Educational Gender Inequality in Sub-Saharan Africa: A Long-term Perspective

African Economic History Working Paper Series

No. 54/2020

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ISBN 978-91-981477-9-7

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Educational Gender Inequality in Sub-Saharan Africa: a Long-term Perspective

August 8, 2020

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Abstract

To what extent was the 20th century schooling revolution in sub-Saharan Africa shared equally between men and women? We examine trajectories of educational gender inequality over the 20th century, using census data from 21 African countries and applying a birth-cohort approach. We present three sets of findings. First, compared to other developing regions with similar histories of colonial rule and educational expansion, sub-Saharan Africa performed comparatively poorly in closing educational gender gaps (M-F) and gender ratios (M/F) over the 20th century. Second, in most African countries, the educational gender gap rose during the colonial era, peaked mid-century, and declined, albeit at very different rates, after independence. Southern African countries were remarkably gender equal, both in terms of gaps and ratios. French (former) colonies had smaller gaps but higher ratios than British (former) colonies, which we attribute to slower expansion of male education in the former. Both on the world-region and country-level, the expansion of male education is associated initially with a growing gender gap, and subsequently a decline. We refer to this pattern as the "educational gender Kuznets curve". Third, using data from 6 decadal cohorts across 1,177 African regions, we explore sub-national correlates of educational gender equity. Better connected and urban regions witnessed lower educational gender inequality. In regions with large Christian mission stations in the early 20th century access to education was also less gender unequal, an effect that persisted into the post-colonial period. We also find that during the colonial era, cash crop cultivation was not consistently associated with larger gender gaps, while female farming systems were associated with smaller gaps. The sub-national cross-sectional results confirm the existence of an educational gender Kuznets curve.

JEL Classification: I24, J16, N37, N97, Z12

Keywords: Education, Gender Inequality, Africa, Long-Term Development, Colonialism, Missions

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1. Introduction

Contemporary Relevance: While sub-Saharan Africa has a poor and erratic record of economic growth over the long 20th century, its sustained expansion of education across the sub-continent is beyond dispute (Lee & Lee 2016). However, the African 'schooling revolution' was highly uneven, with certain regions and particular sections of the population benefiting earlier and more than others. Gender was a major fault line, as boys benefitted disproportionally from new educational opportunities. In many developing countries women have caught up and sometimes even outperformed males in terms of school attainment today (Grant & Behrman 2010; Bossavie & Kanninen 2018; Himaz & Aturupane 2019). Africa, however, exhibits the highest degree of schooling inequality in favor of boys in the world (Psaki et al. 2018; UNICEF 2020). Twelve (15) out of the 17 (20) countries in the world where girls have not yet caught up with boys in primary (lower secondary) school enrolment are located in sub-Saharan Africa (UNESCO 2019).

Progress towards gender parity in education has been linked to a great variety of favorable outcomes for women, their households, and for society as a whole. Gender equality in educational attainment can positively impact women's economic and political participation later in life (World Bank 2017), lower fertility and early marriage (Lloyd et al. 2000; Beierova & Duflo 2004; Duflo et al. 2015; Boahen & Yamauchi 2018; Kabede et al. 2019), reduce child mortality (Makate & Makate 2016; Keats 2018; Andriano & Monden 2019), imply important gains for family well-being (Abuya et al. 2012; Pratley 2016; Alderman & Headey 2017), and spur economic development (Klasen 2002; Baliamoune-Lutz & McGillivray 2009; Klasen & Lamanna 2009). It is thus crucial to understand the origins and drivers of African women's access to education relative to men's.

What we do: In this article, we trace and take a first step towards explaining the evolution of gender inequality in education across sub-Saharan Africa over most of the 20th century – covering the rise of African mass-education. To track historical development of educational gender inequality, we use post-colonial census data. We use a cohort approach, selecting individuals aged 25-80 years, and assigning men's and women's acquired years of education to their country or district of birth. We reconstruct the gender gap and the ratio of male to female years of education from census data covering 15.4 million individuals across 19 African countries and 1,177 (birth) regions.

Gender gaps are obviously shaped by policy decisions on the national level. However, since gender gaps are also highly heterogeneous within individual countries, it is important to consider patterns and explore plausible determinants on the sub-national level as well. While existing datasets provide time series of educational outcomes of men and women at the *country-level* (e.g. Barro & Lee 2013; Lee & Lee 2016), the use of individual-level data enables us to also investigate African historical gender gaps in education on the *sub-national level*. Our regression analyses do not identify causal relationships, but rather explore relevant initial and dynamic conditions on the local level that plausibly contributed to educational gender inequality. Moreover, unlike earlier 'persistence' studies that have linked historical determinants, such as Christian missionary presence (Nunn 2014; Montgomery 2017) or colonial cash crop agriculture (Miotto 2019), to present-day gender-biased education outcomes in Africa, we offer a *dynamic* perspective, showing that gender gaps and their correlates shifted significantly over the 20th century.

Results Preview: We analyze gender gaps at three levels of aggregation. First, we compare the evolution of African educational gender inequality to South Asia, Southeast Asia and the Middle East. These regions were similar in two respects: most of their countries entered the 20th century under European colonial rule, and each witnessed major educational expansion from the late 19th century onwards. For this world-region comparison, we use cohort data from Barro & Lee (2013). We find that sub-Saharan Africa started out as the least gender unequal region in the early 20th century, both in terms of educational gender gaps (male-minus-female) and ratios (male-to-female). However, inequality increased during the early colonial era, while it decreased in other world regions. During the post-colonial period, the gender gap closed in all regions, but much slower in Africa, so that by the 1980s it had become the most gender unequal region. If we compare the four regions at different stages of their male educational expansion trajectories (rather than across time), we find that in each case the educational gender gap first rose and subsequently declined as male education expanded, a relationship that we refer to as 'educational gender Kuznets curve'. Throughout its curve, Africa had the lowest level of educational gender inequality, suggesting that its poor performance over the 20th century was linked to the slow expansion of male education.

Second, using census data from 21 African countries obtained from IPUMS-International, we compare long-term trajectories of the educational gender gap on the country-level. This level of aggregation allows us to investigate the role of colonial and post-colonial policies. We document significant cross-country heterogeneity in gender unequal access to education *within Africa* during the 20th century. We find substantial differences in gender gap trajectories across colonizer and region. In the British colonies in East and West Africa and League of Nations mandated (former German) territories, convergence of years of education of men and women started earlier than in the French colonies. Higher and more persistent educational gender inequality in the latter was linked to slower overall educational expansion. Southern Africa saw much better relative outcomes for women over the entire period, linked to the opportunities for girls that arose from male absenteeism in a context of pastoralism and labor migration.

Third, we analyze the IPUMS-I census data on the level of sub-national birth regions for three periods (1920-39, 1940-59, 1960-1979), using decadal birth cohorts. This approach allows us to study initial and dynamic conditions associated with educational gender gaps on the district level. We explore several hypotheses proposed in the literature. Our findings support the view that openness favored educational gender equity. Districts with large cities, coastal location and connected to a railroad, had significantly lower educational gender inequality. We also find that districts treated by intensive and early Christian missionary activity witnessed lower educational gender inequality. We find some evidence that the cultivation of cash crops increased gender unequal access to education, and that regions where women actively participate in agriculture had lower educational gender inequality than regions where agricultural activities were primarily carried out by men.

Related Literature: Our study contributes to multiple strands of literature. First, we engage with an empirical scholarship on the historical determinants of gender-specific access to education. Ashraf et al. (2018) find that the deeply rooted cultural practice of bride price benefited girls' access to education in Zambia and Indonesia, a finding that our study does not confirm. Nunn (2014) finds that European Protestant missionary presence in colonial Africa left a comparatively benign legacy on women's education relative to men's. In contrast, exposure to Catholic missions had no long-run impact on female education but a large positive impact on male education today. Montgomery (2017) confirms that missions had a positive long-term effect on contemporary educational outcomes in Tanzania, but contrarily finds limited evidence for a comparatively benign effect of Protestant missions on female education or gender equality. Moreover, Catholic missions had a markedly negative effect on gender gaps in education and literacy.[1] In contrast to both studies, we find that the presence of both Catholic and Protestant main mission stations is associated with persistently lower gender gaps in education. Miotto (2019) finds that women in African regions involved in cash crop agriculture during the colonial era have better educational outcomes today. Our results do not confirm this, but instead suggest that cash crop cultivation in the early colonial period was associated with higher educational gender inequality.

[1] For India, Lankina & Getachew (2012) associate Christian missionary activity with better long-term educational outcomes for women during both colonial and post-colonial eras. Calvi et al. (2019) shows that this relationship is particularly strong for colonial missions with higher female missionary staff presence.

Second, we make a key contribution at the intersection of two literatures that respectively trace historical trajectories of overall educational expansion in Africa, and educational gender gaps across other world regions.[2] Our study directly relates to the thriving empirical scholarship studying the long-term patterns and determinants of gender-specific access to education in Europe and the US (Goldin et al. 2006; Becker & Woessmann 2008; Goldin & Katz 2008; Bertocchi & Bozzano 2016; Baten et al. 2017; Beltran Tapia et al. 2018), Latin America (Duryea et al. 2007; Baten & Manzel 2009), and Asia (Friesen et al. 2012). Sub-Saharan Africa has not yet featured comprehensively in this literature, a gap that our study fills.[3] Others have traced Africa's expansion of formal education, human capital formation and educational mobility (Frankema 2012; Cogneau & Moradi 2014; Alesina et al. 2019; Dupraz 2019; Juif 2019; Cappelli & Baten 2020; Müller-Crepon 2020). In particular, this literature links the uneven expansion of education to colonizer identity, as well as the role of variation in economic structure and development at the national and sub-national level. However, aside from several studies on Uganda (Meier zu Selhausen 2014; Meier zu Selhausen & Weisdorf 2016; de Haas & Frankema 2018), which debate the drivers and timing of an inversely U-shaped trajectory of educational gender inequality, long-term development of African educational gender gaps and their determinants have not yet been investigated.

Third, we relate our empirical findings to debates in the historical literature about the changing position of women in African societies under the influence of missionaries, colonialism, urbanization and openness. The historical literature has debated the benign features of European missionaries and colonial officials on female empowerment, instead emphasizing their role in promoting patriarchal social order, and disproportionally allocating educational resources to boys. As a result, girls received not only fewer years of education, but also of lower quality, which disincentivized parents to educate their daughters (Egbo 2000; Bantebya Kyomuhendo & McIntosh 2006; Hanson 2010). Job markets that provided only few opportunities for women further reduced the willingness of parents to send their daughters to school, especially considering their role in female-dominated farming systems (Boserup 1970; Coquery-Vidrovitch 1997; Meier zu Selhausen 2014; de Haas & Frankema 2018).

At the same time, processes of urbanization and economic diversification that gradually spread over the 20th century and intensified from the 1950s onwards, progressively undermined the rural patriarchal order of colonial Africa, as girls and women could migrate to cities and

[2] See Bertocci & Bozzano (2019) for a survey of the literature on long-term educational gender gaps.

[3] Three exceptions include: Alesina et al. (2019, Figure 3) examine male-female gaps in educational mobility for 26 sub-Saharan African countries, 1960s-1990s. Barro & Lee (2015, Table 2.10) present aggregate figures for 17 sub-Saharan African countries of female-male ratios of educational attainment, 1870-2010. Cogneau & Moradi (2014) provide boys-girls enrollment ratios for colonial Ghana and Togo.

exploit various informal activities, such as trading, provisioning food and beer, and sex work (Little 1973; Obbo 1980; Evans 2018; Meier zu Selhausen 2020). Arguably, the presence of such 'exit options' improved women's bargaining power to demand better education. It has also been argued that educated fathers were more likely to favor girls' education (Coquery-Vidrovitch 1997). Moreover, the marriage market may also have played a role, as educated men did not want the spousal education gap to be too large (Obbo 1980; Leach 2008; Meier zu Selhausen & Weisdorf 2020). For Southern Africa, it has been argued that educational gender inequality was lower at a much earlier date, despite strongly patriarchal cultures. The main reason was that boys and young men were occupied with herding and migration to work in mines, leaving colonial and missionary schools with mostly girls to educate (Coquery-Vidrovitch 1997). Our sub-national analysis provides new insights into these different factors contributing to differences in the educational gender gap across time and space.

The paper proceeds as follows. Section 2 presents the data and empirical strategy. Section 3 compares the long-term patterns of educational gender inequality in Africa with Asia and the Middle East. Section 4 takes a within Africa comparative perspective. Section 5 explores various initial and dynamic factors that plausibly contributed to African educational gender inequality between 1920 and 1979 on the sub-national level in a multivariate regression framework. Section 6 concludes.

2. Data and Methods

To study long-term trajectories and local conditions that plausibly contributed to African gender inequality, we construct two datasets on three geographic levels. We analyze African long-run gender inequality in education in a (i) *world-region* comparative perspective, as well as on the African (ii) *country-level*, and (iii) *sub-national-level*. Since we are interested in historical changes in gender-specific access to education, rather than accumulated human capital of men and women, we do not consider the stock of education in the entire population at a certain moment in time, but instead use a *flow* approach, tracing the average years of education for birth cohorts of men and women per world region, country or district.

2.1 African Gender Inequality in a Global Perspective

To compare African gender inequality to other developing regions at similar stages of educational expansion in Asia and the Middle East we use Barro & Lee (2013) (henceforth, BL2013) who provide years of education for 5-year age cohorts (15-74) for each 5-year interval in the 1950-2010 period. Their estimates for each interval are corrected for selective mortality (educated people may live longer). We use their dataset to trace country-level male and female education for five-year birth cohorts back to at least the early 20th century. We consider the year of census enumeration minus the age (to be exact: beginning of the 5-year-age bracket plus 2.5 years[4]) in order to identify the birth year. We then aggregate male and female years of education by birth decade and calculate both the absolute *gender gap* (i.e. male minus female years of education) and the *gender ratio* (i.e. ratio of male-to-female educational attainment), and also place the gender gap in relation to the average level of male schooling.

For the comparison of world regions, we use arithmetic averages of countries, as weighted averages would let the world region of South Asia be dominated by India and Southeast Asia by Indonesia. Hence, we consider even small countries as important cases that allow us to gain insights about the trends of gender inequality. Pre-1890 birth decades were dropped due to potential survivorship bias from using birth cohort data. Similar to IPUMS, BL2013 base their estimates on census data, although they consider a wider set of censuses and for a sample of countries that only partly overlaps with ours. Only IPUMS data, for example, covers Nigeria and Ethiopia, while only BL2013 cover the Democratic Republic of the Congo and Mozambique.

2.2 Gender Inequality in Sub-Saharan Africa

Our African (ii) *cross-country* and (iii) *sub-national* analysis of educational gender inequality is based upon aggregated individual-level data, retrieved from IPUMS (Integrated Public Use Microdata Series) International, hosted by the University of Minnesota Population Center. IPUMS provides 63 harmonized, representative samples, covering ~10% of country's population on 24 sub-Saharan African countries between 1960 and 2013. We restrict our sample to the earliest and latest census years for each country recording both *age* and *years of education*. We retrieved census data from 34 national censuses from 21 countries that observe both individuals' age and years of education: Benin, Botswana, Burkina Faso, Cameroon, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Liberia, Malawi, Mali, Nigeria[5], Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe.[6] Overall, IPUMS records information on educational attainment for around 43 million individuals.

[4] We assume that the smaller deviations do not create substantial bias.
[5] Nigeria is an exception. Its data come from household surveys conducted between 2006 and 2010.
[6] We exclude Mozambique, Sudan, South Sudan and Togo due to missing years of education variable. For these countries only educational attainment is observed.

To obtain coverage of all cohorts for the 1920-79 period, and to avoid double counting of individuals observed in consecutive censuses, we only keep the birth decades of the 1920s to 1950s from one early census year and the 1960s and 1970s birth decades from one late census year of each country. For some countries in our sample (i.e. Burkina Faso, Ethiopia, Rwanda and Sierra Leone) only one census year is available that records individuals' years of education and age at enumeration. In these cases, we make an exception and use all calculated birth decades from the respective census year available, not only those in the period 1920-1959 or 1960-1979. Next, we restrict our sample to individuals aged 25-80 years, whose schooling can reasonably be expected to have been completed (Charles & Luoh 2003). We drop those older than 80 years due to small sample sizes of the cohorts and likelihood of the very elderly to overstate both age and educational attainment (BL2013; Guntupalli & Baten 2006; Crayen & Baten 2010). We use this sample at the (ii) *country-level* for the descriptive trends.

For our (iii) *sub-national* analysis, we further refine our sample to those countries for which IPUMS also records individuals' birth location (Table 1). For Nigeria and Zimbabwe no place of birth is reported. Table 1 provides details on sample construction: census years, birth decades covered and number of regions. Our final dataset consists of ca. 15.4 million individuals, born across 1,177 regions in 19 African countries, retrieved from 32 national censuses.[7] Subsequently, we aggregate those individuals mean years of schooling by birth decade and sex at the administrative sub-national level which together with the time dimension of birth decades constitutes our unit of observation. The aggregated sample with a number of 5,226 observations allows us then to calculate the dependent variables: the absolute gap (years of education) and relative gap (ratio) in average years of schooling between males and females per birth region and birth decade.[8]

The birth regions correspond to either first- or second-level geography,[9] depending on their availability in IPUMS-I (we use the most disaggregated variable available). The unit names of birth regions hence vary across countries (e.g. districts, regions or circles). To account for the different sizes of these administrative subdivisions we use weights for the population

[7] Appendix Table 1 presents details on sample construction: countries, census years, number of birth regions, total observations, observations aged 25-80 and the share of men and women in the sample. Appendix Table 2 shows the number of observed districts per country for our three time periods.

[8] When calculating the ratio in average years of schooling between males and females, our dataset declines to 4924 observations since females do not receive any education in some regions. Therefore the level of schooling for women is zero within these regions which means that these observations are not taken into account in the denominator.

[9] Most countries are divided into administrative divisions which have different levels. First level geography corresponds to the largest administrative subdivisions of a country (i.e. region) whereas second level geography corresponds to administrative boundaries that are inferior to the first level administrative divisions and hence constitute a smaller unit (e.g. districts).

size per birth region and birth decade. In addition, most of these territorial divisions change their geographic borders between the two census years that we include in our sample for each country. To deal with this, IPUMS offers an integrated, year-specific geography variable providing information at the administrative unit-level and the corresponding GIS boundary files.

Statistical Method

To measure gender inequalities, we relate male and female trends per 5-year birth cohorts (country-level) and 10-year birth cohorts (sub-national level). We do so in two ways. First, we consider *educational sex ratios,* which express average years of male education over average years of female education. A ratio of 2, then, means that women, on average, accumulated half of the years of education of men. A ratio of 1 means that women on average accumulated the same number of years of education than men. Second, we reconstruct the *absolute attainment gap* between men and women in years of education. There are good reasons to analyze both relative (ratio) and absolute (gap) measures in conjunction. Ratios allow us to investigate the extent to which the provision of education was skewed towards men or women, no matter the overall years of education accumulated by the whole population. This approach implies diminishing returns to education as the total number of accumulated years increases.[10] The absolute gap expresses the difference as actual number of years of education between the sexes. This approach assumes constant returns to education regardless of the absolute level.[11]

Migration is typically age-, skill- and sex- selective, which means that gender educational attainment at the region of residence is a result not only of local education outcomes (which we seek to capture), but also of selective migration. Therefore, birth region provides a more appropriate unit of observation for our spatial cohort-analysis than the region of residence during census enumeration, which for the oldest cohorts is over half a century after the completion of their education. By taking the birth region as the unit of analysis for our sub-national analysis, we assume that people were indeed educated within their birth region. Most people who migrate between districts do so after they have completed their (primary and secondary) education, although some people did move (with their parents) between birth and the start of their education, or completed part of their education (particularly tertiary) outside of the region of birth.

[10] The ratio is the same if women have 1 year of education and men 2, relative to women 5 and men 10, even though the absolute gap has grown from 1 to 5 years.
[11] The absolute gap is the same if women have 1 year of education and men 2, relative to women 9 and men 10.

