Why is Polygyny More Prevalent in Western Africa? An African Slave Trade Perspective*

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Abstract

Polygyny rates are higher in Western Africa than in Eastern Africa. The African slave trades help explain this difference. More male slaves were exported in the trans-Atlantic slave trades from Western Africa, while more female slaves were exported in the Indian Ocean slave trades from Eastern Africa. The slave trades led to prolonged periods of abnormal sex ratios, which impacted the rates of polygyny across Africa. In order to assess these claims, we present evidence from a variety of sources. We find the trans-Atlantic slave trades have a positive correlation with historical levels of polygyny across African ethnic groups. We also construct an ethnic group level data set linking current rates of polygyny with historical trade flow data from the trans-Atlantic and Indian Ocean slave trades. We find the trans-Atlantic slave trades cause polygyny at the ethnic group level, while the Indian Ocean slave trades do not. We provide cross-country evidence corroborating our findings.

JEL Classification: F14, J12, N17, O55
Keywords: slave trades, polygyny, Africa, development

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1 Introduction

The African slave trades have long been thought to have had a negative impact on African economic development through their erosion of political institutions.[1] Less attention has been paid to the emergence of abnormal sex ratios on the African continent at the time of the slave trades. A higher percentage of male slaves were exported in the trans-Atlantic trade, whereas a higher percentage of female slaves were exported in the Indian Ocean trade. We argue the lengthy periods of abnormal sex ratios created profound implications for marriage institutions across Africa, which is a point also argued in Thornton (1983). For those regions in Western Africa affected by the trans-Atlantic slave trades, polygyny either emerged or was strengthened as an institution. In those regions in Eastern Africa affected by the Indian Ocean slave trades, polygyny remained uncommon. Polygyny, as part of a society's culture, persisted to the present since cultural change occurs slowly. This argument helps to explain the stylized fact that societies in Western Africa tend to have more polygynous marriages than those in Eastern Africa.

To the best of our knowledge, this paper represents the first large-scale empirical study focusing on the link between the slave trades and levels of polygyny in Africa. In order to test the relationship between the slave trades and polygyny, we combine the slave trades data from Nunn (2008) and Nunn and Wantchekon (2011) with polygyny data from a variety of sources, including Murdock (1967), the female Demographic and Health Surveys (DHS), and Tertilt (2005). We document the current stylized fact regarding the prevalence of polygyny in Western and Eastern Africa. For instance, the percentage of married women in polygynous marriages in Western African countries like Guinea, Togo, and Benin is 44, 21, and 25, whereas in Eastern African countries like Ethiopia, Kenya, and Malawi the percentage is 4, 3, and 3. Ethnic groups more heavily exposed to the trans-Atlantic slave trades were more likely to be polygynous in the early twentieth century. We find the trans-Atlantic slave trades increase current levels of polygyny at the ethnic group level, whereas the Indian Ocean slave trades do not. To further test our results, we analyze the effects of the slave trades on polygyny rates using country-level data. Again, we find the trans-Atlantic slave trades increase current levels of polygyny at the country-level, whereas the Indian Ocean slave trades do not.

[1] Nunn (2008) provides a thorough review of this point.

The African slave trades have long been a topic of research for economic historians. Recent contributions include the following: Eltis and Engerman (2000) on the slave trades and British industrialization, Eltis, Lewis, and McIntyre (2010) on decomposing the transport costs of slave voyages, Eltis, Lewis, and Richardson (2005) on slave prices and productivity in the Caribbean, Eltis and Richardson (1995) on productivity of French and British slave voyages, and Hogerzeil and Richardson (2007) on slave purchasing strategies and mortality. The availability of historical slave trade data, particularly the *Trans-Atlantic Slave Trade Database*, fuels much of the renewed research interest.[2] Eltis and Richardson (2010) provides a summary of the data.

Our paper builds on two recent papers which are closely related to ours in their focus on the long-term impact of the slave trades.[3] First, Nunn (2008) examines the impact of the African slave trades on subsequent African economic development. Nunn (2008) shows the poorest African countries today are those from which the most slaves were exported, suggesting the long-term effect of the slave trades is significant and relevant for understanding current African development performance. Second, Nunn and Wantchekon (2011) examines a particular channel through which the slave trades impact current African economic performances, namely the levels of trust across individuals within Africa. Trust supports economic exchange in well-functioning markets and would have plausibly been affected within groups living in the capture and export economies participating in the slave trades. Nunn and Wantchekon (2011) shows those individuals whose ancestral groups experienced higher slave exports exhibit lower levels of trust even to this day. Our paper contributes to these findings by suggesting an additional channel through which the slave trades have had a long-term impact on current African society.

Our paper also relates to the literature on determinants of polygyny and the economic impact of polygyny. Different theories exist about why polygyny emerges in societies. White and Burton (1988) provides a useful overview from the anthropology literature of these alternative theories.[4] Possible explanations of polygyny range from the economic, including income inequality across males, to the demographic, including skewed sex ratios from higher male mortality rates due to

[2]The *Trans-Atlantic Slave Trade Database* appears online at `http://www.slavevoyages.org`.

[3]Given our paper directly builds on the work in Nunn (2008) and Nunn and Wantchekon (2011), we discuss those papers here in detail. For further contributions related to the long-term impact of the slave trades on African development, see Darity (1992), Nunn (2007), and Rodney (1972).

[4]See also Brown (1981), Clignet (1970), and Dorjahn (1954) for sources in anthropology on the determinants of polygyny.

dangerous occupations, to the political, including warfare. Early work in economics on polygyny includes Becker (1974) and Grossbard (1978). These papers focus on male income inequality and the marginal contribution of wives as determinants of polygyny. For more recent work see Jacoby (1995), Gould, Moav, and Simhon (2008), and Fenske (2012). Fenske (2012) builds on our work by considering the slave trades as a possible candidate for the emergence of polygyny in Africa.

Among similar countries, Tertilt (2005) finds polygynous countries are poorer than nonpolygynous countries. Polygynous countries have higher fertility and lower savings. The calibrated model in Tertilt (2005) suggests banning polygyny decreases fertility by 40 percent, increases savings by 70 percent, and increases GDP per capita by 170 percent. Tertilt (2006) documents gender inequality as being more severe in polygynous countries. Women living in polygynous countries face larger literacy gaps, live under more restrictive abortion laws, and have less power in national politics. Tertilt (2006) finds granting women more control over their marriage decisions has a similar impact on economic outcomes, like GDP per capita, as banning polygyny outright. Schoellman and Tertilt (2006) finds banning polygyny in an infinite horizon, overlapping-generations model creates winners and losers, which provides a theoretical basis for why banning polygyny may be difficult to enforce. The findings of this literature suggest the slave trades could have affected current economic performance in Africa through the additional channel of polygyny, that is, in addition to the trust channel found in Nunn and Wantchekon (2011).

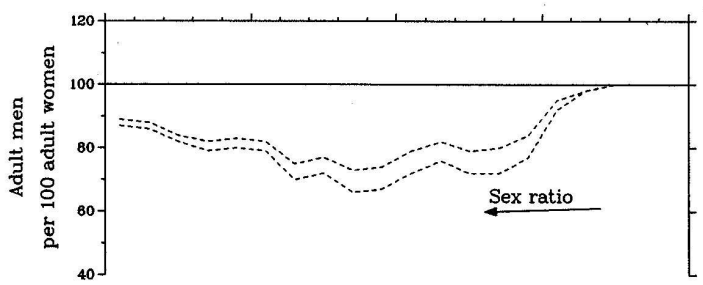
The rest of the paper is organized as follows: Section 2 provides historical background on the slave trades and how they affected marriage arrangements. We also include our empirical analysis of the historical polygyny data in Section 2. Section 3 describes the current ethnic group level data used in our quantitative exercises. Section 4 presents our empirical findings at the ethnic group level. Section 5 provides additional cross-country evidence. Section 6 concludes.

2 Historical Background

2.1 Slave Trades and Polygyny in Africa

Slave exporting existed as an industry for hundreds of years in Africa. The African slave trade comprised four main slave trades: the trans-Atlantic, Indian Ocean, Red Sea, and trans-Saharan. Of these four slave trades, Nunn (2008) documents the trans-Atlantic as having by far the largest total volume of slaves over the period 1400-1900. Slaves were primarily produced by raiding and capturing between groups in the continent who then sold slaves to traders in exchange for imported goods, often times for weapons used for the further production of slaves, the so-called *gun-slave cycle*.

Figure 1: Western Coast: Impact of Slave Exports

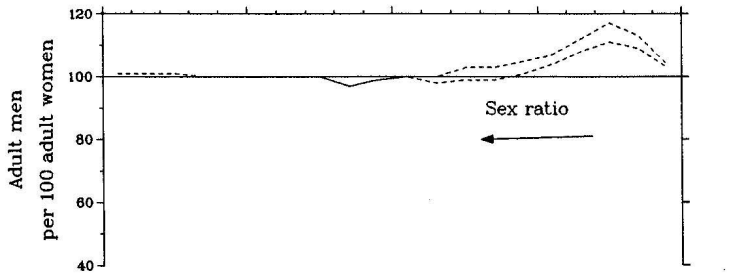


Source: Manning (1990)

The impact of the African slave trades on African societies was substantial. According to Manning (1990), the slave trades dramatically impacted the population trajectory of the continent. By 1850, Africa's population was half of the level expected had the slave trades not taken place. The volume of exported slaves led to a significant drain in labor and human capital. For those Africans remaining on the continent, life became more uncertain and insecure. Nunn (2008) and Nunn and Wantchekon (2011) provide useful historical summaries of the consequences of the slave trades on African political life. The *gun-slave cycle* contributed to political instability and undermined existing institutions. Ethnic fractionalization deepened.

Figures 1 and 2 show a further effect of the slave trades, namely on African demographics as measured by the sex ratio. For space considerations, we only show the aggregate regions of the Western and Eastern coasts, but Manning (1990) provides similar information for smaller regions. The sex ratio series in Figures 1 and 2 are simulations constructed from available

Figure 2: Eastern Coast: Impact of Slave Exports



Source: Manning (1990)

demographic data. The two lines represent low and high estimates based on low and high estimates of population growth. The figures show a skewed sex ratio on the Western and Eastern coasts of Africa during the periods of the slave trades. Figures 1 and 2 are easy to understand given the historical record. The sex ratio of exported slaves depended not only on the available supply from the African continent but also on the demand for slaves in the importing destination. If one gender was persistently demanded more than the other, this would lead to a skewed sex ratio in the remaining population.

