

Gender and Missionary Influence in Colonial Africa

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February 2012

ABSTRACT: Using information on the locations of Catholic and Protestant missions during Africa's Colonial period, I test whether Protestant and Catholic missionaries differentially promoted the education of males and females. I find that while both Catholic and Protestant missions had a positive long-run impact on educational attainment, the impacts by gender were very different. Protestant missions had a large positive impact on the long-run education of females and a very small impact on the long-run education of males. In contrast, Catholic missions had no impact on the long-run education of females, but a large positive impact on the education of males. These findings are consistent with the greater importance placed on the education of women by Protestants relative to Catholics.

Key words: Religion; missions; Africa; education; democracy; civic participation.

JEL classification: N37, N47, Z12

^{*}Book chapter prepared for *Africa's Development in Historical Perspective*. I thank Robert Barro, Oeindrila Dube, Rachel McCleary, Murat Iyigun and Robert Woodberry for valuable comments, as well as Sayon Deb and Eva Ng for excellent research assistance. I also thank seminar participants at Harvard University, ERSAs Conference on Slavery, Colonial History and the New Economic History of Southern Africa, ASSA Annual Meetings, New Technologies and Interdisciplinary Research in Religion Conference, African Poverty over the Longue Durée Conference, Mellon Foundation Sawyer Seminar on Ethnicity in Africa Conference, and Before and Beyond Europe: Economics Change in Historical Perspective Conference.

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1. Introduction

Increasingly, evidence has emerged showing that the historical presence of European missionaries is an important factor affecting economic development across the globe today. The causal mechanism that has received the most attention, and for which there is the most empirical support, is education. The presence of Christian missionaries, particularly Protestant missionaries, has been shown to be strongly correlated with increased educational attainment and the effects appear to persist for many generations (Grier, 1997, Woodberry, 2004, 2009, Bai and Kung, 2011).¹ The education-promoting influence of Protestant missionaries is not surprising given the evidence that the rise of Protestantism within Europe had long-term education (and economic growth) promoting effects (Becker and Woessmann, 2009, 2008, 2010, Schaltegger and Torgler, 2009).

This study provides evidence for the long-term impact of colonial missionary activity within Africa. The analysis uses data on the location of Protestant and Catholic missions from a map titled “Ethnographic Survey of Africa: Showing the Tribes and Languages; also the Stations of Missionary Societies” published by William Roome (1924). This information, combined with data on the locations of ethnic groups from Murdock (1959), is used to calculate estimates of the exposure of African ethnic groups to missionary activity.

I then link this information to the 2005 Afrobarometer survey using reported information about the ethnicity of each respondent. With this, I am able to test whether survey respondents with ancestors living closer to missions during the colonial period are today more educated. I find a positive effect of both Protestant and Catholic missions on the educational attainment of descendants, although the effect of Protestant missions tends to be stronger and more robust than the effect of Catholic missions. When I examine the effects by gender, an interesting pattern emerges. While the impact of Protestant missions on education is strongest for females, the impact of Catholic missions is strongest for males. This is consistent with the Protestant belief that both men and women had to read the Bible to go to heaven. It also supports previous findings that the Protestant religion had a particularly important impact on female education (Becker and Woessmann, 2008). The finding is also consistent with the arguments of Woodberry and Shah (2004) and Woodberry (2009) who assert that because Protestant missionary activity was open to educating minorities and women, it had a particularly positive effect for these groups.

¹Also see Barro and McCleary (2003), as well as the review article by McCleary and Barro (2006).

2. Historical Background

A number of factors determined the locations chosen for mission stations. The three most important appear to have been access to a clean water supply, a high altitude with as temperate a climate as possible, and the ability to establish an external trade route with Europe to import needed supplies (Johnson, 1967). Access to water was crucial for the European missionaries, high altitude and temperate climate reduced the likelihood of disease, and access to supplies from Europe were necessary for the establishment and continued functioning of the mission stations.

Other factors like population density also mattered, but the general effect is ambiguous. Some missionaries and societies intentionally built missions in more remote locations, where the word of God would not have reached otherwise, while others recognized the benefits and efficiencies associated with dense populations, and targeted these groups.