Our birth decade approach has three further limitations. First, our main variable years of education indicates educational attainment as measured by number of years in school completed but does not inform about the quality of education, which may vary across space, time and gender.[12] It is also the most generic indicator of educational attainment, not distinguishing between different levels of schooling, and not accounting for grade repetition. Second, our approach of back-casting census data partly accounts for selective survivorship since we include only individuals aged 25-80. Still, the possibility exists that the more educated may have a better chance of making it into the older cohorts. Such survivor bias in cohort analysis has been studied in earlier literature, but its magnitude proved to be modest (Guntupalli & Baten 2006; Crayen & Baten 2010; Barro & Lee 2013). [13] Third, the earliest cohorts in our analysis are smaller so that confidence intervals widen considerably as we go back in time, especially in our analysis on the sub-national level. Consequently, we drop regional birth decades pre-1920, due to lack of observations. From the 1920s onwards as the number of cases is generally sufficient, even on a regional level, and we drop 10-year averages only in case we have less than 30 observations.

3. Long-term Educational Gender Inequality in Africa and Developing Regions

In this section, we place Africa's trajectories of educational gender inequality in a global perspective. We compare sub-Saharan Africa with the Middle East and North Africa (MENA), South Asia and Southeast Asia, all world regions that experienced a comparable rise in mass-education over the long 20th century from a similarly low initial level, and achieved independence from European colonizers during the mid-20th century. Using the Barro & Lee (2013) dataset, we reconstruct both gaps and ratios of years of education by 10-year-birth cohorts from 1890 to 1980 per world region.

Gender Gap. Figure 1 presents the unweighted country average of the gender gap for each of our four world regions. It shows that sub-Saharan Africa transitioned from being the least gender unequal region among the four world regions during the early 20th century to the most unequal by the 1980s, a situation that has persisted to the present-day (Barro & Lee 2015). Overall, we can see a pattern of rising absolute inequality in each of the four world regions before mid-century, and declining inequality thereafter. Access to education in the MENA

[12] Mission schools typically operated gender biased curricula, emphasizing domesticity and needlework for girls and crafts and reading skills for boys (Musisi 2009; Meier zu Selhausen 2019).

[13] As shown in Appendix Figure 1 survivor bias in our sample is minimal. The graphs respectively present sampled countries of (a) East, (b) West, (c) Central and (d) Southern Africa.

region started out as relatively gender equal, but saw a rapidly widening gap of more than two years by the 1940s birth cohort, after which equally strong gender convergence took place. South Asia presents a picture of relatively high gender inequality in education throughout the entire period, with its gap peaking, jointly with MENA, for the 1940s birth cohort. Southeast Asia peaked two decades earlier and exhibits decreasing absolute gender inequality already for those born after the 1930s. Africa's comparatively more gender unequal performance post-1950s can be explained by its comparatively late inequality peak, for the 1950s birth cohort, and the fact that for the 1970s-1980s cohorts, gender inequality declined at a slower pace relative to the other developing regions.

Gender Ratio. Sub-Saharan Africa's comparatively lower initial rate of absolute inequality concerning the schooling year gap may have been partly linked to the fact that access to education was low for both sexes. However, looking at the male-female ratio, shown in Figure 2, a similar picture emerges. Africa started out as the most gender equal region for the 1890s-1910s birth cohorts but finished as the most gender unequal region by the 1980s birth cohorts. As with the absolute gap, for the 1900s birth cohort South Asia and Southeast Asia were the most gender unequal regions with boys on average obtaining about four times as much education as girls. Unlike the other developing regions, African relative gender inequality increased for those born during the first three decades of the 20th century. For those born since 1930, Africa's ratio also started to decline, but less dynamically than in Southeast Asia and East Asia, moving in tandem with MENA and South Asia.

Kuznets Curve. So far, we have considered the evolution of gender gaps over time (per decadal birth cohort). However, we may also expect that the allocation of educational resources towards boys and girls may follow a non-linear trajectory as male education expands, independent of the historical moment in which such a trajectory unfolds. Historically, there has been a pattern where education initially is monopolized by boys, but as most boys have attained a certain amount of schooling, their demand saturates and access to girls grows.[14] At which level of male education this happens, and how abrupt this saturation effect is, is likely driven by local determinants, such as the economic returns to education which shifted rapidly across 20th century Africa (Frankema & van Waijenburg 2019). A large educational gender gap may also be considered socially and economically undesirable from a labor market and marriage market perspective (Meier zu Selhausen & Weisdorf 2020). Educated fathers, in particular, tend to see the value of girls' education and are likely to send their daughters to school (Coquery-

[14] For Africa, the existence of this pattern is shown for the case of Uganda (Meier zu Selhausen 2014; Meier zu Selhausen & Weisdorf 2016; De Haas & Frankema 2018). Other studies have found similar patterns in other world regions, including Asia (Friesen et al. 2012) and Latin America (Manzel & Baten 2009).

Vidrovitch 1997:151; Meier zu Selhausen & Weisdorf 2016, 2020). As a result, societies will start shifting expanding educational resources from boys towards girls when a certain critical level of educational gender inequality is reached.

Figure 3 relates the gender gap to the expansion of male education.[15] In all regions gender inequality over male educational expansion followed an inverted U-shape, as gender inequality was initially rising and then falling with sustained educational expansion of men. Alluding to the endogenous dynamics that drive it, we term this pattern the *educational gender Kuznets curve*. Sub-Saharan Africa's curve was the *least* gender unequal, starting out, peaking and concluding at lower levels than the other world regions. When African boys received c. 1 year of education on average, the gap was just under half a year of education (meaning that girls received just over half a year of education on average), compared to just over half a year in the MENA region, and close to a year in South Asia and South East Asia. At c. 6 years of education, the gender gap was again smallest in Africa, this time trailed by South East Asia and, at a larger distance, South Asia, and the MENA region. This approach brings us to an important finding, namely that Africa's comparatively poor progress towards educational gender inequality, observed in Figure 1 and 2, is linked to its slower progression of male education, which is still at a stage along the 'Kuznets curve' where the gender gap can be expected to still be high, as it had been in other world regions. Because Africa performs relatively well in terms of gender equity at different stages of its male education expansion, we cannot plausibly attribute Africa's relatively poor performance in reducing educational gender inequality across time to some inherent gender discriminatory traits that inhibit a more equitable distribution of education.

In conclusion, several stylized facts about Africa's trajectory of educational gender inequality emerge from our global comparison. First, African education was relatively gender equal among the 1890s and 1900s birth cohorts, when missionary and colonial government education were just emerging. Secondly, in contrast to other world regions, the educational outcomes of cohorts treated during the prime era of missionary schooling (c. 1900-1939) were increasingly gender unequal. This finding challenges the idea that missionary influences had a benign overall effect on girls' education in Africa, when viewed on an aggregate scale. Thirdly, Africa's post-colonial convergence was sluggish compared to South Asia and South East Asia, suggesting that independent states were unable to mitigate the adverse legacies left behind by European colonizers. Fourthly, Africa's relatively poor performance in terms of educational gender inequality over the 20th century is linked to a comparatively slow progression of male

[15] See Appendix Figure 2 that plots the educational gender ratio over the expansion of male education.

educational expansion. At each of the stages of male educational expansion, however, Africa achieved more gender equality than other comparable regions.

4. Educational Gender Inequality in Africa

How did individual African countries perform relative to the patterns presented in Figures 1 to 3? In this section, we zoom into the long-term trajectories of educational gender inequality on the African country-level using national census records. This allows us to examine heterogeneity among various colonial territories and independent nations over the 20th century. Figure 4 presents the absolute gender gap in years of education for 5-year birth cohorts. Figure 5 presents the relative gender gap defined as male-female ratio. Figure 6 presents the absolute gender gap relative to overall male educational expansion (i.e. the educational gender Kuznets curve).[16] We cluster country trajectories into four groups: (a) British colonies in East and West Africa, (b) French colonies, (c) independent and mandated (former German) territories, and (d) southern Africa.

British Colonies in East and West Africa

The first cluster of former British East and West African colonies includes 7 countries (Ghana, Kenya, Uganda, Malawi, Nigeria, Sierra Leone and Zambia). Figure 4(a) shows that in most of these countries, absolute gender gaps rose steadily from the first birth cohort observed and peaked almost universally around BC 1945, at levels varying between 2 years in Nigeria and Sierra Leone to 3.5 years in Ghana. Post-1940s, absolute inequality started to decline (except in Nigeria), but at variant pace. Convergence in terms of male-female ratios shown in Figure 5(a), was also rather uniform among most of these countries, starting among the 1930s BC, from a ratio of 3-4 and declining to 1-1.5 among the 1980s BC. Nigeria and Sierra Leone had less favorable trends, and saw male-female ratios persist at a higher level.

Notable are the similar patterns of both absolute and relative gender inequality of Ghana, Uganda, Kenya, Malawi and Zambia from the 1920s to the 1950s BC (Figure 4(a) and 5(a)). Such uniformity in gender gaps likely reflects efforts by the British colonial government to more actively coordinate Christian missionary educational efforts and standardize educational practices in the African colonies (Windel 2009). Initially, the assertion of greater state control over African missionary education appears not to have influenced educational gender

[16] See Appendix Figure 3 that plots the gender ratio over expansion of male education.

inequality. Only from the late 1930s onwards, and partly in response to African complaints about poor access and quality of education for girls (Hanson 2010; De Haas & Frankema 2018), do we observe a sustained shift towards more gender equity in schools. Post-colonial trajectories were somewhat more divergent, as countries adopted their own educational policies. Kenya almost entirely closed the gender gap by 1980, while Ghana, Malawi, Uganda and Zambia partly closed the gap, reaching ratios below 1.5. Sierra Leone, a majority Muslim country with a coastal Christian settlement of freed slaves since the beginnings of the 19th century, and Nigeria, where the north was under indirect Muslim rule and therefore not penetrated by Christian missionaries, did not follow the trend observed in the other colonies. Their post-colonial performance was particularly poor, with the absolute gender gap stagnating at above 2 and the relative gap converging much slower than in any of the other countries of our British colonial sub-set.

Figure 6(a) shows that much of the differences observed between the individual British (former) colonies correspond to them being in different stages along the *educational gender Kuznets curve*. During the first 3 years of male educational expansion, all countries saw a consistent increase in gender inequality, rising with c. 1 year for every 1.5 years of male educational expansion. Each of the countries subsequently witnesses a tapering off followed by a decline of the absolute gender gap. Consistent with the Kuznets curve dynamics, those countries whose male education expanded fastest also tended to have strong performance in terms of achieving gender equity, with Kenya being the best performer. This figure clearly highlights that overall educational expansion in Sierra Leone and Nigeria was much slower than in the other five countries, which can explain their poor performance over time (Figure 4 and 5). By the final observed birth cohort (1980s), neither had barely reached the level of male educational expansion at which the other countries had earlier begun to decisively 'turn the corner' towards a declining educational gender inequality. Interestingly, however, Sierra Leone's gender gap did not grow over the last 5 observed decades, despite some expansion of male education. As such, Sierra Leone appears to have bent its Kuznets curve at an earlier *stage* of male educational expansion (albeit later in time) than the other 6 former British colonies in East and West Africa.

French Colonies

In the French West African colonies (Senegal, Benin, Burkina Faso, Guinea, Mali), which were predominantly Muslim and thus had limited missionary presence, a rather different picture emerges. Initial gender gaps were much smaller in absolute terms than in most British colonies

(Figure 4(b)), but larger in relative terms (Figure 5(b)), with ratios in most colonies ranging between 5 and 8 until the 1940s BC. Gender inequality also persisted for longer, with sustained convergence between male and female schooling observable only from the 1945 BC onward. The comparatively poor performance of French territories persisted post-independence, with gender ratios above the average for sub-Saharan Africa (Figure 5(b)). Senegal, which had a much deeper history of modern education (Cappelli & Baten 2017), was the best post-colonial performer among the countries with a French colonial legacy.

When we chart the gender gap over male expansion of education in Figure 6(b), we find that French colonial Africa followed a trajectory comparable to British colonial Africa. However, male educational expansion was considerably slower in (former) French Africa compared to (former) British Africa, which can be attributed to the French colonial practice of investing into the public education of only a small male-dominated administrative elite (Cogneau & Moradi 2014; Guarnieri & Rainer 2018; Dupraz 2019). This slow progression through the Kuznets curve can explain why the provision of education in French Africa was more skewed towards men than in British Africa. Further along the *educational gender Kuznets* curve, Benin saw more educational expansion as well as more absolute gender inequality than in any other French colony observed, following at trajectory quite similar to neighboring Nigeria. Benin's outlier status within the French sample can be linked to the presence of unusually large numbers of mission schools in Benin compared to other French colonies (Huillery 2009), and the status of Benin as the key supplier of educated personnel across Francophone Africa (Challenor 1979). Interestingly, Mali and Senegal turned towards declining absolute gender inequality at a comparatively early stage of their educational expansion, which places them among the African countries that turned towards lower educational inequality early along their male expansion trajectories.

Independent and Mandated Territories

Our next group of countries includes the independent countries of Ethiopia and Liberia as well as former German colonies that were governed after World War I under League of Nations mandate by the British (Tanzania, western Cameroon), Belgians (Rwanda) and French (eastern Cameroon). The experiences of these countries were heterogeneous. Ethiopia's experience was quite similar to that of the French colonies of Burkina Faso and Mali, with a small absolute gap (Figure 4(c)) and a large relative gap (Figure 5(c)). On the Kuznets curve, Ethiopia performed comparatively well, bending the curve towards gender equity at an early stage of educational expansion (Figure 6(c)). Ethiopia's path can be attributed to its deep history of elite literacy linked to Christian Orthodoxy and limited demand for missionary mass education (Meier zu Selhausen 2019). Liberia exhibits the most extreme trends in our sample, starting out with relatively low gender inequality but experiencing a steep rise of relative and absolute inequality until the 1940s BC's, followed by a reduction of inequality, but not enough to offset the earlier increase relative to other countries.

Among the three mandated territories, each with a widespread Christian missionary presence, Cameroon, and to a lesser extent Tanzania, stand out for particularly high rates of gender unequal access to education under German rule (Figure 5(c)). However, under French and British rule, the cohorts born from 1920 onwards in the three mandated territories performed better than average, catching up with the British pattern.[17] Thus, the League of Nations mandate, which introduced a modicum of accountability towards the international community appears to have been associated with better educational outcomes for girls (Pedersen 2015: 134). Figure 6(c) suggests that Cameroon and Tanzania closed their absolute gender gaps along the 'typical' trajectory of male educational expansion, although Tanzania performed comparatively strong in closing the gap during the post-colonial decades. Rwanda performed particularly well, closing most of its gender gap at only 4 to 5 years of average male education (although we should note that, possibly, a selection effect linked to selective mortality of educated men during the 1994 genocide may feed into this outcome).

Southern Africa

The fourth and final grouping consists of the four southern African countries in our sample, Botswana, Lesotho, South Africa and Zimbabwe. Each of these four countries performed distinctly better in terms of educational expansion and gender equality than any of the other countries observed here. Within this group, Zimbabwe's performance was least impressive, with absolute gender inequality rising continuously up BC1960 (Figure 4(d)), and the ratio declining very slowly (Figure 5(d)), albeit from an already low level of 2 years. Subsequently, the gap closed rapidly. Figure 6(d) shows that the absolute gap declined from 2 to less than 0.5 years while overall education barely expanded. Botswana and South Africa both had extremely low absolute and relative inequality throughout the 20th century as well as along their educational expansion trajectories. In both cases, women even outperformed men for the most recent BCs observed. The case of Lesotho is even more at odds with the overall pattern, with women accumulating more years of education than men during the entire period, reaching

[17] Guarnieri & Rainer (2018) find the benign long-run British colonizer effect on education is largely explained by female educational investment, observing that in western Cameroon's British administered territory women had significantly better access to (missionary) education than in the eastern Cameroon's French-controlled area.

an absolute lead of almost 2 years by BC1970. Lesotho is the only country where we do not observe an educational gender Kuznets curve at all (Figure 6(d)). Various factors can explain southern Africa's gender equal pattern. A pattern of widespread and persistent male labor migration in Southern Africa, may explain why women were able to capture more of the expanding education infrastructure. In Botswana and Lesotho in particular, boys were also absent herding cattle, which left more girls behind to attend schools (Coquery-Vidrovitch 1997: 148, 154; Stromquist 2007: 157; Mafela 2008: 338). Thus, girls' superior participation in education does not reflect gender equality and emancipation per se, but rather particular gender dynamics regarding the sexual division of labor and women's lack of physical mobility. In fact, it appears that women's marginalization from cattle farming had the unintended effect of benefitting their educational attainment. In the case of Lesotho, sample selection bias may also play some role, as educated men may have disproportionally migrated to South Africa seeking employment, thus not being observed in the census contrary to (presumably less mobile) educated women and less educated men.

Conclusions

Which overall conclusions can we draw from these country level patterns? Census data permits us to evaluate countries' educational gender inequality across time and along the path of educational expansion. Across time, former British colonies and League of Nations mandated territories in our sample tended to be considerably more gender-equitable in terms of the ratio than French colonies and independent territories, but less gender-equitable when considering the absolute gap. Missionary presence in British colonial Africa and associated greater educational expansion, which generated large absolute gaps, could explain these divergent trajectories. The clear difference in timing of gender convergence (1930s BC for British colonies and mandated territories and 1940s BC for French colonies) suggests that different education policies play a role in their divergent paths. If we relate the gender gap to educational expansion, we find that educational gender inequality in most countries followed an inversely U-shaped trajectory which we have termed the *educational gender Kuznets curve*. Viewed from this perspective, we observe that the relatively poor performance of French and independent territories is linked to their overall slower educational expansion. In fact, some of the poorest performers in terms of gender inequality over time (Mali and Ethiopia) did comparatively well if we consider that they were still in the early stages of their male educational expansion. Interestingly, Senegal, an overwhelmingly Muslim nation with minimal missionary presence, saw strong (absolute and relative) gender convergence from the 1945 BC onwards and after reaching merely 3 years of male educational expansion.

In the next section of the paper, the importance of educational expansion itself to explain the initial rise and subsequent decline of educational gender inequality is confirmed in a cross-sectional, sub-national framework. The section also further explores the role of religious education, finding that the presence of Christian missionaries in a district actually is associated with lower educational gender inequality.

5. Regional Correlates of Gender Inequality

We now examine some of the key correlates of gender inequality in access to education. For 1,177 administrative subdivisions (henceforth districts), located in 19 sub-Saharan African countries, over the periods 1920-39, 1940-59, and 1960-79. Using the LSDV estimator we run the following regression model:

$$y_{it} = \beta_0 + \beta_1 X1_{it} + \beta_2 X2_i + \beta_3 X3_{it} + \mu_c + \upsilon_{t_t} + \varepsilon_{it}$$

where y_{it} represents our dependent variables that measure respectively the gender gap and the gender ratio in average years of schooling between males and females per district *i* during birth decades *t* ={1920-39, 1940-59, 1960-79}, $X1_{i,t}$ is our vector of time-variant variables (e.g. railway access, urbanization, cash crop earnings), and $X2_{i,}$ stands for time-invariant locational factors (e.g. coastal location, agricultural systems, culture). $X3_{i,t}$ captures the effect of our interaction variables. The term μ_c takes into account country fixed effects, υ_t captures time fixed effects, while ε_{it} represents the idiosyncratic error term. We apply a least squares dummy variable (LSDV) model and cluster observations at the level of ethnic regions from the Murdock (1967) Atlas since we may expect substantial interdependence within such regions. Gender gap results are very close to those of the male-female ratio regression. Table 2 reports the results of the main gap and ratio regression specification for each of our three time periods.[18] Our regressions control for spatial autocorrelation.[19] We do not strictly identify causal

[18] Results of further regression specifications are reported in Appendix Tables 5 and 6, including colony fixed effects, mission denominational effects, and female years of education as dependent variable. Appendix 1.4 explains in detail the spatial autoregressive (SAR) model.

[19] Kelly (2019) recently cautioned that many results in the persistence literature could have arisen from random spatial patterns and that the likelihood of this phenomenon is higher if spatial autocorrelation is not controlled for.

effects. Our goal is to uncover a set of factors that plausibly correlated with gender inequality, and assess their association with education gender inequality outcomes over time.