Demand considerations explain not only why a skewed sex ratio can emerge but also why the effect of the slave trades on the sex ratio differs in Figures 1 and 2. Figure 1 shows the impact on the Western Coast. The main source of trans-Atlantic exports were from the Western Coast due to its close proximity to the New World. Eltis and Richardson (2010) shows the main destinations for these slave exports were the Caribbean and Brazil. Slaves exported to the Caribbean and Brazil were destined to perform tasks in places such as sugar plantations. Male slaves were viewed as being able to perform a variety of tasks. A Jamaican planter recalled the differences in tasks by gender (Beckford (1788, p. 13)):

> A negro man is purchased either for a trade, or the cultivation and different process of the cane–the occupations of the women are only two, the house, with its several departments and supposed indulgences, or the field with its exaggerated labours.

A British politician of the time expressed the preference for male slaves (Edwards (1801, p. 118)):

> I have to observe, that though it is impossible to conduct the business, either of a

> house or of a plantation without a number of females...the nature of the slave-service in the West Indies (being chiefly field labor) requires, for the immediate interest of the planter, a greater number of males.

As a result of this preference, traders exported disproportionally more males from the Western Coast. This fact is supported by the average percentages of males exported from various Western Coast regions to mainland North America and the Caribbean over the period 1545-1864 appearing in Table 1. For example, 66 percent and 63 percent of the slaves exported from Senegambia and the Bight of Benin were males. Klein (1983) reports a similar pattern. 62 percent of the slaves exported by the Dutch at the end of the seventeenth and beginning of the eighteenth centuries were male slaves. According to Klein (1983), this trade flow consisted of over 60,000 slaves and was one of the first instances of record keeping with respect to gender. The pattern for 15,000 slave exports from the Guinean coast by Danish traders in the late eighteenth century is similar. 64 percent of the slaves exported by the Danes were males. British exports of 83,000 slaves in the last decade of the eighteenth century were less concentrated geographically than the Dutch and Danish exports. Drawn from the entire Western Coast, 62 percent of the slaves exported by the British were males. Lastly, Klein (1983) considers the 182,000 slaves exported to the port of Havana, Cuba, during the late eighteenth and early nineteenth centuries. 71 percent of these slaves were males.

The impact of the slave trades on the sex ratio differs for the Eastern Coast appearing in Figure 2. Populations of this region of Africa were less likely to serve as a supply of slaves for trans-Atlantic exports. Instead, the Eastern Coast long served as a source of slaves for importing destinations in the Middle East and India. The Eastern Coast was, thus, affected

Table 1: Average Percentage of Slave Exports by Gender to Mainland North America and the Caribbean, 1545-1864

Region	Males	Females
Bight of Benin	63.1	36.9
Bight of Biafra	58.8	41.2
Gold Coast	65.4	34.6
Senegambia	66.4	33.6
Sierra Leone	66.6	33.4
West Central Africa	67.3	32.7
Windward Coast	65.4	34.5

Source: Eltis and Richardson (2010)

primarily by the Indian Ocean and Red Sea slave trades, both of which existed for hundreds of years before the trans-Atlantic slave trades (see, for instance, Lovejoy (1983)). The export flows were dominated by Islamic traders. Middle Eastern and Indian buyers demanded African slaves for use in a variety of roles, but, as Harris (1971), Lewis (1990), and Phillips (1985) all argue, the demand was especially strong for female slaves to use as domestic servants and even concubines. Manning (1990) documents the slave exports from the Eastern Coast were disproportionally female. The ratio of female to male slave exports from the Horn of Africa was exceptionally high. The impact of the loss of females appears in the Eastern Coast sex ratio in Figure 2.[5]

The skewed sex ratios point to a further possible consequence of the slave trades: polygyny. The argument that a skewed sex ratio can lead to polygyny goes back to at least Spencer (1876). Anthropologists have also long recognized the potential for a skewed sex ratio to play an important role in explaining the emergence and strengthening of polygyny.[6] Clignet (1970, p. 24) goes so far as to say, "...the most necessary condition to the emergence of polygynous families in a given society is, of course, an imbalance in its sex ratio..." The argument for why a skewed sex ratio might cause polygyny or make higher polygyny rates possible is as simple as it might seem: there are more women than men, and, in order for women to have a spouse, they marry into polygynous households. The slave trades existed for hundreds of years, and, as a result, Africa experienced abnormal sex ratios for long periods of time. Polygyny could have emerged or been strengthened during the long period of abnormal sex ratios. Figures 1 and 2 suggest the Western Coast should have contained more polygynous marriages, whereas the Eastern Coast should have contained fewer.

Polygyny is only one possible response to a skewed sex ratio, however. It could be the case that the age differential between husbands and wives changes. There are reasons to believe there were pressures pushing Africans towards the polygyny response in the case of the slave trades. The slave trades not only created a demographic environment with skewed sex ratios but also a dangerous and uncertain living environment where the threat of capture, and further drain of

[5]Two likely exceptions to this pattern on the Eastern Coast are the exports of slaves to plantations in Réunion and Mauritius by the French beginning in the middle of the 1700's. Unfortunately, there is no way to tell in our data what percentage of slave exports in the Indian Ocean trade went to Réunion and Mauritius and whether they were primarily male.

[6]See, for example, Clignet (1970), Dorjahn (1954), Ember (1974), Ember (1984), and White and Burton (1988).

males, always remained. Ember (1974) and Ember (1984) argue such a situation gives rise to a type of natural selection mechanism in which polygyny is preferred. Healthy males are able to have more wives and, thus, more children to ensure the survival of the group. Having more children also provides a type of social security. Ember (1984) finds conflict, such as that existing between groups in Africa during the slave trades, also delays the marriage age of males, as they remain warriors for longer periods of time. These forces point in the direction of polygyny as a response to skewed sex ratios. It should also be noted the natural selection arguments in Ember (1974) and Ember (1984) suggest polyandry, when a wife has multiple husbands, might not be a response to skewed sex ratios in the opposite direction, i.e. when there are more men than women, because it is not possible for a woman to have children with multiple husbands simultaneously.

At this point, it is important to stress the particulars of our argument. We do not suggest the slave trades were the only determinant of polygyny in Africa. Rather we argue the slave trades created a demographic environment more conducive to the spread of polygyny, an argument made also by Thornton (1983). For those African ethnic groups not previously practicing polygyny, this might mean polygyny emerged as a marriage institution during the slave trades. If there were certain African ethnic groups already practicing polygyny, the slave trades would only have strengthened this practice. Given the slave trades would still have had an impact on the rate of polygyny in both polygynous and non-polygynous groups, it is less important for our main argument, the slave trades increased polygyny on the Western Coast, whether polygyny existed during the pre-slave trades era. There seems to be no way to know for certain the extent of polygyny in Africa before the slave trades due to the lack of quantitative evidence. Fage (1980), however, does present qualitative evidence from first hand accounts of European observers of Western Africa before 1700. The area under study in Fage (1980) consists of the whole Western Coast, from Senegal to Angola, later affected by the trans-Atlantic slave trades. The earliest piece of evidence in Fage (1980, p. 303) dates from Alvise da Cadamosta during the Portuguese voyages to the Senegambian coasts. Writing about the *Wolof* in 1454, Cadamosta observes:

> The King is permitted to have as many wives as he wishes, as also are all the chiefs and men of this country...He has certain villages and places, in some of which he keeps

> eight or ten [wives]. Each has a house of her own, with young servants to attend her and slaves to cultivate...the lands...All the other chiefs...live in this fashion.

Or, consider the observation about the *Bullom* and *Temne* of Sierra Leone made in about 1507 by the commentator Fernandes (Fage (1980, p. 304)):[7]

> The men have as many wives as possible...The more they have, the richer they are...The wives cultivate, sow, harvest and do everything.

Fage (1980) chronicles these observations and others suggesting polygyny did exist in some form on the Western Coast before the slave trades, but the evidence in Fage (1980) cannot tell us in any quantitative sense how widespread the practice was. Moreover, the observations are from European observers presumably writing for a European audience interested to hear about the different ways of life in Africa. The observations might not be representative of the wider African experience at the time. Nonetheless, given the question we explore in this paper, the evidence in Fage (1980) should be kept in mind.

Why the slave trades' effect on marriage arrangements persists to this day remains an important point to address. Nunn and Wantchekon (2011) faces a similar challenge in explaining the long-term impact of the slave trades on current trust levels. One explanation recognizes cultural change occurs slowly. Bisin and Verdier (2000) and Bisin and Verdier (2001) represent two examples of this view in the economics literature and provide a theoretical framework for understanding cultural transmission between parents and children. The frameworks in Bisin and Verdier (2000) and Bisin and Verdier (2001) model cultural transmission as a socialization process. Parents prefer children to adopt the same cultural traits they, the parents, possess. Parents have access to a socialization technology (spending time with their children in its various forms at the family-level) which they can use to pass on cultural traits. Society also influences children's traits indirectly. When coupled with a marriage market, people with minority traits search for marriage partners with similar minority traits in order to more efficiently pass their minority traits down to their children. As a result, the models in Bisin and Verdier (2000) and Bisin and Verdier (2001) not only provide theoretical motivation for why cultural change occurs slowly but also why minority traits, such as polygyny, might persist.

[7]The *Bullom* fall under the *Bulom* in Murdock (1959)'s classification.

The anthropology literature provides evidence suggesting cultural traits existing within polygynous households might be passed along to children. Strassmann (1997) reports an observation along these lines while conducting fieldwork in a village in Mali named Sangui. Sangui is inhabited by the *Dogon*. 46 percent of the married men in Sangui had two or more wives at the time of the fieldwork, but Strassmann (1997) reports most *Dogon* women will be in a polygynous marriage at some point in their lives. In order to prepare for such marriages, village girls learn to sing, "I'm not afraid of my husband's other wife." In describing the *Abouré* ethnic group of the Ivory Coast, Clignet (1970, p. 76) writes "...polygyny is a mark of prestige about which many males are sensitive."[8] Brown (1981) agrees on the role played by prestige. Maintaining a polygynous household allows a husband to signal his ability to pay multiple bride-prices, manage a large household, and provide for many children. Brown (1981) also notes women may consider polygyny prestigious as well, especially if they enter wealthy households or become the senior wife with authority over her co-wives. Once these cultural traits are established, polygyny can become self-sustaining. Again, describing the *Abouré*, Clignet (1970, p. 76) writes "...males are not entitled to resume sexual relations with a wife before the end of a three-year period following her last childbirth." This type of cultural trait provides an incentive for men to marry more women. Given the slave trades, and their resultant skewed sex ratios, occurred over such long periods of time, their effects on institutions, such as marriage, might not have dissipated even to this day.[9] Nunn (2012) provides a review of other empirical evidence supporting the idea that historical shocks can have a long-term impact on culture.[10]

Dorjahn (1959) provides evidence for another possible explanation for why the slave trades' effect on marriage might have persisted. Although sparse, Dorjahn (1959) reports data showing sex ratios remained skewed in parts of Africa into the early twentieth century, which means a demographic environment conducive to polygyny may have persisted after the shock of the slave trades. For example, Angola contained 111.5 females for every 100 males in the year 1940. The number of females per hundred males in Nigeria remained skewed but decreased over time, from

[8]The *Abouré* fall under the *Assini* in Murdock (1959)'s classification.

