economic opportunities and economic relations; the implications for the African population are still to be fully understood (Horowitz 1985; Nnoli 1998). There has been interest in recent times in understanding the effect of such historic events on the development trajectory, and this has been examined by, among others, Acemoglu et al. (2001), Engerman and Sokoloff (2005), and Michalopoulos and Papaioannou (2016). These papers demonstrate the fundamental importance of taking into account past events to understand differences in institutional and long-term economic growth in developing countries. In this paper, we explore the impact of colonialism on ethnicity and intergenerational mobility in post-colonial African states.

Studies on intergenerational mobility are important as they provide a framework for understanding the association between the socioeconomic standing of an individual's family of origin (as assessed when the individual is growing up), and the socioeconomic standing of that same individual when she or he is an adult (Blanden 2009). Strong linkages between parental status and socioeconomic outcomes of children imply people born in disadvantaged circumstances have limited opportunities of success as adults, which means that in countries with high poverty levels children from poor households are unable to escape their start in life and poverty is perpetuated across generations. This leads to economic inefficiency as children from poor backgrounds are not able to contribute as much as they would if their full potential were realized, irrespective of their personal choices or efforts (Blanden 2009; Nicoletti and Ermisch 2007). If the circumstances into which an individual is born play a role in their labour market outcomes when they are an adult, then equality of opportunity, which is one of the main policy concerns in a society, has not been attained in that society. In this paper, we look at the relationship between an individual's ethnic belonging, a circumstantial factor, and intergenerational mobility, using education as the measure of status.

One of the early contributors to the discussion about ethnicity and intergenerational mobility was Borjas (1992). He showed that the socioeconomic performance of workers depended not only on human capital of their parents, but also on the average skills of the ethnic group in the parents' generation (or ethnic capital). In his work, he defined ethnic capital as the average measure of skills or socioeconomic performance within an ethnic group (Borjas 1992). He further explored the linkage between ethnic capital and intergenerational mobility elsewhere (Borjas 1994, 2006), with the definition of ethnic capital extended to incorporate neighbourhood effects. Other authors have added to this strand of the literature and demonstrated that ethnic capital is an important determinant and has a lasting effect on intergenerational mobility (Chow 2004; Leon 2005). Ethnically determined educational attainment differences between groups have the potential to create social disruption, segregation, and conflict if they persist (Dustmann et al. 2010). In this regard, sub-Saharan Africa is a melting pot for ethnic violence and conflict, and previous research attributes this strife and its country-specific peculiarities to the role of colonialist institutions in inter-ethnic relations in Africa (Blanton et al. 2001). In line with Hertz et al. (2007), who

hypothesized that long-run differences in education persistence may have been initiated in the colonial past, and relate to schooling systems operating in the midst of ethnic divisions, we posit that socio-economic outcomes and intergenerational mobility in African states were altered by colonialism through its impact on ethnicity. We attempt to link differences in administration styles adopted by colonialist masters, in particular the use of ranked (hierarchy-based ethnic group stratification) versus unranked (all ethnic groups seen on a horizontal scale) systems with respect to ethnic relations, to differences in the intergenerational educational mobility outcomes observed in former British or French colonies through the ethnic capital effect.<sup>1</sup>

To do so, we analyse pooled cross-sectional data from eight African countries following the econometric methodology of Becker and Tomes (1986) and Borjas (1992). We develop a measure of ethnic capital using the social and cultural definition of ethnicity, and apply the framework to our household survey dataset of 122,000 observations. Using country fixed effects, we interact ethnic capital with colonial origin to determine differences in both conventional measures of persistence and ethnic-based persistence between former British and French colonies. To circumvent possible measurement error and omitted variable bias, we check for consistency of our results using the instrumental variables (IV) technique with two religion-based historical instruments for both parental and ethnic capital.

Results obtained from the analysis demonstrate strong intergenerational persistence in human capital skill levels between individuals and the average human capital of the parents' ethnic group (ethnic capital). Our results show that when we control for the ethnic-based persistence, then within-family intergenerational mobility in these countries is higher, indicating that conventional measures of mobility for African countries that do not take into account ethnicity overestimate the true persistence of parental human capital in the intergenerational transmission process. We pool our country-level data based on identity of colonial master prior to independence and our results show that persistence from parents to children is stronger in former French colonies while parental ethnic group-based persistence is stronger in former British colonies. When we restrict our analysis to average human capital level of the parents' ethnic group per region and only use fathers and sons in our data sample, we find that ethnic capital is higher in former French than British colonies, indicating that gender plays a significant role in the mobility process and also that network effects in former British colonies may transcend region of residence and are not determined by distance between individuals within an ethnic group. Nevertheless, our birth cohort results show that the importance of ethnicity in the intergenerational mobility process has declined in former British colonies, while remaining comparatively static in former French colonies. We find that persistence from parents to children has also remained relatively unchanged in all the countries over the successive birth cohorts. Using the missionary activity per region within a country as measured in 1923 by Roome (1925) and the country proportion of Muslims measured in 1970 by Woodberry (2004, 2012) and Woodberry et al. (2010), interacted with early Demographic and Health Survey (DHS) region and gender based within country education data as instruments for parental and ethnic capital levels in the colonies, we find that in former British colonies, ethnic capital is more important for intergenerational mobility than parental input and is higher in absolute value than in former French colonies. Various robustness checks using alternative definitions of parental and ethnic capital, and using only fathers' education as a proxy for parental education, finds similar results. Our results are also robust to various IV falsification tests.

Various studies on intergenerational mobility of income and equality have been conducted, mainly in Europe and North America.<sup>2</sup> Intergenerational mobility studies in developing countries, and particularly sub-Saharan African countries (with the exception of South Africa, for which a number of studies have

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<sup>1</sup> Section 2.2 provides more discussion on these two systems of ethnic relations and their possible implications for the development trajectory of human capital accumulation.

<sup>2</sup> For recent surveys, see Black and Devereux (2010); Onuzo et al. (2013); Solon (1999).

been conducted), are sparse. This paper follows closely the approaches of Borjas (1992), and to some extent Acemoglu et al. (2014), by analysing intergenerational mobility, ethnic capital effects, and the linkage to colonial origin. Our work contributes to the genre of studies that look beyond conventional measures of mobility, such as those by Adermon et al. (2016), Clark (2012), Chetty and Hendren (2018), Chetty et al. (2018), and Leon (2005), and examines other aspects that affect the mobility process. In terms of comparability to research on African countries, it is closest to the studies done by Alesina et al. (2019), Azomahou and Yitbarek (2016), and Cogneau and Mesplé-Somps (2008), who perform cross-country comparisons of intergenerational mobility in different African states using census data and Living Standards Measurement Survey (LSMS) datasets, though they use different measures of mobility and sample different countries than us. This paper also compares to the work by Blanton et al. (2001), who studies colonial style and post-colonial ethnic conflict, and compares former British and French colonies. We add to the literature through a comparative analysis of intergenerational education mobility and the role played by parental ethnicity in former British and French colonies. We show that patterns of persistence within families across generations can be linked to colonial origin, and parental ethnicity is an important element of intergenerational mobility for African countries.

The rest of this paper is structured in six sections. Section 2 provides a discussion of differences in ethnic approaches by the colonial administrative systems and how religion-based idiosyncrasies interact with colonial origin, leading to distinct human capital development in Africa. It also sets out the conceptual framework through which differences in colonial administrative systems and ethnic approaches could lead to the patterns of intergenerational mobility observed in contemporary African societies. Section 3 presents a literature review of research that has examined historical events and their impact on the development trajectories, as well as offering a review of studies that look at ethnicity and intergenerational mobility. While similar in approach, these studies examine ethnicity from a nationality or race perspective, while our study measures it at the ethnic group level. Section 4 presents the methodological framework that sets out the econometric models estimated and introduces the variables used in the analysis. Descriptive analysis of the data is provided in Section 5 and illustrates wide disparities in terms of average years of schooling between within-country ethnic groups and between former British and French countries. We also provide a description of how ethnicity, and parental and ethnic capital are defined and measured in this paper. In Section 6 we discuss the main results from the econometric analysis. Results from the pooled cross-sectional linear analysis and interaction model show that the within-family persistence is higher within families in former French colonies, and that ethnic capital, while important in both pools, has a greater impact on the intergenerational mobility process in former British colonies. We conclude in Section 7 and provide policy implications that may arise from our findings.

## 2 African institutions and colonialism

Differences in historically determined political and economic institutions have been identified as one of the key sources of development variations between countries. In particular, historical inequality associated with colonial institutions has been found to be a key variable leading to differences in economic performance between countries even long after these institutions have ceased to exist (Acemoglu et al. 2014; Mookherjee and Napel 2007). Historical institutions and their impact on human capital development and growth is therefore an important area of research and is key to understanding reasons for persistence of inequality in developing countries (Acemoglu et al. 2014). In this study, we focus on the role of colonial origin and the colonial-era administration styles in Africa on intergenerational mobility.

Institutions in Africa bear the profound and long-lasting effects of European colonialism. Though Africa was not the only continent that faced European colonialism (European colonialism spread as far as Asia and North and South America from as early as the fifteenth century), by the time the European powers moved to the African coastal regions through which the slave trade was conducted in the later part of the nineteenth century, Young (1994) argues, the principles of supremacy had matured over five centuries. This meant that there was an accumulated set of concepts of suppression and lessons in colonial science from which to draw, and the European powers had elaborate notions of how a colonial state should be organized, which led to a set of policies and a texture of relationships with African society that still affects contemporary African states. This does not mean that colonialism did not have lasting effects on other continents; Engerman and Sokoloff (2005), Jimeno (2005), and Summerhill (2010) document the long-term impacts of colonialism on economic performance, inequality, and institutions in South America and the Caribbean. However, we argue that colonialism in Africa was more systematic due to the earlier experiences on other continents, and hence the impact in post-colonial African countries and their institutions would be greater. Because of the low feasibility of settlements, resulting from high mortality rates for the colonialists, highly extractive institutions were set up in the majority of African colonies to transfer resources from the colony to the colonialists, and this led to the creation of economic institutions that supported such extraction, particularly forms of labour coercion like slavery, monopolies, legal discrimination, and rules that made the property rights of the indigenous masses insecure. These institutions have persisted (Acemoglu et al. 2001, 2014).

The creation by the European countries of African borders that had little resemblance to the local spatial arrangements of ethnic identity led to post-colonial African states being a collection of numerous ethnic groups (Jenkins 2008). Because the territorial boundaries were drawn with little consideration of the actual distribution of indigenous ethno-cultural groups within them, a key source of the ethnic struggles in post-colonial Africa was established (Blanton et al. 2001; Michalopoulos and Papaioannou 2016). After the end of colonial rule, former colonies remained with their colonial borders intact and were transformed into ethnically fragmented states. The forms and degree of ethnically induced conflict that have ensued in most African countries have differed as a result of the different colonial styles adopted by the colonial masters, and hence one of the major legacies of colonialism was the effect on ethnic relations within African states.

This paper focuses on ethnic groups in former British and French colonies. Aside from having the most colonies in Africa, there were inherent differences in terms of the British and French colonial policies adopted to facilitate colony administration. The British practised indirect rule, a mechanism designed explicitly to make use of traditional ruling/ethnic authorities for the transmission and enforcement of policies. In the process, it sanctioned the notion that an ethnic group was a valid basis for an administrative unit and provided an institutional expression for cultural unity (Horowitz 1985; Kasfir 1972). With regards to relationships with the ethnic tribes in their colonies, the British system was an unranked or horizontally integrated structure of ethnic stratification that led to patterns of 'competitive ethnicity' as groups found themselves competing for the same resources and the same occupational roles in the society's status hierarchy. In this system, opportunities for upward mobility within each group were available. The French adopted a more centralized colonial approach and used the vertically integrated or 'ranked' system of inter-ethnic relations, based on existing ethnic relations; this led to a social structure characterized by one ethnic group being subordinate to another. As such, the social mobility of ethnic groups differed in that upward mobility for the subordinate groups was restricted (Blanton et al. 2001). As a result of these colonial policies, while reducing intra-ethnic conflict, ethnic contrasts that might otherwise have been only vaguely perceived were seen all too clearly after the colonialists cleared the field for comparison (Horowitz 1985).

With this in mind, this study seeks to understand how colonial administrative institutions adopted by the French and British affected subsequent human capital accumulation and intergenerational mobility in sub-Saharan Africa, with a particular emphasis on the role played by ethnic capital.

## 2.1 Religion and human capital development in Africa

Colonialism has had far-reaching effects for Africa, including population movements, increased ethnic consciousness, and the promotion of regional integration and centralization in Africa through the establishment of institutions and processes that link together the various districts and ethnic groups within each region, and provide them with a common interest in the existence of these very same institutions and processes (Jerman 2003; Nnoli 1998). The types of institutions a country has have been linked to human capital development and economic growth (Acemoglu et al. 2014). Operating through the effect on variables of production, namely total factor productivity and human and physical capital, institutions have been shown to be important for economic development. Acemoglu et al. (2014) show that institutions that support mass education lead to higher human capital accumulation and are an important factor in differences in economic outcomes between countries. The church is historically one of the institutions that has facilitated mass education in areas where it has established itself, and hence its operations can be viewed as a natural experiment from which policy-relevant analysis can be made.

Colonialism facilitated the introduction of Christian religions into Africa. In effect, one of the key determinants of long-run differences in human capital in colonized countries has been found to be the work of Protestant missionaries. Especially for African countries, the work of Protestant missionaries was a cardinal factor in the spread of education within the colonies (Nunn 2009; Woodberry 2004, 2012). Empirical evidence shows that education levels in former British colonies in Africa are higher than in former French colonies (Cogneau and Mesplé-Somps 2008; Njoh 2000; Nunn 2009). Woodberry (2004, 2012) argues that the reason for this difference is the activities of Protestant missionaries in the British colonies, where they were able to work with fewer restrictions than in the French colonies. The Protestant missionaries were instrumental to the spread of mass education in the colonies because of their motivation that the native population be able to read the scriptures, and took particular interest in educating indigenous leaders and religious teachers (Gallego and Woodberry 2010; Woodberry 2004). They were also key in creation of native languages and the spread of literacy in former British colonies, and have been cited as the originators of tribe and ethnic group classifications in Africa (Chimhundu 1992; Ranger 1985; Vail 1989). They translated the Bible into the local dialects to increase conversions of the native populace, and this helped to foster mass education in the British colonies. This is in contrast to the former French colonies, which had a greater Catholic presence and missionaries who were more concerned with training of the elites and so did not foster mass education (Woodberry 2004). In fact, research has shown that Catholic missions had no impact on education and did not place emphasis on schooling of the masses except in colonies where they faced religious competition from Protestant missionaries or secularist governments (Gallego and Woodberry 2010; Nunn 2009; Woodberry 2004).

Because the British colonial administration allowed Protestant missionaries to train the masses with few restrictions, and because local dialects were used in the education system of the natives in their colonies, the spread of education was faster. This is in contrast to the French colonies, where Protestant missionary activity was more limited and all education was to be carried out in French, in line with the French overall aim of turning those in the colonies into 'Frenchmen' and their belief in the supremacy and universal application of French civilization (Von Albertini and Wirz 1982). This had the effect of restricting the spread of mass education in these areas (Gallego and Woodberry 2010; Woodberry 2004, 2012). As observed by Kamens (1988), school enrolments were up to five times higher in the British colonies than in others, and this gap has grown over time. Interestingly, education levels were higher in areas where people were less resistant to the presence of missionaries and where the natives had also converted to Christianity. Muslim-dominated areas usually resisted missionary education, and even in British colonies these had lower enrolment rates during the colonial period and, as can be observed in present-day Nigeria, still have lower education levels (Sundkler and Steed 2000; Thiessen 1961). Furthermore, the education system set up by the missionaries was used as a base to develop the current

education system, and hence these missionaries were instrumental in the development of human capital in post-colonial African countries (Gallego and Woodberry 2010; Nunn 2009; Woodberry 2004).