Figure 7 maps the gap on the sub-national level, after controlling for the linear and quadratic effects of male educational expansion which, as argued in Sections 2 and 3, may be expected to have a strong independent inversely U-shaped effect on the gender gap (also see Section 5.3 below). In the following, we jointly present the variables used, our hypotheses, and discuss the regression results. Engaging with various long-standing literatures on the determinants of gender inequality in Africa, we explore right-hand-side variables in five clusters. The Appendix provides variable definitions, source descriptions and further base model specifications.[20]

5.1 Openness

During the 20th century, sub-Saharan Africa experienced a dramatic increase of external orientation, in terms of trade integration, but also exposure to new cultural, religious and political perspectives (Cooper 1981, 2014; Bayart 2000). This process towards increased openness was spatially uneven. Coastal, urban and railroad-connected areas were exposed sooner and more intensely to external commercial and cultural influences. We expect that openness is associated with lower gender inequality in education, driven by multiple mechanisms simultaneously. Exposure to external influences may have increased fathers' willingness to send their daughters to school, especially if fathers were educated themselves (Coquery-Vidrovitch 1997; Meier zu Selhausen & Weisdorf 2016). Trade and urbanization generated new income earning opportunities and resulted in greater demand for labor in urban areas which quelled anxiety among men about female competition for jobs and created incentives to extend education to women (Elkan 1957; Boserup 1970; de Haas & Frankema 2018). Urban informal sectors also created opportunities for women in trading, provisioning food and beer, and sex work, and later a wider range of occupations (Little 1973; Obbo 1980; Evans 2018). Such opportunities provided women with an exit option from patriarchal rural settings, thus increasing their bargaining power towards brothers, fathers and husbands. In

The number of observations declines when controlling for spatial autocorrelation in the regression since we have to establish balanced panels for the three time periods (1920-1939, 1940-1959, 1960-1979). Therefore we lose a total number of 408 observations when calculating the educational gender gap (absolute measure) and 1,092 observations when calculating the educational gender ratio. We report the gap and ratio results for our non-spatial regression analyses in the Appendix Tables 7 and 8 respectively.

[20] The descriptive statistics of variables used are provided in Appendix Tables 3 and 4. We specify our base model without controlling for spatial correlation (Appendix Tables 7 and 8), excluding South Africa, which was on average more developed and may be expected to have a higher level of average years of schooling than birth regions from other countries included in our sample (Appendix Tables 9 and 10).

regions with opportunities for female economic freedom, better educational opportunities for girls may have been granted to prevent women's large-scale exit from rural society. Overall, we find that better connected and urban locations tended to be linked with more gender equality, supporting the idea that, that increased openness benefited girls education during most of the 20th century.

Coastal Proximity: Even though pre-colonial Africa had thriving and densely populated kingdoms and empires in its interior, coastal areas were more favorably located for trade, resulting in an economic 'reversal' and disproportionate investment in coastal areas. Table 2 displays some evidence that coastal regions had lower gender inequality over the colonial period (columns (1)-(2)).

Urbanization: In urban areas, new occupational strata, family arrangements and 'detribalized' identities emerged over the colonial era (Elkan 1960; Meier zu Selhausen et al. 2018). Urban areas were often the first to cater for female secondary education and increasingly provided administrative, teaching and nursing jobs from the late colonial era onward (Meier zu Selhausen & Weisdorf 2020). Table 2 shows that the log city population (larger than 10,000 inhabitants) per district[21] was significantly associated with less inequality in the early colonial period (column (1)) for the gap and late-colonial and post-colonial period for the ratio (columns (5)-(6)).

Railroads: Railroads, built primarily to project colonial power and connect mines and cash crop regions to coastal ports, played a crucial role in connecting the interior to the coast. Urban agglomerations also tended to emerge around railroads, an effect that persisted even as railroads lost their function after independence (Jedwab & Moradi 2016; Jedwab et al. 2017). We find that the presence of colonial railroads in a district was significantly associated with lower gender inequality during the colonial period (columns (1)-(2) and (4)). The correlation is less strong for the post-colonial birth period (columns (3) and (6)) possibly explained by the fact that railroads lost their role as main vector of openness and commercialization after independence (they fell into disuse and their function was replaced by roads). Moreover, new transportation and communication technologies may have diffused of new social norms and economic opportunity for women even into more remote areas.

[21] We divide districts' birth population by 10 because a census captures 10% of a population to adjust it to the true value of city populations.

5.2 Religion

Christian Missions: Christian missions provided the bulk of formal education in colonial Africa, particularly in British colonies (Frankema 2012; Meier zu Selhausen 2019). Various studies have analyzed the locational impact of missionary activities during early colonial times on the contemporary educational outcomes (Gallego & Woodberry 2010; Wantchekon et al. 2015; Cappelli & Baten 2020; Alesina et al. 2019; Jedwab et al. 2019). Nunn (2014) finds that the presence of a Catholic mission is associated with higher male educational attainment in the long-run, while Protestant missions were associated with more present-day education for girls relative to boys.

We create a dummy for districts that hosted a main Christian missionary station in 1924, based on Roome (1925). The mission atlas map has been widely used in the literature to measure persistent spatial effects of missionary activity, including female education (Nunn 2014; Montgomery 2017). It has also been criticized for being grossly incomplete, reporting mostly European missions and thus missing out on large numbers of smaller out-stations, mostly run by African missionaries (Jedwab et al. 2019). Taking this critique on board, we argue that sub-national regions with a missionary post in 1924 can be considered the early 'heartland' of Christianization in Africa, with the strongest degrees of institutionalization of missionary educational practices, and potentially the largest number of converts in the colonial era, relative to areas without main stations.

Columns (1)-(6) illustrate that colonial missionary presence strongly reduced gender unequal access to education. Thus, regions in the initial European Christian missionary 'heartlands' of the early 20th century had persistently lower levels of educational gender inequality even for cohorts born post-independence. The mission schools lost their monopoly in British Africa after the end of the colonial era (Frankema 2012), but these locational effects appear to have persisted. When separating mission denominations, the presence of Protestant and Catholic mission main stations is associated with lower educational gender inequality (see Appendix Tables 5, columns (4)-(6) and 6, columns (4)-(6).[22]

[22] The only evidence we find for a stronger Protestant than Catholic effect on educational gender inequality (Nunn 2014) are larger coefficients when inequality is measured using the ratio, but not when using the gap. All mission effects are significant at the 1 percent level, except Protestant missions in the first cohort when using the gap (not significant).

Muslim Majority: Based on the analysis of global data, Norton & Tomal (2009) conclude that Islam exerts a negative influence on female educational attainment. While our country-level trends suggest that in colonial British Africa educational investments favored Christian rather than Muslim areas, detailed case studies on precolonial Sokoto Caliphate Nigeria (Boyd & Last 1985) and colonial Zanzibar (Decker 2006) have shown that Islam cannot be considered uniformly incompatible with female education. Moreover, Muslim families sent their children to public rather than missionary schools, fearing Christian conversion, so differences in gender inequality between public and missionary schools may have impacted girls' opportunities more than religion per se (Coquery Vidrovitch 1997: 151). Platas Izama (2014) has shown that the average educational gender gap among African Christians was in fact larger than for African Muslims born 1940-80. Also globally, cross-country regressions including countries with large Muslim populations, and controlling for income, lag of female educational expansion, democracy, gender discriminatory family laws and continent fixed effects, fail to find any significant effect of Islam on the educational gender gap for birth cohorts aged 25–34 in 2010 (McClendon et al. 2018). Based on individuals' religion from IPUMS censuses, we create a dummy variable if the districts population was predominantly (>50%) Muslim. This late 20th century benchmark is likely to represent the situation throughout the entire 20th century, as the arrival of Islam dating back much further than Christianity in most parts of Africa and its diffusion took place long before our first cohort, the 1920s, was educated.

Table 2 displays that majority Muslim districts did not have lower educational gender inequality than other (Christian or African religious-dominated) districts during colonial era. Only for the post-colonial cohorts do we find evidence of greater absolute gender inequality in Muslim districts (column 3).

5.3 Male Educational Expansion

The educational gender gap is non-linearly linked to the expansion of male education. In Section 3 and 4 we have shown on the region- and country-level that the absolute gender gap tends to grow fast in early stages of male educational expansion, then flattens, and eventually starts to fall, creating an inverted U-shaped relationship (educational gender Kuznets curve).[23] By entering the linear and quadratic impact of male education in the gap regression, we control for this curvilinear relationship, which allows for a cleaner interpretation of the direct effect of our other variables. The inclusion of these male education variables also enables us to test for

[23] Appendix Table 3 shows that the relationship between the ratio and male educational expansion was close to linear (downward sloping) which justifies the inclusion of a linear male expansion variable in the ratio regressions (columns 4-6).

the presence of an educational gender Kuznets curve, as proposed in Section 3 and 4, in a *cross-sectional* setting (i.e. within rather than across (a) historical time period(s)). We find that both linear and quadratic expansion in male education on educational gender gaps are strongly statistically significant throughout all periods (columns (1)-(6)), and consistent with an inversely U-shaped curve. Jointly interpreting their coefficients, we find that in each of the periods, the absolute gap peaked at 4.8 years when male education had reached 9 years in 1920-39, 3.4 years at 6.5 years of male education in 1940-59, and 2.1 years at 7 years of male education in 1960-79.

In the ratio regression, we exclude the squared term of the male education variable because we do not observe a non-linear relationship between the male education variable and the educational gender ratio.[24] We find strong evidence that the gender ratio reduced as male education expanded.

5.4 Agriculture

Gender division of labor in hoe agriculture: In colonial Africa, agricultural was the primary occupation for the far majority of men and women. In most countries, agriculture remained the most important sector of employment throughout the 20th century and up to today. In her landmark study, Ester Boserup (1970: 16) posited that “Africa is the region of female farming par excellence”. However, she also noted that there was considerable variation in terms of male and female roles in agriculture across African societies, a point that has been emphasized by later scholars as well (Whitehead 1990; Alesina et al. 2013). Differences in the agricultural division of labor may affect educational gender inequality. Boserup (1970) argued that traditional agricultural practices play a crucial role in shaping societies’ variation in broader gender roles, reasoning that women’s lack of participation in agriculture would result in the development of unequal gender norms, pushing women into domestic duties and seclusion. The clearest example of such a dynamic is plough-based agriculture, which historically relied on upper body strength (male task) and required less weeding (female task). Studying the long-run effects of traditional plough use on gender norms and female labor force participation in a global context, Alesina et al. (2013) empirically validated Boserup’s argument.

Only few African societies (i.e. highland Ethiopia and South Africa) had a deep tradition of plough use. Most other agricultural systems in Africa relied on either hoe agriculture, hunting

[24] In Appendix Table 6 (columns (7)-(9)) we show the ratio results excluding the male education term, which does not undermine the effects discussed in Sections 5.1 and 5.2.

or herding. Systems of *hoe agriculture*, however, still differed substantially in terms of male and female participation. We distinguish three gender-divided tasks in hoe agriculture: entirely female (*farm female)*, mostly female but with substantial male involvement *(farm shared)* and mostly male *(farm male)*. We thus follow a classification originally proposed by German ethnographer Hermann Baumann (1928), and reported by Boserup (1970: 18).

The effects of female participation in hoe agriculture are not evident. On the basis of Boserup's argument about the agricultural roots of gender inequality, we may expect that the more involved women were, the more equal gender norms emerged and the more gender equal access to education. Conversely, one might argue that the opportunity cost of girls' education was higher in female farming systems, which would reduce their participation in education. We find some evidence that districts where women traditionally participated actively in hoe agriculture had lower educational gender gaps during the late- and postcolonial period (columns (2) and (3)) compared to districts where tasks in hoe agriculture are mainly carried out by men (reference category), which validates Boserup's theory. These results, however, are not visible in the ratio specifications.

Cattle herding and hunting: As with hoe agriculture, the effect of pastoralism on educational gender inequality is also ambiguous. On the one hand, we may expect more female seclusion in pastoral societies, as men were primarily responsible for herding and hunting and women tended to stay behind in the 'kraal'. Following Boserup (1970) and Alesina et al. (2013), we would expect this to result in more gender inequality. Indeed, livestock-oriented societies in eastern and southern Africa tended to be deeply patriarchal and value male hunting and herding activities over female domestic ones (Coquery-Vidrovitch 1997). For education, however, a specific opposite mechanism may counteract this: boys' absence from home and a culture that glorified livestock and discounted the value of modern education for the most valued members of society may have produced opportunities for stay-at-home girls to receive missionary education (see Section 4). We use two variables to evaluate the impact of cattle herding on educational gender inequality. First, we evaluate educational gender inequality in the pastoral areas indicated by Baumann (1928) relative to areas of male-dominated hoe agriculture. Secondly, we construct a variable expressing pasture relative to cropland. We do not find that these variables significantly affected educational gender inequality.

Cash crops: An extensive literature has argued that the production of cash crops undermined the status of women. Men tended to control most cash crop income, while women put in large amounts of poorly remunerated labor into non-monetized self-provisioning as well as cash crop production. Colonial authorities also prioritized cash crops, and tended to focus their agricultural extension efforts on men (Boserup 1970; Whitehead 1990: Grier 1992; Byfield 2018). Women's loss in status, power and economic autonomy associated with cash crops under colonial rule may have reduced the perceived value of girls' skill accumulation. The importance of unremunerated female labor to grow food and cash crops and increased opportunity costs of going to school after the introduction of the latter, may also have increased educational gender inequality. Nevertheless, Miotto (2019) reports a positive long-run effect of cash crop agriculture on women's status, measured as higher agency within the household, less willingness to justify husbands' violence, and higher levels of education. She argues that this effect is driven by increased female labor force participation in the cash crop economy, which benefited girls' education as well.

We investigate the net treatment effect of cash crops on educational gender inequality, by apportioning the expected share of colony-level cash crop exports (Frankema, Williamson & Woltjer 2017) to individual districts based on their crop-specific maximum potential yields (FAO/IIASA 2011). We also interact this variable with railroad presence, expecting that actual production is not just predicted by suitability but also market access. While the cash crop term is statistically insignificant in most specifications, we find some evidence that cash crop cultivation increased the gender education gap in the early colonial period in railroad districts (column (1)).

5.5 Cultural Practices of Low Female Autonomy

Finally, family systems that regulate degrees of female autonomy can also be expected to affect educational gender inequality. Van der Vleuten (2016), for example finds a strong correlation between the value assigned to women in the family and the educational gender ratio in developing regions during 1950-2005. Based on data from the Murdock Ethnographic Atlas (1967), we generate a composite variable to capture the degree of female autonomy, which we link to (i) bride price (not dowry), (ii) matrilineal inheritance and (iii) the absence of polygamy. Bride price, which is a payment at marriage by the groom or the groom's family to the bride's family, gives the latter an incentive to invest in their girls' education (Lowes & Nunn 2018; Ashraf et al. 2020). On the other hand, it has been shown that adverse shocks to family income can increase girls' chances of early marriage at the expense of their education (Corno & Voena 2016). Patrilineal systems, where property is passed on through the male line, are likely to see gender discrimination in favor of boys, while matrilineal systems have better outcomes for girls

(Holden & Mace 2003; Henderson & Whatley 2014). Polygamy, a long-established practice in most sub-Saharan African countries (Fenske 2012), is associated with lower female status, in the case of additional wives (United Nations General Assembly 1979). We thus expect our composite variable of limited female autonomy to increase gender differences in average years of schooling. However, we do not find evidence that low female autonomy worsened educational gender inequality. Instead, we find some evidence for the post-colonial era (column (3)) that low female autonomy is linked to lower educational gender inequality.

6. Conclusion

We studied sub-Saharan African gender inequality in education on three levels. Compared to other developing world regions, we saw that Africa started out the 20th century with low inequality, but performed comparatively poorly over the century. Despite, declining inequality post-independence, Africa turned out as the most gender-unequal region in the developing world for the latest birth cohort we observe, both in terms of gender ratios and gaps. In all world regions, we observe an inversely U-shaped relationship between the gender gap and male educational expansion, which we have termed the educational gender Kuznets curve. Along each stage of its curve, Africa had smaller gender gaps than other world regions. Therefore, Africa's comparatively modest progress in closing the gender gap over the 20th century cannot be attributed to particularly strong male preference in African education, but can rather be related to its comparatively slow expansion of male education, a finding that holds substantial policy implications.

Our country comparison revealed that especially the southern part of Africa had relatively low gender inequality in schooling, no matter what metric we use. In West, East and Central Africa, we observed a rising gap of school years until the 1950s birth cohort, and a subsequent development towards less inequality. In terms of the gender ratio, the colonial era saw slow progress towards greater gender equality, while convergence accelerated with cohorts born in the late colonial period, and educated after independence. Progress towards gender equality in educational attainment was faster in (former) British territories compared to (former) French territories. However, both country groups follow a similar trajectory on the educational gender Kuznets curve, with French territories progressing slower in terms of male educational expansion, and therefore still on the upward trajectory of the curve into the 1980s. Some countries that performed remarkably well along the Kuznets curve, allocating their educational resources in a more gender equitable way since the post-colonial decades were Kenya, Senegal, Sierra Leone, Tanzania, Rwanda and Zimbabwe, countries that had little in common in terms of overall educational expansion, colonizer, region or religion. Clearly, post-colonial policy mattered a great deal.

Finally, we examined how various region-specific factors were associated with sub-national inequality over time, keeping country effects constant by controlling for their fixed effects. Although our analysis does not prove causality, documenting relevant conditional correlations for such a large body of evidence on African gender equality of schooling shines new light on various earlier findings on the long-term drivers of gender inequality. Our results therefore present an important step forward for our understanding of gendered development in African education. We observe that regional economies that benefited from urbanization, coastal access or railway proximity also achieved more gender equality, compared to more remote places and regions characterized by agricultural labor markets and family economies. Even though our world-regional and country-level analysis suggests that gender inequality during the colonial era, which was also the heyday of missionary education, remained high (ratio) or even increased substantially (gap), we find that districts with large (Catholic or Protestant) missionary presence in the early colonial era consistently had lower gender inequality of years of schooling than other districts, controlling for numerous factors that may have determined missionary location. This finding of high aggregate (country- or world-region-level) gender inequality of schooling in the era of missionary education and comparatively low gender inequality in missionary districts is a paradox worth investigating further in future research.