[9]The lengthy time period of the shock is important, because changes in cultural institutions like marriage require time to emerge. So, although historical shocks like the effect of World War II on sex ratios in the Soviet Union would serve as additional tests of our argument, we are unlikely to see any lasting effects on marriage institutions given the short duration of the shock.

[10]For example, empirical evidence exists suggesting European migration, plough agriculture, and missionaries have all had a lasting impact on culture and institutions.

117 in 1911 to 106 in 1921 to 110 in 1931. Sierra Leone contains the highest number of females per hundred males out of the regions covered in Dorjahn (1959), reaching as many as 141 in 1921. Of course, this evidence raises the question why skewed sex ratios persisted in Africa at all after the slave trades. Although purely speculative on our part, the *gun-slave cycle* may have played a role in that lasting distrust and feuds between groups pitted against one another in the capture and raiding economies of the slave trades caused these groups to remain in conflict with one another. Since males would be more likely to engage in the fighting and die, skewed sex ratios in Africa could persist.

The question remains whether a change to the sex ratio always leads to the emergence or strengthening of polygyny. There are examples throughout history suggesting the contrary, such as restrictions on when Roman soldiers could marry, the drain of men in the Tibetan marriage market after they became monks, and the flow of European slaves during the Middle Ages to the Middle East. If polygyny does not always emerge or strengthen, then it is important to understand why Africa is different. Africa is likely different because the shock in Africa was larger (more males being subtracted), longer (hundreds of years), and more destabilizing (dangerous and uncertain, giving rise to the natural selection forces mentioned above). Nunn (2008) calls the slave trades in Africa "unprecedented" compared to other episodes of slavery throughout history. What these observations do suggest is that the relation between the sex ratio and polygyny is complex. It could be the case the sex ratio needs to reach a certain threshold before polygyny takes hold or strengthens, and we observe this in the case of Africa.

2.2 Historical Probit Estimates

Our main empirical analysis, which we discuss in later sections, measures the effects of the trans-Atlantic and Indian Ocean slave trades on current polygyny. Although the data constrains us, we present here an analysis of available historical polygyny data as a way of providing quantitative evidence for our historical discussion. Murdock (1967) provides us with a source of anthropological data, including polygyny, on African ethnic groups around the time of the early twentieth century.[11] The polygyny variable takes the value of one if polygyny existed in

[11]Dorjahn (1954) also reports ethnicity-level data on polygyny for a limited number of years in the first half of the twentieth century. However, the data in Dorjahn (1954) is not comprehensive enough for use in our analysis,

the ethnic group. The variable for an ethnic group's exposure to the trans-Atlantic slave trades comes from Nunn and Wantchekon (2011). We describe the slave trades data in further detail in our main data description in Section 3.1. We also consider a number of ethnic group controls from data in Murdock (1967), including a measure of class stratification; the percentage of the economy dependent on fishing, hunting, and agriculture; and the marriage residence where a new couple relocates. Class stratification is a dummy variable with zero being no significant class distinctions among freemen and one being some form of class stratification. The unit of the economy variables is five percentage points. Marriage residence is a dummy variable with zero indicating the husband would move to live with the wife's family after marriage, and one indicating otherwise. We also consider the number of churches in an ethnic group's location normalized by land area. The church data, which indicate the number of foreign mission stations across ethnic groups in the early 20th century, come from Nunn (2010). Lastly, we measure the Euclidean distance in kilometers from the ethnic group's location to Mecca as a proxy for Islam.

Table 2 shows the estimates from a probit regressing historical polygyny on the trans-Atlantic slave trades and the other controls at the ethnicity-level.[12] Column 1 reports the results regressing historical polygyny on the trans-Atlantic slave trades. Column 2 includes the religious controls, and column 3 includes the remaining controls. The relationship between the trans-Atlantic slave trades and polygyny is positive and statistically significant in the first two specifications and only marginally insignificant in the third. In addition, the point estimates are robust across all three specifications. The percentage of the economy dependent on agriculture and the marriage residence variables are also statistically significant. Some of the controls could be endogenous to the trans-Atlantic slave trades. It is not clear which specification is preferred, because we may be over-controlling.[13] The available quantitative evidence seems to support our historical discussion or, at least, does not reject our hypothesis. We now turn to a more comprehensive analysis of the relation between the slave trades and current polygyny.

so we choose to rely on the data in Murdock (1967) instead.

[12]We do not include the Indian Ocean slave trades variable from section 3.1, because all of the monogynous ethnic groups in Murdock (1967) have zero exports in the Indian Ocean slave trade.

[13]This point holds for the other regressions throughout the rest of the paper as well.

Table 2: Probit Estimates of the Impacts of Slave Trade on Historical Polygyny[a]

	(1)	(2)	(3)
Trans-Atlantic Slave Trade	159.885*	197.138*	155.417
	(91.862)	(110.997)	(102.569)
Churches		800.507	451.322
		(718.094)	(497.350)
Distance to Mecca		-0.113	-0.082
		(0.096)	(0.109)
Class Stratification			-0.428
			(0.274)
Fishing Economy			0.242
			(0.225)
Hunting Economy			0.020
			(0.183)
Agriculture Economy			0.105*
			(0.061)
Marriage Residence			0.331*
			(0.184)
Constant	1.467***	1.770***	0.718
	(0.113)	(0.357)	(0.622)
N	415	415	339
Pseudo R^2	0.0942	0.1177	0.1794

[a] Robust standard errors are reported in brackets. ***, **, and * indicate significance at the 1%, 5% and 10% levels.

3 Data

Because we are interested in examining the effects of the slave trades on the persistence of polygyny across different ethnic groups, we use two types of data for our analysis. The first report the total number of slaves exported at the ethnic group level. The second report the prevalence of polygyny at the ethnic group level.

3.1 Slave Export Data

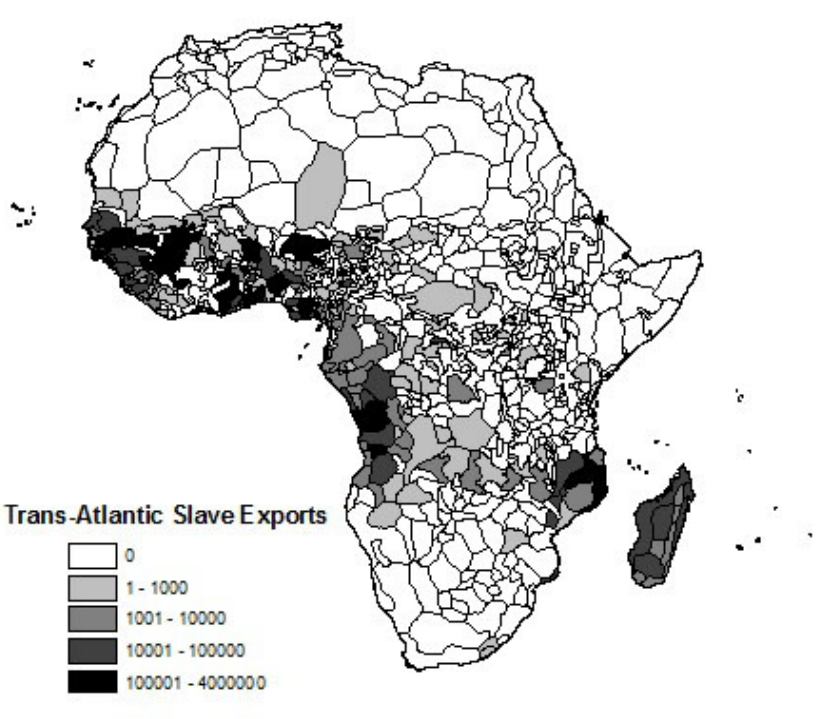
The ethnicity-level data on slave exports is from Nunn and Wantchekon (2011).[14] Out of the four slave trades, Nunn and Wantchekon (2011) compiles only the ethnicity-level slave exports data for the trans-Atlantic and Indian Ocean slave trades due to data limitations. The slave exports data cover four time periods (1400-1599, the 1600's, 1700's, and 1800's) for 841 ethnic groups. As Nunn (2008) shows, the impact of the slave trades as a whole is driven almost solely by the trans-Atlantic trade; omitting the Red Sea and trans-Saharan slave trades will likely not

[14]The data can be obtained at `http://www.economics.harvard.edu/faculty/nunn/data_nunn`.

change the results.

Figures 3 and 4 show the total number of slaves exported at the ethnic group level during the trans-Atlantic and Indian Ocean slave trades. The figures map the historic boundaries of ethnic groups according to Murdock (1959). Figure 3 shows the trans-Atlantic slave trade, which exported disproportionately more males, affected much of the African continent, but the Western Coast was the most affected region since it is closest to the New World. Figure 4 shows the Indian Ocean slave trade, which exported disproportionately more females, was confined primarily to the Eastern Coast.

Figure 3: Ethnicity-Level Slave Exports during Trans-Atlantic Slave Trade

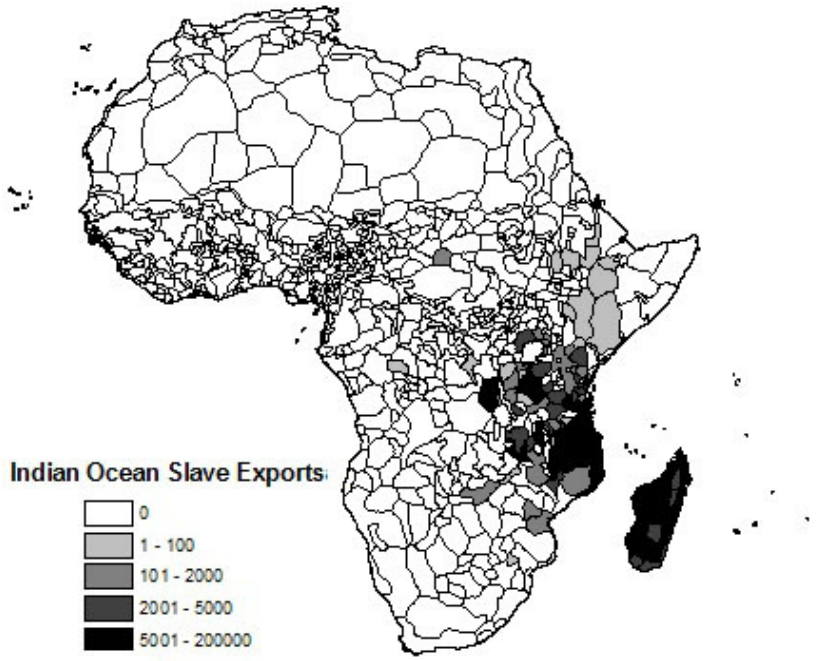


Data Source: Nunn and Wantchekon (2011)

3.2 Polygyny Data

We obtain our polygyny data from the standard female DHS conducted by the Measure DHS Project. Since 1984, Measure DHS Project has conducted more than 260 demographic and health surveys in over 90 developing countries. We restrict our data to 23 African countries

Figure 4: Ethnicity-Level Slave Exports during Indian Ocean Slave Trade



Data Source: Nunn and Wantchekon (2011)

from 45 surveys conducted between 1990 and 2010 that have polygyny information.[15] In the female surveys, respondents were asked to provide information on the number of co-wives they currently have (our measure of polygyny) and demographics, including age, education level, residence location, etc. We restrict our attention to those respondents reporting latitude and longitude coordinates of the survey cluster where the survey was conducted. Of the 434,350 respondents in our sample, we drop those females who are not married or who are under the age of 20, leaving us with 236,556 married respondents in our sample. We also use household-level surveys from DHS to extract household-level variables of interest not included in the female surveys, such as whether the household has a television or car. Table 3 reports summary statistics.