As such, missionary activity in a country can be viewed as a natural experiment. Respondents from the former British colonies who were exposed to higher levels of Protestant and Catholic missionary activity would in essence be the treatment group, while those from the French colonies, which were predominantly Muslim, would be considered as the control group. Missionary activity had long-lasting impacts on education and we therefore use it to instrument for human capital accumulation for the countries in this paper, as was done by Acemoglu et al. (2014), though their paper focuses on more countries globally.

## 2.2 Ethnicity in Africa

Ethnic identity or ethnicity can be understood to be a kind of kinship that derives from shared beliefs about supposed common ancestry. Ethnic identities are a universal recurrent phenomenon that constitute one of the basic forms of social integration (Horowitz 1985; Stavenhagen 1996). Ethnic identity is usually taken up at birth for most group members and is based on a myth of collective ancestry which usually carries with it traits believed to be innate. In certain circumstances (e.g. by marriage), individuals may alter their ethnic identity (Horowitz 1985). In the African setting, ethnic groupings previously were usually referred to as a tribe, though the use of this terminology in modern times is commonly avoided because of derogatory connotations as a residual of term's use in the colonial period (Jermain 2003). In some instances, African cities are populated by people of different ethnic origins who organize themselves into ethnic associations for economic and political activity (Bates 1970; Stavenhagen 1996). Ethnicity has historically provided some advantages for the African populace, such as providing a basis for organization against colonial domination, assemblage of the massive population in rural areas in the nationalist movement against the imperialists, and being a route to demand justice and liberty through ethnic movements (Nnoli 1998). However, ethnicity and ethnic conflict have the potential to divide the society into different states and lead to open conflict and war against the state, which is interested in preserving its territorial integrity against secession and hence must be carefully handled.

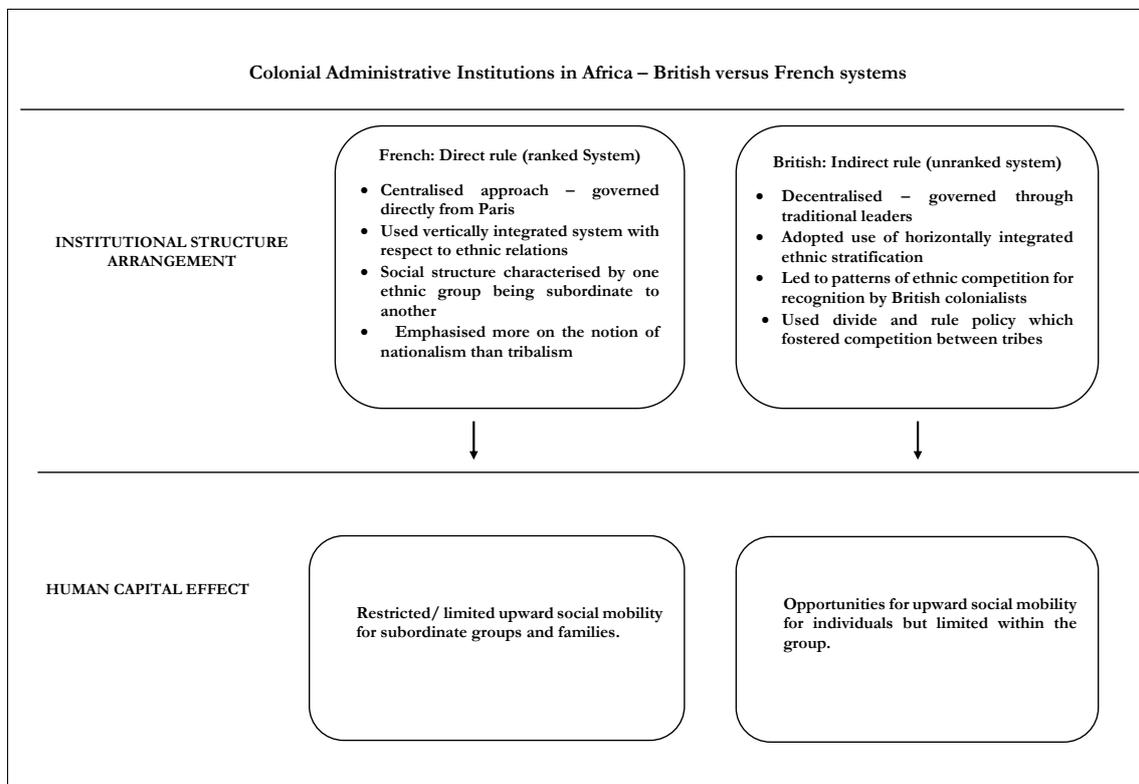
To understand how the different colonialist systems affected ethnicity, we need to examine the structure of group ethnic relations. As postulated by Horowitz (1985), a distinction can be made between ranked and unranked ethnic groups. In the ranked system, stratification is synonymous with ethnic membership, and mobility opportunities are restricted by group identity. In such systems, political, economic, and social status tend to be cumulative so that members of the lower-ranked ethnic group are simultaneously subordinate in each of these ways to the higher-ranked ethnic group(s). Race relations founded on African slavery in the Western Hemisphere are examples of the ranked system, but closer to Africa the relations between Hutu and Tutsi in Burundi and Rwanda are examples of the same (Horowitz 1985). In the unranked system, parallel ethnic groups that are internally stratified co-exist and socioeconomic and political opportunities are available to all.

Our main hypothesis is based on the above discussion that persistence from parents to children in terms of educational attainment in countries that had the ranked system could be higher than those with the unranked system. We also expect that ethnicity-based persistence should be high where the ranked system was used because the determination of who had opportunities to progress was at the ethnic group level. For the countries with the unranked system, we hypothesize weaker persistence within families but stronger persistence within ethnic groups. The British colonial administrators used a divide-and-rule system with regards to relations with the ethnic groups, whereby the tribal groups competed against each other for recognition by the colonial masters (Von Albertini and Wirz 1982). We posit that this would

have the effect of heightened ethnic consciousness and strengthening unity within the ethnic groups and hence lead to stronger ethnic ties.

Horowitz (1985) argues that this distinction is fundamental and should not be ignored in the course of understanding countries that have experienced these systems. Ranked systems usually have ritualized modes to express the lower status of subordinate groups. These may include restrictions on education and occupation, among others, which limits their opportunities for upward mobility (see Figure 1). In modern times, virtually all ranked systems of ethnic relations are transitioning to unranked systems, bolstered by the diffusion of education and international contact. However, this is a slow process. In contrast, unranked ethnic groups develop elaborate ways of reaffirming the superiority of their own culture, even while conceding limited spheres of cultural superiority to other groups, and there are equal opportunities for mobility among the ethnic groups. Because the boundaries of ranked ethnic groups largely coincide with class boundaries, conflict in ranked systems is usually aimed at social transformation. Conflict between unranked ethnic groups is usually aimed at approaching sovereign autonomy, the exclusion of parallel ethnic groups from a share of power, and often reversion to an idealized ethnically homogeneous status quo (Horowitz 1985).

Figure 1: Ranked versus unranked systems of ethnic relations



Source: authors' creation.

Of course the role played by ethnicity has evolved in African countries post-independence, and this topic is discussed in detail by others (Jean-François 1993; Nnoli 1998). Arguments put forward by these authors can be used to understand our results. During the colonial period, the main objective was the pacification of the conquered people and the creation of a capitalist mode of production to facilitate economic interaction between the colony and the metropolis that would be advantageous to the latter. To attain these objectives, the colonial state intervened in the social, economic, cultural, and political lives of the colony. As already mentioned, sections of the population were favoured over others and the colonial state adopted policies that segmented ethnic groups or supported one ethnic group against another. Therefore, at the time of independence the colonial state left a legacy that adversely

affected inter-ethnic relations in Africa (Blanton et al. 2001; Horowitz 1985; Nnoli 1998). In post-colonial Africa, ethnicity has become a part of the modern culture of the people. The notion of ethnicity has faced intense manipulation by factions of the African leadership as they mobilize support in as they compete for power and wealth (Jean-François 1993; Nnoli 1998). Though African states were initially characterized by massive investment in human capital development after independence, the ensuing instability in most African countries may have arisen partially as a result of ethnic conflict resulting from the colonial administrations and the complex sets of institutions inherited following colonization that have hypothetically led to inhibited economic growth and reinforced poverty levels. Indeed, greater education in the African context can be a path to greater discontent, depending on the institutional and social context. This is more apparent in the face of ethnic differences—the salience of ethnicity (Friedman et al. 2011).

### 3 Related literature

This work relates to various strands of the literature. First, it relates to the literature that links differences in contemporaneous living standards between countries to institutional and historical events. In this regard, Acemoglu et al. (2001) provide seminal works on the link between colonialism and economic development. In their work, the authors argue that colonization policies and institutions adopted by Europeans were different for their different colonies. Extractive institutions, which are still in existence, were set up in colonies where Europeans faced high mortality rates (or were more densely populated); once the effect of these institutions is taken into account, the countries in Africa and those closer to the equator worldwide do not have lower incomes than the rest of the world. Their findings were unaffected even when legal origin of the countries (British or French) was taken into account. Michalopoulos and Papaioannou (2013) studied pre-colonial ethnic institutions in Africa and showed that the complexity and hierarchy system of these ethnic institutions correlate significantly with modern-day regional development, and that the legacies of the pre-colonial institutions were important for contemporary African development. Michalopoulos and Papaioannou (2016) also looked at the impact of the scramble for Africa on ethnic relations and long-term development. They found that in historical homelands of ethnic groups partitioned during the scramble for Africa, the incidence, severity, and duration of violence was higher. They also documented that respondents who identified with split groups had worse access to public goods and poorer educational outcomes, highlighting the importance of ethnicity for African development. Our work complements this literature by showing how these historical events affected intergenerational mobility in Africa.

Our work also relates to that of Engerman and Sokoloff (2005), who study colonialism, inequality, and the long-run paths of development for former European colonies. They argue that the most important result of European colonization may have been in changing the composition of the people in the colonized societies. This change in population composition meant that Europeans were implanted into the colonies and were more advantaged than the natives in terms of human capital and legal status, leading to extreme inequality; because the paths of institutional development were sensitive to inequality, this activity has had long-lasting lingering effects. Summerhill (2010) looked at the impact of colonial institutions, slavery, farm inequality, and political inequality on long-term development in São Paulo, Brazil. One of his principal finding is that the colonial institution was positively correlated with income per capita at the end of the twentieth century and that slavery did not have a lasting impact on long-term development. Furthermore, he found that political inequality in the early twentieth century was unrelated to contemporary farm inequality and long-term economic growth, and the local public goods provision in the early twentieth century as measured by local public education outlays had a positive impact on long-term development. These results are different from those of Bertocchi and Dimico (2014), who

found that in countries that historically had slavery, education and income inequality demonstrated a strong racial component and hence had an impact on the development of the country. However, this literature abstracts from ethnicity-based inequality, which is the main focus of this paper.

Other studies focus on the importance of legal origin for the socioeconomic outcome of the country. In this regard, legal origin is as defined by La Porta et al. (2008), and refers to the ‘style of social control of economic life (and maybe of other aspects of life as well)’. La Porta et al. (2008) summarized research that looked at the correlation between the historical origin of a country’s laws, its legal rules and regulations, and its economic outcomes. They found that legal rules and regulations differed systematically across countries and that this difference could be measured and quantified. These differences were accounted for to a significant extent by the legal origin and the basic historical divergence in the styles of legal traditions—the policy-implementing focus of civil law versus the market-supporting focus of common law—explains well why legal rules differ. These measured differences in legal rules matter for economic and social outcomes. They also found that the number of years of schooling was sharply higher in common-law countries than in French legal origin ones, even when per capita income is held constant. Rostowski and Stacescu (2006) argue that legal origin should enter a country’s growth equation through the variable of education because the British adapted colonial education local conditions and taught in the vernacular, while the French colonial policy was largely guided by the idea of assimilation, with French textbooks and teachers teaching in French. There have been debates about whether legal origin is more important than colonial origin for development. Rostowski and Stacescu (2006), Rostowski and Stacescu (2008), and Klerman et al. (2009), in their work on the impact of legal versus colonial origin on economic growth, find that colonial origin is more important than legal origin and that the channel of transmission through which colonial origin impacts on growth is education. In this paper, we focus more on colonial rather than legal origin and its impact on the intergenerational transmission mechanism and ethnicity (as measured by ethnic capital) through education.

Another strand of the literature our paper more closely relates to focuses on ethnicity and social mobility. Research on ethnicity and its effects on the intergenerational transmission mechanism have highlighted the significant role played by this variable in countries in which it has been undertaken. In his work done using data from the United States, Borjas (1992) showed that the socioeconomic performance of workers depended not only on the human capital of their parents, but also on the average skills of the ethnic group in the parents’ generation (or ethnic capital). Borjas (1992) argued that an individual’s ethnicity had an external effect on the human capital accumulation process. The channel through which this operated was that individuals raised in beneficial ethnic environments (where the ethnic capital is high) would be exposed to social and economic factors that increased their productivity and skill set and hence positively altered their socioeconomic outcome. In this way, Borjas (1992) showed that the socioeconomic performance of workers depended not only on human capital of their parents, but also on the average skills of the ethnic group in the parents’ generation (or ethnic capital). Other authors have also shown that ethnic capital is an important determinant and has a persistent effect on intergenerational mobility (Leon 2005). Chow (2004) showed that among Chinese immigrants in Canada, ethnic self-identification and ethnic capital exhibits a strong positive effect on school performance. We complement this literature by showing how distinctive historic colonial administration systems in different African countries could lead to differences in how ethnicity affects the intergenerational transmission mechanism.

Studies on ethnic capital and its role in the intergenerational transmission process fall within the genre of studies that look beyond conventional measures of mobility. In this respect, work done by Clark (2012), Adermon et al. (2016), and Lindahl et al. (2015) highlighted how conventional measures of mobility may under- or overestimate the true persistence of skills across generations. Using the surname distribution in Sweden, Clark (2012) showed that the conventional measure of mobility, which is usually measured at 0.2–0.4, underestimates the true persistence across generations, which he found to be 0.7–0.8. He notes that the Swedish nobility of old are still an elite in the society today. Adermon et al. (2016) and Lindahl et al. (2015) used outcomes from close relatives (what they referred to as ‘dynastic capital’)

and show that using only parental outcomes underestimates the long-term persistence of human capital across generations. Chetty and Hendren (2018) further looked at neighbourhood effects and migration on mobility; one of their findings was that moving to a better neighbourhood has positive implications for child outcomes, but this is dependent on the child's age at the time of movement and the time spent in the better neighbourhood—what they termed child exposure effects. Our paper adds to this literature as we incorporate colonial origin and ethnicity into the discussion, which is important for understanding African development patterns, and show how conventional measures of mobility that do not take into account ethnic externalities may under- or over-estimate true intergenerational mobility levels.

Intergenerational mobility studies for African countries are scant, with the exception of South Africa for which a number of studies in education, occupation, and income mobility exist. An early contribution to the South African literature on intergenerational mobility came from Hertz (2001), who used data on co-resident fathers and sons in the KwaZulu-Natal Income Dynamics Study (KIDS) to calculate the range of intergenerational elasticity. Evidence of education persistence among generations, particularly among black South Africans, is presented by Thomas (1996), Case and Deaton (1999), and Lam (1999). Their results are confirmed by more recent studies suggesting that parental education is still an important determinant of children's educational outcomes (Finn et al. 2017; Girdwood and Leibbrandt 2009; Nimubona and Vencatachellum 2007). Piraino (2015) calculated the intergenerational earnings elasticity and inequality-of-opportunity index for South Africa. He found that the level of persistence between the earnings of fathers and sons is very high and is comparable to other developing countries with high levels of income inequality. He locates South Africa along the 'Great Gatsby curve' as a country with both a high level of intergenerational persistence and a high level of economic inequality. Kwenda et al. (2015) investigated trends in intergenerational transmission of education among black South Africans and subsequently found a decrease in intergenerational transmission of education over the past four decades. The role of race in mobility for South Africa was examined by Nimubona and Vencatachellum (2007). Using the October Household Surveys, they found that the intergenerational education mobility of whites is higher than that of blacks. Interestingly, black females had a higher intergenerational education mobility than their male counterparts, while, as expected, the poorest had the lowest intergenerational education mobility. The authors attributed the lower education mobility of blacks compared to that of whites as resulting from historically determined factors such as access to the credit market and the availability and quality of schools, which are important determinants of educational attainment.