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TABLES

Table 1: Number of birth regions and observations per country and census year

Country	Census Year	Birth decades used	N Regions	Obs.
Benin	1979	1920-1950	76	304
Benin	2013	1960-1970	77	154
Botswana	2001	1920-1950	19	74
Botswana	2011	1960-1970	19	38
Burkina Faso	1985	1920-1960	30	150
Cameroon	1976	1920-1950	112	447
Cameroon	2005	1960-1970	306	612
Ethiopia	1984	1920-1950	85	340
Ghana	1984	1920-1950	10	40
Ghana	2010	1960-1970	10	20
Guinea	1983	1920-1950	33	132
Guinea	1996	1960-1970	34	68
Kenya	1969	1920-1940	41	123
Kenya	2009	1960-1970	156	312
Lesotho	1996	1920-1950	1	4
Lesotho	2006	1960-1970	1	2
Liberia	1974	1920-1940	11	33
Liberia	2008	1960-1970	15	30
Malawi	1987	1920-1950	26	104
Malawi	2008	1960-1970	31	62
Mali	1998	1920-1950	45	180
Mali	2009	1960-1970	46	92
Rwanda	2002	1920-1970	101	606
Senegal	1988	1920-1950	30	120
Senegal	2002	1960-1970	34	68
Sierra Leone	2004	1920-1970	66	396
South Africa	2001	1920-1950	9	36
South Africa	2011	1960-1970	9	18
Tanzania	1988	1920-1950	25	100
Tanzania	2012	1960-1970	30	60
Uganda	1991	1920-1950	34	136
Uganda	2002	1960-1970	56	112
Zambia	1990	1920-1950	52	207
Zambia	2010	1960-1970	71	142
Total			**1,701**	**5,322**

Table 2: Correlates of educational gender gap and ratio (log), panel

Dependent Variable:	Gender Educational Gap			Male/Female Ratio (log)		
	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79
	(1)	(2)	(3)	(4)	(5)	(6)
Urban Share (log)	-0.083***	-0.006	-0.022	-0.030	-0.032**	-0.032***
	(0.030)	(0.021)	(0.019)	(0.032)	(0.015)	(0.008)
Dummy if Railroad	-0.195***	-0.175*	-0.308	-0.220**	-0.072	-0.069
	(0.057)	(0.090)	(0.225)	(0.111)	(0.095)	(0.075)
Coastal Share	-0.104	-0.277**	0.024	-0.164	0.018	0.039
	(0.101)	(0.116)	(0.349)	(0.218)	(0.145)	(0.144)
Dummy if Main Mission 1924	-0.125***	-0.188***	-0.180***	-0.238***	-0.170***	-0.087***
	(0.040)	(0.052)	(0.047)	(0.071)	(0.040)	(0.0149)
Dummy if Muslim Majority	0.021	-0.034	0.154***	0.025	-0.0002	0.008
	(0.024)	(0.046)	(0.054)	(0.097)	(0.0605)	(0.03)
Male Years of Educ.	1.050***	1.030***	0.582***	-0.130***	-0.087***	-0.054***
	(0.053)	(0.032)	(0.036)	(0.034)	(0.019)	(0.008)
Male Years of Educ. Sq.	-0.058***	-0.078***	-0.041***			
	(0.013)	(0.004)	(0.003)			
Farm Shared	0.051	-0.043	0.005	0.040	0.039	0.025
	(0.043)	(0.0640)	(0.059)	(0.141)	(0.085)	(0.034)
Farm Female	0.002	-0.180***	-0.121**	-0.074	0.003	0.006
	(0.047)	(0.068)	(0.061)	(0.130)	(0.080)	(0.031)
Farm Plough	-0.096	-0.118	-0.158	0.100	0.035	-0.024
	(0.076)	(0.089)	(0.190)	(0.141)	(0.114)	(0.118)
Farm Pastoral	0.037	-0.138	-0.042	0.021	0.009	0.074
	(0.071)	(0.086)	(0.111)	(0.167)	(0.107)	(0.054)
Cash Crop (log)	-0.002	0.003	0.003	0.004	0.007	0.007
	(0.005)	(0.007)	(0.012)	(0.012)	(0.006)	(0.006)
Cash Crop (log) * Railroad	0.017**	-0.00005	0.011	0.0103	-0.003	-0.0007
	(0.007)	(0.00975)	(0.017)	(0.013)	(0.009)	(0.006)
Cash Crop (log) * Coast	0.010	0.009	-0.012	-0.013	-0.014	-0.004
	(0.012)	(0.012)	(0.028)	(0.027)	(0.014)	(0.011)
Pasture / Cropland (log)	0.019	-0.004	0.025	0.009	-0.004	0.008
	(0.013)	(0.020)	(0.020)	(0.033)	(0.018)	(0.009)
Low Female Autonomy Index	-0.002	0.010	-0.030*	0.007	-0.003	-0.002
	(0.011)	(0.018)	(0.017)	(0.027)	(0.015)	(0.006)
Constant	0.024	-1.009***	-1.980***	1.328***	-0.884	0.0720
	(0.068)	(0.122)	(0.179)	(0.347)	(0.589)	(0.193)
Rho	-0.106	0.857***	1.432***	0.397***	1.629***	1.387***
	(0.088)	(0.048)	(0.002)	(0.121)	(0.350)	(0.165)
Observations	1,554	1,462	2,082	1,124	1,418	2,082
No. Admin. Clusters	777	731	1,041	562	709	1,041
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Panel regressions for 3 periods, two decades respectively. Regression models are corrected for spatial autocorrelation. Rho indicates spatial autocorrelation coefficient. We omit the coefficient of population density (log). The reference category to the 4 farm variables is Farm Male. Variables are temporally dynamic except those capturing initial and invariant condition: Dummy if Main Mission in year 1924; the 4 farming practices that were measured from Baumann (1928); Low Female Autonomy Index constructed from Murdock (1967); and Coastal Share. Robust standard errors (in parentheses) are clustered at the sub-national administrative level. Significance codes: *** p<0.01, ** p<0.05, * p<0.1. See Web-Appendix for data construction and sources.

FIGURES

Figure 1: Educational gender gaps in developing world regions, 1890-1980 birth decades

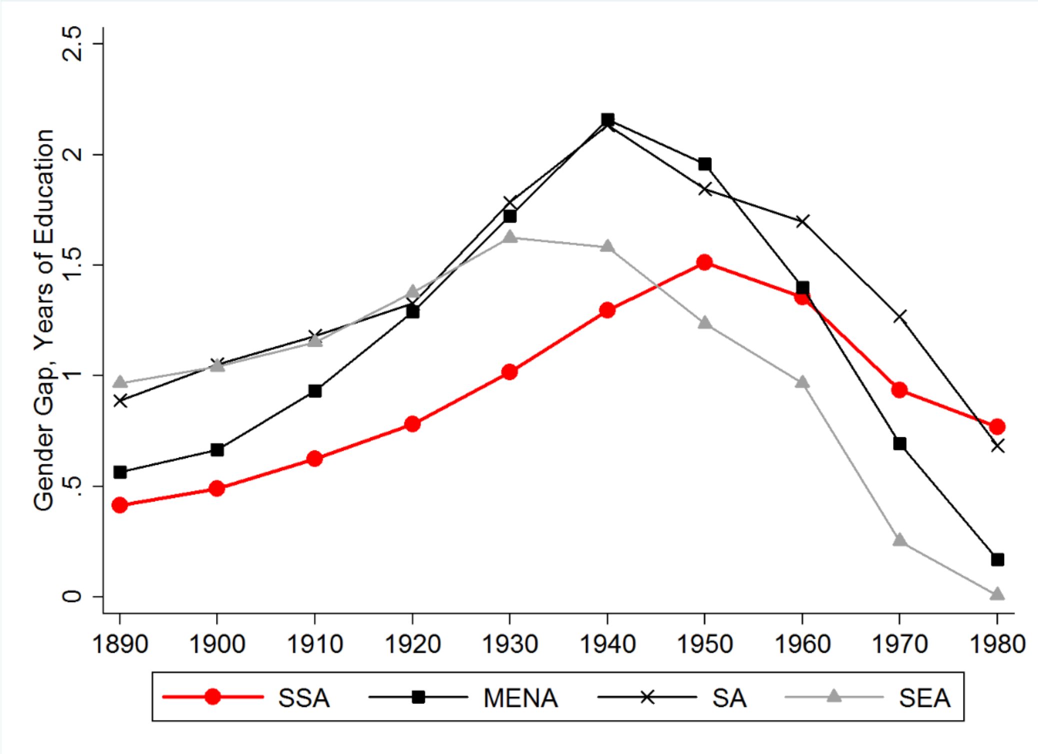


Figure 2: Educational male-female ratios in developing world regions, 1890-1980 birth decades

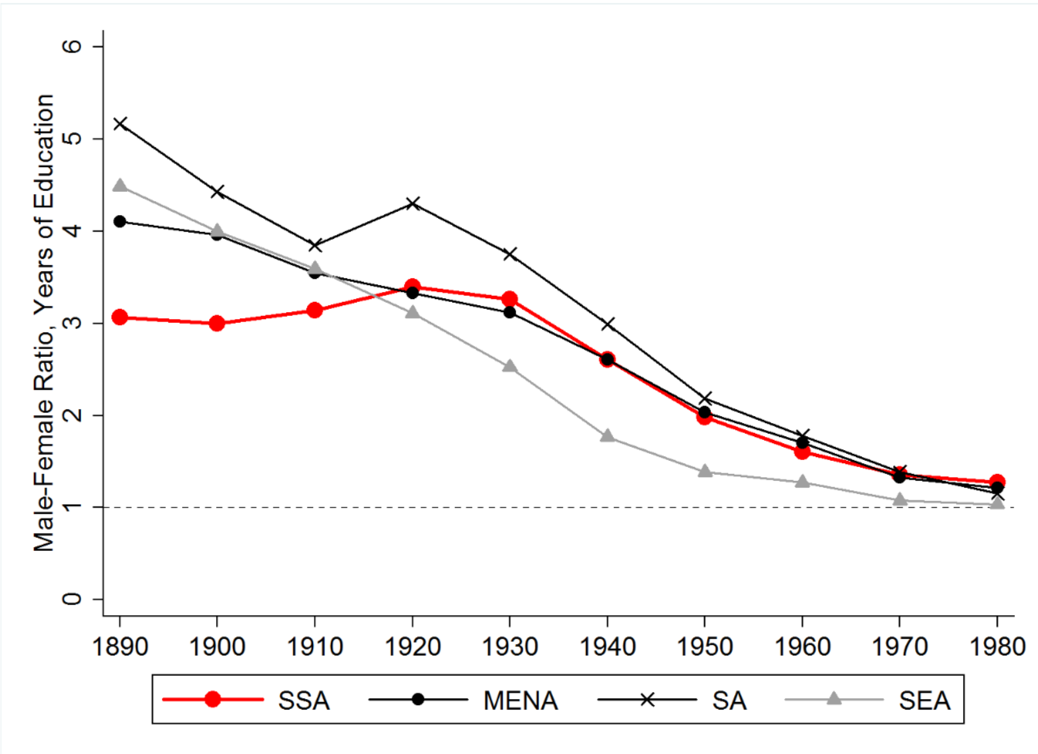
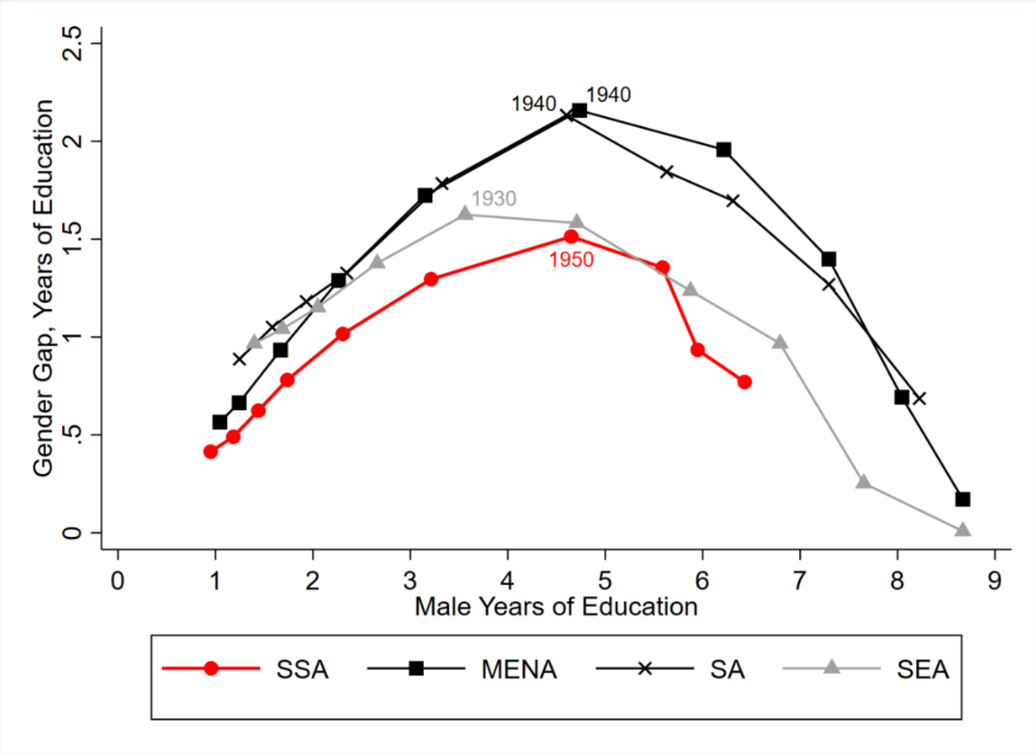


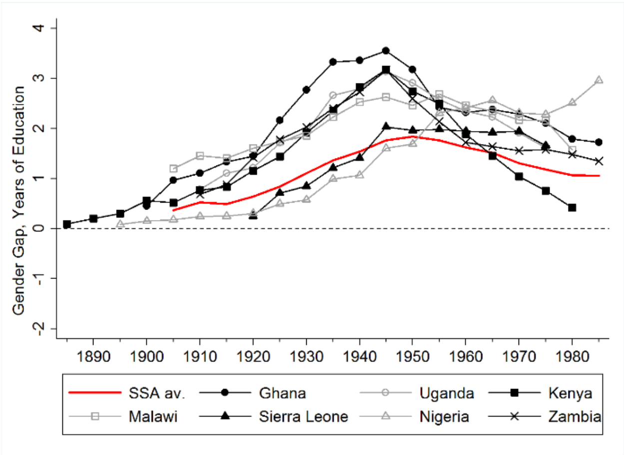
Figure 3: Educational gender gaps and male years of education in developing world regions, 1890-1980



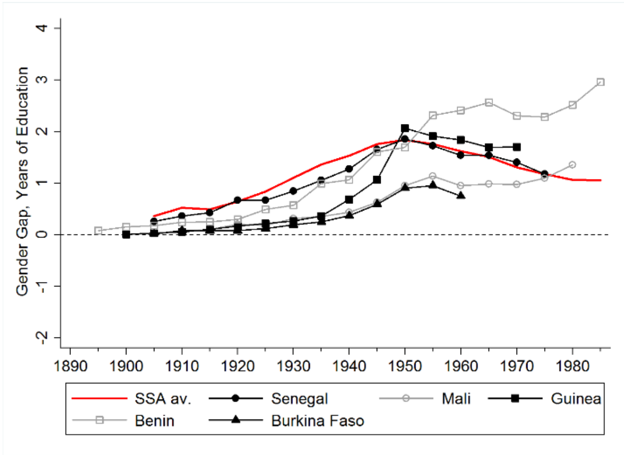
Note: Year figures in graph indicate the peak birth decade of the educational gender gap.

Figure 4: Educational gender gaps in African countries, 1885-1985

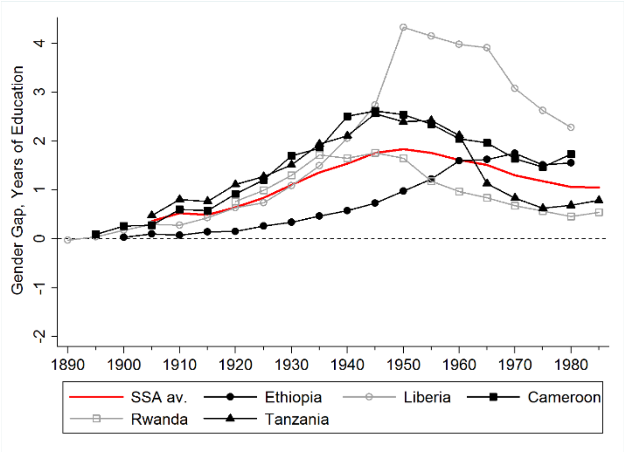
(a) (former) British Colonies



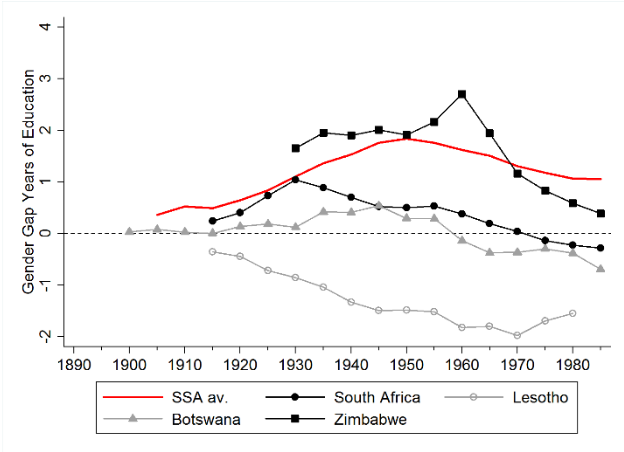
(b) (former) French Colonies



(c) Independent and (former) Mandated Territories



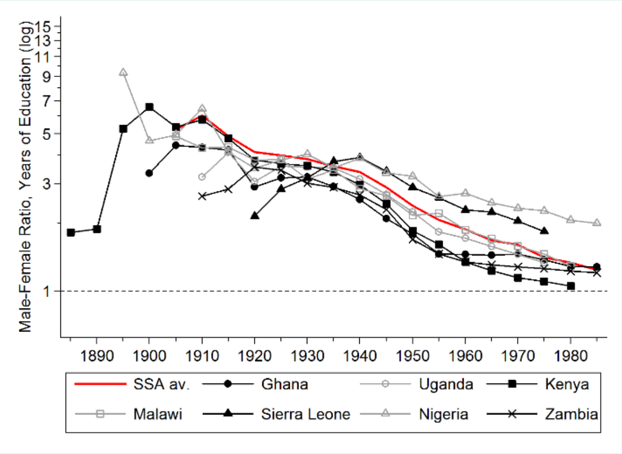
(d) Southern Africa



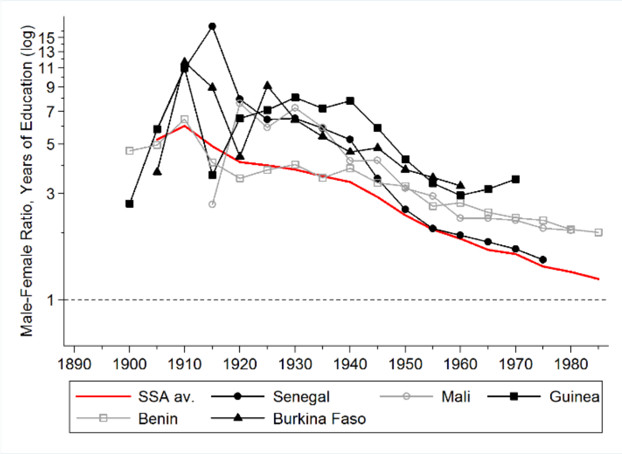
Notes: Graphs show 5-year birth cohort averages. Gender gap of 0 indicates gender equality. Red line represents the average for our sub-Saharan African sample.

Figure 5: Educational male-female ratio in African countries, 1885-1985

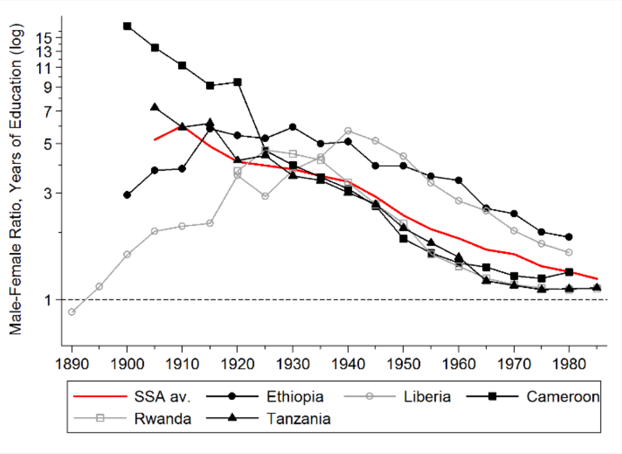
(a) (former) British Colonies



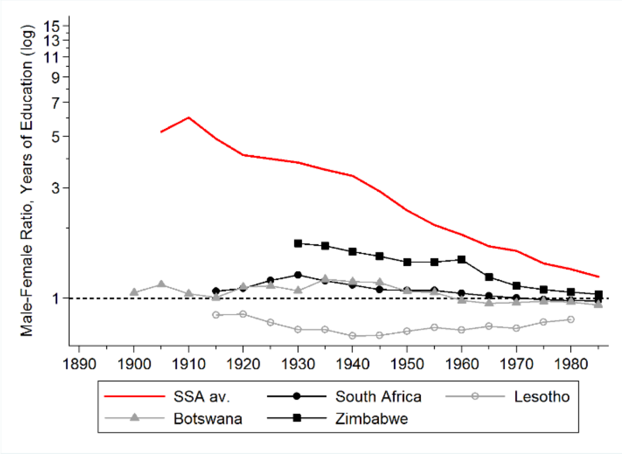
(b) (former) French Colonies



(c) Independent and (former) Mandated Territories



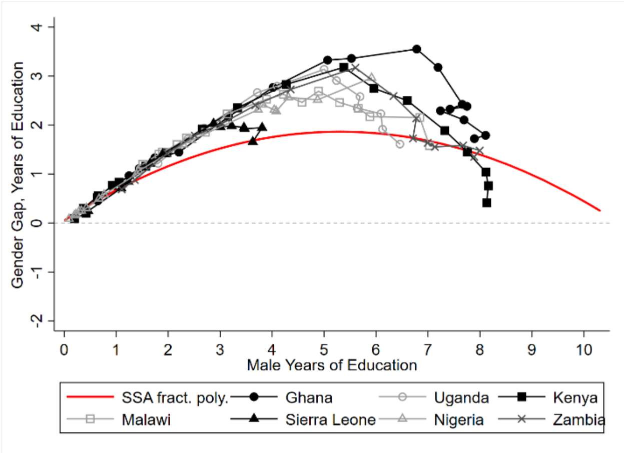
(d) Southern Africa



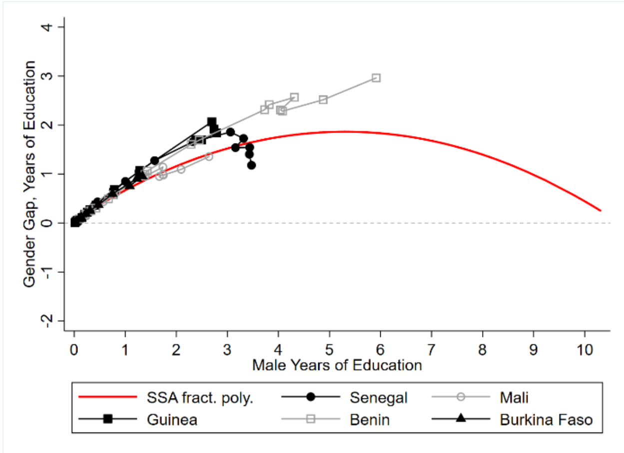
Notes: Graphs show 5-year birth cohort averages. Male-female ratio of 1 indicates gender equality. Red line represents the average for our sub-Saharan African sample.