For our empirical analysis, we group the married female respondents into observations at the ethnic group level. We use the respondents' latitude and longitude coordinates to match

[15]We include all African countries that have polygyny data. The 23 countries are: Benin, Burkina Faso, Cameroon, Central African Republic, Ethiopia, Ghana, Guinea, Ivory Coast, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Namibia, Niger, Nigeria, Rwanda, Senegal, Togo, Uganda, Zambia, and Zimbabwe.

Table 3: Summary Statistics

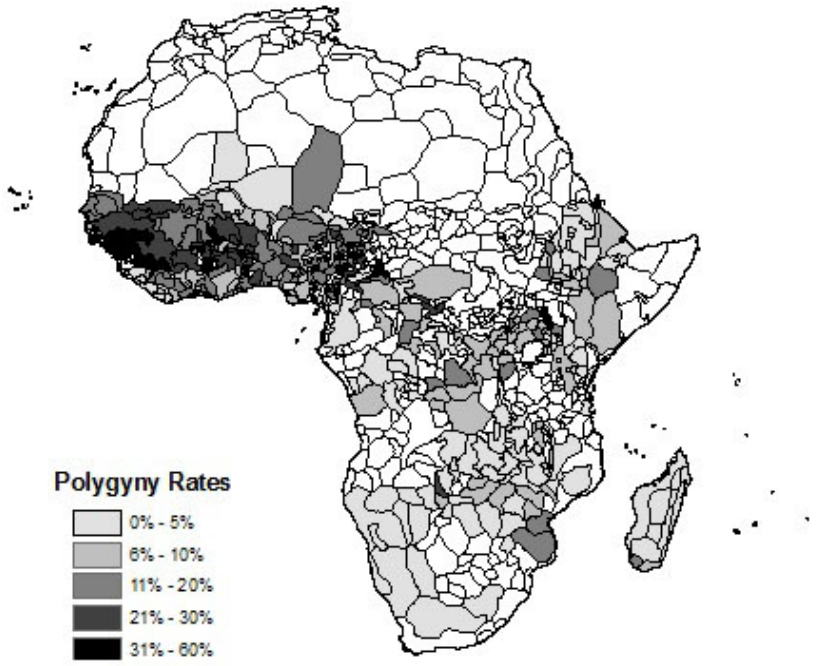
	Mean	Standard Dev.	N
% of Polygyny	9.94	29.92	238075
% with Electricity	26.37	44.07	298988
% with Radio	63.87	48.04	299146
% with TV	21.33	40.96	298994
% with Refrigerator	11.71	32.16	276853
% with Bicycle	29.85	45.76	298991
% with Motorcycle	10.81	31.05	298922
% with Car	5.82	23.41	298790
% of Women with College Edu.	2.96	16.96	341534
% of Islam	27.85	44.83	341534
% of Christian	17.38	37.89	341534
Average Age	31.49	8.25	341534
% of Urban Population	32.09	46.68	341534

Data Source: Demographic and Health Surveys (2011)

the respondents with the ethnic groups in the map in Nunn and Wantchekon (2011). These respondents represent 532 ethnic groups. We drop those ethnic groups with fewer than 40 married women, which leaves 399 ethnic groups in 23 countries in our sample. Approximately 25 percent of the ethnic groups' historical boundaries overlap with the countries' boundaries. On average, there are 18.4 ethnic groups in each country, while the median number is 15. Respondents report their ethnicity name in some countries. We prefer not to use the reported ethnicity name information, because it significantly drops the sample size. The number of ethnic groups decreases from 399 to 84 if we use the reported ethnicity name to merge with the Murdock (1959) classifications. Nevertheless, we use the sample constructed from merging based on reported ethnicity name and re-do the analysis in the appendix. Even though some of the results are not statistically significant, the trans-Atlantic slave trades still have a positive impact on polygyny in all specifications. Once we group respondents into ethnic groups, we construct ethnicity-level measures of each of the DHS variables, such as the percentage of the ethnic group in polygynous marriages, the average age in the ethnic group, the percentage of the ethnic group with televisions, etc.

Figure 5 shows the distribution of the percentage of married females in polygynous marriages by ethnic group. This figure establishes the stylized facts regarding polygyny being more prevalent on the Western Coast where most of the trans-Atlantic slave trade occurred. The percentage of married women in polygynous marriages in western African countries like Guinea,

Figure 5: Ethnicity-Level Polygyny



Data Source: Demographic and Health Surveys (2011)

Table 4: Persistence of Polygyny

Historical Marriage	Current Polygyny Rate	N
Monogyny	1.93	4088
Polygyny	9.93	170233

Data Source: Demographic and Health Surveys (2011) and Murdock (1967)

Togo, and Benin is 44, 21, and 25, respectively, while that in eastern African countries like Ethiopia, Kenya, and Malawi is 4, 3, and 3, respectively.

Table 4 shows the persistence of polygyny over time. The column titled "Historical Marriage" divides ethnic groups by monogyny and polygyny according to the historical polygyny data from Murdock (1967) used in our historical analysis in Section 2.2. The second column shows the current polygyny rate for historically monogynous ethnic groups is only approximately 2 percent, whereas the current polygyny rate for historically polygynous ethnic groups is around a much higher 10 percent.

4 Empirical Model and Results

4.1 OLS Estimates

In this section, we estimate the relationship between the number of slaves taken from an ethnic group during the trans-Atlantic and Indian Ocean slave trades and the percentage of married women with co-wives in an ethnic group.[16] The baseline estimating equation is:

$$\text{polygyny}_{e,c} = \alpha_c + \beta_1 \text{trans-Atlantic}_e + \beta_2 \text{Indian Ocean}_e + \mathbf{X}'_e\mathbf{\Psi} + \mathbf{X}'_c\mathbf{\Theta} + \epsilon_{e,c} \qquad (1)$$

where e indexes ethnic groups and c countries. The variable $\text{polygyny}_{e,c}$ denotes the percentage of married women with co-wives in ethnic group e. The country fixed effects, α_c, should capture country-specific factors that affect polygyny, such as the imposition and enforcement of monogamy laws and income inequality. The number of slaves taken from ethnic group e during the trans-Atlantic and Indian Ocean slave trades are measured by the variables trans-Atlantic_e and Indian Ocean_e.

As Nunn and Wantchekon (2011) notes, it would be ideal to use a measure of slave exports normalized by the pre-slave trade population of each ethnic group. These data do not exist, however. In this paper, we follow Nunn and Wantchekon (2011) by using the natural log of one plus slave exports normalized by land area as our measure of slave exports.

Several factors are also correlated with polygyny. First, older women are more likely to be in a polygynous marriage. Second, Islam allows up to four wives, while Christianity forbids polygyny. Third, laws prohibiting polygyny might be better enforced in urban, rather than rural, areas. Fourth, more educated women might be less willing to engage in polygyny. Fifth, more wealthy husbands are more likely to marry multiple wives. $\mathbf{X}'_e$ is a set of ethnicity-level controls that capture these factors. The controls include the ethnic group's average age, two religion controls (percentage of Muslims and Christians in the ethnic group), the percentage of the ethnic group living in an urban location, the percentage of married women in the ethnic group with college education, and a number of wealth proxies (percentage of the ethnic group with a

[16] Instead of using the percentage of married women with co-wives in an ethnic group, an alternative approach is to use the polygyny status of an individual and conduct the analysis at the individual-level. In the appendix, we show that our main results still hold at the individual-level in most of the specifications.

television, car, electricity, bicycle, motorcycle, and refrigerator). All ethnicity-level controls are constructed from the DHS, as described previously in Section 3.2.

In order to capture the effects of factors at the country-level, we also include a set of country-level controls by the vector $\mathbf{X}'_c$. These include four subsets of controls. The first set relates to women's status and includes controls obtained from the World Bank's World Development Indicators (WDI), including the sex ratio of the country's population aged between 15 to 60 and the ratio of female-to-male tertiary enrollment. The second set of controls consists of two political controls which capture the effect of political stability on polygyny. These include a measure of ethnic fractionalization (from Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)) and a state development index (from Gennaioli and Rainer (2006)). The third set of controls is colonial controls obtained from Nunn (2008), including a set of colonizer indicators and a dummy for French legal origin. These capture the colonizers' impact on the institution of polygyny. The fourth set of controls is economy controls which capture the impact of economic development on polygyny. These controls include the natural log of per capita GDP in 2000 (from Nunn (2008)) and the average Gini coefficients in the past 20 years (from the WDI). We also include these controls in our cross-country analysis in Section 5.

Table 5 reports the estimates of the OLS regression. Column 1 reports the results of the OLS regressing the percentage of married women with co-wives in an ethnic group on the slave trade variables. Column 2 includes religious controls. Column 3 includes both the religious controls and the education control. Column 4 adds the controls for urban population, age, and wealth. Column 5 adds some country-level controls. Column 6 then replaces the country-level controls with country fixed effects. All coefficients have the expected sign.

Religion plays an important role in polygyny. It is a tradition in Islam to allow men to have up to four wives, conditional on the approval of the senior wives. Our results also suggest Muslims tend to have more wives than people of other religions like Christians.

Older people tend to have more wives. In some ethnic groups, like the *Bété* described by Clignet (1970), men recruit wives through levirate, or the custom by which the wives of a deceased person are transmitted to his heir.[17] And, older people are more likely to be heirs than their younger counterparts.