Studies in cross-country comparisons of intergenerational mobility in other parts of Africa are in existence, though limited in number. Alesina et al. (2019) examined intergenerational mobility in 23 African countries and found that investments in infrastructure during the colonial period and geographic features are strongly correlated to educational mobility. A study conducted in 2016 by Azomahou and Yitbarek (2016) for nine sub-Saharan African countries estimated the intergenerational elasticity coefficient and the partial correlation coefficient using five-year birth cohorts and found that both measures affirmed the importance of parental education in determining the education attainment of their children in Africa, and that there has been greater education mobility across recent cohorts in all the countries that were included. The authors attributed observed trends to modifications of the education systems after the independence period of the 1960s, and huge investment in human capital accumulation in post-colonial African states. However, there were inter-country differences in mobility, with Nigeria, Guinea, Ghana, and Uganda experiencing the highest intergenerational mobility, and Comoros and Madagascar the lowest (Azomahou and Yitbarek 2016). These findings are similar to other studies, such as that by Hertz et al. (2007), who estimated education intergenerational mobility coefficients for 42 countries worldwide, including four African countries, and found higher levels of education persistence in Latin American and African countries compared to Nordic countries. An earlier study in intergenerational mobility in five African countries found similar country-specific results—the two former British colonies (Ghana and Uganda) shared a much higher intergenerational educational and occupational mobility than the three former French colonies (Ivory Coast, Guinea, and Madagascar)—and ethnicity was found to be a significant factor for inequality of opportunities (Cogneau and Mesplé-Somps 2008). A common feature of

this literature is that they abstract from ethnic-based intergenerational mobility, which is the main focus of this paper.

## 4 Methodology

The methodological framework for analysis is based on international literature in intergenerational mobility and ethnic capital as first espoused by Becker and Tomes (1986) and adapted by Borjas (1992). In general, the impact of parental education on the child’s education is usually estimated as:

$$y_{ij}(t) = \beta_0 + \beta_1 y_{ij}(t-1) + \varepsilon_{ij}(t) \quad (1)$$

where  $y_{ij}(t)$  denotes level of education for child  $i$  in ethnic group  $j$  in generation  $t$ ; and  $y_{ij}(t-1)$  refers to the education level of their parent. The estimate of  $\beta_1$  is reported as one of the measures of intergenerational education elasticity (or other measure of mobility—income or occupation). Alternatively,  $1 - \beta_1$  is a measure of intergenerational mobility. This estimate does not demonstrate the role played by other factors, including ethnicity, in intergenerational mobility. As argued by Borjas (1992), the intergenerational mobility process may be mis-specified if ethnic capital plays an important role in determining the educational outcome of the children and we do not take into account the presence of these partially transmitted ethnic effects across generations. If there are positive benefits that accrue to individuals based on the circumstances that are not chosen, such as ethnic group of birth or income level of the family, this infers that some members of that society will have superior outcomes based on this circumstantial identity, and Equation 1 would then be mis-specified (Adermon et al. 2016). To represent the impact of parental education and ethnic capital on child education outcomes, following Borjas (1992), Equation 1 is estimated using the following reduced-form equation:

$$y_{ij}(t) = \beta_0 + \beta_1 y_{ij}(t-1) + \beta_2 \bar{y}_j(t-1) + \xi_{ij}(t) \quad (2)$$

where  $\xi_{ij}(t)$  represents the disturbance term and is assumed to be independent and identically distributed (i.i.d.) with mean zero and constant variance and  $\bar{y}_j(t-1)$  refers to the average education level of the parental ethnic group.

The transmission parameter that describes how skills of the ethnic group evolve across generations is given by the sum of the coefficients  $\beta_1 + \beta_2$ . If the coefficients sum is less than 1, this implies that the average human capital of the different ethnic groups will converge across generations and vice versa. If the sum of the coefficients is equal to 1, then the relative dispersions that between the ethnic groups will continue indefinitely (Borjas 1992, 1994). Accordingly, we present the estimates for intergenerational persistence across generations and ethnic capital for the African states.

Our measure of ethnicity differs from that of Borjas (1992) and Leon (2005), who measured it as the nationality of recent immigrants in America. We measure it using both common descent and common language, similar to the criteria used to define ‘tribes’ in the colonial framework, as discussed by Jerman (2003). We construct it at the ethnic group level and it is measured per ethnic group within a country.<sup>3</sup> This ethnic grouping measure is arguably more intricate as there is an element of living in co-existence for a longer period of time, or if they were moved during the colonial period, their area of settlement can be assumed to have been a place where they had to negotiate a peace settlement with the ethnic groupings found in the new territories. The difference and relations between and within the ethnic

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<sup>3</sup> There are numerous ethnic groups within the sampled countries and we group the smaller groups (fewer than 100 individuals) into the ‘other’ ethnic group classification in the country-level descriptive statistics. In the regressions, the ethnic groups are retained as measured in the survey.

groups as it relates to intergenerational mobility is then more complex, and to the best of our knowledge our study is the first to measure ethnic capital from this point of view. Parental years of schooling are subtracted from that of the other members of the ethnic group in computing ethnic capital so as to not overestimate the impact of parental education in the model. Adermon et al. (2016) argue that this does not change the model outcomes when estimated using weights, and we contend that it further ensures that ethnic capital purely represents the effect of the parental ethnic group. The computation of ethnic capital used in our estimations can be represented as follows:

$$\bar{y}_{j,t-1} \equiv \frac{1}{n-1} \left( \sum_{i=1}^n y_{ij,t-1}^k - y_{ij,t-1}^k \right) \quad (3)$$

To incorporate the effect of the British or French colonial identity on intergenerational mobility across the different countries in the analysis, we estimate Equation 1 using a pooled dataset of the countries by colonial origin, which we define as the last colonial ruler before independence of the country. We also adapt the model to include interaction effects, and the main interaction is between a dummy variable of the identity of the colonizer and the ethnic capital variable. Interaction effects in our case capture the difference in importance of ethnic capital, as measured by the average of the parents' ethnic group, for intergenerational mobility in former British and French colonies. Our second econometric model is then specified as follows:

$$\begin{aligned} y_{ij}^k(t) = & \beta_0 + \beta_1 y_{ij}^k(t-1) + \beta_2 \bar{y}_j^k(t-1) + \beta_3 C_i^k * y_{ij}^k(t-1) \\ & + \beta_4 C_i^k * \bar{y}_j^k(t-1) + \beta_5 \\ & \sum x_i j^k + \xi_{ij}^k(t) \end{aligned} \quad (4)$$

where  $C_i^k$  is a binary (dummy) variable, which takes the value of 1 if the person  $i$  resides in country  $k$  which is a former British colony, and 0 otherwise. We control for variables that may affect individual  $i$ 's mobility in the conditioning set,  $x_i$ , which is composed of the variables age, age-squared, sex, and household size.  $\xi_{ij}^k(t)$  is the error term which is assumed to have zero mean and constant variance. In this case, the partial effect of being a British colony *ceteris paribus* will be given by

$$\frac{\Delta y_{ij}^k(t)}{\Delta \bar{y}_j^k(t-1)} = \beta_2 + \beta_4 C_i^k \quad (5)$$

If  $\beta_4$  is greater than zero, this means that being a former British colony increases the education attainment levels of successive generations given the average years of education of the parents' ethnic group. In other words, persistence between the parental ethnic group and child outcome as measured by years of schooling is higher in the former British colonies. If  $\beta_4$  is less than zero, this implies that being a former British colony decreases the education attainment levels of successive generations given the average years of education of the parents' ethnic group.  $\beta_2$  would then be the slope of ethnic capital for the French colonies. We also include an interaction between parental capital, as measured by parents' years of schooling, and the colonial identity and the interpretation with respect to  $\beta_3$  is the same. To ensure a more comprehensive comparison and interpretation of the effect of being a former British or French colony on educational attainment, we evaluate using parental and ethnic capital variables that have demeaned/centred values in the second model and control for country fixed effects.<sup>4</sup> As argued by

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<sup>4</sup> By demeaning, we mean we subtract the sample average from the data; it has been noted that in linear models the effect of this is innocuous. See Bao (2015) on demeaning in non-linear models.

Williams (2015), model 2 results do not change the results from the first model but are considered to be more interpretable and logical to understand.

Omitted variable bias and measurement error are the main problems that arise when using the ordinary least squares (OLS) estimation method, and this may lead to inefficient and biased estimates. To mitigate against these biases, we apply an IV approach in which we instrument for ethnic and parental capital using historical religion-based data. The first instrument is country- and region-specific missionary activity which was, as argued, dependent on the colonial identity and was an important determinant of the spread of education in Africa, and subsequent differences in human capital skill levels. We also use as a second instrument the earliest available gender disaggregated DHS data for education as measured in median years of schooling for each region per country and interact it with the inverse proportion of Muslims in 1970 as an instrument for the variables. In selecting the DHS data, we tried to ensure they were collected in the same DHS wave or as close as possible.<sup>5</sup> We estimate the model as shown:

$$y_{ij}^k(t) = \beta_0 + \beta_1 y_{ij}^k(t-1) + \beta_2 \bar{y}_j^k(t-1) + \beta_3 \sum x_{ij}^k + \xi_{ij}^k(t) \quad (6)$$

$$\bar{y}_j^k(t-1) = \gamma_0 + \gamma_1 ML_{ij}^k(t) + \gamma_2 MP_j^k(t) + \gamma_3 \sum Z_j^k + v_{ij}^k(t) \quad (7)$$

$$y_{ij}^k(t-1) = \pi_0 + \pi_1 ML_{ij}^k(t) + \pi_2 MP_j^k(t) + \pi_3 \sum Z_j^k + v_{ij}^k(t) \quad (8)$$

The variables for Equation 6 are as defined in Equation 2. The variable  $ML_{ij}$  in Equation 7 represents the presence of a mission station in the region of the country as captured by Roome (1925), while  $MP_i$  is the proportion of Muslims in 1970 in the sampled countries interacted with the regional years of education from the DHSs. The proportion of Muslims is sourced from (Woodberry 2004, 2012) and (Woodberry et al. 2010). Previous research shows a strong linkage between missionary activity and development of education in Africa (Nunn 2009; Woodberry 2004) and has utilized religion data, in particular on missionary activity, to instrument for human capital; it was found to be an adequate instrument (see Acemoglu et al. (2014) for more on this). We use this to check the adequacy of the variables and utilize it in this paper. The error terms,  $v_{ij}^k(t)$  and  $\xi_{ij}^k(t)$ , are assumed to be uncorrelated with mean zero and constant variance. In estimating the IV, we use the two-stage least squares estimation technique for simultaneous equations. We check for instrument relevance using correlation analysis and from the first-stage results. Instrument validity is more difficult to measure than relevance; Cameron and Trivedi (2010) noted that in some cases it relies more on theory from economics and precedent/norms set up in previously related empirical studies. Therefore, in addition to the first-stage results, we also base the validity of our instrument on established norms, mainly following the work of Acemoglu et al. (2014), Woodberry (2004, 2012), and Woodberry et al. (2010), who trace the effects of religious activity on human capital accumulation.

We introduce a matrix of geographic control variables  $Z_j^k$ , which have been shown to have influenced missionary penetration of a country as set out by Nunn (2009) in Equation 7. This is also in line with Michalopoulos and Papaioannou (2016), Acemoglu et al. (2001), and other similar works that examine the long-term impact of colonialism. The variables included in  $Z_j^k$  are distance from the coast, mean precipitation and elevation from sea level, and the presence of natural resources in the country. Household weights and country and region fixed effects are used in our analysis.

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<sup>5</sup> The DHSs for the countries are as follows: Cote D'Ivoire (1994), Guinea (1999—earliest data were from 1992 but the dataset was not publicly available), Madagascar (1992), Niger (1992), Ghana (1993), Uganda (1995), Malawi (1992), and Nigeria (1993). All the data are sourced from (ICF 2004–17).

## 5 Data

The study will focus on four French (Niger, Madagascar, Cote d’Ivoire, and Guinea) and four British former colonies (Nigeria, Uganda, Ghana, and Malawi). These countries account for over 34 per cent of the total population of Africa (World Bank 2018b). To ensure comparability of the findings, the dataset used will be the LSMS, which is available from the World Bank database. The LSMS is a nationally representative household survey aimed at facilitating the use of household survey data for evidence-based policy-making (World Bank 2018a). It has been conducted in several countries worldwide; in Africa, early survey datasets go back as early as the 1980s. In addition to asking respondents questions on parental education and occupation, the survey also collects data on the ethnic group of household members—or the main language used by the head of the household for some countries, which limits the number of countries included in this study. This information allows us to group the individuals into the various ethnic groups, a key variable for the analysis.

As can be seen in Table 1, most of the country datasets used are fairly recent, with the exception of Cote d’Ivoire, where the only information that was available was for the years 1985–86. Despite this, we include it because we are still able to analyse the impact of colonization on mobility and ethnicity as there is a period of almost 30 years post-independence. The most recent survey included is for Malawi and was conducted in 2017, while the others fall between 2002 and 2013. The total sample size for analysis is 122,374 households; the country-specific sample sizes used in the analysis range from 4,139 for Uganda to 34,000 for Ghana. The sample sizes of some of the countries included were reduced because we dropped observations where the education level of the respondent was not captured or both parental education levels were missing. We did not include observations not directly related to the head of household for countries where ethnicity was observed for only the head of the household. This was the case for Guinea, Cote d’Ivoire, and Malawi.

Table 1: Sampled countries: former British and French colonies

Country	Colony	Year of survey	Year of independence	Sample size	EF
Cote d’Ivoire	French	1985/87	1960	11,616	0.820
Ghana	British	2013	1957	34,003	0.673
Guinea	French	2002/03	1958	13,016	0.739
Madagascar	French	2005	1960	21,517	0.879
Malawi	British	2017	1964	21,066	0.674
Niger	French	2014	1960	8,994	0.651
Nigeria	British	2010	1960	11,999	0.850
Uganda	British	2013	1962	4,139	0.930

Notes: EF, ethnic fractionalization index.

Source: authors’ compilation based on data.

The degree of ethnic polarization within the different countries is obtained from Alesina et al. (2003). The ethnic polarization index measures the degree of heterogeneity in terms of ethnic groups within a country, lying between 0 and 1, with 1 being the highest measure. We see relatively high levels of ethnic polarization within the sampled countries, particularly in Uganda at 0.93, with linguistic fractionalization being almost equal in value to ethnic polarization, underscoring the importance of understanding the role of ethnicity.