Another potential determinant of the location of missionary activity is based on path dependence. The routes taken by the first missionary explorers determined which areas of Africa became relatively more well-known to Europe, and this may have affected the locations of subsequent missions.

In the analysis, I control for these determinants. If these factors had a direct long-term effect on the outcomes of interest, not properly accounting for this effect will result in biased estimates of the effects of missionary activity.

Historical accounts indicate that missionaries had significant impacts. William Brown (1864), writing about missionary efforts in Southern Africa in the mid 19th century, notes that “the success of the mission was, on the whole, highly pleasing. The congregations were considerable; numbers of the natives baptized, many of whom were also admitted as communicants. The influence of the mission extended far beyond the stations; it was felt in a great part of the surrounding country.” (p. 532)

A large part of this success arose from the provision of education, training, and health care, as incentives for conversion. With increased European influence, it became clear that a new era had arrived, and with education came power and influence. Robin Horton writes: “With the advent of the twentieth century. . . Europeans came to be seen as symbols of power, and Christianity itself came to be seen as part of a larger order, comprising Western education, colonial administration, commerce and industry, with which everyone had henceforth to reckon. These changes created a

much more favourable climate for conversion.” (Horton, 1971, p. 86).

William Brown (1864), the Secretary of the Scottish Missionary society, described the benefits to conversion experienced by the Bechuana of Southern Africa: “The people under the care of the missionaries made considerable advances in some of the more common and necessary arts of civilized life. Many of them built themselves convenient houses, some of them of stone, instead of their old smoky unhealthy huts. In place of the skins of animals which they used to throw over their bodies, the men adopted in part the European dress, while the women who had learned to sew made decent clothes for themselves and their daughters. Though they were previously not simply a pastoral people, but cultivated millet and other produce, yet now their husbandry was considerably extended. They obtained ploughs and other agricultural implements, and many of them occupied themselves in the culture of corn, which they sold to the Dutch farmers for cattle, clothing, soap, salt, and other useful articles.” (p. 534)

Education was so central to the conversion strategy of missionaries that education was almost exclusively provided by missions during the colonial period. In the 1940s, 97% of the student population in Ghana and Nigeria were from missionary schools. In South Africa during this period, there were 5,360 mission-sponsored schools and only 230 state-sponsored schools (Berman, 1974, p. 527).

3. Data and their Sources

The data used in the analysis are built around the third round (2005) of the Afrobarometer surveys. These nationally standardized questionnaires measure a host of characteristics among a random sample of either 1,200 or 2,400 individuals in each country. The questionnaire provides a variety of information, including individuals’ education, religion, age, gender and their views about female equality.

The 2005 Afrobarometer covers the following 17 sub-Saharan African countries: Benin, Botswana, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Namibia, Nigeria, Senegal, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe. It is clear that this is not a random sample. The countries tend to be concentrated in West Africa, Eastern Africa, and Southern Africa. All of West Central Africa is not included, as well as countries inland of the Red Sea. Therefore, it is important to keep in mind that all of the results in the paper apply only to

the 17 sub-Saharan African countries included in our sample. The relationships that I identify in the data may be very different within the African countries not included in our sample.

Information on the historical influence of Christianity within Africa is taken from a map created by Roome (1924). The map provides the exact location of all Protestant and Catholic missions in Africa in 1924. A foreign mission is defined as a location established by foreign missionaries with the intention to convert, educate, and/or assist in other ways the foreign indigenous populations. Therefore, churches developed by foreigners for their own populations are not included in the data, as are churches meant to serve the immigrant (e.g., white) populations living in Africa. The analysis only includes individuals belonging to ethnic groups indigenous to Africa.

The map produced by Roome was highly regarded by experts in the area, who confirmed the accuracy of the mission station locations.² The only criticisms of the map involved disagreements about the exact spellings of the tribes and of their locations on the maps. For my analysis here, I do not rely on the spellings or locations of ethnic groups from Roome's map.

Roome's map is shown in figure 1. Superimposed on the map are circles showing the location of each Protestant mission and triangles showing the locations of Catholic missions.

Although there is a clear clustering of Protestant and Catholic missions, there is also a fair amount of mixing. Many locations contain missions of both types, closely mixed together. This fact can be explained in part by the General Act of the Conference of Berlin, which guaranteed freedom of religion throughout Africa.³

I undertake two strategies to trace the impacts of missions on individuals today. The first is to use an individual's ethnic identity to construct a measure of historical exposure to missionaries. The second is to use an individual's current location to construct a measure of past missionary activity.