[17]The *Bété* fall under the *Bete* in Murdock (1959)'s classification.

Table 5: OLS Estimates of the Impacts of Slave Trade on Polygyny[a]

	(1)	(2)	(3)	(4)	(5)	(6)
Trans-Atlantic Slave Trade	2.089**	1.431*	1.570**	1.037	0.305	0.390
	(0.871)	(0.844)	(0.794)	(0.685)	(0.659)	(0.545)
Indian Ocean Slave Trade	-4.919**	-6.242***	-6.677***	-4.945***	-4.185***	-0.443
	(1.205)	(1.134)	(1.216)	(1.055)	(0.882)	(1.423)
% of Islam		0.059***	0.047**	0.001	-0.004	0.029
		(0.020)	(0.020)	(0.018)	(0.019)	(0.022)
% of Christianity		-0.137**	-0.136***	-0.100***	-0.093***	-0.035
		(0.022)	(0.021)	(0.024)	(0.027)	(0.030)
% of Women with College Edu.			-.599***	-0.430***	-0.046	-0.318*
			(0.096)	(0.144)	(0.196)	(0.170)
% of Urban Population				0.058*	-0.021	-0.027
				(0.035)	(0.043)	(0.032)
Average Age				2.745***	2.849***	0.741
				(0.777)	(0.740)	(0.535)
Wealth Controls	No	No	No	Yes	Yes	Yes
Country Level Controls	No	No	No	No	Yes	No
Country Fixed Effects	No	No	No	No	No	Yes
Constant	11.652***	11.133***	14.960***	-78.299***	-130.642***	-10.607
	(0.628)	(1.219)	(1.312)	(24.789)	(31.319)	(17.650)
N	399	399	399	388	379	444
R^2	0.0204	0.1833	0.2232	0.4456	0.5335	0.6775

[a] Robust standard errors are reported in brackets. ***, **, and * indicate significance at the 1%, 5% and 10% levels.

Ethnic groups with a higher percentage of married women with college education tend to have less polygyny. These women might tend to be more independent and less tolerant of polygyny. Our results suggests an unclear relation between urban population and polygyny.

Although Becker (1974) shows polygyny is more common among wealthier men, our results when including the wealth controls are mixed. For example, a higher percentage of electricity is associated with lower polygyny, whereas a higher percentage of bicycles, motorcycles, and cars is associated with higher polygyny.

Slave exports during the trans-Atlantic slave trade are also positively correlated with the percentage of polygyny. The positive coefficient estimates in columns 1-3 of Table 5 are statistically significant. The positive coefficient estimate in column 4, when including wealth controls, is only marginally insignificant. The standard deviation of the trans-Atlantic slave trade variable is about 0.59. Thus, one standard deviation increase in the trans-Atlantic slave trade variable results in about a 0.9 percentage point increase in polygyny. After including the country-level controls and country fixed effects in columns 5 and 6, respectively, the coefficient estimate on

the trans-Atlantic slave trade variable is much smaller in magnitude and is no longer statistically significant.

The estimate on the Indian Ocean slave trade is negative, larger in magnitude than the estimate on the trans-Atlantic slave trade, and statistically significant across the specifications in columns 1-5. The standard deviation of the Indian Ocean slave trade variable is about 0.23, which means a one standard deviation increase results in about a 1.3 percentage point decrease in polygyny, a larger economic effect than the trans-Atlantic slave trade variable. Again, after including country fixed effects in column 6, the magnitude of the coefficient estimate decreases and is no longer statistically significant.

The results related to the trans-Atlantic and Indian Ocean slave trades provide some support for the qualitative and quantitative evidence on the impact of the slave trades on the Western and Eastern Coasts of Africa, as reported in Section 2.

4.2 IV Estimates

In the previous section, we demonstrated there is a positive correlation between trans-Atlantic slave exports and the level of polygyny. One might argue, however, that there are omitted variables biasing the estimates. The omitted variables can bias the estimates both up and down. On the one hand, there might be substantial income inequality within ethnic groups in the pre-slave trade period which led to a high level of polygyny, and many of the lower-class males who were single might be bought up as slaves to be exported to the New World. If men in these ethnic groups continue to marry multiple wives, this could generate a positive relationship between the slave trade and the level of polygyny and bias the estimates upward. On the other hand, certain ethnic groups might have a strong cultural preference for monogyny and be less capable of defending themselves against slave raids. This might be due to the higher cost married males face when joining a militia or other armed group. Since monogynous ethnic groups have fewer unmarried males, members of these ethnic groups would be more vulnerable to capture during slave raids and, thus, be more likely to be exported as slaves. If the strong cultural preference for monogyny continues to persist after the slave trades, this channel could bias the estimates downward. If monogynous ethnic groups tend to be from more developed and densely populated societies pre-slave trades, then this channel would be consistent with the

historical evidence provided in Nunn (2008).

In this section, we use an instrumental variable approach to address the problem of omitted variables. In this approach, we need to find an instrument that is correlated with slave exports but is uncorrelated with any characteristics of the ethnic group that affect the level of polygyny. Although we use different instruments, our approach is similar to Nunn (2008).[18] For the trans-Atlantic slave trades, the instrument measures the distance from the centroid of the ethnic group to the closest African port. For the Indian Ocean slave trades, the instrument measures the distance from the centroid of the ethnic group to Mecca. While we acknowledge Mecca is not the only destination in the Indian Ocean slave trades, it still represents one of the main destinations. The instruments capture the exposure of an ethnic group to the trans-Atlantic and Indian Ocean slave trades and, thus, are correlated with our slave exports variables. Also, as Nunn (2008) argues, there is no historical evidence showing the location of the slave supply influenced the location of slave demand. For example, it was because of the closer distance to plantations in the West Indies that slaves were taken from Western Africa. And, so, our instruments should be valid.

Table 6 reports our IV estimates. First-stage estimates are reported in the bottom two panels, and second-stage estimates are reported in the top panel. The first stage estimates show that historical distance from trans-Atlantic slave ports is negatively correlated with trans-Atlantic slave trades. The distance from Mecca is also negatively correlated with Indian Ocean slave trades, though the correlation is not as strong. Trans-Atlantic slave exports still have a positive and significant impact on the level of polygyny. In fact, the magnitude of the estimates are more than ten times higher than that of the OLS estimates, which is likely due to measurement error biasing the OLS estimates downward. Or, it could be possible the monogyny channel biasing the OLS estimates downward dominates the polygyny channel biasing the OLS estimates upward. A one standard deviation increase in the trans-Atlantic slave trade variable now increases polygyny by more than 10 percentage points when we do not control for country-level factors. The coefficient estimate on the Indian Ocean slave trade variable increases in magnitude as well,

[18]We need to construct our own instruments, because the instruments in Nunn (2008) are country-level and, thus, not applicable here. In Nunn and Wantchekon (2011), which is an ethnic group level analysis, different slave trades are treated as the same, and the distances between ethnic groups and the coast are used as instruments for slave trades. This again is not applicable in our analysis in which we treat trans-Atlantic slave trades and Indian Ocean slave trades differently.

Table 6: IV Estimates of the Impacts of Slave Trade on Polygyny[a]

	(1)	(2)	(3)	(4)	(5)	(6)
Second Stage, Dependent variable is Polygyny						
Trans-Atlantic Slave Trade	20.903***	23.949***	23.838***	21.041***	13.823***	4.903*
	(5.747)	(7.675)	(7.493)	(5.991)	(5.375)	(2.669)
Indian Ocean Slave Trade	-83.792	-69.236	-46.776	-23.037	-30.293	-40.000
	(58.770)	(49.318)	(34.163)	(19.788)	(25.476)	(46.571)
% of Islam		0.199***	0.162***	0.106**	0.082*	0.082
		(0.059)	(0.051)	(0.044)	(0.048)	(0.064)
% of Christianity		0.014	0.005	0.006	-0.066*	0.007
		(0.052)	(0.047)	(0.034)	(0.037)	(0.005)
% of Women with College Edu.			-.808***	-0.194	-0.286	-0.298
			(0.250)	(0.284)	(0.309)	(0.186)
% of Urban Population				-0.006	-0.014	-0.065
				(0.005)	(0.069)	(0.053)
Average Age				1.551*	1.669*	1.050
				(0.926)	(1.017)	(0.712)
Wealth Controls	No	No	No	Yes	Yes	Yes
Country Level Controls	No	No	No	No	Yes	No
Country Fixed Effects	No	No	No	No	No	Yes
Constant	10.578***	3.802	6.448**	-46.281	-99.341**	-27.721
	(1.164)	(3.072)	(2.667)	(29.153)	(39.644)	(25.027)
N	399	399	399	388	379	444
First Stage, Dependent variable is Trans-Atlantic Slave Trade						
Trans-Atlantic Distance	-0.043***	-0.037***	-0.038***	-0.038***	-.068***	-0.065***
	(0.009)	(0.008)	(0.009)	(0.011)	(0.014)	(0.014)
Indian Ocean Distance	-0.000	-0.000	-0.000	-0.000	0.003	-0.009
	(0.002)	(0.002)	(0.002)	(0.003)	(0.006)	(0.010)
F-stat	15.73	17.08	15.92	11.37	13.35	10.30
First Stage, Dependent variable is Indian Ocean Slave Trade						
Trans-Atlantic Distance	-0.010	-0.012	-0.014*	-0.016*	-0.018*	-0.003
	(0.006)	(0.007)	(0.008)	(0.009)	(0.009)	(0.002)
Indian Ocean Distance	-0.003	-0.003	-0.004*	-0.005*	-0.007*	-0.003**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.002)
F-stat	1.29	1.37	1.47	2.16	2.00	2.30

[a] Robust standard errors are reported in brackets. ***, **, and * indicate significance at the 1%, 5% and 10% levels.

still has a negative sign, but is not statistically significant. Given the F-statistics for the first stage regression of the Indian Ocean slave trades are not as high as that of the trans-Atlantic slave trades, we do not claim the Indian Ocean slave trades cause less polygyny. Islam remains an important factor contributing to polygyny. The magnitude of the Islam coefficient increases under the IV approach and is statistically significant without country fixed effects. The IV results related to Christianity differ from the OLS results. The coefficients are now positive and no longer statistically significant. Most of the other coefficients have similar estimates when compared to the OLS.

Just like the OLS estimates, the magnitude of the coefficient on the trans-Atlantic slave trades decreases significantly when including country-level controls and country fixed effects in columns 5 and 6, respectively. A one standard deviation increase in the trans-Atlantic slave trade increases polygyny by 8 and 3 percentage points when we include country-level controls and country fixed effects, respectively. This might suggest the effect of the trans-Atlantic slave trades on polygyny is transmitted through a country's institutions. One thing to note is that the decrease in magnitude is larger when country fixed effects are included compared to when country-level controls are included. This might suggest the country-level controls do not capture all the countries' institutions.