### 5.1 Main variable definition and measurement

There are three main variables of interest in this paper. These are the years of schooling of the respondents (children), the years of schooling of their parents, and parental ethnicity. To measure the years of schooling of the respondents and their parents, in line with previous work (Adermon et al. 2016; Azom-

ahou and Yitbarek 2016; Hertz et al. 2007), we transform the categorical education levels collected as highest grade completed or highest qualification attained into a continuous variable, years of schooling, using as a guide the country-specific education system layout on number of years of schooling required to attain the different education levels. We assume no repetition of grades.<sup>6</sup>

### *Parental capital*

Parental education is measured as the highest number of years of schooling of either parent in the household. In the intergenerational mobility literature, parental education is usually measured as the average of both parents' education, the highest education level of either parent, or as the father's level of education (due to low levels of women in education historically). To increase our sample size, we include the years of schooling of the mothers in our analysis and use the highest number of years of schooling of either parent, (i.e. the parental maximum) as a measure of parental education, similar to the approach undertaken by Behrman et al. (2001).<sup>7</sup> As argued by Hertz et al. (2007), when used, the correlation coefficients obtained from using parental average or parental maximum are similar, but the coefficients from the regression are lower when the parental maximum is used. We used parental maximum because the low level of education of the mothers in the households in our sampled households may significantly bias downwards the average parental years of schooling/education level if it were used. Therefore, our regression coefficient can be interpreted as being the lower bound of education persistence across generations.

### *Ethnic capital*

Ethnic capital is derived from the years of schooling of the parents' ethnic group and is measured in two ways. First, we measure it as the average human capital of the parents' ethnic group in each country as defined by Borjas (1992). We then extend the definition to include region-specific human capital levels, that is we redefine ethnic capital as the average years of schooling of the parents' ethnic group per region.<sup>8</sup> As such, in the second case, we modify the original definition of ethnic capital and incorporate effects of living in specific neighbourhoods, taken as the district/region of residence. We make the assumption that the respondents reside in the same region as their parents and were raised in those areas, that is we assume little movement across geographic areas. This modification is generally acceptable and in his later work Borjas (1994) contends that ethnic groups tend to cluster in particular regions, and hence a study of ethnic effects should incorporate neighbourhood or regional effects. Leon (2005) also states that ethnic capital operates mainly in geographic clusters of ethnic groups. This is especially relevant for studies done on mobility in Africa, where there are wide disparities in wealth and socioeconomic opportunities between regions, usually dependent on whether one resides in an urban or rural area. Arguably, these disparities in within-country development resulted from colonialism in the sense that areas where colonial administrative institutions were set up are more developed today than other areas, and ethnic groups who lived in and around these areas had more opportunities for upward mobility (Horowitz 1985). So in our study, our main measure of ethnic capital is the highest average human

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<sup>6</sup> We assume that the respondents do not have increased numbers of years of schooling due to repetition of a grade and so we count those who spent two years or more in one grade as only having completed one year of schooling overall.

<sup>7</sup> There was no significant difference in terms of reporting of education levels of either parents: 94 per cent of respondents in the sample reported their mother's education level while 93 per cent reported their father's education level.

<sup>8</sup> We do not include region fixed effects as education policies in Africa are formulated at the national level, and hence at the region level there is limited autonomy in determining education infrastructure and access.

capital of an individual's parents' ethnic group who reside in a particular region, but we also present results for the former definition. We do not consider ethnic endogamy in this paper.

### *Ethnicity*

Ethnicity was measured using social and cultural criteria, which refers to individually identified common descent and common language. Respondent ethnicity was collected directly as a variable for each respondent in the country surveys for Ghana, Madagascar, Niger, and Uganda, and hence did not have to be imputed. For Cote d'Ivoire, only the ethnicity of the head of the household was collected, and for Malawi and Guinea it was derived from the language used by the head of the household, which was taken to be a sufficient proxy. Ethnicity in Africa is inherited mainly through the patrilineal system (i.e. through the father's lineage), but in some ethnic tribes it is matrilineal (through the mother's lineage). In Guinea, where there were no matrilineal tribes, only immediate relations to the male head of the household (parents and children) were included in the analysis. The spouse and relations who we could not ascertain to be in the same ethnic group as the head of the household were excluded from the sample. For Cote d'Ivoire and Malawi, some of the tribes were identified to be matrilineal,<sup>9</sup> and for these groups we included the spouse in the analysis.<sup>10</sup> For Nigeria, ethnicity was not collected directly but the stark ethnic regional distribution countrywide was used to derive ethnicity. Furthermore, the country is dominated by four main ethnic groups (75 per cent of the population) and hence various online resources were used to identify the main ethnic groups by state<sup>11</sup> and conduct the analysis.<sup>12</sup> This is similar to the approach adopted by Archibong (2018) in determining ethnic group distributions for the regions in Nigeria.

The surveys collected parental education data for those who had parents living in the same household as well as those whose parents did not live in their household. For Uganda, there was no parental education data collected if the parent was deceased, and hence these households were excluded from the analysis. Population weights were collected and are used in the analysis to ensure the results are nationally representative. The minimum age for inclusion was taken to be 20 years of age.

## 5.2 Summary statistics

The descriptive statistics presented in Table 2 provide insight into human capital accumulation, as measured by years of schooling, of the respondents in comparison to their parents. As expected, the average education levels of the respondents is higher than that of their parents in all the countries. This is in line with the general observed upward trend in education levels globally as perceived returns have increased. Overall, as shown in Table 3, for the whole sample the mean education level is 6.30 years for children, which approximately equals the number of years required to complete primary education

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<sup>9</sup> Malawi matrilineal tribes were the Chewa, Yao, and Lomwe (Berge et al. 2014); for Cote d'Ivoire, the matrilineal tribe was Akan or the Ashanti as they are known in Ghana (De Witte 2001). More information on ethnic group organization structures is available from Murdock (1967)

<sup>10</sup>Since this is the main language in the house, it is plausible to assume that even the spouse belongs to the same ethnic group. We chose not to remove these groups from the analysis as they are the biggest ethnic tribes in their countries and their exclusion would have biased our results more than if the male head of the household is from another tribe

<sup>11</sup>Hausa-Fulani were the main ethnic group in Bauchi, Borno, Jigawa, Kaduna State, Kano, Kastina, Kebbi, Niger, Taraba, Sokoto, and Yobe states; Igbo were the main group in Abia, Anambra, Benue, Ebonyi, Enugu, and Imo states; Yoruba are the main group in Kwara, Lagos, Ogun, Onyo, Osun, Ekiti, and Kogi states; Ijaw are the main ethnicity in Bayelsa, Delta, Ondo, and Rivers states.

<sup>12</sup>See, for example, PBS Newshour (2007) and CorrectNG (2018).

(six years in former French and seven years in former British colonies). Ghana had the highest average years of schooling for respondents, while the fewest years of schooling were for those from Guinea, Madagascar, and Cote d'Ivoire. Despite having low levels of education across the board in Madagascar, the gender disparities between male and female children and mothers and fathers were low. The average years of education for sons was 2.31 years, while for daughters it was 1.80 years. For the mothers, the average education level was 1.58 years, while that for fathers was 2.22 years. This may be indicative of an absence of historical gender-based discrimination in terms of access, or lack thereof, to education, which has been a major impediment to other areas within Africa.

Table 2: Descriptive statistics: cohort analysis

Country	Sample size	Cohort	Years of schooling		
			Children	Father	Mother
<b>French colonies</b>					
Cote d'Ivoire	1,804	1937–46	1.31	0.21	0.02
	2,267	1947–56	3.64	0.54	0.06
	3,996	1957–66	3.67	1.04	0.16
	147	1967–76	3.64	1.60	0.62
Guinea	1,584	1937–46	1.03	0.38	0.04
	2,028	1947–56	3.12	0.56	0.15
	2,354	1957–66	2.83	0.90	0.29
	3,996	1967–76	3.27	1.83	1.28
	2,725	1977–86	4.32	2.95	2.61
Madagascar	1,209	1937–46	1.13	1.41	0.90
	2,677	1947–56	1.74	1.84	1.27
	4,221	1957–66	2.35	2.17	1.59
	5,682	1967–76	2.14	2.38	1.71
	6,869	1977–86	2.16	2.52	1.77
Niger	422	1937–46	1.38	0.05	0.01
	866	1947–56	2.17	0.10	0.04
	1,347	1957–66	2.46	0.12	0.04
	1,656	1967–76	2.95	0.36	0.13
	2,490	1977–86	3.02	0.56	0.31
	2,053	1987–96	3.96	1.43	0.83
<b>British colonies</b>					
Ghana	1,884	1937–46	3.57	1.24	0.26
	2,825	1947–56	5.85	1.96	0.69
	4,828	1957–66	6.50	2.97	1.18
	6,888	1967–76	6.54	4.25	2.05
	8,700	1977–86	7.45	5.31	3.24
	7,730	1987–96	8.95	6.30	4.11
Malawi	834	1937–46	2.22	0.14	0.06
	1,466	1947–56	3.30	0.27	0.09
	2,048	1957–66	4.39	0.68	0.24
	3,359	1967–76	5.15	0.89	0.33
	5,388	1977–86	6.36	1.28	0.60
	6,764	1987–96	7.51	2.22	1.38
Nigeria	760	1937–46	3.41	1.39	0.86
	1,280	1947–56	4.77	2.30	1.33
	1,931	1957–66	6.03	2.68	1.74
	2,580	1967–76	6.25	3.54	2.45
	3,302	1977–86	8.14	5.12	3.76
	1,654	1987–96	9.51	6.30	4.88
Uganda	26	1937–46	5.27	1.01	0.51
	97	1947–56	4.79	1.88	0.34
	385	1957–66	5.94	4.23	1.44
	779	1967–76	5.98	4.67	2.03
	1,180	1977–86	6.91	5.44	3.04
	1,672	1987–96	8.40	6.74	4.05

Source: authors' compilation based on LSMS data (World Bank).

Table 3: Descriptive statistics: years of schooling

Country	Children		Father		Mother		Age	Hhld size
	Mean	<i>n</i>	Mean	<i>n</i>	Mean	<i>n</i>		
Cote d'Ivoire	2.24	11,616	0.51	11,591	0.08	11,602	40.9	9.53
Ghana	6.98	34,003	4.37	32,457	2.46	33,501	40.3	5.08
Guinea	2.74	13,016	1.34	12,908	0.88	10,948	42.8	12.01
Madagascar	2.05	21,517	2.22	20,733	1.58	20,963	37.6	6.57
Malawi	5.94	21,066	1.40	21,064	0.78	21,064	39.5	4.67
Niger	2.94	8,994	0.57	8,864	0.31	8,969	40.4	8.87
Nigeria	6.79	11,999	3.93	11,920	2.81	11,890	39.5	7.13
Uganda	7.13	4,139	5.81	2,468	3.01	3,683	32.75	6.92
French colonies	2.31	50,792	1.81	49,773	1.28	48,484	39.5	8.07
British colonies	6.79	70,978	3.92	67,680	2.78	69,909	39.4	7.04
All	6.30	121,770	3.70	117,453	2.62	118,393	39.4	7.16

Notes: Hhld size = mean household size

Source: authors' compilation based on LSMS data (World Bank).

We divided the country samples into 10-year birth cohorts, as shown in Table 2, and the results show that there has been an upward trend in terms of school attainment across successive cohorts. One finding that stands out from the cohort analysis is that average years of schooling of children in the latest birth cohort in Madagascar (1977–86) is lower than that seen in Nigeria, Uganda, and Ghana in the 1937–46 birth cohort, a difference of 40 years. This suggests major impediments to educational attainments in former French colonies when compared to the British colonies, and requires further research to understand the source of this disparity. The data show that former British colonies had higher education attainment than French colonies, as was also shown by Cogneau and Mesplé-Somps (2008). On average, in the former British colonies the sons had 7.97 years of education compared to 2.70 years in former French colonies.<sup>13</sup> The average education levels of mothers in former French colonies is just slightly over one year, while for daughters it is less than two years, showing that little has changed for women in the former French colonies. This is in contrast to the differences in education attainment between mothers (2.78 years) and daughters (5.76) in former British colonies.

We also looked at the descriptive statistics of the sampled countries by ethnic group (Tables A1–A8 in the Appendix). Given the large number of ethnic groups that exist within any given African country, for countries for which we had identified large numbers of ethnic groups, the descriptive statistics were limited to those groups that had respondents numbering more than 100 sampled households, while the smaller groups were recorded as other ethnic groups. However, for the regression analysis the ethnic groups were maintained as collected in the surveys to ensure the results were not biased by this manipulation. For Madagascar, the years of schooling on average for all the ethnic groups was low and the largest sampled group was Merina (23 per cent), who had an average number of years of schooling of 3.07 for the respondent, 3.08 years for the fathers, and 2.40 years for the mothers. In Nigeria, the most populous group were the Hausa/Fulani (33 per cent) and they had the lowest average education levels at 4.59 years for the respondents, 3.89 years for the fathers, and 3.01 years for the mothers. The ethnic group with the highest average years of schooling were the Ijaw, who had 10.16 years of education for the respondent, 5.79 years for the fathers, and 3.95 years for the mothers. For Guinea, individuals who identified as having French as the main language of use in the household and who composed 17 per cent of the sample had the highest average years of schooling at almost 7 years for the respondents, 3 years for the fathers, and 2.5 years for the mothers.<sup>14</sup> The Fulani (Pular) were the most populous at 29

<sup>13</sup>Gender disaggregated results are not presented here but are available on request.

<sup>14</sup>French is the official language of Guinea and the lack of identification with an ethnic language can be considered as part of the colonial heritage.

per cent, and the respondents from this ethnic group had on average 1.74 years of schooling, the fathers had 0.64 years, and the mothers had 0.37 years of schooling respectively. In Ghana, average years of schooling across the numerous ethnic groups was high, and the largest sampled ethnic group, the Ewe (12 per cent), had 8 years of schooling for the respondents, 5 years for the fathers, and 3 years for the mothers.

The country-level ethnic group statistics show how former French colonies have low levels of education among the ethnic groups, and the differences between the groups are small. For former British colonies, though ethnic groups generally have much higher levels of education, there is a big disparity in years of schooling of ethnic groups who are highly educated and those who have lagged behind.

Furthermore, when we performed the Blinder–Oaxaca decomposition on the results obtained using the twofold pooled method (inclusive of control variables), the mean years of schooling in former British colonies was 6.79 years, while for the French colonies it was 2.31 years with a mean education gap as measured in years of schooling of 4.48 years. Of this, differences in endowments included in the model between the two groups accounted for more than half (2.56 years) of the observed disparity, while the rest was due to differences in the coefficients (unexplained).

The descriptive data show wide dispersions in education attainment across ethnic groups within and across sampled countries for parents and children. There is also a stark difference in education attainment between French and British colonies. It is therefore of interest to examine the role that ethnicity plays in the intergenerational transmission of skills. We explore this further in the next section.

## 6 Results

### 6.1 Ethnic capital and intergenerational mobility: country analysis

The coefficients of the regression of the child years of schooling and that of their parents are presented in Table 4. We estimate the intergenerational transmission coefficient from parents to children without ethnic capital (columns 1 and 4) and with ethnic capital (columns 2, 3, 5, and 6). We present results from the two measurements of ethnic capital and control for region in the latter measurement (columns 3 and 6). We also include the vector of control variables in columns 3 and 4. In our analysis, we refer to the intergenerational elasticity measure from parents to children as parental capital. Column (1) shows that the intergeneration transmission coefficients from parents to children in the sampled countries is within the range 0.4–0.7, which is similar to findings by Hertz et al. (2007) and Azomahou and Yitbarek (2016) for African countries. Our findings are also akin to those of Behrman et al. (2001) for previously colonized countries—by Spain—in Latin America (Brazil and Colombia had a parental capital coefficient of around 0.7, while Mexico and Peru had coefficients of 0.5). Niger has the highest coefficient at 0.63, with Cote d’Ivoire second with a coefficient of 0.61, which indicates that intergenerational education persistence between parents and children is higher in these countries. The lowest coefficient was in Uganda, at 0.455.

Table 4: Intergenerational transmission coefficients: country-level analysis.