In the first strategy, I examine the reported ethnicities from the Afrobarometer survey and calculate the intensity of missionary activity in the 1920s within the area inhabited by the ethnic group at the time. Information on the location of ethnicities during the colonial period is taken

²See for example, E.W.S. (1925).

³Article 6 of Chapter I mandated that each of the European powers "shall, without distinction of creed or nation, protect and favour all religious, scientific, or charitable institutions, and undertakings created and organized for the above ends, or which aim at instructing the natives and bringing home to them the blessings of civilization. Christian missionaries, scientists, and explorers, with their followers, property, and collections, shall likewise be the objects of especial protection" (Keith, 1919, p. 304).



Figure 1: Map displaying the location of Catholic missions (red triangles) and Protestant missions (green circles) in Africa in 1924.

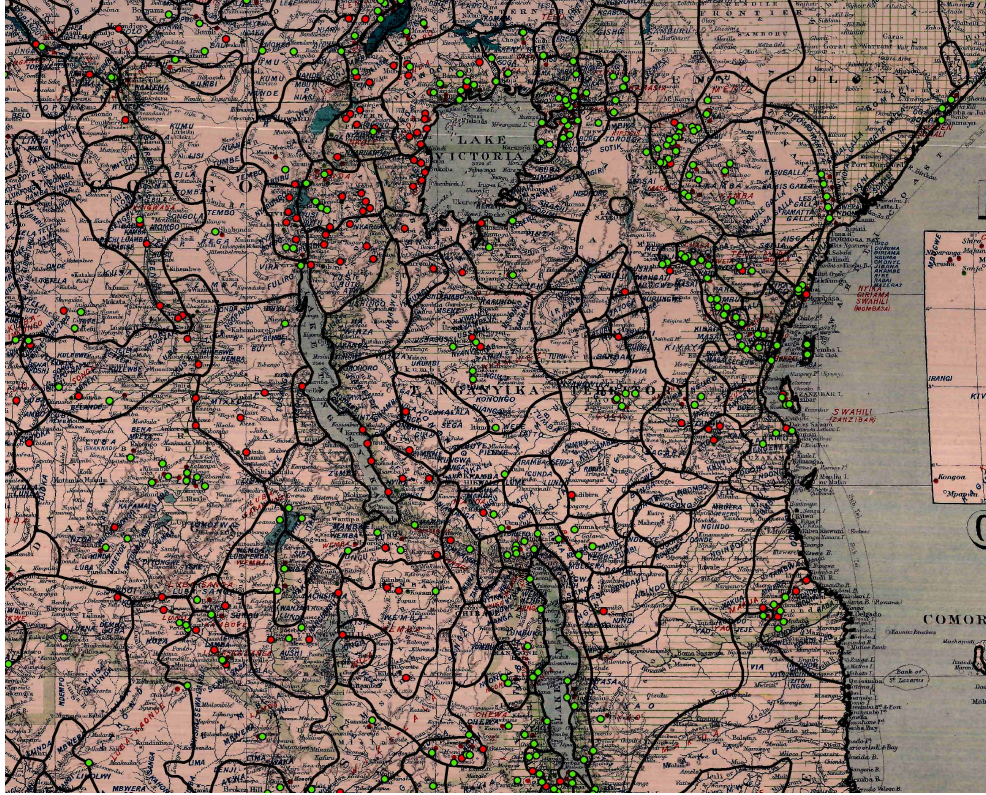


Figure 2: Constructing ethnicity-level missions measures.

from a map in Murdock (1959) showing the approximate borders of ethnic groups in early 19th century Africa. Superimposing the Murdock map over Roome's map, I construct a measure of the density of Catholic and Protestant missions in the area traditionally inhabited by each ethnic group.

This procedure is illustrated by figure 2. The figure shows the locations of Catholic and Protestant mission stations in Eastern Africa. It also shows, as black polygons, the boundaries of ethnic groups (in the 19th century) as mapped by Murdock (1959). For each ethnic group I calculate the number of missions (either total, Protestant, or Catholic) per 1,000 km of land area. This variable is my measure of the exposure a respondent's ethnic group had to religion in the early 20th century.