Figure 6: Educational gender gaps and male years of education in African countries, 1885-1985

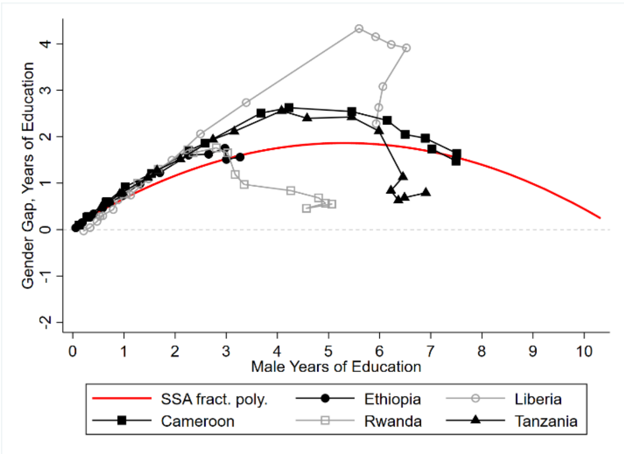
(a) (former) British Colonies



(b) (former) French Colonies



(c) Independent and (former) Mandated Territories



(d) Southern Africa

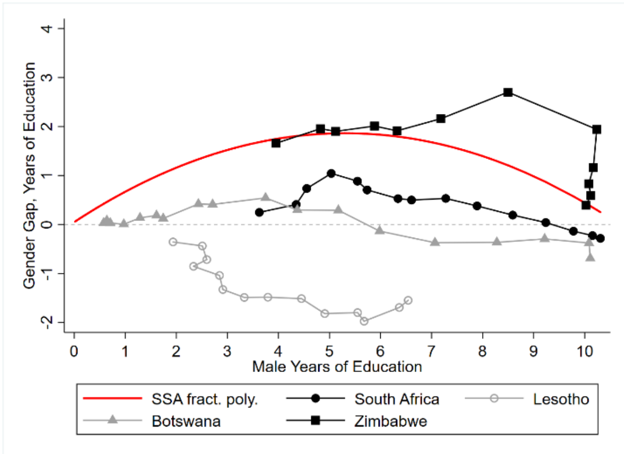
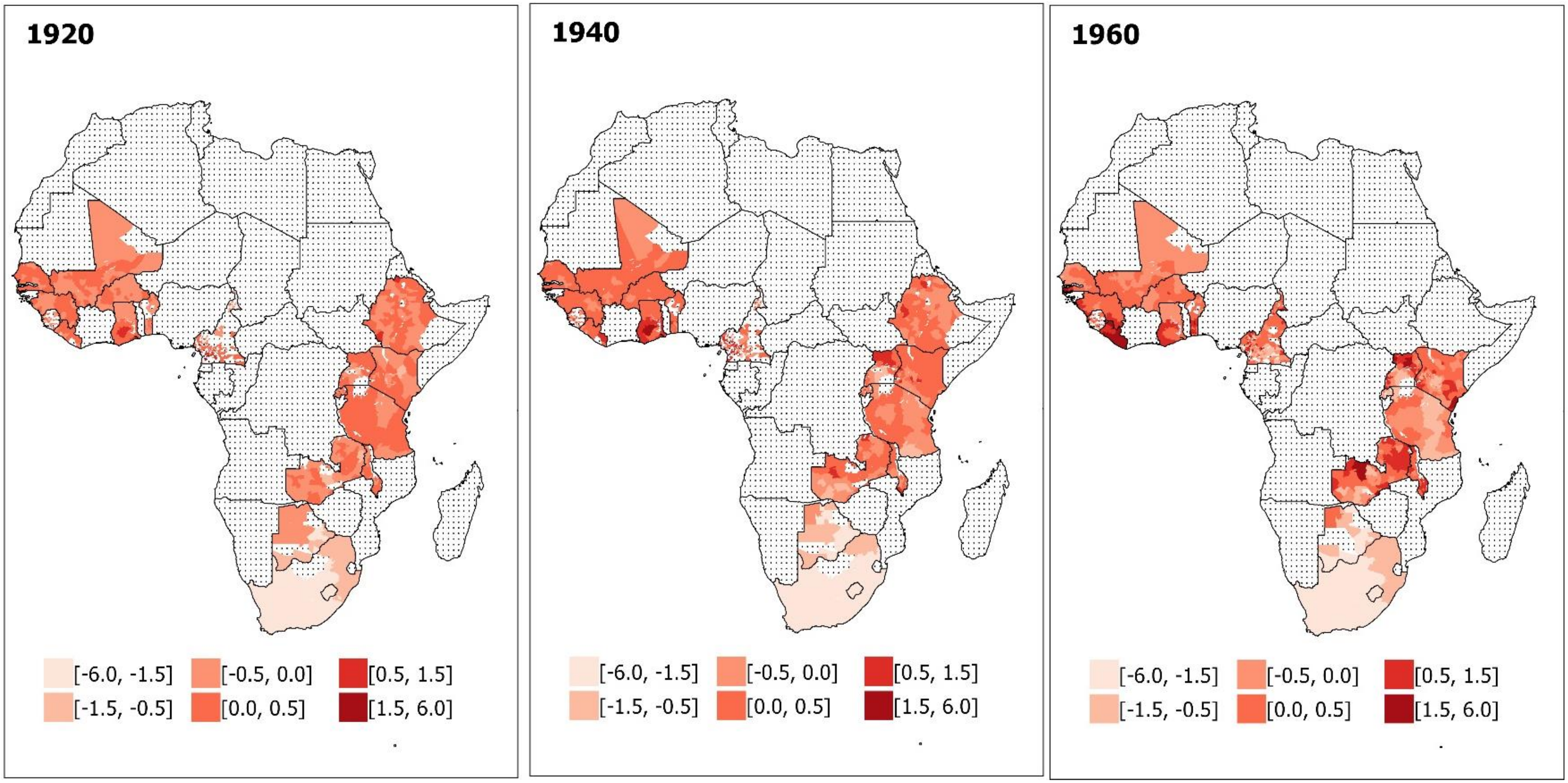


Figure 7: Educational gender gaps



Notes: Educational gender gaps controlling for linear and quadratic effects of male years of schooling (educational gender Kuzents curve) for 1920s, 1940s and 1960s. No data for Ethiopia in 1960s.

Web Appendix

1. Data Appendix

1.1 Spatial units for sub-Saharan Africa

We assemble data for 1,177 subnational units in 19 sub-Saharan African countries. While our final gap dataset contains 5,226 observations our final ratio dataset comprises 4,924 observations. Since in some regions women do not receive any education, the number of observations declines when we calculate the gender ratio which looks at the educational attainment of men relative to the one of women. For regions where the level of female schooling is zero the ratio cannot be calculated (since the denominator would be zero), leading to a loss of observations. Table A2 displays the number of observations per country and period, for the gap and the ratio dataset, respectively.

1.2 Gender Inequality in Educational Attainment

For measuring the outcomes of educational gender inequality, we construct two dependent variables. First, we compute the gender gap, an absolute measure which expresses the educational difference between males and females in years of schooling. Second, we calculate the male-female ratio in education, a relative measure which allows us to investigate educational outcomes for males relative to females. The dependent variables were constructed as follows:

- **Gender gap:** Data for the years of schooling variable come from IPUMS-International (YRSCHOOL), indicating the number of years of schooling for individuals, both males and females. We then calculate the average number of years of schooling per birth decade and birth region for men and women, respectively. Next, we reconstruct the absolute educational attainment gap between males and females by calculating the difference between male and female average years of schooling.
- **Gender ratio:** For the construction of the gender ratio we likewise use the YRSCHOOL variable from IPUMS and calculate the average number of years of schooling per birth decade and birth region for both genders. We then compute the educational gender inequality ratio by dividing the calculated average years of schooling for males by the average years of schooling for females. We took the natural logarithm of the educational gender ratio variable due to a highly skewed distribution of the sample. As already

mentioned above we have to accept a decline in observations when using the educational gender ratio since the result of a division by zero in regions where women don't have any education is undefined.

1.3 Determinants of Educational Gender Inequality

Educational Expansion

- **Male Educational Expansion:** We obtain data on years of schooling for male individuals from IPUMS and calculate the average number of years of schooling per birth region and decade. To account for the non-linear relationship that exists between the expansion of male education and the educational gender gap we include in addition to the male education variable its squared term in the gender gap regression. Since we do not observe this curvilinear relationship between the educational gender ratio and the male education variable we exclude the squared term from the ratio regression specifications.

Agriculture

- **Predicted Cash Crop Export Value:** We obtain a time-variant cash crop variable (1920-1979) by combining district-level crop specific suitability indices derived from the Food and Agriculture Organization GAEZ database (FAO/IISAS 2011) with country-level production data derived from Frankema et al. (2018), Mitchell (1995) and van Melkebeke (2017). The variable gives the suitability-predicted cash crop export values of the five main cash crops grown in this period (coffee, cocoa, cotton, groundnuts and palm oil) per district. This approach builds on Jedwab & Moradi (2016), Jedwab, Meier zu Selhausen & Moradi (2019), Papaioannou & de Haas (2017) and Tadei (2020), who distribute the value of total export per country (which is known) to sub-national regions by using the suitability for this crop in each region (which is also known). In other words, if a country produces 100 tonnes of coffee in its two regions, the region which is twice as suitable for coffee is estimated to have produced two thirds of total whereas the other one third. Hence, to calculate the predicted cash crop export values we multiply the relative cash crop suitability data (i.e. the suitability of a cash crop in an administrative subdivision compared to its suitability in another territorial division within the same country) with the cash crop's export value (measured in kg) per country. Since a considerable number of observations of this variable take the value zero, we add a small number (i.e. 1) to all observations of the cash crop variable before taking the log as a measure to prevent the loss of observations (as the log of zero is not defined).

- **Agricultural Division of Work by Sex:** We digitised the spatial distribution of five categories that indicate different degrees of men's and women's participation in agriculture (Figure A4), as originally compiled by the German ethnographer Hermann Baumann (1928). Based on Baumann's classification we construct the following five dummy variables to account for gender division in agriculture: (i) *Farm Male* (ref. category) takes the value 1 in areas where farming is hoe-based and men do most of the agricultural work, 0 otherwise; (ii) *Farm Female* takes the value 1 in areas where farming is hoe-based and considered a female occupation, 0 otherwise; (iii) *Farm Shared* takes the value 1 if both sexes contribute substantially to hoe-based agriculture; (iv) Farm Plough takes the value 1 if ploughs are traditionally used in agriculture, 0 otherwise; and (v) Farm Pastoral takes the value 1 in region where hunting and pastoralism predominate, 0 otherwise.
- **Pastures relative to cropland:** Several studies have used pastures (livestock) and cropland as indicators for female labor participation in agriculture (Alesina et al. 2013; Voigtländer & Voth 2013; Baten et al. 2017). We calculate the log of the relative share of pastureland to cropland in squared kilometres. For doing so we use Goldewijk et al.'s (2017) estimates of pastureland and cropland from the History Database of the Global Environment (HYDE). Since this variable is widely distributed, we drop observations within that variable based on percentiles and keep a percentile range from 1 to 99. Due to dropping these outliers our observations contained in the final dataset decline from 5,318 to 5,226.
- **Population pressure:** We calculate the population number per district based on IPUMS data and divide it by the area of birth regions based on our own GIS calculations.

Openness

- **Urbanization:** As a proxy for urbanization we consider the share of the urban population per birth region. To construct this variable, we aggregate the population of cities with more than 10,000 inhabitants (Africapolis, OECD 2018) per birth region and divide it by the total district population. We divide the total city population by 10 before calculating the urban share which allows us to normalize it to the IPUMS census (10%)

data district birth population. We then construct this variable for the decades 1920, 1950 and 1970, respectively.

- **Colonial Railroads:** Railroads are drawn from the GIS database used in Jedwab & Moradi (2016). We create a time variant binary variable that takes the value 1 if the railroad line was present during a certain decade within a birth region, 0 otherwise.
- **Coastal Share:** The original coastal dummy variable is obtained from Alsan (2015) and takes the value 1 if a Murdock ethnic region is situated at the coast, 0 otherwise. In order to see whether the birth regions which we use as a unit of analysis in this paper, are located at the coast or not, we intersected the borders of the birth regions with the borders of the Murdock ethnic regions and obtained this way respectively the share of a birth region located at the coast.

Religion

- **Christian Missions:** Data for the presence of Christian missions come from Nunn (2010) based on a digitized a map in Roome (1925). We create a dummy equal 1 if a Christian mission (Protestant or Catholic) is located in a district and equal 0 if there is none. We also study the individual effect of Protestant and Catholic mission denominations and thus create three dummy variables. One dummy takes the value 1 if Protestant missions, 0 otherwise. Another dummy takes the value 1 if Catholic missions, 0 otherwise and the third dummy variable is used as a reference category and equals 1 if there are no missions, 0 otherwise. Note, that the Christian mission variable only shows European residence stations by 1924 that were more likely to have larger churches, congregations and a school and were more likely to be located in economically developed, connected and densely populated areas (Jedwab et al. 2019). We attempt to control for the endogenous placement of these early missions by controlling for districts' urban population share, railroad presence, cash crop exports, coastal access and Muslim majority.
- **Muslim Majority:** We obtain the religion variable from IPUMS. It comprises major religious groups including no religion, Buddhist, Hindu, Jewish, Muslim and Christian. Since we have already included a Christian Mission variable in our analysis and want to avoid multicollinearity among our predictors we do not create an additional Christian variable using IPUMS data but compute the share of Muslims in the population. We

then create a binary variable that takes the value 1 if Muslims constitute more than 50 percent of the population in an administrative subdivision, 0 otherwise.

Cultural Practices of Low Female Autonomy

- **Low Female autonomy:** We create an index of three variables that proxy cultural practices regarding low female autonomy. We obtain information about the practice of *brideprice*, *patrilineality and polygamy* within the various Murdock regions from the Murdock Ethnographic Atlas (1967). To see in which parts of our birth regions these cultural customs are practiced we intersect the borders of the birth regions with the Murdock regions and construct three new variables that indicate the share of birth regions in which the practice of bride price, patrilineality and polygamy prevails, respectively (omitting areas with no Murdock observations from the shares). To construct the low female autonomy variable we first invert the bride price variable (*i.e. 1- brideprice*) and create a *no_brideprice* variable since the practice of bride price is associated with the wellbeing of women (Ashraf et al., 2018) and not with low female autonomy. We then create the low female autonomy variable, a linear combination of the *no_brideprice*, *polygamy* and *patrilinealty* variables, by performing a Principal Component Analysis (PCA).

Political Economy

- **Colonizer Identity:** We create a dummy for colonizer's identity for territories being ruled by the British (Ghana, Guinea, Malawi, Nigeria, Sierra Leon, Uganda, Zambia), the French (Benin, Burkina Faso, Mali, Senegal, Western Cameroon), League of Nations mandate (Cameroon, Rwanda, Tanzania), or independent during (most of) the period considered (Ethiopia, Liberia, South Africa). French Colonizer is used as reference category.

Interaction Variables

We include two interaction terms in our regression model. We respectively interact the cash crop variable with the coastal share variable (Cash Crop (log) * Coastal Share) and the railroad dummy (Cash Crop (log) * Dummy if Railroad) since we expect that the production of cash crops is not only dependent on the suitability but also on the access to the market.

1.4 Spatial Autocorrelation Test

Because spatial methods require a weighting matrix to link each observation of the dependent variable to every contemporaneous observation from a different geographical unit's dependent and independent variables, they require strongly balanced panels. Unfortunately, as with most studies in social science, we do not have a perfectly balanced panel and must resort to an alternative strategy. This is a common problem in the spatial econometrics literature, with researchers either having to drop all panels with any missing data whatsoever or having to revert to imputation. For sources on multiple imputation in spatial econometrics, see Griffith et al. (1989); Stein (1999); LeSage & Pace (2004); Griffith & Paelinck (2011); Baker et al. 2014; Bihrmann & Ersbøll (2015).

To perform our imputation, we used Stata's *mi* command with its multivariate regression option, using this statistical simulation technique to effectively create 50 new datasets of predicted values for each panel. The following analysis is then performed on each simulated dataset separately before the results are pooled using Rubin's Rules (Rubin 1987).

According to Rubin (1987), these estimates afford valid inferences despite the increased sample size of the underlying analysis, provided that data are missing at random.

Our spatial analysis utilises a simple spatial econometric model, the Spatial Autoregressive Model (SAR Model; equation 1).

$$y_{it} = \rho W y_{it} + \beta_1 X1_{it} + \beta_2 X2_i + \beta_3 X3_{it} + \mu_c + \upsilon_t + \varepsilon_{it} \tag{1}$$

where y_{it} represents respectively the educational gender gap and educational gender ratio in region *i* and time period *t*; $X1_{it}$ is a matrix of all time-varying regressors in region *i* and time period *t*; $X2_i$ is a matrix of all time-invariant regressors in region *i* ; $X3_{it}$ is a matrix of our interaction variables; μ_c and υ_t respectively represent country and time (decadal) fixed effects; ε_{it} is a vector of spatially lagged errors; *W* is an inverse distance weighting matrix constructed using the coordinates of geographic birth region centroids. ρ is the spatial autocorrelation coefficient.

The SAR Model controls for the direct effect that variation in the dependent variable of other birth regions may have on birth region *i* (measured by ρ) i.e. the effect of educational gender inequality spillovers from neighbours. While more complex models can be estimated, these often suffer from multicollinearity, or else fail to converge (Burkey 2017).[1] Additionally, our estimate of ρ from each of these simpler specifications indicate that spatial correlation is influential in our analysis.

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[1] For example: The Spatial Durbin Model (SDM; LeSage & Pace 2009) simultaneously captures spillover effects from neighbouring dependent and independent variables, the Kelejian-Prucha Model (Kelejian & Prucha 1998) considers spillovers from the dependent variable and error term, while all three spatial terms are included in the Manski Model (Manski 1993).