Dependent variable: respondent education level $y_t$						
Variable	(1)	(2) <sup>§</sup>	(3) <sup>†</sup>	(4)	(5) <sup>§</sup>	(6) <sup>†</sup>
<b>Cote d'Ivoire</b>						
Parental capital	0.608*** (0.033)	0.557*** (0.032)	0.372*** (0.030)	0.518*** (0.036)	0.465*** (0.035)	0.323*** (0.031)
Ethnic capital		0.876*** (0.130)	1.214*** (0.090)		0.953*** (0.121)	1.132*** (0.085)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.108	0.137	0.275	0.209	0.242	0.348
<b>Guinea</b>						
Parental capital	0.466*** (0.019)	0.396*** (0.020)	0.299*** (0.019)	0.418*** (0.023)	0.351*** (0.022)	0.265*** (0.020)
Ethnic capital		0.931*** (0.084)	1.176*** (0.051)		0.919*** (0.080)	1.151*** (0.052)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.147	0.207	0.285	0.196	0.254	0.327
<b>Madagascar</b>						
Parental capital	0.584*** (0.033)	0.559*** (0.032)	0.521*** (0.029)	0.575*** (0.035)	0.551*** (0.034)	0.512*** (0.030)
Ethnic capital		0.434*** (0.073)	0.555*** (0.059)		0.419*** (0.072)	0.550*** (0.059)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.246	0.253	0.269	0.254	0.260	0.276
<b>Niger</b>						
Parental capital	0.625*** (0.028)	0.620*** (0.028)	0.536*** (0.027)	0.553*** (0.029)	0.547*** (0.029)	0.460*** (0.028)
Ethnic capital		0.654*** (0.185)	0.948*** (0.088)		0.725*** (0.189)	0.943*** (0.088)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.151	0.154	0.202	0.224	0.227	0.274
<b>Ghana</b>						
Parental capital	0.485*** (0.009)	0.395*** (0.008)	0.366*** (0.008)	0.424*** (0.010)	0.308*** (0.009)	0.280*** (0.008)
Ethnic capital		0.538*** (0.026)	0.612*** (0.022)		0.630*** (0.025)	0.686*** (0.022)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.265	0.309	0.330	0.339	0.395	0.415
<b>Malawi</b>						
Parental capital	0.576*** (0.015)	0.545*** (0.014)	0.533*** (0.014)	0.485*** (0.017)	0.453*** (0.017)	0.442*** (0.016)
Ethnic capital		0.925*** (0.063)	0.957*** (0.052)		0.877*** (0.056)	0.908*** (0.047)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.221	0.242	0.249	0.337	0.356	0.363
<b>Nigeria</b>						
Parental capital	0.489*** (0.019)	0.460*** (0.020)	0.418*** (0.019)	0.387*** (0.023)	0.353*** (0.023)	0.295*** (0.023)
Ethnic capital		1.464*** (0.156)	0.756*** (0.114)		1.546*** (0.162)	0.896*** (0.113)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.176	0.218	0.208	0.259	0.306	0.302
<b>Uganda</b>						
Parental capital	0.455*** (0.020)	0.440*** (0.019)	0.379*** (0.020)	0.421*** (0.023)	0.409*** (0.021)	0.344*** (0.022)
Ethnic capital		0.212 (0.155)	0.597*** (0.065)		0.169 (0.156)	0.588*** (0.066)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.224	0.226	0.263	0.277	0.278	0.314

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , robust standard errors in parentheses; sample size: Cote d'Ivoire = 11,615; Guinea = 13,016; Madagascar = 21,517; Niger = 8,990; Ghana = 32,546; Malawi = 20,034; Nigeria = 11,240; Uganda=3,799.

§ = Ethnic capital calculated as average human capital of parental ethnic group.

† = Ethnic capital calculated as average human capital of parental ethnic group per region.

Source: authors' compilation based on LSMS data (World Bank).

In line with Borjas (1992) and Azomahou and Yitbarek (2016), we introduce a minimal number of controls: age, age-squared (to control for cohort effect), sex, and size of the household.<sup>15</sup> When we include the vector of control variables, as can be seen in column (4), the coefficients decrease across all countries, with Nigeria having the lowest coefficient at 0.387; but overall the difference is modest. The explanatory power of the model increases when the control vector is introduced and is evidenced by the increased value of  $R^2$ .

When ethnic capital is introduced to the model (columns 2, 3, 5, and 6), it has a positive and significant impact on children's education attainment in all of the countries, when we hold constant the parental education level. The highest ethnic capital results, as measured using the average of the ethnic group of the parents only, and shown in column (2), are seen in Nigeria (1.46), Malawi (0.93), and Guinea (0.93). When we also control for the region of the parental ethnic group, as shown in column 3, then ethnic capital is seen to be highest in Cote d'Ivoire (1.21), Guinea (1.18), Malawi (0.96), and Niger (0.95), of which three of the four are former French colonies. When the control vector is introduced (column 6), both parental and ethnic capital effects reduce in the former French colonies. The coefficients that we obtain for ethnic capital are much higher than those obtained by Borjas (1992, 1994) and Leon (2005), which suggests that ethnic capital, as we measure it, is a more important variable for mobility in Africa than in the United States, where the other studies are conducted.

In terms of magnitude, it can be argued that the average human capital of the parental ethnic group has more impact on changes in skill level for children in the next generation than the human capital of parents. In all the countries, the ethnic capital coefficient is almost twice as large or more than that of the parental capital, which suggests that parental ethnicity (and their skill level) and region of residence may be more important for mobility across generations in African countries than is parental capital. This finding is important as it may explain the persistence of poverty across subsequent generations of families in Africa and presents an opportunity for intervention to correct for this. When we only take into account parental capital, since the coefficients for this variable in all the countries is less than 1, we anticipate that the differences between children in successive generations will reduce and eventually revert to the mean. However, our results show that the ethnic capital effect is larger than the parental capital effect and the combined effect of these two coefficients is greater than 1, meaning that the dispersion in human capital in future generations may not revert to the mean but will instead grow larger, as explained by Borjas (1992). In essence, inequality will persist and the differences in attainment among the ethnic groups will increase over time. As was stated by Becker and Tomes (1986) and referred to by Lindahl et al. (2015) for the United States and other rich countries, unless affected by discrimination based on ethnicity, it is expected that most of the advantages or disadvantages inherited by descendants would disappear within three generations. In our case, the reversion to the mean across successive generations is severely hampered by ethnic tribe differentials in educational attainment.

In Table 5 we pool the cross-sectional data by colonial origin and compare the results, our results still show that ethnic capital has a bigger impact in terms of magnitude on the educational outcome of the next generation than does parental capital. Using control variables and fixed effects, we see in column (6) that ethnic capital correlation is higher in former British colonies (0.875) than in former French colonies (0.861). When we measure ethnic capital using only the average years of schooling of the parental ethnic group (columns 2 and 5), we see large differences in terms of impact of ethnic capital, but when region controls are also introduced in the measurement of ethnic capital, then the difference between the two cross-sectional pools reduces to a small margin. What we infer is that, overall, looking at column (6), ethnic capital has a greater impact on the education attainment of children in former British colonies than in former French colonies, while intergenerational persistence as measured between parents and children

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<sup>15</sup>Control variables are necessary to ensure that other factors that may directly affect mobility are taken into account and hence provide a better model for prediction (Wooldridge 2015).

is higher in former French than former British colonies. This also suggests that conventional mobility measures which do not include ethnicity as a variable overestimate the within-family persistence levels. When we compare the coefficients of the variables between the two cross-sectional pools using a *t*-test, we see that the variables in the two groups are statistically significantly different from each other. This supports our hypothesis that parental capital could be more important in former French colonies, whereas ethnic capital could be an important variable for mobility in African countries.

Table 5: Intergenerational transmission coefficients in former British and French colonies: pooled country analysis

Dependent variable: respondent education level $y_t$						
Variable	(1)	(2) <sup>§</sup>	(3) <sup>†</sup>	(4)	(5) <sup>§</sup>	(6) <sup>†</sup>
<b>French colonies</b>						
Parental capital	0.549*** (0.02)	0.506*** (0.02)	0.442*** (0.02)	0.532*** (0.02)	0.489*** (0.02)	0.426*** (0.02)
Ethnic capital		0.710*** (0.06)	0.865*** (0.04)		0.709*** (0.05)	0.861*** (0.04)
Controls for x	No	No	No	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.208	0.230	0.267	0.226	0.248	0.284
N	50,792	50,791	50,760	50,783	50,782	50751
<b>British colonies</b>						
Parental capital	0.489*** (0.02)	0.456*** (0.02)	0.417*** (0.02)	0.389*** (0.02)	0.351*** (0.02)	0.297*** (0.02)
Ethnic capital		1.280*** (0.13)	0.742*** (0.10)		1.369*** (0.13)	0.875*** (0.10)
Controls for x	No	No	No	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.179	0.217	0.211	0.261	0.304	0.304
N	70,978	70,978	70,912	70,956	70,956	70890

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

§ = Ethnic capital calculated as average human capital of parental ethnic group.

† = Ethnic capital calculated as average human capital of parental ethnic group per region.

Source: authors' compilation based on data.

## 6.2 Ethnic capital and location of residence

The pooled data were further analysed to determine whether ethnic capital differs by location of residence and by colonial origin; that is, does living in an urban or rural area affect persistence in years of schooling between children in successive generations and the parental ethnic group? A priori, we expect that ethnic capital may be higher in rural areas due to lack of education infrastructure, which would limit progression of children in successive generations and in this way increase the ethnic group-based persistence. In urban areas, while it is more than likely that there would be what Borjas (1992) refers to as social, cultural, and economic assimilation—which would reduce the importance of ethnic capital in the intergenerational transmission mechanism—we also posit that the presence of different ethnic groups may lead to a more apparent role for ethnic capital—as a form of social capital—in terms of using networks in the competition for education and employment opportunities, and hence it could also have a larger effect on education outcomes.

Our results are presented in Table 6 and show that in former French colonies, ethnic capital is higher in urban areas as opposed to rural areas. The opposite is true for former British colonies. For the former French colonies, the urban ethnic persistence could be a remnant of the lack of opportunities for individuals based on their ethnic group, which also limits the scope of opportunities based on their ethnic networks. For the rural areas, our results can be explained as resulting from historically low/no levels of education among parents in the rural areas in the colonial era and the subsequent increase in education due to government provision of schools in these areas in post-colonial countries—reducing the persistence within families and ethnic groups. In the former British colonies, the ethnic-based persistence is

higher within rural compared to urban areas and point estimates for rural areas are in fact much higher than in former French colonies. Rural area persistence may be as a result of poorer schooling infrastructure generally in these areas, which may not have changed over time, especially when compared to urban areas, limiting education progression for successive generations; but we see that ethnic capital effects in urban areas are also large, indicating that ethnic externalities play an important role in the intergenerational mobility process in the former British colonies irrespective of locality.

Table 6: Intergenerational transmission coefficients and ethnic capital: urban versus rural areas

Dependent variable: respondent education level $y_t$								
Variable	Urban				Rural			
	(1) <sup>†</sup>	(2) <sup>§</sup>	(3) <sup>†</sup>	(4) <sup>†</sup>	(5) <sup>§</sup>	(6) <sup>†</sup>	(7) <sup>§</sup>	(8) <sup>†</sup>
<b>French colonies</b>								
Parental capital	0.441*** (0.03)	0.412*** (0.02)	0.423*** (0.03)	0.393*** (0.03)	0.376*** (0.03)	0.352*** (0.03)	0.360*** (0.03)	0.335*** (0.03)
Ethnic capital	0.845*** (0.07)	0.778*** (0.06)	0.848*** (0.07)	0.779*** (0.06)	0.408*** (0.05)	0.512*** (0.05)	0.406*** (0.05)	0.511*** (0.05)
Controls for x	No	No	Yes	Yes	No	No	Yes	Yes
Country FE	Yes							
R <sup>2</sup>	0.238	0.254	0.263	0.278	0.120	0.133	0.142	0.155
N	24,346	24,329	24,345	24328	26,445	26,431	26,437	26,423
<b>British colonies</b>								
Parental capital	0.408*** (0.02)	0.387*** (0.02)	0.305*** (0.02)	0.278*** (0.02)	0.415*** (0.03)	0.378*** (0.03)	0.299*** (0.03)	0.244*** (0.03)
Ethnic capital	0.850*** (0.21)	0.532*** (0.14)	0.957*** (0.23)	0.620*** (0.14)	1.062*** (0.15)	0.545*** (0.14)	1.105*** (0.14)	0.703*** (0.13)
Controls for x	No	No	Yes	Yes	No	No	Yes	Yes
Country FE	Yes							
R <sup>2</sup>	0.213	0.216	0.297	0.302	0.145	0.134	0.263	0.260
N	22,671	22,645	22,663	22,637	48,307	48,267	48,293	48,253

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ; robust standard errors in parentheses.

§ = Ethnic capital calculated as average human capital of parental ethnic group.

† = Ethnic capital calculated as average human capital of parental ethnic group per region.

Source: authors' compilation based on data.

Overall, in all our countries, we find higher persistence from parental ethnic group than from the parents, indicating that irrespective of locality, ethnicity plays an important role in the intergeneration mobility process. When we compare the persistence within immediate families between the two pooled groups, we can see that the correlation is higher in urban areas than rural areas in both groups, though in terms of point estimates, persistence is higher in former French than former British colonies. This is more or less consistent with results obtained in the previous section and supports the assertion that colonial origin does have implications for the intergenerational mobility process in Africa.

### 6.3 Ethnic capital and intergeneration mobility: birth cohort analysis

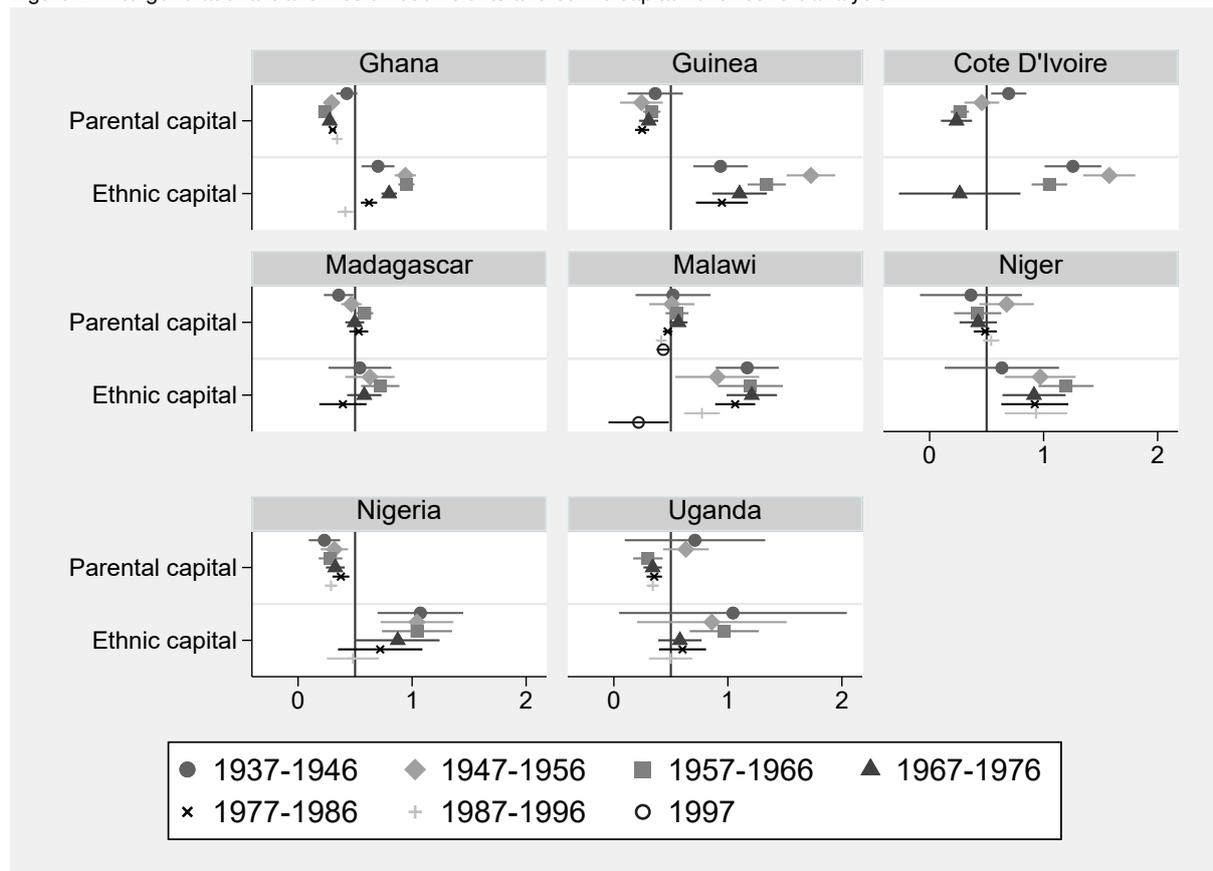
The empirical analysis done thus far does not show how ethnic capital and mobility have changed since the sampled countries attained independence. In this section, we discuss the results from our birth cohort analysis, which highlight how these two variables have evolved over time. In line with previous studies, we separated respondents into 10-year birth cohorts, the oldest of which precede independence for all the countries included in this study. As noted by Hertz et al. (2007), aggregation into cohorts may introduce a bias in terms of reasons for selection of size, but the estimates remain unbiased as long as the same cohort size is applied across surveys.