In the second strategy, I also construct a geography-based measure of the historical intensity of missionary activity. Unlike the first variable, which is measured at the ethnicity level, this variable is measured at the village level.⁴ The construction of the variable is illustrated in figure 3, which shows the location of Catholic and Protestant mission stations, as well as a number of

⁴For individuals living in larger cities, the variable is actually measured at the neighborhood level.

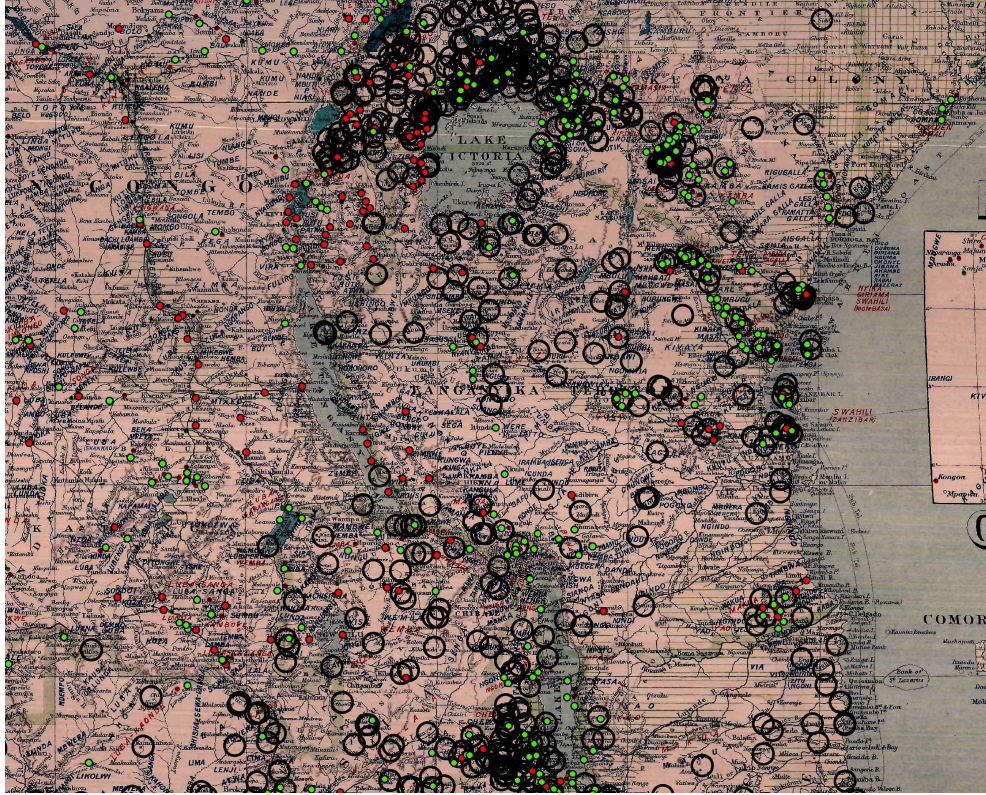


Figure 3: Constructing village-level missions measures.

circles, indicating 25km radii around the locations of each individual from the Afrobarometer surveys.⁵ The second measure calculates the number of missions (total, Catholic and Protestant) that lie within each circle. Therefore, the variable measures the number of missions that the village where the individual is currently living was exposed to in 1924.

In the analysis, I control for a number of variables. These include the existence of a colonial railway line, and of early explorer contact, both measured at the ethnicity and village levels. Data on the location of rail lines (as of 1897), and explorer routes (prior to 1895) are from a map created by The Century Company (1897). The original map is shown in figures 4 and 5. In figure 4, the expedition routes are superimposed over the map. Figure 5 illustrates the colonial railway lines.

The same procedure used for the missions is also used to construct analogous measures for the control variables. For each village and ethnic group, I construct an indicator variable that equals one if a railway contacted the town or group, and zero otherwise. I also construct ethnicity- and village-level indicator variables that equal one if a European explorer contacted the ethnic group or town.

⁵Twenty-five kilometers is chosen arbitrarily. The results are similar using larger radii, such as 50 or 100 kilometers.



Figure 4: Explorer routes.