5 Additional Cross-Country Evidence

In this section, we perform an additional test of our idea by evaluating country-level data for evidence of the link between the slave trades and polygyny. This allows us to use all of the country-level slave trade data from Nunn (2008). The polygyny data described in Section 3.2 represents 23 African countries. In order to examine the largest number of countries possible, we use the country-level data on polygyny reported in Tertilt (2005).[19] Tertilt (2005) reports the percentage of married women in polygynous marriages by country. We match polygyny data from 37 countries with the slave trades data.[20]

[19]The data resides at `http://tertilt.vwl.uni-mannheim.de/`.

[20]The 37 countries are: Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Congo, Ivory Coast, Egypt, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe. We also performed

5.1 Cross-Country OLS Estimates

We estimate the relationship between the number of slaves exported from a country and the country's polygyny rate. The estimating equation is:

$$\text{polygyny}_c = \beta_0 + \beta_1 \text{trans-Atlantic}_c + \beta_2 \text{Indian Ocean}_c + \mathbf{X}_c' \mathbf{\Theta} + \epsilon_c \tag{2}$$

where c indexes countries. The variable polygyny_c denotes the percentage of married women in polygynous marriages in country c. The number of slaves exported from country c during the trans-Atlantic slave trade is measured by the variable trans-Atlantic_c. The variable Indian Ocean_c measures the number of slaves exported from country c during the Indian Ocean slave trades. Again, we normalize the slave exports by land area, as in Section 4. The vector $\mathbf{X}_c'$ includes a set of country-level controls. These country controls include the percentage of people practicing Islam; a dummy variable for whether the country's laws have French origin; dummy variables indicating the colonizer prior to the country's independence; the current sex ratio (male-to-female); the degree of ethnic fractionalization; an index of state development during the nineteenth century; a measure of women's status (the female-to-male ratio in tertiary education); and variables measuring the country's real GDP per capita and level of inequality.

Table 7 reports the estimates of the OLS regression for the percentage of married women in polygynous marriages. Column 1 reports the results regressing the percentage of married women in polygynous marriages on the trans-Atlantic and Indian Ocean slave trades variables. Column 2 includes the country-level controls capturing Islam, the current sex ratio, and women's status. Column 3 adds country-level controls for real GDP per capita and inequality. Column 4 controls for state development and ethnic fractionalization, and, lastly, column 5 controls for legal origin and includes colonizer fixed effects.

The relationship between the trans-Atlantic slave trades and polygyny is significant and positive and remains so across all specifications. The Indian Ocean slave trades variable shows a negative relationship with polygyny and is statistically significant across all specifications. An

the analysis in this section on a reduced sample of just sub-Saharan countries. Using the U.N.'s definition of sub-Saharan Africa, we drop Egypt, Morocco, and Sudan from the sample. The results from this reduced sample are similar to the results we report here. The only difference is the trans-Atlantic slave trade is no longer significant in the last specification with colonizer fixed effects.

increase in the trans-Atlantic slave trade by one standard deviation (5.915) is correlated with an increase in polygyny by 8 to 10 percentage points. An increase in the Indian Ocean slave trade by one standard deviation (4.308) is correlated with a decrease in polygyny by approximately 4.3 percentage points. Columns 3-6 also show real GDP per capita is negatively correlated with polygyny and is statistically significant. Except for the sex ratio and women's status in column 2, the other coefficients are not statistically significant. These OLS results corroborate the previous qualitative and quantitative findings in Sections 2 and 4.

Table 7: OLS Estimates on the Relationship Between Slave Trades and Polygyny at Country-Level[a]

	(1)	(2)	(3)	(4)	(5)
Trans-Atlantic Slave Trade	1.848***	1.527***	1.605***	1.399***	1.291*
	(0.325)	(0.321)	(0.329)	(0.404)	(0.648)
Indian Ocean Slave Trade	-1.041***	-0.898***	-1.161***	-1.035***	-0.952*
	(0.373)	(0.298)	(0.310)	(0.302)	(0.539)
% of Muslim		0.018	-0.001	0.014	-0.021
		(0.055)	(0.057)	(0.063)	(0.085)
Sex Ratio		-0.480*	-0.410	-0.510	0.447
		(0.282)	(0.288)	(0.311)	(0.379)
Female/Male Ratio in Tertiary Edu.		-0.201***	-0.151	-0.150	-0.197
		(0.053)	(0.092)	(0.100)	(0.164)
Gini			0.150	0.164	-0.063
			(0.182)	(0.217)	(0.325)
Ln(Real GDP per capita)			-6.735***	-6.341**	-7.644*
			(2.342)	(2.815)	(4.095)
State Development				-6.378	-6.445
				(7.720)	(10.465)
Ethnic Fractionalization				1.956	-7.683
				(12.681)	(18.291)
French Legal Origin					-3.202
					(10.794)
Colonizer Fixed Effects	No	No	No	No	Yes
Constant	13.433***	68.670**	100.775***	110.474***	151.698***
	(3.236)	(27.013)	(26.640)	(36.340)	(59.467)
N	37	35	34	33	33
R^2	0.5003	0.6570	0.7164	0.7159	0.7505

[a] Robust standard errors are reported in brackets. ***, **, and * indicate significance at the 1%, 5% and 10% levels.

5.2 Cross-Country IV Estimates

We use an instrumental variable approach to address the problem of omitted variables. We use two separate instruments for the trans-Atlantic and Indian Ocean slave trades, both of which are

Table 8: IV Estimates on the Relationship Between Slave Trades and Polygyny at Country-Level[a]

	(1)	(2)	(3)	(4)	(5)
Second Stage, Dependent variable is Polygyny					
Trans-Atlantic Slave Trade	1.754***	2.320***	1.741***	1.625***	1.626**
	(0.679)	(0.718)	(0.331)	(0.516)	(0.718)
Indian Ocean Slave Trade	-1.201*	-0.006	-0.940**	-0.642	-0.225
	(0.681)	(0.914)	(0.417)	(0.413)	(0.636)
% of Muslim		-0.087	0.017	0.031	0.010
		(0.097)	(0.054)	(0.053)	(0.060)
Sex Ratio		-0.547	-0.424*	-0.528**	-0.542*
		(0.358)	(0.260)	(0.267)	(0.309)
Female/Male Ratio in Tertiary Edu.		-0.146*	-0.152*	-0.155*	-0.217
		(0.087)	(0.080)	(0.087)	(0.146)
Gini			0.173	0.180	-0.054
			(0.157)	(0.186)	(0.191)
Ln(Real GDP per capita)			-6.232***	-5.547**	-5.331
			(2.164)	(2.416)	(3.428)
State Development				-9.576	-9.503
				(7.166)	(7.390)
Ethnic Fractionalization				-4.936	-14.538
				(13.666)	(15.594)
French Legal Origin					-0.743
					(7.474)
Colonizer Fixed Effects	No	No	No	No	Yes
Constant	14.760**	61.076*	95.157***	108.854***	140.333***
	(7.556)	(36.198)	(26.512)	(30.252)	(46.980)
N	37	35	34	33	33
First Stage, Dependent variable is Trans-Atlantic Slave Trade					
Trans-Atlantic Distance	-1.10185***	-1.03845**	-2.13057***	-2.06710***	-2.48577***
	(0.37663)	(0.44923)	(0.56000)	(0.53638)	(0.53603)
Indian Ocean Distance	-0.21218	-0.20446	-1.19862**	-1.54100***	-1.57402**
	(0.42731)	(0.50465)	(0.53833)	(0.50120)	(0.55570)
F-stat	13.30	7.64	10.96	7.43	12.01
First Stage, Dependent variable is Indian Ocean Slave Trade					
Trans-Atlantic Distance	-0.14859	-0.15364	-0.73013	-0.50077	0.47643
	(0.28496)	(0.39254)	(0.50252)	(0.44366)	(0.61294)
Indian Ocean Distance	-1.02107***	-1.10022**	-1.61465***	-1.71030***	-1.08616*
	(0.29986)	(0.53689)	(0.50942)	(0.48607)	(0.56898)
F-stat	15.04	10.08	9.80	15.95	28.82

[a] Robust standard errors are reported in brackets. ***, **, and * indicate significance at the 1%, 5% and 10% levels.

taken from Nunn (2008). The first instrument measures the sailing distance between the point on the African coast closest to the centroid of the country and the closest major destination market of the trans-Atlantic slave trade. The destination markets include Virginia, USA; Havana, Cuba; Haiti; Kingston, Jamaica; Dominica; Martinique; Guyana; Salvador, Brazil; and Rio de Janeiro, Brazil. The second instrument measures the sailing distance between the point on the African coast closest to the centroid of the country and the closest major destination markets of the Indian Ocean slave trade, Mauritius and Muscat, Oman.

Table 8 reports our IV estimates. Again, the trans-Atlantic slave trade has a positive and significant effect on polygyny across all specifications. The standard deviation of the trans-Atlantic slave trade is 5.915. Thus, an increase in the trans-Atlantic slave trade by one standard deviation would increase polygyny by approximately 10 percentage points. The magnitude of the effects of trans-Atlantic slave trade is similar to those found in the ethnic group level analysis when country-level factors are not considered. The Indian Ocean slave trade always negatively affects polygyny, but the variable is not always statistically significant. When Indian Ocean slave trade increases by one standard deviation (4.308), the decrease in polygyny ranges from almost zero to approximately 5 percentage points. Real GDP per capita is negatively correlated with polygyny and is statistically significant except when including colonizer fixed effects and controlling for French legal origin in Column 5. Real GDP per capita has a strong effect on polygyny. When GDP per capita increases by one percent, polygyny in the country would decrease by five to six percent. As in the OLS results, the current sex ratio and women's status negatively affect polygyny. Current sex ratio and women's status are now statistically significant in most specifications. The slave trade results are consistent with the other findings in the paper.

6 Conclusion

The slave trades touched the lives of many Africans over the course of hundreds of years. It is unsurprising the impact of the slave trades can still be felt today. This paper shows those ethnic groups most severely affected by the trans-Atlantic slave trades tended to have more polygynous marriages in the early twentieth century. We find the trans-Atlantic slave trades increase the

current percentage of polygyny at the ethnic group level and country-level. Our results also suggest the effects of the trans-Atlantic slave trades on polygyny may be transmitted through institutions at the country-level. The Indian Ocean slave trades do not increase polygyny at the ethnic group level or country-level. These findings highlight the role played by historical shocks to long-term cultural and economic development.

Understanding the origins of polygyny is important, because previous research shows a link between polygyny and certain development outcomes, such as those related to women's status. Future research could explore the role played by the African slave trades, through their effects on polygyny, on gender inequality and fertility, for example.