We have shown in our descriptive analysis that average years of schooling has increased over time in our birth cohorts (see Table 2). Results presented in Table 7 show that the effect of ethnic capital on children's education outcomes has also diminished across cohorts (see also Figure 2). Ethnic capital

is highest in terms of point estimates in the oldest birth cohort (those born between 1937 and 1946) in Malawi (1.175) and Cote d'Ivoire (1.200), while it is lowest in Niger (0.634) and Madagascar (0.542). There is an observed increase in terms of importance of ethnic capital as measured using the point estimates in the second and third 10-year birth cohorts (1947–66), before declining in the successive cohorts. Interestingly, parental capital in all the sampled countries, with the exception of Cote d'Ivoire, are more or less unchanged over the last three cohorts, indicating that the role of within-family inequalities across generations has remained relatively unaltered post-independence. Ethnic capital is also relatively unchanged when we compare earliest to last birth cohort in the former French colonies, despite the initial increase for Guinea, and this points to societal rigidities with regards to ethnic group-level mobility.

This is in contrast to the former British colonies, for which ethnic capital, as shown in Figure 2 has diminished in magnitude over cohorts while parental capital has only marginally reduced (with the exception of Uganda, for which it is 0.7 in the oldest two birth cohorts and oscillates around 0.3 in the last four birth cohorts). In spite of this, ethnic capital has a larger coefficient than parental capital even in the last birth cohort. In this respect, what we can infer is that colonial origin may be important in explaining the evolution of ethnic capital in African countries, and in particular why the role of ethnic capital seems to remain unchanged in the intergenerational mobility process in French colonies, but there are no differences based on colonial origin to explain parental capital, which is relatively unchanged across birth cohorts in all countries.

Figure 2: Intergenerational transmission coefficients and ethnic capital: birth cohort analysis.



Source: authors' creation.

Table 7: Intergenerational transmission coefficients and ethnic capital: birth cohort analysis.

Dependent variable: respondent education level $y_t$						
Variable	1937–46 (1)	1947–56 (2)	1957–66 (3)	1967–76 (4)	1977–86 (5)	1987–96 (6)
<b>Cote d'Ivoire</b>						
Parental capital	0.701*** (0.076)	0.459*** (0.068)	0.246*** (0.036)	0.281*** (0.057)		
Ethnic capital <sup>†</sup>	1.200*** (0.157)	1.559*** (0.142)	1.022*** (0.073)	0.471* (0.228)		
R <sup>2</sup>	0.331	0.326	0.196	0.197		
<b>Guinea</b>						
Parental capital	0.374*** (0.112)	0.260** (0.090)	0.331*** (0.038)	0.278*** (0.037)	0.251*** (0.027)	
Ethnic capital <sup>†</sup>	0.902*** (0.120)	1.726*** (0.103)	1.286*** (0.085)	1.097*** (0.107)	0.926*** (0.101)	
R <sup>2</sup>	0.233	0.319	0.260	0.265	0.267	
<b>Madagascar</b>						
Parental capital	0.356*** (0.066)	0.468*** (0.045)	0.584*** (0.038)	0.497*** (0.042)	0.533*** (0.042)	
Ethnic capital <sup>†</sup>	0.542*** (0.140)	0.630*** (0.110)	0.721*** (0.086)	0.581*** (0.076)	0.393*** (0.105)	
R <sup>2</sup>	0.148	0.189	0.268	0.242	0.332	
<b>Niger</b>						
Parental capital	0.363 (0.227)	0.676*** (0.121)	0.421*** (0.105)	0.426*** (0.083)	0.488*** (0.051)	0.540*** (0.037)
Ethnic capital <sup>†</sup>	0.634* (0.255)	0.970*** (0.158)	1.196*** (0.123)	0.916*** (0.141)	0.923*** (0.149)	0.933*** (0.139)
R <sup>2</sup>	0.045	0.116	0.116	0.156	0.171	0.289
<b>Ghana</b>						
Parental capital	0.427*** (0.047)	0.294*** (0.034)	0.234*** (0.019)	0.277*** (0.014)	0.304*** (0.013)	0.343*** (0.016)
Ethnic capital <sup>†</sup>	0.701*** (0.074)	0.941*** (0.047)	0.949*** (0.036)	0.799*** (0.035)	0.622*** (0.036)	0.415*** (0.036)
R <sup>2</sup>	0.241	0.285	0.307	0.356	0.324	0.309
<b>Malawi</b>						
Parental capital	0.519** (0.167)	0.511*** (0.101)	0.559*** (0.050)	0.566*** (0.040)	0.473*** (0.021)	0.417*** (0.015)
Ethnic capital <sup>†</sup>	1.175*** (0.141)	0.902*** (0.187)	1.194*** (0.145)	1.213*** (0.113)	1.065*** (0.089)	0.773*** (0.078)
R <sup>2</sup>	0.110	0.109	0.205	0.220	0.207	0.264
<b>Nigeria</b>						
Parental capital	0.231** (0.070)	0.318*** (0.061)	0.284*** (0.053)	0.327*** (0.042)	0.375*** (0.038)	0.289*** (0.027)
Ethnic capital <sup>†</sup>	1.073*** (0.191)	1.043*** (0.162)	1.043*** (0.156)	0.874*** (0.187)	0.720*** (0.188)	0.481*** (0.116)
R <sup>2</sup>	0.142	0.151	0.128	0.155	0.202	0.194
<b>Uganda</b>						
Parental capital	0.712* (0.313)	0.632*** (0.102)	0.299*** (0.066)	0.341*** (0.041)	0.355*** (0.035)	0.342*** (0.027)
Ethnic capital <sup>†</sup>	1.045* (0.508)	0.859* (0.333)	0.969*** (0.154)	0.580*** (0.097)	0.602*** (0.105)	0.498*** (0.097)
R <sup>2</sup>	0.255	0.190	0.191	0.204	0.226	0.251

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ; robust standard errors in parentheses.

<sup>†</sup> = Ethnic capital calculated as average human capital of parental ethnic group per region.

Source: authors' compilation based on data.

## 6.4 Colonial origin and ethnic capital: estimates from the interaction model

To capture the colonial origin effect on ethnic capital differentials in the two cross-sectional pools, we estimated Equation 4, an interaction model, as set out in the methodology section. From the results presented in Table 8, we can see that in model 1, which does not have demeaned values, the coefficients for the interactive effect between ethnic capital and the colonial identity dummy,  $\beta_4$ , with controls and country fixed effects shows a positive and significant relationship. The positive interaction term is statistically significant at the 95 per cent confidence level, and this implies that ethnic capital has a larger impact as measured by the point estimates on the intergenerational transmission mechanism in former British compared to former French colonies. The positive value of the coefficient suggests that ethnic capital had a higher impact on the years of schooling of children in successive generations in former British colonies than former French colonies. Parental capital can also be seen to be lower in terms of impact in former British colonies than French colonies, and this is in line with our findings from the pooled country regression analysis. This is seen in the negative coefficient of the interaction between parental capital and colonial identity, and our results are significant in the full control and fixed effects model. This is in line with our hypothesis that the use of the ranked system in former French colonies may have led to stronger within-family persistence.

Table 8: Interaction estimation: ethnic capital and intergenerational transmission coefficients in British and French colonies

	Dependent variable: respondent education level $y_i$					
	Model 1			Model 2 (demeaned values)		
	(1)	(2)	(3)	(4)	(5)	(6)
Parental capital	0.464*** (0.021)	0.506*** (0.021)	0.434*** (0.024)	0.520*** (0.021)	0.525*** (0.022)	0.456*** (0.024)
Ethnic capital <sup>§</sup>	0.695*** (0.057)	0.710*** (0.056)	0.718*** (0.057)	0.173* (0.069)	0.761*** (0.067)	0.779*** (0.071)
Colony (British)	-0.639 (0.613)	-2.447*** (0.645)	-2.437*** (0.667)	4.316*** (0.267)	2.204*** (0.145)	2.067*** (0.153)
Parental capital*colony (British)	-0.008 (0.028)	-0.050 (0.028)	-0.074* (0.029)	-0.014 (0.029)	-0.019 (0.030)	-0.045 (0.031)
Ethnic capital <sup>§</sup> *colony (British)	0.457*** (0.127)	0.571*** (0.139)	0.642*** (0.141)	-0.228 (0.186)	-0.823*** (0.215)	-0.863*** (0.221)
Constant	-0.259* (0.117)	0.827*** (0.173)	2.475*** (0.550)	2.348*** (0.070)	4.212*** (0.129)	4.595*** (0.174)
Controls for x	No	No	Yes	No	No	Yes
Country FE	No	Yes	Yes	No	Yes	Yes
R <sup>2</sup>	0.260	0.266	0.339	0.223	0.226	0.297

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ;  $n = 121,739$ .

§ = Ethnic capital calculated as average human capital of parental ethnic group.

Source: authors' compilation based on data.

When results from the demeaned model are examined, we see that when other variables are taken at their averages, there seems to be evidence of downward ethnic mobility in former British colonies. Our results show that the average aged individual in a former British colony who has parents of average education levels and given average household sizes will have lower education levels than the parents' ethnic group. This is not surprising, given that the average age of respondents is in the mid-forties and that this coincides with the period when there was a shift in priorities from education in most African countries after the initial increase in the post-independence level (though this has been countered by the renewed drive in universal primary education and similar agendas under the Millennium Development Goals). Our findings are similar to those of Alesina et al. (2019) who also find evidence of downward mobility in Africa and bases the reason for this on the flow constraint with regards to education infrastructure.

The intercept term in model 1 shows the predicted years of schooling for those in French colonies when parental capital and ethnic capital equal 0, and this is seen to be 2.5 years of schooling (column 3).

However, using demeaned values (column 6), we see that the average years of schooling in French colonies when parental and ethnic capital are taken at the average value goes up to 4.6 years, an increase of almost two years. The results for the colonial identity dummy,  $\beta_3$ , are significant and represent the predicted difference in years of schooling between those in former British and French colonies. In model 1, the variable shows the predicted difference in the two colonies when parental and ethnic capital are assumed to be zero, while in model 2 it is taken at average parental and ethnic capital levels. When we estimate using demeaned values of parental and ethnic capital, we can see in column (6) that the average difference in years of schooling between individuals in former British colonies and those in former French colonies given average ethnic capital levels in their countries is 2.1 years.

Overall, our results for model 1 show that the partial effect of an increase in ethnic capital of one year is correlated with an increase in education attainment of the children of less than one year in both former British and former French colonies, when we control for other variables. However, the impact of ethnic capital on educational attainment of successive generations is higher in former British colonies than former French colonies, and the results are statistically significant. These results are consistent with those obtained in the OLS pooled country estimations. In the interaction model, ethnic capital changes both the slope and intercept of the two cross-sectional pools, hence changing the magnitude of the impact. Therefore, the interaction parameter shows the difference between the slopes for the two groups. The results show that both the intercept and slope are higher in former British colonies (with controls included) and hence the impact of an increase in ethnic capital on child education would be higher in these countries.

## 7 Additional results and specification tests

To check the robustness of our results, we explored different specifications of our model. In particular, we estimate a model that includes only fathers and sons in the first specification, and ethnic capital refers to the average years of schooling of the father's ethnic tribe. In the second specification, we used parental average, which is the average years of schooling of the parents, as the measure of analysis for parental capital. In this respect, ethnic capital was also computed as the average of both parents' ethnic capital, rather than the maximum that was used in the previous analysis.

### 7.1 Results from fathers and sons estimation

When we use fathers' education rather than parental maximum as the explanatory variable for parental capital, there is little change in the results, as can be seen in Table 9, and results obtained from this specification are similar to those in Section 6.1. This can be explained as resulting from the generally low level of maternal education levels in the sampled countries—implying that measuring using parental maximum in most cases took on the father's education level. We estimated using only fathers observations in relation to both male and female children outcome, and then restricted it to only fathers and sons. The results show that persistence from the father's ethnic group to the children is higher than the within-family measurement. In particular, we find that the persistence from the ethnic group is highest in Cote d'Ivoire, Guinea, and Niger, similar to earlier country-level results presented in Table 4. Persistence within the family is highest in Madagascar, Niger, and Malawi, while it is lowest in Guinea, Ghana, Nigeria, and Uganda (see Tables 9 and 10), again similar to the earlier observed patterns. Overall, our results from the robust check support the argument that ethnic externalities play a significant role in the mobility process in African countries.

Table 9: Intergenerational transmission coefficients from fathers to children

Dependent variable: respondent education level $y_t$						
Variable	(1)	(2) <sup>§</sup>	(3) <sup>†</sup>	(4)	(5) <sup>§</sup>	(6) <sup>†</sup>
<b>Cote d'Ivoire</b>						
Parental capital	0.655***	0.599***	0.403***	0.555***	0.504***	0.345***
Ethnic capital		0.861***	1.257***		0.818***	1.157***
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.119	0.145	0.291	0.190	0.213	0.330
N	8,603	8,602	8,599	8,603	8,602	8,599
<b>Guinea</b>						
Parental capital	0.484***	0.416***	0.311***	0.420***	0.353***	0.262***
Ethnic capital		0.936***	1.200***		0.919***	1.159***
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.155	0.215	0.296	0.194	0.252	0.324
N	11,573	11,573	11,572	11,573	11,573	11,572
<b>Madagascar</b>						
Parental capital	0.584***	0.555***	0.515***	0.574***	0.547***	0.506***
Ethnic capital		0.500***	0.608***		0.480***	0.601***
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.230	0.238	0.256	0.234	0.242	0.259
N	20,733	20,733	20,712	20,733	20,733	20,712
<b>Niger</b>						
Parental capital	0.655***	0.646***	0.557***	0.631***	0.622***	0.532***
Ethnic capital		0.976***	0.955***		0.989***	0.940***
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.147	0.154	0.200	0.160	0.166	0.210
N	8864	8864	8860	8855	8855	8851
<b>Ghana</b>						
Parental capital	0.488***	0.391***	0.362***	0.426***	0.310***	0.282***
Ethnic capital		0.577***	0.644***		0.648***	0.704***
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.262	0.315	0.337	0.296	0.357	0.379
N	32,457	32,457	32,425	32,457	32,457	32,425
<b>Malawi</b>						
Parental capital	0.577***	0.544***	0.532***	0.498***	0.461***	0.450***
Ethnic capital	0.929***	0.956***		0.979***	0.986***	
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.203	0.224	0.232	0.286	0.310	0.318
N	20,835	20,835	20,833	20,835	20,835	20,833
<b>Nigeria</b>						
Parental capital	0.474***	0.448***	0.400***	0.386***	0.357***	0.298***
Ethnic capital		1.581***	0.813***		1.639***	0.910***
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.156	0.204	0.193	0.201	0.252	0.246
N	11,920	11,920	11,920	11,899	11,899	11,899
<b>Uganda</b>						
Parental capital	0.456***	0.441***	0.403***	0.419***	0.401***	0.364***
Ethnic capital		0.767***	0.659***		0.852***	0.676***
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.226	0.233	0.268	0.249	0.259	0.293
N	2,468	2,468	2,453	2,468	2,468	2,453

Notes: \* $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

† = Ethnic capital calculated as average human capital of parental ethnic group per region.