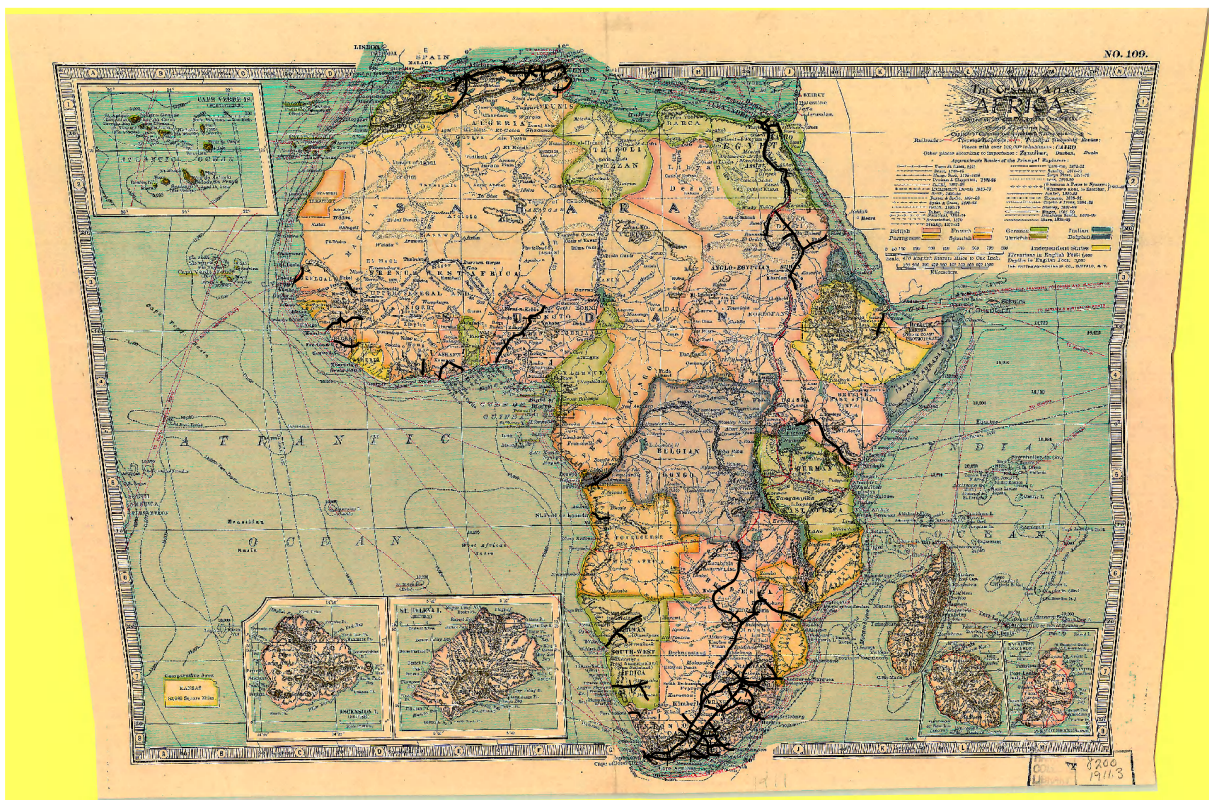


Figure 5: Colonial railway lines.

The railway variable is meant to capture ease of access that villages or ethnic groups had to supplies from Europe, an important factor affecting the choice of mission stations. The explorer variable captures the proximity of villages and ethnic groups to the routes of early missionaries and other explorers. This may have affected European knowledge about an area, which may have affected the likelihood of missions being developed there.

The set of controls also include three geographic measures: the suitability of climate and land for the cultivation of crops; the amount of land within 10 kilometers of a fresh water source; and average altitude. Again, the three controls are measured at both the ethnicity and village levels. Data on suitability for agriculture are from the FAO's GAEZ 2002 database. The FAO provides a suitability index for 5 arc minute by 5 arc minute (approx. 56 km by 56 km) grid cells globally. Data on the location of fresh water sources and elevation are from Global Mapping International's (GMI) Seamless Digit Chart of the World Version 3.2.