Appendix

In this appendix, we provide additional results by using different samples to show our main results are robust. In Tables 9 and 10, we use one married woman, instead of ethnic groups, as our unit of analysis. The dependent variable is 0 (monogamy) or 100 (polygyny). In addition to the ethnic-level and country-level controls from the ethnicity-level analysis, we include a set of individual controls, including dummy variables for their religious status (Islam or Christian), education level (whether they have received college education or not), current location (urban or rural), and several wealth proxies (such as whether they own a car or not). We also control for their age and square of their age.

Trans-Atlantic slave trades have a positive impact on polygyny in all specifications. The magnitude of the coefficient drops when we control for country fixed effects, which is similar to the results in the ethnicity-level analysis presented in the main body of the paper. As a referee pointed out, the magnitude of the point estimate of the Indian Ocean slave trade in the individual-level analysis in Table 9 is different from that in the ethnicity-level analysis in Table 5. The difference can be due to the fact that different weights are given to the different ethnicities in the two specifications. We explore this possibility by redoing the individual-level analysis using weighted least squares, instead of an OLS, by giving equal weights to all ethnicities. The magnitude of the point estimate of the Indian Ocean slave trade becomes closer to that in Table 5.

In the ethnicity-level analysis in the main body of the paper, we match DHS respondents' geographic coordinates with the historical map of ethnic groups to obtain volumes of trans-Atlantic slave trades and Indian Ocean slave trades of ethnic groups. Another way to obtain the slave trades volumes is to use the respondents' self-reported ethnicity. We prefer to use geographic coordinates. Not all DHS surveys provide self-reported ethnicity information. Using geographic coordinates can give us far more observations (three times more in terms of individuals, and five times more in terms of ethnic groups).

Nevertheless, we provide results using the self-reported ethnicity in Tables 11 and 12 as robustness checks. In Table 11, we present results from the ethnicity-level analysis. The effects of the trans-Atlantic slave trades on polygyny are still positive in all specifications but only

Table 9: OLS Estimates of the Impacts of Slave Trade on Polygyny (Individual-Level)[a]

	(1)	(2)	(3)	(4)	(5)	(6)
Trans-Atlantic Slave Trade	1.660	1.129	1.403	0.983	0.079	-0.417
	(1.179)	(1.112)	(1.052)	(0.847)	(0.777)	(0.474)
Indian Ocean Slave Trade	-11.644**	-11.380***	-12.363***	-18.765***	-10.459***	-1.345
	(3.712)	(2.059)	(2.176)	(4.499)	(2.529)	(1.660)
Islam		2.108	1.962	1.617	2.041	3.234***
		(1.407)	(1.396)	(1.547)	(1.454)	(1.249)
% of Islam		0.060**	0.053*	-0.016	-0.012	0.012
		(0.028)	(0.029)	(0.031)	(0.027)	(0.021)
Christian		-1.637***	-1.617***	-2.112***	-1.657***	-1.323***
		(0.357)	(0.356)	(0.529)	(0.445)	(0.378)
% of Christianity		-0.100***	-0.085***	-0.158***	-0.082**	-0.014
		(0.026)	(0.025)	(0.042)	(0.030)	(0.027)
College Edu.			-5.588***	-3.477***	-3.194***	-3.129***
			(0.711)	(0.606)	(0.606)	(0.576)
% of Women with College Edu.			-0.412***	0.045	0.746**	-0.092
			(0.134)	(0.249)	(0.314)	(0.124)
Urban				-3.302***	-3.570***	-3.491***
				(0.799)	(0.832)	(0.814)
% of Urban Population				0.093*	-0.049	-0.030
				(0.055)	(0.054)	(0.034)
Age				1.353***	1.280***	1.250***
				(0.149)	(0.134)	(0.120)
Age^2				-0.010***	-0.008***	-0.008***
				(0.002)	(0.002)	(0.002)
Wealth Controls	No	No	No	Yes	Yes	Yes
Country Level Controls	No	No	No	No	Yes	No
Country Fixed Effects	No	No	No	No	No	Yes
Constant	9.750***	9.916***	11.267***	-26.510***	-61.484***	-11.394***
	(1.061)	(1.619)	(1.804)	(4.351)	(17.244)	(4.209)
N	229342	229342	229342	187320	181778	187320
R^2	0.0056	0.0299	0.0352	0.1087	0.1270	0.1570

[a] Standard errors are clustered at the ethnic group level and are reported in brackets. ***, **, and * indicate significance at the 1%, 5% and 10% levels.

statistically significant in two of the specifications. The Indian Ocean slave trades have a negative effect on polygyny in all but two specifications, but they are all statistically insignificant. Most of the other coefficients are statistically insignificant. Table 12 presents results using the individual as the unit of analysis, as in Table 10. The trans-Atlantic slave trades again have a positive impact on polygyny.

Table 10: IV Estimates of the Impacts of Slave Trade on Polygyny (Individual-Level)[a]

	(1)	(2)	(3)	(4)	(5)	(6)
Second Stage, Dependent variable is Polygyny (0 or 100)						
Trans-Atlantic Slave Trade	9.703**	12.296***	12.871***	28.066	16.378**	6.111*
	(4.068)	(4.724)	(4.457)	(24.401)	(6.837)	(3.799)
Indian Ocean Slave Trade	-139.077	-107.651	-65.977	-309.235	-165.656	-79.217
	(107.632)	(94.715)	(57.138)	(520.238)	(171.993)	(81.864)
Islam		1.539	1.575	1.615	2.341*	3.406***
		(1.435)	(1.412)	(1.376)	(1.349)	(1.295)
% of Islam		0.132	0.118*	0.264	0.224	0.136
		(0.084)	(0.067)	(0.272)	(0.143)	(0.096)
Christian		-1.359***	-1.439***	-1.227	-1.066	-1.532***
		(0.324)	(0.325)	(1.627)	(0.771)	(0.444)
% of Christianity		0.040	0.066	0.088	0.048	-0.0003
		(0.078)	(0.068)	(0.326)	(0.081)	(0.004)
College Edu.			-0.056***	-3.508***	-3.344***	-3.102***
			(0.007)	(0.706)	(0.867)	(0.581)
% of Women with College Edu.			-0.828**	1.744	1.577**	0.339
			(0.409)	(1.841)	(0.654)	(0.361)
Urban				-4.050***	-3.751***	-3.571***
				(1.052)	(0.867)	(0.822)
% of Urban Population				0.001	0.034	-0.061
				(0.244)	(0.142)	(0.063)
Age				1.210***	1.197***	1.253***
				(0.152)	(0.126)	(0.121)
Age^2				-0.007*	-0.008***	-0.008***
				(0.002)	(0.002)	(0.002)
Wealth Controls	No	No	No	Yes	Yes	Yes
Country Level Controls	No	No	No	No	Yes	No
Country Fixed Effects	No	No	No	No	No	Yes
Constant	10.935***	4.090	5.028	-43.572**	-206.533**	-30.355**
	(2.295)	(4.630)	(3.272)	(21.341)	(89.421)	(11.988)
N	229342	229342	229342	187320	181778	187320
First Stage, Dependent variable is Trans-Atlantic Slave Trade						
Trans-Atlantic Distance	-0.103***	-0.095***	-0.093***	-0.089**	-0.108***	-0.091***
	(0.031)	(0.027)	(0.028)	(0.032)	(0.026)	(0.020)
Indian Ocean Distance	-0.007	-0.007	-0.007	-0.007	0.009	-0.002
	(0.008)	(0.008)	(0.008)	(0.008)	(0.010)	(0.015)
F-stat	13.96	15.69	14.41	5.16	13.22	11.33
First Stage, Dependent variable is Indian Ocean Slave Trade						
Trans-Atlantic Distance	-0.009	-0.010	-0.014	-0.006	-0.007	-0.003
	(0.006)	(0.008)	(0.011)	(0.005)	(0.005)	(0.003)
Indian Ocean Distance	-0.003	-0.003	-0.004	-0.002	-0.001	-0.002
	(0.002)	(0.002)	(0.003)	(0.002)	(0.001)	(0.001)
F-stat	1.05	0.88	1.01	1.89	0.30	1.10

[a] Standard errors are clustered at the ethnic group level and are reported in brackets. ***, **, and * indicate significance at the 1%, 5% and 10% levels.

Table 11: IV Estimates of the Impacts of Slave Trade on Polygyny (Ethnic Group Level with Name Merge)[a]

	(1)	(2)	(3)	(4)	(5)	(6)
Second Stage, Dependent variable is Polygyny						
Trans-Atlantic Slave Trade	7.536*	16.133	2.461	3.347	15.053**	1.682
	(4.633)	(21.967)	(8.256)	(9.796)	(6.379)	(4.696)
Indian Ocean Slave Trade	-217.131	-252.037	-8.365	54.503	-44.627	14.006
	(190.859)	(273.338)	(62.179)	(139.369)	(84.373)	(29.629)
% of Islam		0.320	0.007	-0.084	0.148	0.034
		(0.416)	(0.114)	(0.238)	(0.113)	(0.072)
% of Christianity		0.044	-0.164	-0.096	-0.004	-0.006
		(0.335)	(0.121)	(0.085)	(0.109)	(0.096)
% of Women with College Edu.			-1.024**	-0.762	-0.019	-0.322
			(0.402)	(1.012)	(0.820)	(0.309)
% of Urban Population				-0.017	-0.072	-0.119
				(0.187)	(0.158)	(0.077)
Average Age				2.109	-0.672	2.144
				(2.065)	(2.749)	(1.051)
Wealth Controls	No	No	No	Yes	Yes	Yes
Country Level Controls	No	No	No	No	Yes	No
Country Fixed Effects	No	No	No	No	No	Yes
Constant	13.551***	2.446	20.131**	-39.716	-269.715**	82.154**
	(3.468)	(24.736)	(7.800)	(56.456)	(112.094)	(37.777)
N	84	84	84	84	93	101
First Stage, Dependent variable is Trans-Atlantic Slave Trade						
Trans-Atlantic Distance	-0.112***	-0.082**	-0.066**	-0.091**	-.089**	-0.102***
	(0.031)	(0.028)	(0.026)	(0.043)	(0.039)	(0.034)
Indian Ocean Distance	-0.007	-0.009	-0.003	-0.000	0.005	-0.021
	(0.008)	(0.007)	(0.008)	(0.014)	(0.020)	(0.022)
F-stat	10.72	6.25	5.71	6.16	5.04	4.47
First Stage, Dependent variable is Indian Ocean Slave Trade						
Trans-Atlantic Distance	-0.004	-0.007	-0.009	-0.008	-0.007	-0.013
	(0.004)	(0.007)	(0.009)	(0.007)	(0.006)	(0.009)
Indian Ocean Distance	-0.001	-0.001	-0.002	-0.001	-0.004*	-0.008*
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.004)
F-stat	1.25	0.82	0.87	0.98	1.74	1.81

[a] Robust standard errors are reported in brackets. ***, **, and * indicate significance at the 1%, 5% and 10% levels.