§ = Ethnic capital calculated as average human capital of parental ethnic group.

Source: authors' compilation based on data.

Table 10: Intergenerational transmission coefficients from fathers to sons

Dependent variable: respondent education level $y_t$						
Variable	(1)	(2) <sup>§</sup>	(3) <sup>†</sup>	(4)	(5) <sup>§</sup>	(6) <sup>†</sup>
<b>Cote d'Ivoire</b>						
Parental capital	0.677*** (0.04)	0.585*** (0.04)	0.364*** (0.04)	0.558*** (0.04)	0.466*** (0.05)	0.285*** (0.04)
Ethnic capital		1.320*** (0.11)	1.651*** (0.07)		1.329*** (0.11)	1.550*** (0.07)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.099	0.157	0.355	0.188	0.247	0.409
<b>Guinea</b>						
Parental capital	0.488*** (0.03)	0.401*** (0.03)	0.288*** (0.03)	0.440*** (0.03)	0.351*** (0.03)	0.244*** (0.03)
Ethnic capital		1.172*** (0.10)	1.397*** (0.06)		1.156*** (0.10)	1.373*** (0.06)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.132	0.217	0.308	0.162	0.244	0.331
<b>Madagascar</b>						
Parental capital	0.597*** (0.03)	0.568*** (0.03)	0.521*** (0.03)	0.588*** (0.03)	0.561*** (0.03)	0.514*** (0.03)
Ethnic capital		0.511*** (0.09)	0.671*** (0.07)		0.486*** (0.09)	0.662*** (0.07)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.236	0.245	0.266	0.242	0.250	0.271
<b>Niger</b>						
Parental capital	0.563*** (0.03)	0.549*** (0.03)	0.465*** (0.03)	0.503*** (0.04)	0.487*** (0.04)	0.390*** (0.04)
Ethnic capital		1.549*** (0.25)	1.205*** (0.09)		1.548*** (0.25)	1.212*** (0.09)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.122	0.139	0.205	0.147	0.163	0.230
<b>Ghana</b>						
Parental capital	0.437*** (0.01)	0.316*** (0.01)	0.284*** (0.01)	0.392*** (0.01)	0.255*** (0.01)	0.224*** (0.01)
Ethnic capital		0.701*** (0.03)	0.755*** (0.03)		0.741*** (0.03)	0.792*** (0.03)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.230	0.314	0.341	0.252	0.341	0.368
<b>Malawi</b>						
Parental capital	0.514*** (0.02)	0.480*** (0.02)	0.465*** (0.02)	0.462*** (0.02)	0.425*** (0.02)	0.410*** (0.02)
Ethnic capital		0.854*** (0.08)	0.936*** (0.07)		0.869*** (0.07)	0.941*** (0.06)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.176	0.199	0.211	0.227	0.250	0.262
<b>Nigeria</b>						
Parental capital	0.402*** (0.02)	0.380*** (0.02)	0.350*** (0.02)	0.303*** (0.02)	0.282*** (0.02)	0.239*** (0.02)
Ethnic capital		1.439*** (0.15)	0.670*** (0.11)		1.477*** (0.16)	0.791*** (0.10)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.127	0.169	0.154	0.203	0.247	0.239
<b>Uganda</b>						
Parental capital	0.395*** (0.03)	0.373*** (0.03)	0.332*** (0.03)	0.381*** (0.03)	0.357*** (0.03)	0.311*** (0.03)
Ethnic capital		1.054*** (0.29)	0.798*** (0.10)		1.072*** (0.29)	0.816*** (0.10)
Controls for x	No	No	No	Yes	Yes	Yes
R <sup>2</sup>	0.178	0.193	0.240	0.183	0.197	0.247

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , robust standard errors in parentheses; sample size: Cote d'Ivoire = 5,492; Guinea = 8,262; Madagascar = 10,111; Niger = 3,952; Ghana = 14,916; Malawi = 10,389; Nigeria = 5,546; Uganda = 1,207.

† = Ethnic capital calculated as average human capital of parental ethnic group per region.

§ = Ethnic capital calculated as average human capital of parental ethnic group.

Source: authors' compilation based on data.

Pooled country results, shown in Table 12, where we use data from only the fathers and sons, support our findings when we measure ethnic capital using the national average of the parental ethnic group. We see a larger impact of ethnic capital in former British colonies than former French colonies, while the persistence within families is higher in former French colonies than former British colonies, in line with our earlier findings. What is interesting is that when females are not included in the analysis, then persistence from parental ethnic group to children when measured using regional average ethnic group years of schooling is lower in former British colonies than former French colonies, by a sizeable margin (see Tables 11 and 12). This indicates that the interaction of gender and ethnicity may provide strong region-based externalities when females are not included in the analysis, so persistence is stronger from the father's ethnic group to sons in former French colonies. A more detailed investigation of gender roles and ethnicity is not covered in this paper, but can be the subject matter of future work. Another way to conceptualize this is that ethnic externalities may transcend region of residence in former British colonies. In other words, male respondents from a particular region may still be able to benefit from having kinsmen with higher education levels even if they reside in other regions—the social capital effect is not limited by region borders.

Table 11: Pooled country analysis: fathers and children (sons/daughters) (robustness check).

Dependent variable: respondent education level $y_t$						
Variable	(1)	(2) <sup>§</sup>	(3) <sup>†</sup>	(4)	(5) <sup>§</sup>	(6) <sup>†</sup>
<b>French colonies</b>						
Parental capital	0.550*** (0.021)	0.504*** (0.020)	0.438*** (0.019)	0.530*** (0.021)	0.484*** (0.020)	0.420*** (0.019)
Ethnic capital		0.745*** (0.058)	0.894*** (0.041)		0.744*** (0.057)	0.890*** (0.042)
Controls for x	No	No	No	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.198	0.222	0.261	0.217	0.241	0.280
N	49,773	49,772	49,743	49,764	49,763	49,734
<b>British colonies</b>						
Parental capital	0.475*** (0.020)	0.445*** (0.020)	0.400*** (0.020)	0.372*** (0.023)	0.339*** (0.023)	0.282*** (0.022)
Ethnic capital		1.396*** (0.131)	0.799*** (0.106)		1.465*** (0.136)	0.908*** (0.103)
Controls for x	No	No	No	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.159	0.203	0.197	0.249	0.297	0.296
N	67,680	67,680	67,631	67,659	67,659	67,610

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

§ = Ethnic capital calculated as average human capital of parental ethnic group.

† = Ethnic capital calculated as average human capital of parental ethnic group per region.

Source: authors' compilation based on data.

Table 12: Pooled country analysis: fathers and sons (robustness check).

Dependent Variable: respondent education level $y_t$						
Variable	(1)	(2) <sup>§</sup>	(3) <sup>†</sup>	(4)	(5) <sup>§</sup>	(6) <sup>†</sup>
<b>French colonies</b>						
Parental capital	0.547*** (0.022)	0.488*** (0.021)	0.411*** (0.022)	0.532*** (0.022)	0.473*** (0.023)	0.397*** (0.022)
Ethnic capital		0.949*** (0.067)	1.092*** (0.045)		0.935*** (0.067)	1.080*** (0.045)
Controls for x	No	No	No	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.190	0.228	0.280	0.201	0.238	0.289
N	27,818	27,817	27,801	27,815	27,814	27,798
<b>British colonies</b>						
Parental capital	0.404*** (0.021)	0.377*** (0.021)	0.349*** (0.019)	0.308*** (0.022)	0.281*** (0.022)	0.241*** (0.022)
Ethnic capital		1.299*** (0.125)	0.675*** (0.104)		1.348*** (0.130)	0.793*** (0.095)
Controls for x	No	No	No	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.130	0.170	0.159	0.203	0.247	0.242
N	32,058	32,058	32,037	32,049	32,049	32,028

Notes: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

§ = Ethnic capital calculated as average human capital of parental ethnic group.

† = Ethnic capital calculated as average human capital of parental ethnic group per region.

Source: authors' compilation based on data.

## 7.2 Alternative measurement of parental capital

When we use parental average as our measure of analysis, our results show much higher estimates of parental and ethnic variables. This is in line with the findings by Hertz et al. (2007) that using parental average provides higher estimates of mobility and may be considered as the upper-bound values. Our results are unchanged in terms of findings as we still see that ethnic capital plays an important role in the mobility process (see Table 13). Pooled country analysis and results from the interaction model using the alternative specification confirms our findings that persistence within families (parental capital) is higher in former French colonies than former British colonies. We also see that ethnic capital is much higher in terms of correlation with the educational outcomes of children in successive generations in former British colonies than former French colonies, irrespective of how ethnic capital is measured.

Overall, when the different specifications of the pooled model are used, we see a clear pattern showing that colonial origin has differing implications for how parental or ethnic capital affects the mobility process. This has policy relevance in terms of the approach that can be taken by respective policy makers regarding increasing inequality of opportunity with respect to education in their countries, and highlights the importance of taking into account historical factors when understanding contemporary African intergenerational mobility patterns.

Table 13: Pooled country analysis: robustness check.

Dependent variable: respondent education level $y_t$						
Variable	(1)	(2) <sup>§</sup>	(3) <sup>†</sup>	(4)	(5) <sup>§</sup>	(6) <sup>†</sup>
<b>French colonies</b>						
Parental capital	0.645*** (0.028)	0.591*** (0.027)	0.511*** (0.025)	0.626*** (0.029)	0.572*** (0.028)	0.493*** (0.026)
Ethnic capital		0.770*** (0.062)	0.977*** (0.044)		0.765*** (0.061)	0.971*** (0.045)
Controls for x	No	No	No	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.207	0.230	0.267	0.226	0.248	0.285
N	50,792	50,791	50,760	50,783	50,782	50,751
<b>British colonies</b>						
Parental capital	0.539*** (0.025)	0.507*** (0.024)	0.440*** (0.025)	0.416*** (0.028)	0.380*** (0.026)	0.289*** (0.028)
Ethnic capital		1.749*** (0.141)	0.851*** (0.110)		1.844*** (0.146)	0.999*** (0.106)
Controls for x	No	No	No	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.151	0.216	0.195	0.242	0.312	0.299
N	70,978	70,978	70,912	70,956	70,956	70,890

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

§ = Ethnic capital calculated as average human capital of parental ethnic group.

† = Ethnic capital calculated as average human capital of parental ethnic group per region.

Source: authors' compilation based on data.

## 8 Colonial institutions and ethnic capital: IV estimation model

In this section, we estimate the impact of colonial origin on the intergenerational mobility process using IV to control for possible omitted variables and measurement error from the least squares regression. To that end, we instrument for ethnic and parental capital using missionary presence in a region for the countries included, collected by Roome (1925), and the inverse of the percentage of the population who were Muslims in 1970 in the country, obtained from Woodberry (2004, 2012) and Woodberry et al. (2010), interacted with median education years of schooling for the regions as collected in the earliest available DHS for the countries. The Hausman test confirms endogeneity of the ethnic and parental capital variables and hence validates the use of the IV technique.

We checked for relevance of the instruments using both correlation analysis and first-stage results; our instruments were found to be sufficient (see Table 14 for the correlation results). When we look at the first-stage results presented in Table 15, the results from the regression of ethnic and parental capital on the instruments and covariates show that our instruments are statistically significant overall based on their  $F$ -statistics. We find that for former British and French colonies, locations where both Catholic and Protestant missions was recorded in 1923 show a significant and positive association with human capital levels of different individuals. A positive and significant association is also found between our second instrument and the endogenous variables. Hence, we deem our instruments to be relevant for use in our model.

The IV results show that in former British colonies, ethnic capital has a significantly higher effect (1.63) than in former French colonies (0.42) when we use control variables, country and region fixed effect (columns 4 and 8 of Table 15). These estimates are higher than those from the OLS estimations but consistent with the findings. These results are statistically significant and do not change in effect when ethnic capital is defined as the average human capital of the parental ethnic group in each region.

Table 14: Pairwise correlation coefficients.

	PC	EC (1)	EC (2)	ML	MusP
<b>French colonies</b>					
PC	1.00				
EC (1)	0.2330*	1.00			
EC (2)	0.3464*	0.6969*	1.0000		
ML	0.2445*	0.2234*	0.2712*	1.0000	
MP	0.2360*	0.2984*	0.2267*	0.8012*	1.0000
<b>British colonies</b>					
PC	1.00				
EC (1)	0.1487*	1.00			
EC (2)	0.3301*	0.6230*	1.0000		
ML	0.0236*	0.3575*	0.2540*	1.0000	
MP	0.0688*	0.1032*	0.1562*	0.4875*	1.0000

Notes: \* significant at the 5 per cent level.

PC = parental capital, the highest number of years of schooling of parents; EC (1) = ethnic capital calculated as average human capital of parental ethnic group; EC (2) = Ethnic capital calculated as average human capital of parental ethnic group per region; ML = Mission location (Roome 1925); MP = Muslim proportion in the country (1970)\*years of schooling (ICF 2004–17).

Source: authors' compilation based on data.

Our results show that there is higher persistence in education from parents to children in former French colonies than in former British colonies, just as we found from the OLS estimations. However, the point estimates are higher than those obtained earlier. This is in line with expectations as estimates from an instrumental variable regression tend to be higher than those from a least squares estimation, and is indicative of measurement error in the least squares estimation. It also implies that the OLS estimation method may underestimate the persistence within families and from the parental ethnic group and respondents, though the standard errors are much larger, which infers some loss in precision in the IV estimation. For ethnic capital, our results for the French colonies are in line with the findings of Leon (2005), who finds that OLS estimates of ethnic capital effects are subject to upward bias from measurement error in the father's skills. He found that not only does the measurement error attenuate the coefficient on parental capital, but it can also create a false impression of positive ethnic peer effects. However, for the former British colonies, ethnic capital is higher using the IV than using OLS methodology. This difference in our results from Leon (2005), who uses literacy rates of the father upon arrival in the United States as an instrument, may be explained by choice of instruments, but given the unavailability of such data for African countries, we hypothesize that use of another instrument would not change our results, given the historical role of ethnicity as a variable of control and the increased resulting ethnic consciousness. However, this contradiction does present an area of further research in looking for more instruments that may provide better estimates—especially for Africa, where quality of data remains a challenge.

Table 15: Instrumental variables estimation: intergenerational transmission coefficients in British and French colonies.