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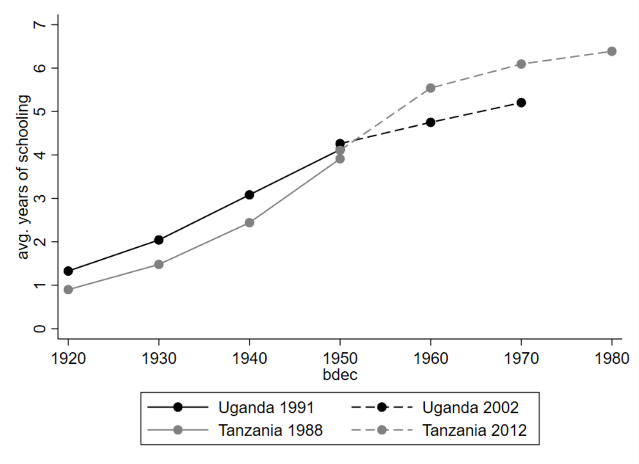
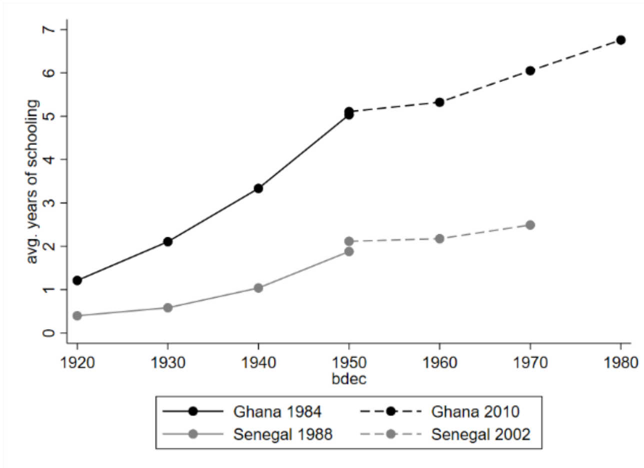
Figure A1: Survivor Bias, cohort analysis for different regions in Africa

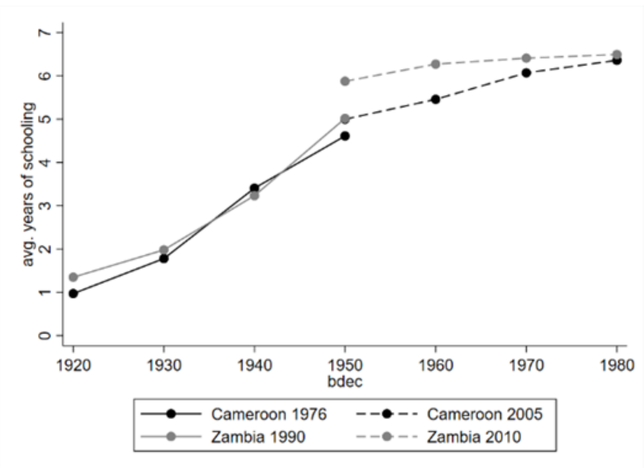
(a) East Africa



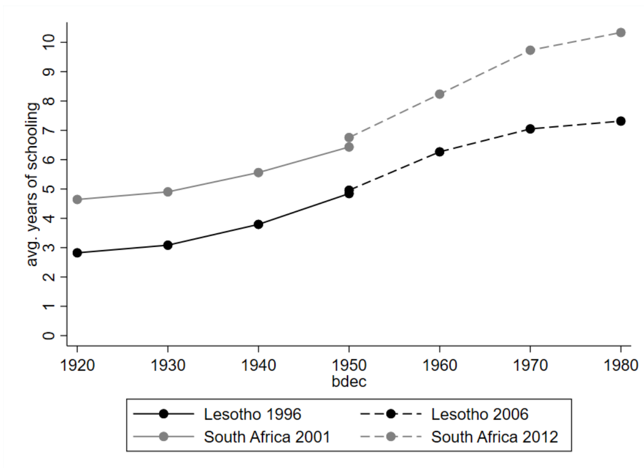
(b) West Africa



(c) Central Africa



(d) Southern Africa



Note: **S**urvivorship bias for the cohorts in Cameroon (displayed in graph (c)) is larger compared to the other countries. This may be an actual survivor bias but could also be the result of a culturally influenced difference of responding or later schooling.

Figure A2: Educational male-female ratios and male years of education in developing world regions, 1890-1980

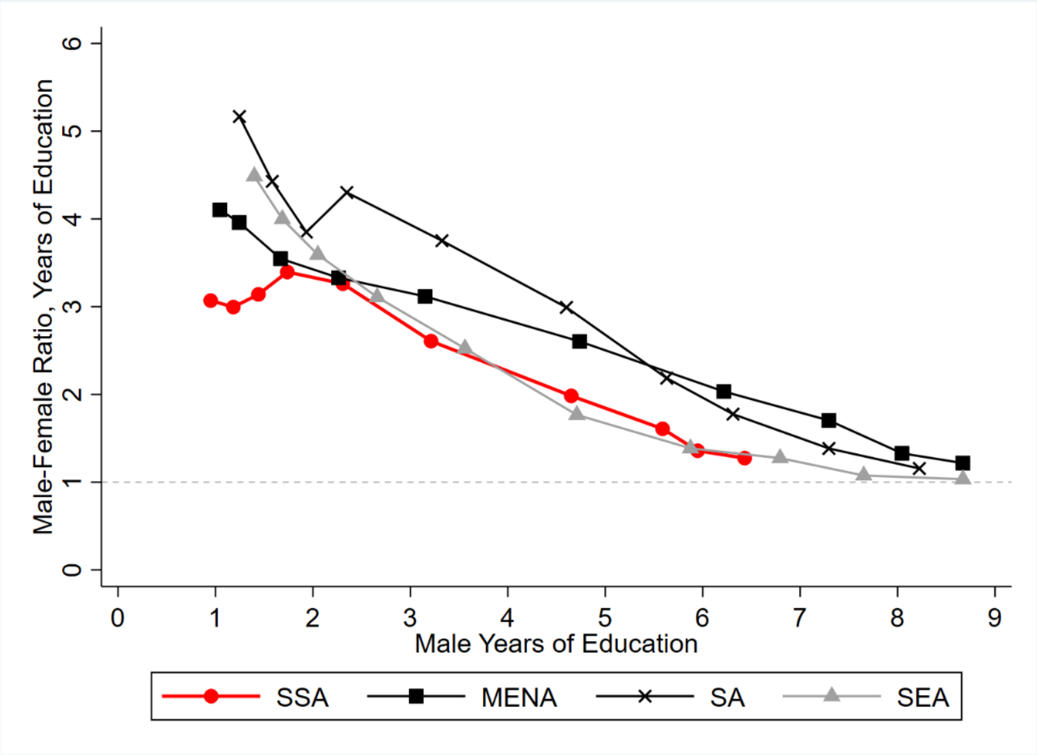
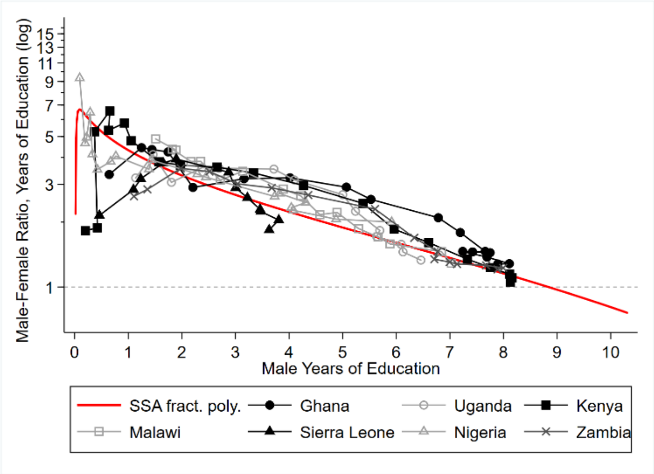
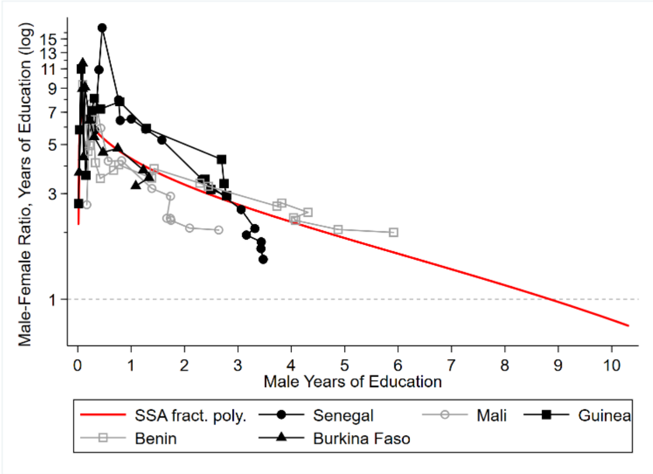


Figure A3: Educational male-female ratio and male years of education in African countries, 1885-1985

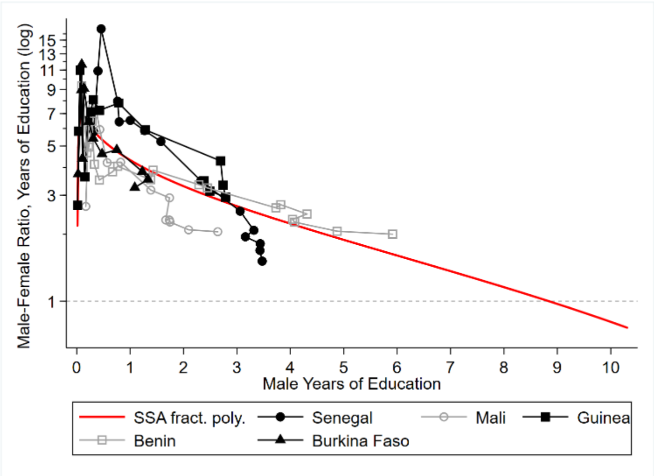
(a) (former) British Colonies



(b) (former) French Colonies



(c) Independent and (former) Mandated Territories



(d) (former) Southern Africa

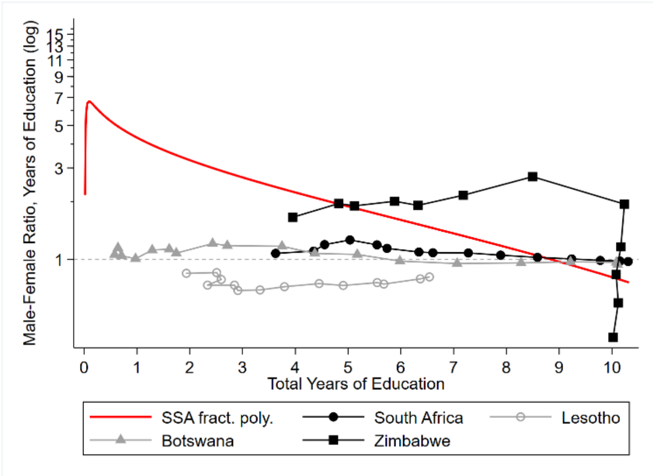
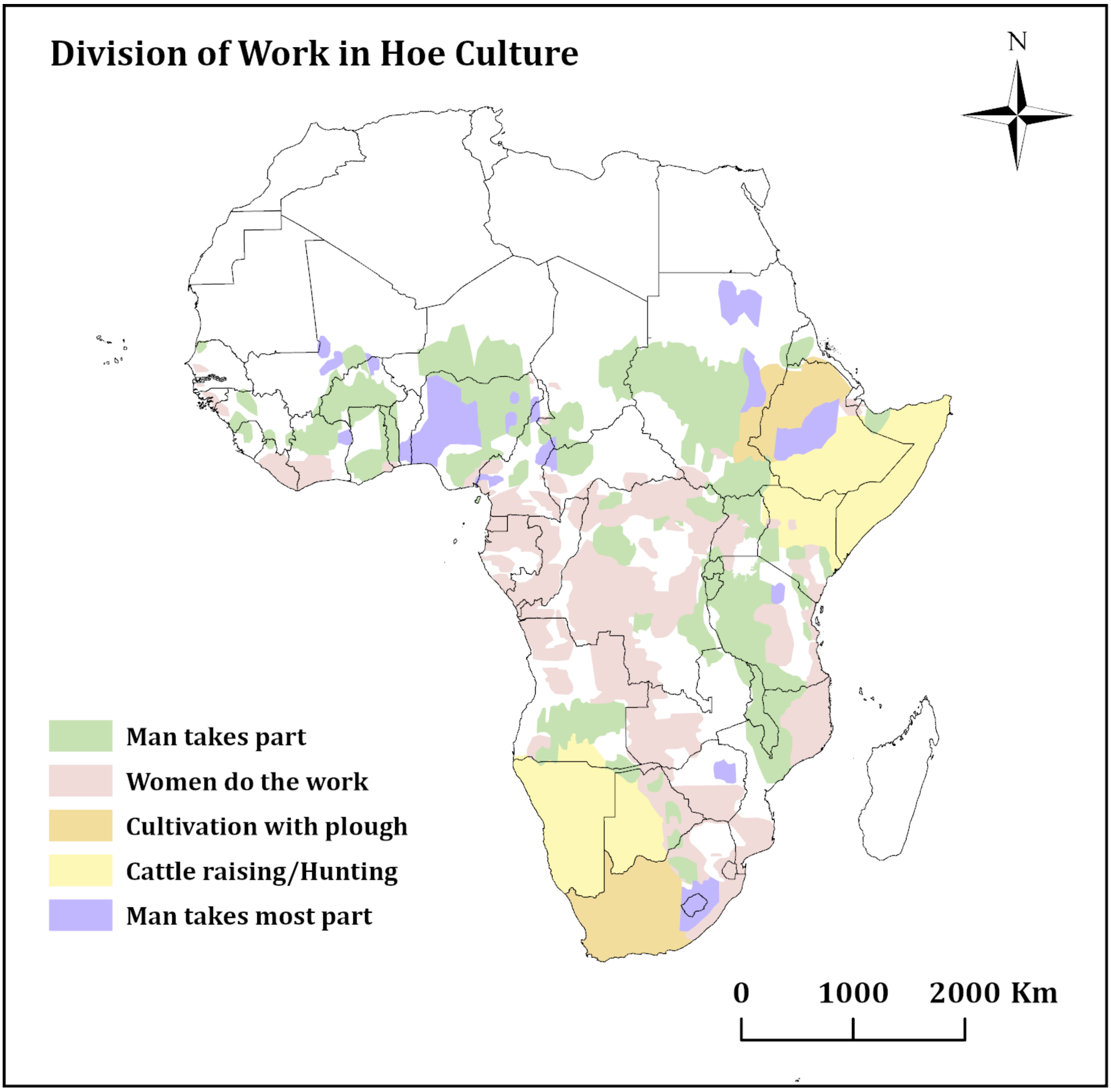


Figure A4 : Division of Work in Hoe Culture in sub-Saharan Africa



Source: Digitized from Baumann (1928, p. 303).

Notes: The linked variable names in the regression tables are as follows: *Farm Shared* (Man takes part), *Farm Female* (Women do the work), *Farm Plough* (Cultivation with plough), *Farm Pastoral* (Cattle raising/Hunting), and *Farm Male* (Man takes most part).

Table A1: Sample construction

Country	Census year	Fraction of pop., %	N_{all}	$N_{age\ 25\text{-}80,\ educ}$	$N_{age\ 25\text{-}80, educ}$ Male, %	$N_{age\ 25\text{-}80, educ,}$ Female, %	$N_{birth\ regions}$
Benin	1979	10	321,639	110,888	45	55	76
Benin	2013	10	973,181	319,358	46	54	77
Botswana	2001	10	160,837	61,276	46	54	19
Botswana	2011	10	192,303	80,472	46	54	19
Burkina Faso	1985	10	838,963	255,337	43	57	30
Cameroon	1976	10	530,720	192,928	46	54	112
Cameroon	2005	10	1,480,837	477,895	47	53	306
Ethiopia	1984	10	360,885	233,991	43	57	85
Ghana	1984	10	1,057,940	327,666	44	56	10
Ghana	2010	10	2,433,834	955,288	46	54	10
Guinea	1983	10	453,093	181,186	47	53	33
Guinea	1996	10	692,175	250,607	47	53	34
Kenya	1969	6	600,040	208,333	59	41	41
Kenya	2009	10	3,759,026	1,304,266	49	51	156
Lesotho	1996	10	187,795	72,124	47	53	1
Lesotho	2006	10	180,208	74,209	47	53	1
Liberia	1974	10	144,337	56,474	50	50	11
Liberia	2008	10	338,809	121,658	49	51	15
Malawi	1987	10	746,526	253,846	48	52	26
Malawi	2008	10	1,320,183	429,732	49	51	31
Mali	1998	10	973,938	310,729	46	54	45
Mali	2009	10	1,107,648	350,139	48	52	46
Nigeria	2006-10	0.6	426,395	166,202	49	51	-
Rwanda	2002	10	746,978	238,424	45	55	101
Senegal	1988	10	676,313	217,609	47	53	30
Senegal	2002	10	972,925	340,945	48	52	34
Sierra Leone	2004	10	362,402	131,737	46	54	66
South Africa	2001	10	3,643,062	1,653,673	45	55	9
South Africa	2011	8.6	4,102,679	1,919,113	45	55	9
Tanzania	1988	10	2,271,445	771,871	48	52	25
Tanzania	2012	10	4,481,851	1,597,048	47	53	30
Uganda	1991	10	1,505,350	473,690	48	52	34
Uganda	2002	10	2,457,456	764,287	51	49	56
Zambia	1990	10	665,468	230,340	47	53	52
Zambia	2010	10	1,234,750	411,452	49	51	71
Zimbabwe	2012	5	654,688	244,417	47	53	-
Total			**43,056,679**	**15,789,210**			**1,701**

Table A2: N districts by country and time period in gender gap and ratio datasets

	Gender Gap			Gender Ratio		
Country	**1920-1939**	**1940-1959**	**1960-1979**	**1920-1939**	**1940-1959**	**1960-1979**
Burkina Faso	60	60	30	46	59	30
Benin	130	134	140	70	121	140
Botswana	34	36	38	34	36	38
Cameroon	218	219	602	181	217	602
Ethiopia	170	170	-	160	170	-
Ghana	20	20	20	20	20	20
Guinea	66	66	68	30	65	68
Kenya	82	41	312	76	38	312
Liberia	22	11	30	21	11	30
Lesotho	2	2	2	2	2	2
Mali	90	90	92	57	89	92
Malawi	52	52	62	52	52	62
Rwanda	198	200	202	167	199	202
Sierra Leone	132	132	132	92	129	132
Senegal	60	60	68	53	60	68
Tanzania	50	50	60	50	50	60
Uganda	66	66	110	66	66	110
South Africa	16	16	18	16	16	18
Zambia	101	104	142	99	104	142
Total	**1,569**	**1,529**	**2,128**	**1,292**	**1,504**	**2,128**