Table 12: IV Estimates of the Impacts of Slave Trade on Polygyny (Individual-Level with Name Merge)[a]

	(1)	(2)	(3)	(4)	(5)	(6)
Second Stage, Dependent variable is Polygyny (0 or 100)						
Trans-Atlantic Slave Trade	3.621	5.535	7.700	6.836**	6.293***	1.342
	(4.699)	(7.029)	(4.898)	(3.165)	(2.274)	(1.893)
Indian Ocean Slave Trade	-169.918	-167.338	-80.634	-108.618	-99.342	0.463
	(152.949)	(147.434)	(75.582)	(83.152)	(78.078)	(16.717)
Islam		19.579*	9.142	7.919**	8.005**	7.372***
		(10.124)	(5.397)	(3.712)	(3.847)	(1.753)
% of Islam		0.117	0.012	0.016	0.031	0.008
		(0.105)	(0.085)	(0.060)	(0.060)	(0.026)
Christian		-1.056	-2.862*	-4.606***	-4.709***	-1.930**
		(2.874)	(1.596)	(1.561)	(0.473)	(0.754)
% of Christianity		0.061	0.061	0.093	0.129**	-0.0006
		(0.125)	(0.097)	(0.077)	(0.059)	(0.043)
College Edu.			-6.655***	-3.021***	-3.165***	-2.426**
			(1.389)	(1.086)	(1.112)	(1.036)
% of Women with College Edu.			-1.393***	0.509	0.507	0.053
			(0.501)	(0.476)	(0.388)	(0.152)
Urban				-4.969***	-5.070***	-5.237***
				(1.853)	(1.861)	(1.683)
% of Urban Population				0.149*	0.056	-0.015
				(0.079)	(0.073)	(0.053)
Age				1.404***	1.438***	1.357***
				(0.223)	(0.230)	(0.204)
Age^2				-0.008***	-0.009***	-0.008***
				(0.003)	(0.003)	(0.003)
Wealth Controls	No	No	No	Yes	Yes	Yes
Country Level Controls	No	No	No	No	Yes	No
Country Fixed Effects	No	No	No	No	No	Yes
Constant	15.711***	13.075	11.505*	-48.464**	-109.503**	-25.872***
	(4.490)	(9.957)	(6.136)	(9.954)	(56.068)	(9.286)
N	84916	84916	84916	78285	76373	78285
First Stage, Dependent variable is Trans-Atlantic Slave Trade						
Trans-Atlantic Distance	-0.199***	-0.186***	-0.150**	-0.181***	-0.158***	-0.157***
	(0.063)	(0.060)	(0.067)	(0.062)	(0.048)	(0.046)
Indian Ocean Distance	-0.021	-0.022	-0.012	-0.012	0.013	-0.025
	(0.015)	(0.014)	(0.015)	(0.012)	(0.013)	(0.020)
F-stat	8.01	7.29	6.76	8.56	18.03	7.17
First Stage, Dependent variable is Indian Ocean Slave Trade						
Trans-Atlantic Distance	-0.008	-0.008	-0.013	-0.009	-0.013	-0.010
	(0.009)	(0.011)	(0.014)	(0.009)	(0.011)	(0.011)
Indian Ocean Distance	-0.003	-0.003	-0.004	-0.004	-0.006	-0.009*
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.005)
F-stat	0.87	0.99	1.07	1.47	1.53	2.13

[a] Robust standard errors are reported in brackets. ***, **, and * indicate significance at the 1%, 5% and 10% levels.

References

Alesina, A., A. Devleeschauwer, W. Easterly, S. Kurlat, and R. Wacziarg (2003): "Fractionalization," *Journal of Economic Growth*, 8(3), 155–194.

Becker, G. S. (1974): "A Theory of Marriage: Part II," *Journal of Political Economy*, 82(2), S11–S26.

Beckford, W. (1788): *Remarks Upon the Situation of Negroes in Jamaica: Impartially Made form a Local Experience of Nearly Thirteen Years in that Island*. London.

Bisin, A., and T. Verdier (2000): ""Beyond the Melting Pot": Cultural Transmission, Marriage, and the Evolution of Ethnic and Religious Traits," *Quarterly Journal of Economics*, 115(3), 955–988.

——— (2001): "The Economics of Cultural Transmission and the Dynamics of Preferences," *Journal of Economic Theory*, 97(2), 298–319.

Brown, J. E. (1981): "Polygyny and Family Planning in sub-Saharan Africa," *Studies in Family Planning*, 12(8/9), 322–326.

Clignet, R. (1970): *Many Wives, Many Powers: Authority and Power in Polygynous Families*. Evanston, IL: Northwestern University Press.

Darity, Jr., W. (1992): "A Model of "Original Sin": Rise of the West and Lag of the Rest," *American Economic Review*, 82(2), 162–167.

Demographic and Health Surveys (2011): www.measuredhs.com, accessed April 2011.

Dorjahn, V. R. (1954): "The Demographic Aspects of African Polygyny," Ph.D. thesis, Northwestern University, Evanston, IL.

——— (1959): "The Factor of Polygyny in African Demography," in W. R. Bascom and M. J. Herskovits, editors, Continuity and Change in African Cultures, Chicago, IL: University of Chicago Press, 87-112.

Edwards, B. (1801): *The History, Civil and Commercial, of the British Colonies in the West Indies*. London.

Eltis, D., and S. L. Engerman (2000): "The Importance of Slavery and the Slave Trade to Industrializing Britain," *Journal of Economic History*, 60(1), 123–144.

Eltis, D., F. D. Lewis, and K. McIntyre (2010): "Accounting for the Traffic in Africans: Transport Costs on Slaving Voyages," *Journal of Economic History*, 70(4), 940–963.

Eltis, D., F. D. Lewis, and D. Richardson (2005): "Slave Prices, the African Slave Trade, and Productivity in the Caribbean, 1674-1807," *Economic History Review*, LVIII(4), 673–700.

Eltis, D., and D. Richardson (1995): "Productivity in the Transatlantic Slave Trade," *Explorations in Economic History*, 32, 465–484.

——— (2010): *Atlas of the Transatlantic Slave Trade*. New Haven, CT: Yale University Press.

Ember, M. (1974): "Warfare, Sex Ratio, and Polygyny," *Ethnology*, 13(2), 197–206.

——— (1984): "Alternative Predictors of Polygyny," *Behavior Science Research*, 19(1), 1–23.

Fage, J. (1980): "Slaves and Society in Western Africa, c. 1445-c. 1700," *Journal of African History*, 21(3), 289–310.

Fenske, J. (2012): "African Polygamy: Past and Present," working paper.

Gennaioli, N., and I. Rainer (2006): "The Modern Impact of Precolonial Centralization in Africa," working paper.

Gould, E. D., O. Moav, and A. Simhon (2008): "The Mystery of Monogamy," *American Economic Review*, 98(1), 333–357.

Grossbard, A. (1978): "Towards a Marriage between Economics and Anthropology and a General Theory of Marriage," *American Economic Review*, 68(2), 33–37.

Harris, J. E. (1971): *The African Presence in Asia: Consequences of the East African Slave Trade*. Evanston, IL: Northwestern University Press.

Hogerzeil, S. J., and D. Richardson (2007): "Slave Purchasing Strategies and Shipboard Mortality: Day-to-Day Evidence from the Dutch African Trade, 1751-1797," *Journal of Economic History*, 67(1), 160–190.

Jacoby, H. G. (1995): "The Economics of Polygyny in Sub-Saharan Africa: Female Productivity and the Demand for Wives in Cote d'Ivoire," *Journal of Political Economy*, 103(5), 938–971.

Klein, H. S. (1983): "African Women in the Atlantic Slave Trade," in C. C. Robertson and M. A. Klein, editors, Women and Slavery in Africa, Madison, WI: University of Wisconsin Press, 29-38.

Lewis, B. (1990): *Race and Slavery in the Middle East: An Historical Enquiry*. Oxford, UK: Oxford University Press.

Lovejoy, P. E. (1983): *Transformations in Slavery: A History of Slavery in Africa*. Cambridge, UK: Cambridge University Press.

Manning, P. (1990): *Slavery and African Life: Occidental, Oriental, and African Slave Trades*. Cambridge, UK: Cambridge University Press.

Murdock, G. P. (1959): *Africa: Its Peoples and Their Cultural History*. New York: McGraw-Hill Book Company.

——— (1967): *Ethnographic Atlas*. Pittsburgh: University of Pittsburgh Press.

Nunn, N. (2007): "Historical Legacies: A Model Linking Africa's Past to its Current Underdevelopment," *Journal of Development Economics*, 83(1), 157–175.

——— (2008): "The Long-Term Effects of Africa's Slave Trades," *Quarterly Journal of Economics*, 128(1), 139–176.

——— (2010): "Religious Conversion in Colonial Africa," *American Economic Review*, 100(2), 147–152.

——— (2012): "Culture and the Historical Process," *Economic History of Developing Regions*, 27(S1), S108–S126.

Nunn, N., and L. Wantchekon (2011): "The Slave Trade and the Origins of Mistrust in Africa," *American Economic Review*, 101(7), 3221–3252.

Phillips, W. D. (1985): *Slavery From Roman Times to the Early Transatlantic Trade*. Minneapolis, MN: University of Minnesota Press.

Rodney, W. (1972): *How Europe Underdeveloped Africa*. London: Bogle-L'Ouverture Publications.

Schoellman, T., and M. Tertilt (2006): "Marriage Laws and Growth in Sub-Saharan Africa," *American Economic Review*, 96(2), 295–298.

Spencer, H. (1876): *Principles of Sociology, Vol. 1*. London: Appleton.

Strassmann, B. I. (1997): "Polygyny as a Risk Factor for Child Mortality among the Dogon," *Current Anthropology*, 38(4), 688–695.

Tertilt, M. (2005): "Polygyny, Fertility, and Savings," *Journal of Political Economy*, 113(6), 1341–1371.

——— (2006): "Polygyny, Women's Rights, and Development," *Journal of European Economic Association*, 4(2-3), 523–530.

Thornton, J. (1983): "Sexual Demography: The Impact of the Slave Trade on Family Structure," in C. C. Robertson and M. A. Klein, editors, Women and Slavery in Africa, Madison, WI: University of Wisconsin Press, 39-48.

White, D. R., and M. L. Burton (1988): "Causes of Polygyny: Ecology, Economy, Kinship, and Warfare," *American Anthropologist*, 90(4), 871–887.