	French colonies			British colonies		
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A: second stage</b>						
	Dependent variable: respondent education level $y_t$					
Parental capital	1.350*** (0.258)	1.302*** (0.245)	1.305*** (0.247)	0.441* (0.185)	0.693** (0.249)	0.783** (0.240)
Ethnic capital †	0.691* (0.298)	0.270 (0.272)	0.212 (0.274)	1.530** (0.578)	1.628** (0.607)	1.788** (0.595)
<b>Panel B: first stage</b>						
	Dependent variable: ethnic capital					
(Base: both Protestant and Catholic missionary stations)						
ML0 (None)	-0.351* (0.163)	-0.108 (0.164)	-0.096 (0.163)	-0.391** (0.124)	-0.287* (0.118)	-0.267* (0.115)
ML1 (Prot. )	-1.031*** (0.128)	-0.729*** (0.146)	-0.724*** (0.145)	-0.487*** (0.094)	-0.580*** (0.094)	-0.585*** (0.092)
ML2 (Cath.)	-0.209 (0.133)	-0.146 (0.132)	-0.136 (0.131)			
MP	-0.108 (0.062)	-0.249*** (0.070)	-0.242*** (0.070)	-0.367* (0.154)	2.234*** (0.425)	2.306*** (0.419)
F-statistic	99.190	190.901	146.354	236.031	753.607	549.979
N	50,791	50,791	50,782	69,845	69,845	69,823
	Dependent variable: parental capital					
(Base: both Protestant and Catholic missionary stations)						
ML0 (None)	-1.214*** (0.363)	-0.629 (0.364)	-0.443 (0.328)	0.299 (0.599)	0.514 (0.603)	0.596 (0.555)
ML1 (Prot. )	-1.157** (0.370)	-0.331 (0.392)	-0.258 (0.374)	-0.045 (0.364)	0.066 (0.382)	0.056 (0.353)
ML2 (Cath.)	-1.488*** (0.357)	-1.320*** (0.341)	-1.172*** (0.304)			
MP	0.018 (0.198)	-0.210 (0.215)	-0.095 (0.203)	5.063*** (0.788)	8.704*** (1.959)	9.109*** (1.844)
F-statistic	54.490	46.622	52.227	10.522	116.384	118.840
N	50,792	50,792	50,783	69,845	69,845	69,823
Controls for x	No	No	Yes	No	No	Yes
Country FE	No	Yes	Yes	No	Yes	Yes

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , standard errors in parentheses.

Endogenous variables: respondent education level, ethnic capital, parental capital.

Exogenous variables: ML, geographic variables, MP, control variables.

† = Ethnic capital calculated as average human capital of parental ethnic group.

ML = presence of a missionary location in the region; MP = Muslim proportion in the country (1970)\*years of schooling (ICF 2004–17).

Source: authors' compilation based on data.

## 9 Conclusion

The central concept of this paper is that colonial origin affected intergenerational mobility through its impact on ethnicity. The channel of transmission is that institutional colonial administrative styles that differed between the French and the British led to differences in opportunities for upward mobility in their colonies, and this inequality was along ethnic lines, hence making ethnicity an important variable in understanding intergenerational mobility in Africa. To that effect, we have shown that ethnic capital as measured by the average educational attainment of the parents' ethnic group is an important determinant of educational attainment of successive generations. In fact, our results show that changes in ethnic capital have greater impact on education attainment of children than parental capital, especially in former British colonies. Our results are robust to the use of different estimation techniques.

These findings are in line with our hypothesis that the French colonies who had the ranked system with regards to ethnicity would have a high level of ethnic-based persistence in terms of education attainment.

For the former British colonies, though we expected ethnic capital to be higher than parental capital, our results show that it possibly plays a much more prominent role in the intergenerational transmission of skills and is much higher in terms of impact on successive generations than in former French colonies. This finding can be explained if we understand it from a point of view that indirect rule, as used by the British for colonial administration, fostered competition for recognition between ethnic groups which acted as an impetus for each group to have an added interest in opening up opportunities for kinsmen—in essence, an individual’s ethnic tribe becomes a form of social capital that avails them opportunities for upward mobility or may act as a factor limiting their economic outcome in life. As has been argued by Jean-François (1993) and Bates et al. (1972), ethnicity or tribalism should not be looked at in isolation but as a channel through which self-serving groups can accumulate wealth and mobilize votes so they can access political power and resources. In this sense, there would be a self-satisfying interest to ensure that members of one’s own ethnic group are more educated and have easier access to better jobs so they maintain a higher social class and hence have more opportunities to be in control of the resources, and because of the tribal competition fostered during colonialism in British colonies, ethnic capital is understandably higher in these countries. The French fostered a sense of nationalism as the overarching goal, and hence in these countries a sense of patriotism rather than competition between the ethnic groups was fostered, and that may explain why ethnic capital is lower, though it is still an important factor for mobility there.

Although our results are mainly obtained from the pooled country analyses and may conceal country-level idiosyncratic differences despite our use of fixed effects, they still have some important policy implications. Based on our findings, there is a clear role of policy makers in ensuring that upward social mobility opportunities are available to individuals irrespective of their ethnicity or tribe, and this is more so for former British colonies for which it is an important circumstantial determinant of the socioeconomic outcome of children. Interventions on an ethnic group level would be a short-term measure to correct for the lack of opportunities for particular ethnic groups, but in the long term the reduction in perceived ethnic differences in terms of opportunities will reduce the importance of ethnic capital in the intergenerational mobility process. Further research is needed to understand the role of ethnicity in post-colonial African states and how it impacts on differences in education attainment, which is the main driver of opportunities in the labour markets.

## 10 Data sources and variable definitions

1. *Geographic control variables*: the geographic variables were obtained from the AidData website (Goodman et al. 2016). The specific variables are as follows:

Elevation: average value of elevation above sea level in meters; data are sourced from Jarvis et al. (2008).

Precipitation levels: measured as the average precipitation in millimetres for the year 1930, which is during the colonial period for all the countries included in this study; data are sourced from Willmott and Matsuura (2001).

Distance to the coast: refers to the mean distance from the coast for the country, measured in metres; data are sourced from Wessel and Smith (1996).

2. *Presence of oil*: measures the presence of petroleum on- or off-shore for a country. It takes the value of 1 if an oil deposit is in the country and 0 otherwise. The data are sourced from the Map of Diamond Resources, Peace Research Institute of Oslo (PRIO).

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## Appendix

Table A1: Descriptive statistics: Madagascar (2005)

Ethnic tribe	Education (mean years of schooling)				
	Respondent	Father	Mother	Sample size	percentage of sample
Antakarana	2.07	1.6	1.42	219	1.02
Antambahoaka	3.77	4.01	2.81	78	0.36
Antandroy	0.81	0.67	0.49	1,720	7.99
Antanosy	1.23	1.09	0.59	650	3.02
Antefasy	2.13	2.59	0.92	310	1.44
Antemoro	2.61	2.72	1.67	615	2.86
Antesaka	1.7	1.63	1.1	941	4.37
Arabo	3.62	3.17	3.17	14	0.07
Bara	0.48	0.79	0.45	852	3.96
Betsileo	2.1	2.59	1.79	3,480	16.17
Betsimisaraka	1.33	2.12	1.37	2,807	13.05
Bezanozano	2.75	1.89	1.67	85	0.4
Frantsay	3.28	5.6	2.99	4	0.02
Karana	3.92	4.05	3.15	22	0.1
Komoriana	3.23	2.36	2.65	64	0.3
Mahafaly	0.74	0.77	0.43	317	1.47
Merina	3.07	3.08	2.4	4,869	22.63
Sakalava	1.65	1.69	1.27	1,532	7.12
Sihanaka	2	1.76	1.19	774	3.6
Sinoa	4.75	7.21	5.68	9	0.04
Tanala	0.63	1.31	0.69	503	2.34
Tsimehety	1.79	1.36	0.85	1,289	5.99
Vezo	3.8	2.26	2.39	168	0.78
Other ethnic groups	1.48	2	1.29	195	0.91

Source: authors' compilation.

Table A2: Descriptive statistics: Nigeria (2010)

Ethnic tribe	Education (mean years of schooling)				
	Respondent	Father	Mother	Sample size	Percentage of sample
Hausa/ Fulani	4.59	3.89	3.01	4,186	33.21
Igbo	7.89	3.14	2.18	2,663	21.13
Yoruba	8.72	4.37	2.81	2,604	20.66
Ijaw	10.16	5.79	3.95	700	5.55
Other ethnic groups	6.86	3.8	2.73	2,450	19.44

Source: authors' compilation.

Table A3: Descriptive statistics: Niger (2014)

Ethnic tribe	Education (mean years of schooling)				Percentage of sample
	Respondent	Father	Mother	Sample size	
Arab	6.5	0.03	0.06	42	0.47
Djema/Songhai	2.84	0.72	0.37	2,452	27.26
Gourmantche	6.16	1.91	1.3	41	0.46
Haoussa	3.05	0.49	0.29	3,538	39.34
Kanouri-Manga	2.86	0.44	0.22	658	7.32
Peul	2.91	0.79	0.32	576	6.4
Touareg	2.23	0.44	0.22	1,334	14.83
Toubou	3.55	1.07	0.23	187	2.08
Other ethnic group	5.7	0.1	0.92	9	0.1
Foreign	7.36	3.36	1.79	157	1.75

Source: authors' compilation.

Table A4: Descriptive statistics: Guinea (2002)

Ethnic tribe	Education (mean years of schooling)				Percentage of sample
	Respondent	Father	Mother	Sample size	
Fulani (Pular)	1.74	0.64	0.37	3,733	28.7
Soussou	3.51	1.84	1.14	2,935	22.5
Maninka	1.49	0.7	0.51	3,243	24.9
Toma/Lomagouwe	0.93	0.36	0.2	120	0.9
Kpelewo/Guerze	2.09	1.29	0.66	461	3.5
Kissi	2.27	0.53	0.4	253	1.9
French	6.32	3.36	2.47	2,177	16.7
Other	1.53	0.77	0.53	94	0.7

Source: authors' compilation.

Table A5: Descriptive statistics: Malawi (2017)

Ethnic tribe	Education (mean years of schooling)				Percentage of sample
	Respondent	Father	Mother	Sample size	
Chewa	6.08	1.45	0.82	14,040	66.65
Nyanja	5.73	1.33	0.6	1,235	5.86
Yao	3.65	0.38	0.15	1,279	6.07
Tumbuka	8.28	2.54	1.44	1,771	8.41
Lomwe	4.59	0.7	0.35	364	1.73
Nkhonde	8.05	1.68	0.88	171	0.81
Ngoni	5	0.62	0.39	512	2.43
Sena	5.02	0.75	0.28	533	2.53
Nyakusa	4.86	1.05	0.4	51	0.24
Tonga	7.69	2.82	1.9	548	2.6
Lambya	7.54	1.6	0.88	121	0.57
Senga	6.75	2.34	0.91	8	0.04
Sukwa	6.94	1.14	0.98	81	0.38
English	15.51	12.19	9.97	41	0.19
Other ethnic group	6.43	1.64	0.71	311	1.48

Source: authors' compilation.

Table A6: Descriptive statistics: Ghana (2013)

Ethnic tribe	Education (mean years of schooling)				
	Respondent	Father	Mother	Sample size	Percentage of sample
Akuapem	9.03	6.99	4.64	829	2.44
Akyem	9.14	6.57	4.36	887	2.61
Asante	8.68	5.92	3.51	3,312	9.74
Asen (Assin)	8.88	6.52	3.4	207	0.61
Boron (Brong) (including Banda)	7.68	4.27	2.22	1,635	4.81
Denkyira / Twifo	8.55	6.85	3.42	164	0.48
Fante	7.85	5.64	3.11	3,247	9.55
Kwahu	8.83	6.29	3.65	565	1.66
Nzema	8.12	6.01	3	399	1.17
Sefwi	7.93	4.86	2.24	428	1.26
Wasa	7.74	5.93	2.67	386	1.14
Ga-Dangme	6.46	3.02	1.38	219	0.64
Dangme (Ada, Shai, Krobo, Osudoku)	7.26	4.9	2.44	1,075	3.16
Ga	10.07	8.4	5.61	736	2.16
Ewe	7.88	5.39	2.87	4,132	12.15
Avatime, Nyongbo, Tafi, Logba	5.71	3.07	1.84	208	0.61
Gonja	4.36	1.65	0.42	522	1.54
Yeji, Nchumuru, Krachi, Nawuri, Bass	6.78	3.04	1.46	250	0.74
Bimoba	4.62	1.46	0.14	348	1.02
Kokomba	1.67	0.29	0.11	1,201	3.53
Basare(Kyamba)	4.73	2.12	0.52	239	0.7
Kotokoli	4.93	1.63	0.82	157	0.46
Builsa (Kangyaga or Kanjaga)	4.98	1.99	0.95	458	1.35
Dagarte (Dagaba), Lobi , Wali (Wala)	3.88	1.13	0.58	3,175	9.34
Dagomba	3.14	0.71	0.21	1,814	5.33
Kusasi	3.24	0.95	0.3	1,183	3.48
Mamprusi	3.6	1.49	0.47	407	1.2
Nankansi, Talensi and Gurense (Frafra)	4.92	1.39	0.5	1,324	3.89
Mosi	4.5	1.45	1.14	247	0.73
Kasena (Paga)	4.88	1.85	1.2	370	1.09
Sisala	3.79	1.25	0.82	882	2.59
Other Grusi (e.g. Lela, Templensi)	4.16	0.5	0.67	381	1.12
Busanga	3.81	1.03	0.55	296	0.87
Other tribes	6.23	3.49	2.02	2,320	6.82

Source: authors' compilation.

Table A7: Descriptive statistics: Uganda (2013)

Ethnic tribe	Education (mean years of schooling)				
	Respondent	Father	Mother	Sample size	Percentage of sample
Baganda	9.36	7.87	5.95	618	14.93
Banyakole	7.04	4.9	2.36	520	12.56
Langi	6.74	6.14	2.04	434	10.49
Bagisu	7.27	5.69	3.17	232	5.61
Bakiga	5.84	4.57	2.04	200	4.83
Lugbara	5.9	4.89	2.09	183	4.42
Basoga	7.68	6.7	3.88	320	7.73
Banyoro	7.05	6.13	4.24	136	3.29
Iteso	7.08	5.98	2.66	334	8.07
Karimojong	1.97	1.59	0.19	80	1.93
Acholi	8.06	6.91	2.96	147	3.55
Alur	6.44	5.51	2.1	108	2.61
Batoro	7	5.43	3.01	172	4.16
Other ethnic groups	6.43	5.02	2.1	655	15.83

Source: authors' compilation.

Table A8: Descriptive statistics: Cote d'Ivoire (1985–87)

Ethnic tribe	Education (mean years of schooling)			Sample size	Percentage of sample
	Respondent	Father	Mother		
Abron	3.85	0.34	0.02	102	0.88
Krou	0	1.2	0	5	0.04
We	2.74	0.81	0	146	1.26
Other Krou	2.16	1.05	0	70	0.6
Dioula	2.04	0.46	0.02	420	3.62
Malinke	2.82	0.76	0.1	484	4.17
Other Mande North	0.85	0.1	0	317	2.73
Dan/ Yacouba	2.14	0.25	0.02	488	4.2
Gouro	1.28	0.09	0	469	4.04
Toura	3.93	0	0	10	0.09
Other Mande South	1.72	0.37	0.05	499	4.3
Agni	2.39	0.7	0.08	1,508	12.98
Senoufo	1.22	0.13	0.02	824	7.09
Koulango	1.97	0.13	0	84	0.72
Lobi	2.03	1.25	0	22	0.19
Other Voltanic	2.03	0.54	0.09	121	1.04
Burkina Faso	0.75	0.05	0	572	4.92
Mali	1.39	0.27	0.08	343	2.95
Guinea	1.46	0.48	0	135	1.16
Ghana	2.33	2.68	0	42	0.36
Senegal	1.88	0.68	0	39	0.34
Liberia	0	0	0	2	0.02
Baoule	2	0.34	0.08	2,117	18.22
Other African country	3.22	0.92	0.23	221	1.9
Laguinaires	7.1	2.22	0.39	322	2.77
Other African country	6	0	0	1	0.01
Other Akan	2.58	0.67	0.13	1,242	10.69
Bakwe	0	0	0	2	0.02
Bete	3.77	0.85	0.13	737	6.34
Dida	2.4	0.27	0.02	264	2.27
Godie	10.51	5.19	3.84	8	0.07

Source: authors' compilation.