The final control variable included is a measure of the intensity of the slave trade, given that the goal of many missionaries, particularly Protestant missionaries, was to end slavery, missions may have been intentionally located in areas with a history of slavery (Johnson, 1967). The measures of the intensity of the Atlantic and Indian Ocean slave trade are taken from Nunn and Wantchekon (2011). The study provides both ethnicity- and village-level measures. The ethnicity-level variable measures the number of slaves taken from the ethnic group, normalized by the size of the ethnic group, which is measured by the amount of land they inhabited during the early 20th century. To construct a village-level measure, the authors use the location of each village as well as Murdock's map to determine which ethnic group traditionally inhabited the location of the village. The village is then given the slave export measure of the ethnic group, thereby providing an estimate of the intensity of the slave trade in that location historically.

4. Empirical Results: Missionaries and Education

I begin by examining the relationship between historical missionary activity and educational attainment today. I first examine the average effect of all Christian mission stations (both Protestant and Catholic) on educational attainment. The estimating equation is:

$$Y_{i,e,v,c} = \alpha_c + \beta M_e + \gamma M_v + \mathbf{X}_i \Gamma + \mathbf{X}_e \Lambda + \mathbf{X}_v \Phi + \varepsilon_{i,e,v,c} \quad (1)$$

where i indexes individuals, e ethnic groups, v villages, and c countries. The dependent variable measures individual i 's educational attainment (in years). The variable M_e measures the exposure of ethnic group e to Protestant and Catholic missions in 1924. It is measured as the log number of missions per 1,000 kilometers of land area historically inhabited by the ethnic group. I take the natural log to remove the skew that exists in the distribution otherwise. M_v is the analogous measure of missionary activity, but measured at the village level. It is measured by the number of missions (Catholic and Protestant) in the village of the respondent. More precisely, the measure is calculated by identifying the number of missions within a 25 kilometer radius of the geographic location of the respondent. α_c denotes country fixed effects, which are included in all regressions. These capture country-level characteristics, including colonial policies, that may be correlated with average education and missionary activity.

Equation (1) also includes a host of control variables that vary at either the individual, ethnicity, or village levels. \mathbf{X}_i denotes a vector of individual level control variables that include a gender indicator variable, age, and an indicator variable that equals one if he or she is living in an urban location. \mathbf{X}_e denotes a vector of ethnicity level control variables, including an indicator that equals one if the ethnic group was contacted by early European explorers, an indicator that equals one if a railway was built on the land inhabited by the ethnic group, the proportion of the ethnic group's historical land that is arable, the proportion that was within 10 kilometers of a fresh water source, and the normalized number of slaves exported in the Atlantic and Indian Ocean slave trades. \mathbf{X}_v includes the same covariates, but measured at the village level, rather than the ethnicity level.

OLS estimates of equation (1) are reported in table 1. Column (1) reports estimates with the ethnicity-level mission variable and ethnicity-level controls. Column (2) includes the village-level mission variable and village-level controls, while column (3) includes both the village-level and ethnicity-level variables together. All three specifications also include individual-level controls and country fixed effects. The estimates show a positive and statistically significant effect of missionary activity, measured either at the ethnicity or village level, on educational attainment.

This finding provides added support for the arguments and cross-country evidence of Woodberry (2004) that missionary activity (his analysis focuses on Protestants) had long-term impacts on the level of education.

These effects could occur through a variety of channels. First, missionaries may have altered people's views about the importance of education. If individuals transmitted their new attitudes

Table 1: OLS estimates of the relationship between colonial missionary activity and educational attainment today.

	Dependent variable: Years of education		
	(1)	(2)	(3)
Mission stations among ethnic group, M_e	0.102** (0.046)		0.098** (0.044)
Mission stations in village, M_v		0.143*** (0.033)	0.119*** (0.042)
Individual-level controls	Yes	Yes	Yes
Ethnicity-level controls	Yes	No	Yes
Village-level controls	No	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Number of observations	20,914	20,914	20,914
Number of clusters	185	2,693	185 / 2,693
R-squared	0.337	0.336	0.342