Table A3: Descriptive statistics, educational gender gap for all time periods

	1920 - 1939					1940 - 1959					1960 - 1979				
Variable	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Gender Educational Gap	1,569	1.141	1.063	-3.600	6.500	1,529	1.833	1.164	-3.000	6.107	2,126	1.489	1.006	-2.100	5.394
Female Years of Educ.	1,569	0.457	0.907	0.000	8.250	1,529	1.518	1.672	0.000	10.000	2,126	4.103	2.849	0 .016	11.720
Urban Share (log)	1,569	0.125	0.646	0.000	5.252	1,529	0.231	0. 852	0.000	6.513	2,126	0.351	0.938	0.000	5.656
Dummy if Railroad	1,569	0.253	0.435	0.000	1.000	1,529	0.250	0.433	0.000	1.000	2,126	0.239	0.427	0.000	1.000
Coastal Share	1,439	0.185	0.342	0.000	1.000	1,402	0.190	0.347	0.000	1.000	1,934	0.175	0.341	0.000	1.000
Dummy if Main Mission 1924	1,569	0.251	0.434	0.000	1.000	1,529	0.241	0.428	0.000	1.000	2,126	0.227	0.419	0.000	1.000
Dummy if Protestant Mission	1,569	0. 198	0.398	0.000	1.000	1,529	0.186	0.390	0.000	1.000	2,126	0.178	0 .382	0.000	1.000
Dummy if Catholic Mission	1,569	0.117	0.322	0.000	1.000	1,529	0.116	0.321	0.000	1.000	2,126	0.096	0.295	0.000	1.000
Dummy if Muslim Majority	1,569	0.296	0.46	0.000	1.000	1,529	0.302	0.459	0.000	1.000	2,126	0.244	0.429	0.000	1.000
Male Years of Educ.	1,569	1.598	1.560	0.000	11.000	1,529	3.352	2.243	0.051	10.000	2,126	5.592	2.753	0.1005	11.828
Male Years of Educ. Sq.	1,569	4.987	10.204	0.000	11.000	1,529	16.261	18.705	0.003	100.000	2,126	38.850	30.485	0.010	139.892
Farm Shared	1,194	0.490	0.481	0.000	1.000	1,149	0.493	0.483	0.000	1.000	1,752	0.467	0.480	0.000	1.000
Farm Female	1,194	0.263	0.420	0.000	1.000	1,149	0.260	0.419	0.000	1.000	1,752	0.330	0 .451	0.000	1.000
Farm Plough	1,194	0.066	0.236	0.000	1.000	1,149	0.068	0.240	0.000	1.000	1,752	0.004	0.058	0.000	1.000
Farm Pastoral	1,194	0.070	0.237	0.000	1.000	1,149	0.064	0.227	0.000	1.000	1,752	0.052	0.207	0.000	1.000
Farm Male	1,194	0.111	0.294	0.000	1.000	1,149	0.116	0.299	0.000	1.000	1,750	0.146	0.344	0.000	1.000
Cash Crop (log)	1,511	5.943	4.394	0.000	14.645	1,303	7.971	3.722	0.002	14.514	2,126	12.155	2.185	0.000	18.268
Cash Crop (log) * Railroad	1,511	1.689	3.704	0.000	14.641	1,303	1.828	3.937	0.000	14.483	2,126	2.936	5.367	0.000	18.241
Cash Crop (log) * Coast	1,407	1.099	2.548	0.000	12.750	1,219	1.318	2.854	0.000	13.248	1,934	2.150	4.190	0.000	16.407
Pasture / Cropland (log)	1,337	-0.005	1.056	-3.121	2.833	1,333	0.099	1.078	-3.334	3.702	1,860	-0.339	1.362	-4.968	4.384
Low Female Autonomy Index	1,335	0.037	1.653	-2.195	2.534	1,300	0.072	1.662	-2.195	2.534	1,666	0.204	1.584	-2.196	2.534
French Colony	1,569	0.259	0.438	0.000	1.000	1,529	0.268	0.443	0.000	1.000	2,126	0.187	0.390	0.000	1.000
British Colony	1,569	0.312	0.463	0.000	1.000	1,529	0.296	0.457	0.000	1.000	2,126	0.384	0.486	0.000	1.000
Mandated Colony	1,569	0.297	0.457	0.000	1.000	1,529	0.307	0.461	0.000	1.000	2,126	0.406	0.491	0.000	1.000
Independent Colony	1,569	0.133	0.339	0.000	1.000	1,529	0.129	0.335	0.000	1.000	2,126	0.023	0.149	0.000	1.000

Table A4: Descriptive statistics, educational gender ratio (M/F) for all time periods

	1920 - 1939					1940 - 1959					1960 - 1979				
Variable	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Gender Educational Ratio	1,292	1.760	0.922	-0.969	6.634	1,504	1.200	0.696	-1.424	4.354	2,126	0.541	0.504	-0.492	3.266
Urban Share (log)	1,292	0.152	0.709	0.000	5.252	1,504	0.234	0.859	0.000	6.513	2,126	0.351	0.938	0.000	5.656
Dummy if Railroad	1,292	.278	0.448	0.000	1.000	1,504	0.254	0.435	0.000	1.000	2,126	0.240	0.427	0.000	1.000
Coastal Share	1,191	0.169	0.328	0.000	1.000	1,384	0.188	0.344	0.000	1.000	1,934	0.175	0.341	0.000	1.000
Dummy if Main Mission 1924	1,292	0.295	0.456	0.000	1.000	1,504	0.244	0.430	0.000	1.000	2,126	0.227	0.419	0.000	1.000
Dummy if Protestant Mission	1,292	0.231	0.421	0.000	1.000	1,504	0.189	0.392	0.000	1.000	2,126	0.178	0.382	0.000	1.000
Dummy if Catholic Mission	1,292	0.141	0.348	0.000	1.000	1,504	0.118	0.323	0.000	1.000	2,126	0.096	0.295	0.000	1.000
Dummy if Muslim Majority	1,292	0.298	0.457	0.000	1.000	1,504	0.297	0.457	0.000	1.000	2,126	0.243	0.429	0.000	1.000
Male Years of Educ.	1,292	1.847	1.576	0.011	11.000	1,504	3.394	2.233	0.073	10.000	2,126	5.592	2.753	0.101	11.828
Farm Shared	1,034	0.470	0.480	0.000	1.000	1,141	0.495	0.483	0.000	1.000	1,752	0.467	0.480	0.000	1.000
Farm Female	1,034	0.283	0.429	0.000	1.000	1,141	0.260	0.419	0.000	1.000	1,752	0.330	0.451	0.000	1.000
Farm Plough	1,034	0.071	0.244	0.000	1.000	1,141	0.069	0.241	0.000	1.000	1,752	0.004	0.058	0.000	1.000
Farm Pastoral	1,034	0.073	0.240	0.000	1.000	1,141	0.062	0.224	0.000	1.000	1,752	0.052	0.207	0.000	1.000
Farm Male	1,034	0.104	0.284	0.000	1.000	1,141	0.115	0.297	0.000	1.000	1,750	0.146	0.344	0.000	1.000
Cash Crop (log)	1,235	6.170	4.343	0.000	14.645	1,280	8.008	3.694	0.000	14.515	2,126	12.155	2.185	0.000	18.268
Cash Crop (log) * Railroad	1,235	1.917	3.903	0.000	14.641	1,280	1.861	3.965	0.000	14.483	2,126	2.936	5.367	0.000	18.241
Cash Crop (log) * Coast	1,160	1.080	2.514	0.000	12.611	1,203	1.314	2.851	0.000	13.248	1,934	2.150	4.190	0.000	16.407
Pasture / Cropland (log)	1,109	0.014	1.018	-3.099	2.833	1,313	0.109	1.070	-3.333	3.701	1,860	-0.339	1.362	-4.968	4.384
Low female Autonomy Index	1,111	-0.047	1.651	-2.195	2.534	1,288	0.068	1.663	-2.195	2.534	1,666	0.204	1.584	-2.195	2.534
French Colony	1,292	0.198	0.399	0.000	1.000	1,504	0.262	0.440	0.000	1.000	2,126	0.187	0.390	0.000	1.000
British Colony	1,292	0.341	0 .474	0.000	1.000	1,504	0.297	0.457	0.000	1.000	2,126	0.383	0.486	0.000	1.000
Mandated Colony	1,292	0.308	0.462	0.000	1.000	1,504	0.310	0.463	0.000	1.000	2,126	0.406	0.491	0.000	1.000
Independent Colony	1,292	0.152	.360	0.000	1.000	1,504	0.130	0.337	0.000	1.000	2,126	0.023	0.149	0.000	1.000

Table A5: Correlates of educational gender gap and female years of education, panel

Dependent variable:	Gender Educational Gap			Gender Educational Gap			Female Years of Education		
	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Urban Share (log)	-0.166***	-0.018	-0.029	-0.081***	-0.009	-0.021	0.089***	0.032	0.047**
	(0.050)	(0.023)	(0.020)	(0.030)	(0.021)	(0.019)	(0.031)	(0.023)	(0.020)
Dummy if Railroad	-0.118*	-0.149	-0.221	-0.195***	-0.175*	-0.338	0.191***	0.164*	0.335
	(0.067)	(0.099)	(0.239)	(0.057)	(0.090)	(0.225)	(0.057)	(0.086)	(0.240)
Coastal Share	-0.053	-0.279**	-0.172	-0.108	-0.280**	0.023	0.104	0.165	-0.105
	(0.082)	(0.119)	(0.352)	(0.100)	(0.117)	(0.349)	(0.102)	(0.119)	(0.359)
Dummy if Main Mission 1924	-0.150***	-0.152***	-0.213***				0.123***	0.243***	0.262***
	(0.046)	(0.058)	(0.053)				(0.040)	(0.055)	(0.053)
Dummy if Protestant Mission				-0.039	-0.132**	-0.137***			
				(0.040)	(0.061)	(0.051)			
Dummy if Catholic Mission				-0.167***	-0.120**	-0.138**			
				(0.059)	(0.058)	(0.065)			
Dummy if Muslim Majority	0.052	-0.068	0.137**	0.015	-0.035	0.154***	-0.022	-0.054	-0.048
	(0.038)	(0.048)	(0.057)	(0.024)	(0.045)	(0.053)	(0.025)	(0.047)	(0.068)
Male Years of Educ.	1.081***	0.945***	0.489***	1.052***	1.029***	0.581***	-0.047	-0.148***	0.232***
	(0.061)	(0.032)	(0.034)	(0.053)	(0.031)	(0.036)	(0.051)	(0.029)	(0.040)
Male Years of Educ. Sq.	-0.065***	-0.068***	-0.033***	-0.058***	-0.078***	-0.041***	0.056***	0.075***	0.042***
	(0.014)	(0.004)	(0.003)	(0.013)	(0.004)	(0.003)	(0.013)	(0.004)	(0.004)
Farm Shared	0.064	0.036	0.211***	0.050	-0.041	0.005	-0.051	0.019	-0.012
	(0.055)	(0.075)	(0.060)	(0.043)	(0.064)	(0.059)	(0.043)	(0.061)	(0.061)
Farm Female	-0.014	-0.160**	0.132**	-0.004	-0.185***	-0.122**	-0.004	0.101	0.059
	(0.057)	(0.078)	(0.061)	(0.047)	(0.068)	(0.061)	(0.047)	(0.064)	(0.060)
Farm Plough	-0.090	-0.144	-0.180	-0.098	-0.121	-0.158	0.095	0.069	0.147
	(0.107)	(0.110)	(0.235)	(0.075)	(0.088)	(0.191)	(0.077)	(0.087)	(0.199)
Farm Pastoral	0.063	-0.146	0.015	0.047	-0.137	-0.036	-0.050	0.077	-0.032
	(0.086)	(0.104)	(0.123)	(0.070)	(0.086)	(0.111)	(0.071)	(0.084)	(0.119)
Cash Crop (log)	-0.013***	-0.009	0.036**	-0.002	0.00316	0.002	0.002	-0.0009	0.013
	(0.005)	(0.007)	(0.015)	(0.005)	(0.007)	(0.012)	(0.005)	(0.0064)	(0.012)
Cash Crop (log) * Railroad	0.009	-0.004	-0.010	0.017**	0.0008	0.014	-0.018**	-0.003	-0.011
	(0.008)	(0.010)	(0.019)	(0.007)	(0.0098)	(0.017)	(0.007)	(0.010)	(0.019)
Cash Crop (log) * Coast	0.011	0.013	-0.002	0.010	0.009	-0.011	-0.011	-0.007	0.012
	(0.010)	(0.013)	(0.029)	(0.012)	(0.012)	(0.028)	(0.012)	(0.012)	(0.029)
Pasture / Cropland (log)	0.008	-0.010	0.028	0.019	-0.005	0.025	-0.018	-0.022	-0.053**
	(0.014)	(0.021)	(0.019)	(0.013)	(0.020)	(0.020)	(0.013)	(0.021)	(0.022)
Low Female Autonomy Index	-0.020*	-0.013	-0.006	-0.003	0.009	-0.031*	0.003	-0.007	0.030*
	(0.012)	(0.017)	(0.016)	(0.011)	(0.018)	(0.017)	(0.011)	(0.019)	(0.017)
British Colony	-0.080	-0.284***	-0.112						
	(0.058)	(0.066)	(0.075)						
Mandated Territory	-0.259***	-0.705***	0.074						
	(0.087)	(0.137)	(0.115)						
Independent Country	-0.277***	-0.625***	0.134						
	(0.092)	(0.155)	(0.176)						
Constant	0.400***	-1.914***	-4.823***	0.030	-1.010***	-1.973***	-0.017	-0.385***	-2.767***
	(0.145)	(0.207)	(0.231)	(0.068)	(0.122)	(0.179)	(0.054)	(0.115)	(0.191)
Rho	-0.025	1.256***	2.610***	-0.113	0.858***	1.432***	0.390**	0.851***	0.810***
	(0.098)	(0.026)	(0.006)	(0.088)	(0.048)	(0.002)	(0.166)	(0.063)	(0.039)
Observations	1,554	1,462	2,082	1.554	1,462	2,082	1,554	1,462	2,082
Country Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	No	No	No	No	No	No
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Panel regressions for 3 periods, two decades respectively. Columns (1)-(3) include colony FEs (French Colony reference group); columns (4)-(6) specify mission denominations; columns (7)-(9) baseline. Regression models are corrected for spatial autocorrelation. Rho indicates the spatial autocorrelation coefficient. We omit the coefficient of population density (log). Variables are temporally dynamic except those capturing initial and invariant conditions: Dummy if Main Mission in year 1924; the 4 farming variables measured by Baumann (1928) (reference category Farm Male); Low Female Autonomy Index constructed from Murdock (1967); and Coastal Share. Robust standard errors (in parentheses) are clustered at the sub-national administrative level. Significance codes: *** p<0.01, ** p<0.05, * p<0.1. See Web-Appendix for data construction and sources.

Table A6: Correlates of educational gender ratio (M/F), panel

Dependent variable:	Educational Gender Ratio (M/F)			Educational Gender Ratio (M/F)			Educational Gender Ratio (M/F)		
	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Urban Share (log)	-0.075**	-0.037**	-0.033***	-0.025	-0.033**	-0.032***	-0.071**	-0.063***	-0.042***
	(0.035)	(0.015)	(0.008)	(0.032)	(0.019)	(0.008)	(0.030)	(0.015)	(0.010)
Dummy if Railroad	-0.222**	-0.074	-0.044	-0.229**	-0.077	-0.079	-0.325***	-0.147	-0.221**
	(0.110)	(0.097)	(0.079)	(0.111)	(0.095)	(0.076)	(0.111)	(0.097)	(0.086)
Coastal Share	-0.280	0.022	0.126	-0.183	-0.002	0.041	-0.248	-0.059	0.083
	(0.173)	(0.129)	(0.145)	(0.219)	(0.143)	(0.148)	(0.223)	(0.148)	(0.148)
Dummy if Main Mission 1924	-0.162**	-0.109***	-0.074***				-0.304***	-0.219***	-0.115***
	(0.071)	(0.041)	(0.016)				(0.073)	(0.045)	(0.017)
Dummy if Protestant Mission				-0.179**	-0.096**	-0.044***			
				(0.07)	(0.045)	(0.016)			
Dummy if Catholic Mission				-0.228***	-0.175***	-0.098***			
				(0.08)	(0.040)	(0.022)			
Dummy if Muslim Majority	0.161**	0.032	-0.034	0.018	-0.012	0.007	0.071	0.029	0.120***
	(0.080)	(0.047)	(0.032)	(0.098)	(0.059)	(0.037)	(0.097)	(0.060)	(0.045)
Male Years of Educ.	-0.104***	-0.092***	-0.051***	-0.127***	-0.092***	-0.053***			
	(0.029)	(0.017)	(0.005)	(0.034)	(0.017)	(0.010)			
Farm Shared	0.122	0.066	0.041	0.037	0.036	0.026	0.011	0.007	0.012
	(0.132)	(0.081)	(0.033)	(0.141)	(0.086)	(0.035)	(0.145)	(0.092)	(0.034)
Farm Female	0.042	0.006	0.007	-0.083	-0.012	0.007	-0.090	-0.054	-0.018
	(0.126)	(0.082)	(0.032)	(0.130)	(0.081)	(0.033)	(0.134)	(0.089)	(0.046)
Farm Plough	0.046	-0.010	-0.074	0.097	0.025	-0.023	0.033	-0.034	-0.039
	(0.146)	(0.118)	(0.118)	(0.141)	(0.114)	(0.117)	(0.143)	(0.122)	(0.122)
Farm Pastoral	-0.029	-0.057	0.050	0.032	0.004	0.082	-0.006	0.003	0.106*
	(0.171)	(0.112)	(0.055)	(0.167)	(0.106)	(0.055)	(0.168)	(0.114)	(0.059)
Cash Crop (log)	0.003	0.002	0.011*	0.004	0.007	0.007	0.005	0.008	0.006
	(0.009)	(0.006)	(0.006)	(0.012)	(0.006)	(0.006)	(0.011)	(0.006)	(0.006)
Cash Crop (log) * Railroad	0.008	-0.005	-0.003	0.013	-0.002	0.0001	0.016	-0.003	0.009
	(0.013)	(0.009)	(0.006)	(0.013)	(0.009)	(0.0057)	(0.013)	(0.009)	(0.006)
Cash Crop (log) * Coast	0.020	-0.010	-0.012	-0.011	-0.014	-0.004	-0.005	-0.011	-0.010
	(0.021)	(0.013)	(0.011)	(0.027)	(0.014)	(0.012)	(0.027)	(0.014)	(0.012)
Pasture / Cropland (log)	-0.009	-0.003	0.012	0.008	-0.004	0.008	0.018	0.005	0.011
	(0.035)	(0.018)	(0.009)	(0.033)	(0.017)	(0.009)	(0.034)	(0.019)	(0.009)
Low Female Autonomy Index	-0.043*	-0.024*	-0.006	0.005	-0.004	-0.002	-0.002	-0.013	-0.006
	(0.023)	(0.013)	(0.006)	(0.027)	(0.015)	(0.006)	(0.027)	(0.016)	(0.007)
British Colony	-0.095	0.002	-0.210***						
	(0.137)	(0.072)	(0.044)						
Mandated Territory	-0.368**	-0.322***	-0.413***						
	(0.163)	(0.114)	(0.048)						
Independent Country	-0.247	-0.159	-0.141**						
	(0.176)	(0.117)	(0.058)						
Constant	1.510***	0.678	0.430***	1.311***	-0.523	0.0439	1.022***	-0.475	-0.297
	(0.282)	(0.479)	(0.098)	(0.346)	(0.374)	(0.257)	(0.316)	(0.366)	(0.370)
Rho	0.679***	1.105***	1.423***	0.408***	1.415***	1.418***	0.574***	1.379***	1.658***
	(0.084)	(0.284)	(0.005)	(0.121)	(0.217)	(0.228)	(0.099)	(0.207)	(0.354)
Observations	1,124	1,418	2,082	1,124	1,418	2,082	1,124	1,418	2,082
Country Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	No	No	No	No	No	No
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Panel regressions for 3 periods, two decades respectively. Columns (1)-(3) include colony FEs (French Colony reference group); columns (4)-(6) specify mission denominations; columns (7)-(9) exclude male years of education. Regression models are corrected for spatial autocorrelation. Rho indicates the spatial autocorrelation coefficient. We omit the coefficient of population density (log). Variables are temporally dynamic except those capturing initial and invariant conditions: Dummy if Main Mission in year 1924; the 4 farming variables measured by Baumann (1928) (reference category Farm Male); Low Female Autonomy Index constructed from Murdock (1967); and Coastal Share. Robust standard errors (in parentheses) are clustered at the sub-national administrative level. Significance codes: *** p<0.01, ** p<0.05, * p<0.1. See Web-Appendix for data construction and sources.

Table A7: Correlates of educational gender gap and female years of education, panel (without spatial autocorrelation control)

Dependent variable:	Gender Educational Gap			Gender Educational Gap			Female Years of Education		
	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Urban Share (log)	-0.225***	-0.195***	-0.088*	-0.133**	-0.098	0.032	0.135**	0.094	-0.027
	(0.060)	(0.075)	(0.049)	(0.061)	(0.070)	(0.032)	(0.062)	(0.069)	(0.031)
Dummy if Railroad	0.010	-0.002	1.447**	-0.111	-0.176	-0.546	0.113	0.218	0.513
	(0.177)	(0.374)	(0.672)	(0.142)	(0.290)	(0.385)	(0.145)	(0.289)	(0.388)
Coastal Share	-1.187**	-1.776**	1.277	-0.523	-0.937	-0.313	0.492	0.744	0.144
	(0.498)	(0.798)	(0.988)	(0.424)	(0.811)	(0.757)	(0.426)	(0.755)	(0.748)
Dummy if Main Mission 1924	-0.224***	-0.346***	-0.390***				0.131**	0.328***	0.297***
	(0.060)	(0.102)	(0.108)				(0.052)	(0.105)	(0.097)
Dummy if Protestant Mission				-0.104**	-0.079	-0.080			
				(0.052)	(0.113)	(0.089)			
Dummy if Catholic Mission				-0.022	-0.160	-0.229***			
				(0.052)	(0.121)	(0.077)			
Dummy if Muslim Majority	-0.009	0.136	-0.180	-0.069	0.017	-0.005	0.074	-0.020	-0.029
	(0.085)	(0.106)	(0.190)	(0.051)	(0.076)	(0.099)	(0.053)	(0.085)	(0.117)
Male Years of Educ.	0.986***	1.177***	0.866***	1.021***	1.160***	0.632***	-0.027	-0.179**	0.355***
	(0.072)	(0.086)	(0.110)	(0.055)	(0.079)	(0.090)	(0.055)	(0.077)	(0.091)
Male Years of Educ. Sq.	-0.075***	-0.089***	-0.070***	-0.078***	-0.090***	-0.047***	0.079***	0.091***	0.048***
	(0.010)	(0.010)	(0.009)	(0.008)	(0.009)	(0.008)	(0.008)	(0.009)	(0.008)
Farm Shared	0.087	0.223	0.474**	0.389***	0.648***	0.0309	-0.396***	-0.645***	-0.030
	(0.135)	(0.215)	(0.239)	(0.143)	(0.226)	(0.198)	(0.143)	(0.220)	(0.188)
Farm Female	-0.168	-0.297	0.209	0.295**	0.256	-0.287*	-0.303**	-0.288	0.289*
	(0.141)	(0.199)	(0.245)	(0.143)	(0.198)	(0.164)	(0.141)	(0.194)	(0.163)
Farm Plough	-0.929***	-0.901***	-0.752***	-0.625***	-0.418***	-1.032***	0.621***	0.382**	1.026***
	(0.351)	(0.242)	(0.262)	(0.205)	(0.153)	(0.168)	(0.203)	(0.148)	(0.166)
Farm Pastoral	0.043	0.331	0.021	0.130	0.212	-0.405	-0.122	-0.195	0.463*
	(0.134)	(0.228)	(0.379)	(0.160)	(0.184)	(0.260)	(0.158)	(0.169)	(0.267)
Cash Crop (log)	-0.005	-0.073***	0.143***	0.027**	0.037	0.005	-0.027**	-0.045*	-0.011
	(0.012)	(0.016)	(0.052)	(0.011)	(0.025)	(0.039)	(0.011)	(0.025)	(0.041)
Cash Crop (log) * Railroad	0.015	0.015	-0.106**	0.024*	0.022	0.035	-0.024*	-0.025	-0.032
	(0.019)	(0.034)	(0.048)	(0.014)	(0.029)	(0.027)	(0.014)	(0.028)	(0.027)
Cash Crop (log) * Coast	0.187***	0.236***	-0.080	0.103**	0.123	0.059	-0.010**	-0.104	-0.044
	(0.063)	(0.083)	(0.070)	(0.051)	(0.088)	(0.051)	(0.050)	(0.079)	(0.050)
Pasture / Cropland (log)	-0.003	-0.074	-0.136**	-0.004	-0.077	-0.060	0.004	0.075	0.059
	(0.036)	(0.051)	(0.056)	(0.030)	(0.052)	(0.045)	(0.030)	(0.051)	(0.045)
Low Female Autonomy Index	-0.029	-0.103**	-0.082**	-0.016	-0.040	-0.139***	0.015	0.035	0.135***
	(0.029)	(0.050)	(0.038)	(0.028)	(0.064)	(0.044)	(0.027)	(0.063)	(0.043)
British Colony	0.537**	0.261	0.052						
	(0.212)	(0.186)	(0.290)						
Mandated Territory	0.326	-0.294	-0.695**						
	(0.214)	(0.236)	(0.321)						
Independent Countries	-0.020	-0.184	-0.469						
	(0.276)	(0.292)	(0.350)						
Constant	0.090	1.317***	-2.118***	-0.327**	-1.079***	-0.514	0.334**	1.178***	0.624
	(0.253)	(0.301)	(0.777)	(0.155)	(0.392)	(0.635)	(0.154)	(0.392)	(0.655)
R-squared	0.881	0.853	0.682	0.932	0.891	0.772	0.979	0.976	0.967
Observations	906	799	1,312	906	799	1,312	906	799	1,312
Country Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	No	No	No	No	No	No
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Panel regressions for 3 periods, two decades respectively. Columns (1)-(3) include colony FEs (French Colony reference group); columns (4)-(6) specify mission denominations; columns (7)-(9) baseline. Regression models do not control for spatial autocorrelation. We only impute missing values when we control for spatial autocorrelation, thus the loss of observations. We omit the coefficient of population density (log). Regressions are weighted by district population to account for different sizes of birth regions. The reference category to the 4 farm variables is Farm Male. Variables are temporally dynamic except those capturing initial and invariant condition: Dummy if Main Mission in year 1924; the 4 farming practices that were measured from Baumann (1928); Low Female Autonomy Index constructed from Murdock (1967); and Coastal Share. Observations are clustered at the level of ethnic regions from the Murdock (1967). Significance codes: *** p<0.01, ** p<0.05, * p<0.1.

Table A8: Correlates of educational gender ratio (M/F), panel (without spatial autocorrelation control)

Dependent variable:	Educational Gender Ratio			Educational Gender Ratio			Educational Gender Ratio		
	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Urban Share (log)	0.124***	-0.011	-0.036***	0.177***	0.040	-0.010	-0.023	-0.085***	-0.0281**
	(0.046)	(0.027)	(0.014)	(0.045)	(0.027)	(0.010)	(0.043)	(0.028)	(0.0112)
Dummy if Railroad	0.073	-0.056	0.300*	0.029	-0.104	-0.120	-0.087	-0.057	-0.258
	(0.210)	(0.175)	(0.156)	(0.217)	(0.143)	(0.130)	(0.283)	(0.217)	(0.171)
Coastal Share	-2.086***	-0.472	0.542	-2.229***	-0.932*	-0.363	-2.073***	-0.857	-0.228
	(0.511)	(0.536)	(0.432)	(0.698)	(0.540)	(0.345)	(0.562)	(0.538)	(0.394)
Dummy if Main Mission 1924	-0.434***	-0.178***	-0.071***				-0.442***	-0.305***	-0.102***
	(0.087)	(0.055)	(0.025)				(0.112)	(0.078)	(0.0266)
Dummy if Protestant Mission				-0.201**	-0.046	-0.002			
				(0.099)	(0.057)	(0.021)			
Dummy if Catholic Mission				-0.170**	-0.125**	-0.063***			
				(0.082)	(0.055)	(0.020)			
Dummy if Muslim Majority	0.060	0.080	-0.020	-0.011	0.014	0.027	0.027	0.139	0.141***
	(0.140)	(0.079)	(0.055)	(0.125)	(0.067)	(0.031)	(0.127)	(0.095)	(0.0383)
Male Years of Educ.	-0.214***	-0.124***	-0.084***	-0.211***	-0.149***	-0.085***			
	(0.039)	(0.016)	(0.008)	(0.039)	(0.016)	(0.009)			
Farm Shared	0.238	0.116	0.069	0.434**	0.328***	0.039	0.255	0.111	-0.067
	(0.172)	(0.118)	(0.064)	(0.190)	(0.111)	(0.057)	(0.200)	(0.143)	(0.098)
Farm Female	-0.094	-0.122	-0.030	0.120	0.090	-0.055	-0.033	-0.107	-0.196**
	(0.156)	(0.099)	(0.067)	(0.168)	(0.092)	(0.054)	(0.178)	(0.108)	(0.095)
Farm Plough	-0.140	-0.195*	-0.182**	-0.015	0.047	-0.160***	-0.305*	-0.212*	-0.325***
	(0.195)	(0.101)	(0.071)	(0.138)	(0.086)	(0.053)	(0.166)	(0.108)	(0.093)
Farm Pastoral	0.050	0.431**	-0.032	0.193	0.367**	-0.037	0.057	0.329**	-0.061
	(0.180)	(0.172)	(0.102)	(0.199)	(0.142)	(0.091)	(0.196)	(0.148)	(0.143)
Cash Crop (log)	0.037***	-0.007	0.027**	0.041***	0.052***	0.002	0.031**	0.040*	-0.017
	(0.012)	(0.007)	(0.011)	(0.015)	(0.015)	(0.012)	(0.014)	(0.022)	(0.016)
Cash Crop (log) * Railroad	-0.009	0.001	-0.023**	-0.003	0.002	0.005	0.005	-0.005	0.013
	(0.021)	(0.015)	(0.011)	(0.021)	(0.014)	(0.009)	(0.027)	(0.020)	(0.012)
Cash Crop (log) * Coast	0.252***	0.060	-0.037	0.232***	0.058	0.028	0.219***	0.044	0.012
	(0.061)	(0.046)	(0.032)	(0.080)	(0.050)	(0.023)	(0.059)	(0.051)	(0.027)
Pasture / Cropland (log)	-0.029	-0.038	-0.023	-0.015	-0.038	-0.013	0.023	-0.032	-0.005
	(0.044)	(0.026)	(0.014)	(0.043)	(0.027)	(0.012)	(0.036)	(0.024)	(0.012)
Low Female Autonomy Index	-0.023	-0.077***	-0.032**	-0.006	-0.002	-0.025**	-0.038	-0.032	-0.038**
	(0.034)	(0.023)	(0.013)	(0.038)	(0.024)	(0.010)	(0.046)	(0.028)	(0.015)
British Colony	-0.153	-0.012	-0.305***						
	(0.240)	(0.108)	(0.083)						
Mandated Territory	-0.332	-0.304**	-0.554***						
	(0.249)	(0.138)	(0.092)						
Independent Country	-0.723***	-0.193	-0.274***						
	(0.265)	(0.144)	(0.096)						
Constant	3.266***	2.591***	1.230***	1.535***	0.702***	1.223***	1.651***	0.860**	1.429***
	(0.348)	(0.183)	(0.192)	(0.239)	(0.232)	(0.217)	(0.240)	(0.335)	(0.282)
R-squared	0.681	0.807	0.760	0.700	0.841	0.807	0.658	0.784	0.749
Observations	789	797	1,312	789	797	1,312	789	797	1,312
Country Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	No	No	No	No	No	No
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Panel regressions for 3 periods, two decades respectively. Columns (1)-(3) include colony FEs (French Colony reference group); columns (4)-(6) specify mission denominations; columns (7)-(9) exclude male years of education. Regression models do not control for spatial autocorrelation. We only impute missing values when we control for spatial autocorrelation, thus the loss of observations. We omit the coefficient of population density (log). Regressions are weighted by district population to account for different sizes of birth regions. The reference category to the 4 farm variables is Farm Male. Variables are temporally dynamic except those capturing initial and invariant condition: Dummy if Main Mission in year 1924; the 4 farming practices that were measured from Baumann (1928); Low Female Autonomy Index constructed from Murdock (1967); and Coastal Share. Observations are clustered at the level of ethnic regions from the Murdock (1967). Significance codes: *** p<0.01, ** p<0.05, * p<0.1.

Table A9: Robustness test: educational gender gap, panel (excluding South Africa)

Dependent variable:	Gender Educational Gap			Gender Educational Gap		
	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79
	(1)	(2)	(3)	(4)	(5)	(6)
Urban Share (log)	0.021	0.055	0.037	-0.046**	-0.0001	-0.021
	(0.037)	(0.058)	(0.032)	(0.020)	(0.021)	(0.019)
Dummy if Railroad	-0.275***	-0.144	-0.432	-0.194***	-0.165*	-0.289
	(0.088)	(0.260)	(0.465)	(0.056)	(0.100)	(0.230)
Coastal Share	-0.460	-1.055	-0.591	-0.123	-0.286**	0.015
	(0.408)	(0.687)	(0.741)	(0.103)	(0.116)	(0.351)
Dummy if Main Mission 1924	-0.131***	-0.280***	-0.280***	-0.128***	-0.189***	-0.182***
	(0.041)	(0.095)	(0.095)	(0.040)	(0.052)	(0.048)
Dummy if Muslim Majority	0.002	0.019	0.022	0.0208	-0.0310	0.153***
	(0.044)	(0.087)	(0.111)	(0.0238)	(0.0457)	(0.0536)
Male Years of Educ.	0.967***	1.289***	0.848***	1.015***	1.030***	0.588***
	(0.066)	(0.081)	(0.100)	(0.055)	(0.032)	(0.037)
Male Years of Educ. Sq.	-0.060***	-0.101***	-0.068***	-0.050***	-0.077***	-0.042***
	(0.014)	(0.010)	(0.008)	(0.013)	(0.004)	(0.003)
Farm Shared	0.144*	0.034	-0.067	0.048	-0.051	0.006
	(0.075)	(0.157)	(0.214)	(0.042)	(0.064)	(0.059)
Farm Female	-0.032	-0.407***	-0.387*	-0.023	-0.200***	-0.124**
	(0.055)	(0.136)	(0.198)	(0.045)	(0.069)	(0.061)
Farm Plough	-0.010	-0.044		-0.008	-0.067	-0.068
	(0.031)	(0.112)		(0.064)	(0.089)	(0.215)
Farm Pastoral	0.056	0.130	-0.567*	0.038	-0.131	-0.043
	(0.079)	(0.149)	(0.328)	(0.070)	(0.085)	(0.112)
Cash Crop (log)	0.014**	0.034	0.022	0.001	0.004	0.003
	(0.007)	(0.024)	(0.046)	(0.005)	(0.007)	(0.012)
Cash Crop (log) * Railroad	0.027***	0.002	0.027	0.016**	-0.002	0.009
	(0.010)	(0.026)	(0.034)	(0.007)	(0.010)	(0.018)
Cash Crop (log) * Coast	0.079	0.111	0.081	0.012	0.010	-0.011
	(0.051)	(0.080)	(0.049)	(0.012)	(0.012)	(0.028)
Pasture / Cropland (log)	0.015	0.003	0.020	0.021	-0.002	0.027
	(0.014)	(0.034)	(0.034)	(0.013)	(0.019)	(0.020)
Low Female Autonomy Index	-0.018	-0.015	-0.132***	0.001	0.011	-0.030*
	(0.023)	(0.057)	(0.043)	(0.011)	(0.018)	(0.017)
Rho				-0.103	0.856***	1.430***
				(0.081)	(0.048)	(0.002)
Constant	-0.165*	-0.452	-0.928	0.025	-1.006***	-1.998***
	(0.098)	(0.339)	(0.715)	(0.063)	(0.122)	(0.181)
R-squared	0.953	0.837	0.685			
Observations	892	785	1,298	1,538	1,446	2,064
Country Fixed Effects	No	No	No	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	No	No	No
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Panel regressions for 3 periods, two decades respectively. For the robustness test we run the baseline regression excluding exclude South Africa from our sample. Columns (1)-(3) do not control for spatial autocorrelation while columns (4)-(6) control for spatial autocorrelation. Rho indicates spatial autocorrelation coefficient. We omit the coefficient of population density (log). The reference category to the 4 farm variables is Farm Male. Variables are temporally dynamic except those capturing initial and invariant condition: Dummy if Main Mission in year 1924; the 4 farming practices that were measured from Baumann (1928); Low Female Autonomy Index constructed from Murdock (1967); and Coastal Share. Robust standard errors (in parentheses) are clustered at the sub-national administrative level in columns (4)-(6). For the regression specification, where we do not control for spatial autocorrelation (columns (1)-(3)) observations are clustered at the level of ethnic regions from Murdock (1967). Significance codes: *** p<0.01, ** p<0.05, * p<0.1. See Web-Appendix for data construction and sources.

Table A10: Robustness test: educational gender ratio (M/F), panel (excluding South Africa)

Dependent variable:	Educational Gender Ratio			Educational Gender Ratio		
	1920-39	1940-59	1960-79	1920-39	1940-59	1960-79
	(1)	(2)	(3)	(4)	(5)	(6)
Urban Share (log)	0.215***	0.017	-0.016	-0.033	-0.034**	-0.031***
	(0.065)	(0.027)	(0.010)	(0.033)	(0.016)	(0.008)
Dummy if Railroad	0.012	-0.063	-0.094	-0.217*	-0.061	-0.054
	(0.208)	(0.136)	(0.144)	(0.112)	(0.097)	(0.076)
Coastal Share	-1.689***	-0.808*	-0.380	-0.161	0.044	0.024
	(0.613)	(0.483)	(0.323)	(0.218)	(0.143)	(0.148)
Dummy if Main Mission 1924	-0.313***	-0.168***	-0.066***	-0.236***	-0.174***	-0.083***
	(0.091)	(0.046)	(0.022)	(0.072)	(0.040)	(0.015)
Dummy if Muslim Majority	-0.032	-0.002	0.026	0.025	0.014	0.001
	(0.131)	(0.072)	(0.034)	(0.098)	(0.060)	(0.037)
Male Years of Educ.	-0.259***	-0.161***	-0.094***	-0.132***	-0.075***	-0.065***
	(0.038)	(0.016)	(0.009)	(0.036)	(0.017)	(0.009)
Farm Shared	0.282	0.174	-0.0003	0.036	0.046	0.018
	(0.207)	(0.124)	(0.067)	(0.143)	(0.088)	(0.034)
Farm Female	-0.059	-0.056	-0.088	-0.077	0.014	-0.007
	(0.200)	(0.111)	(0.065)	(0.134)	(0.084)	(0.031)
Farm Plough	0.052	0.077		0.104	0.062	-0.022
	(0.123)	(0.114)		(0.149)	(0.120)	(0.137)
Farm Pastoral	-0.081	0.235*	-0.118	0.020	0.026	0.060
	(0.172)	(0.136)	(0.103)	(0.168)	(0.110)	(0.053)
Cash Crop (log)	0.057***	0.049***	0.010	0.004	0.007	0.007
	(0.018)	(0.016)	(0.014)	(0.012)	(0.006)	(0.006)
Cash Crop (log) * Railroad	-0.007	-0.001	0.004	0.010	-0.004	-0.002
	(0.021)	(0.012)	(0.010)	(0.013)	(0.009)	(0.006)
Cash Crop (log) * Coast	0.183**	0.054	0.031	-0.014	-0.016	-0.003
	(0.071)	(0.043)	(0.021)	(0.027)	(0.014)	(0.012)
Pasture / Cropland (log)	0.062	-0.002	0.006	0.010	-0.002	0.008
	(0.039)	(0.021)	(0.011)	(0.033)	(0.018)	(0.009)
Low Female Autonomy Index	0.018	0.018	-0.022**	0.007	-0.003	-0.001
	(0.034)	(0.025)	(0.011)	(0.027)	(0.015)	(0.007)
Constant	1.678***	1.254***	1.130***	1.359***	-1.547***	0.397*
	(0.263)	(0.230)	(0.234)	(0.348)	(0.333)	(0.215)
Rho				0.382***	2.017***	1.082***
				(0.122)	(0.177)	(0.183)
R-squared	0.414	0.724	0.779			
Observations	775	783	1,298	1,108	1,402	2,064
Country Fixed Effects	No	No	No	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	No	No	No
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Panel regressions for 3 periods, two decades respectively. For the robustness test we run the baseline regression. excluding South Africa from our sample. Columns (1)-(3) do not control for spatial autocorrelation while columns (4)-(6) control for spatial autocorrelation. Rho indicates spatial autocorrelation coefficient. We omit the coefficient of population density (log). The reference category to the 4 farm variables is Farm Male. Variables are temporally dynamic except those capturing initial and invariant condition: Dummy if Main Mission in year 1924; the 4 farming practices that were measured from Baumann (1928); Low Female Autonomy Index constructed from Murdock (1967); and Coastal Share. Robust standard errors (in parentheses) are clustered at the sub-national administrative level in columns (4)-(6). For the regression specification, where we do not control for spatial autocorrelation (columns (1)-(3)) observations are clustered at the level of ethnic regions from Murdock (1967). Significance codes: *** p<0.01, ** p<0.05, * p<0.1. See Web-Appendix for data construction and sources.