Notes: The table reports OLS estimates. The unit of observation is an individual. The individual control variables are for age, age squared, a gender indicator variable, and an indicator variable for whether the respondent lives in an urban location. The ethnicity level controls include the log number of slaves exported per land area during the Atlantic and Indian Ocean slave trades, an indicator variable equal to one if the ethnicity was contacted by a European explorer prior to colonial rule (1885), an indicator variable equal to one if a railway line dissected the region in which the ethnicity was living during colonial rule, the proportion of the ethnic group's land that is suitable for agriculture, the proportion of land that is within 10 kilometers of a fresh water source, and average elevation. The village level controls include an indicator variable equal to one if the inhabitant's current village was contacted by a European explorer prior to colonial rule (1885), an indicator variable equal to one if a railway line dissected the village, the log number of slaves exported per land area during the Atlantic and Indian Ocean slave trades among the ethnic group that historically inhabited the village, the fraction of the land within the village (25 kilometer radius of the centroid) that is suitable for cultivation, the fraction of the village land that is within 10 kilometers of a fresh water source, and the average elevation of the village. Coefficients are reported, with clustered standard errors in brackets. ***, **, and * indicates significance at the 1, 5, and 10% level.

and beliefs to their children, then the descendants of those in contact with Protestant missions would also value education more and therefore be better educated today. This explanation is consistent with the positive estimates for the ethnicity-level mission variable. The positive and significant coefficients in columns (1) and (3) show that ethnicities that had closer contact to missionaries have descendants that are more educated today.

An alternative mechanism is because missionaries valued education, they immediately established schools and universities. In fact, in British colonies, most of the schools in the colonies were established by missionaries rather than by the colonial administration (e.g., Berman, 1974, p. 527). These investments in educational infrastructure tend to persist over time (e.g., Huillery, 2009), so that today, towns and villages that historically had more missionary activity may today have more schools, and therefore the equilibrium level of education is higher. This channel, which operates through location and not ethnicity, is captured by the village-level mission variable, which is positive and significant in columns (2) and (3). Villages that had more missions during the colonial period have more educated inhabitants today.

Given that the two sets of mission variables – measured at the village and ethnicity levels – capture different transmission mechanisms, a natural question is which is more important. Because the variables are measured in different units, a direct comparison of their coefficients is inappropriate. Instead, I compare standardized beta coefficients, which are unit-less coefficients that report the number of standard deviation increases in the dependent variable per one-standard-deviation increase in the independent variable. This comparison suggests that the effect of the ethnicity-level measure is approximately three times the magnitude of the effect of the village-level measure. According to the estimates of column (3), the beta coefficient for the ethnicity-based measure is 0.047 and for the village-level measure is 0.036. Therefore, the evidence suggests that both channels are important and of a similar magnitude.

5. Empirical Results: Missionaries and Education, Distinguishing between Catholics and Protestants

Much of the pre-existing qualitative and quantitative literature distinguishes between the impact of Protestant and Catholic missions, documenting important differences between the two (Woodberry, 2004, Woodberry and Shah, 2004, Gallego and Woodberry, 2010). The most detailed evidence in the African context is from Gallego and Woodberry (2010), who provide evidence that

Protestant missions, relative to Catholic missions, had a greater impact on increased education. They also show that this is most pronounced in Catholic Nation-States where there was less competition from Protestant missions.

In this section, I examine whether there is evidence of differential impacts of Protestant and Catholic missions on religious conversion. I construct variables that measure the intensity of Catholic missions and of Protestant missions, at both the ethnicity and village levels. These are then included in the estimating equation, rather than the measures of missionary activity generally. Doing this allows the impact of missionary activity to differ depending on whether the mission was Catholic or Protestant. The new estimating equation is:

$$Y_{i,e,v,c} = \alpha_c + \beta_p M_e^{Prot} + \gamma_p M_v^{Prot} + \beta_c M_e^{Cath} + \gamma_c M_v^{Cath} + \mathbf{X}_i \Gamma + \mathbf{X}_e \Lambda + \mathbf{X}_v \Phi + \varepsilon_{i,e,v,c} \quad (2)$$

where i continues to index individuals, e ethnic groups, v villages, and c countries. The variables M_e^{Prot} and M_e^{Cath} are measures of the intensity of exposure of ethnic group e to Protestant and Catholic missions in 1924. They are measured in the same units as M_e above. Similarly, M_v^{Prot} and M_v^{Cath} measure the intensity of exposure of village v to Protestant and Catholic missionaries and are given in the same units as M_v . \mathbf{X}_e , \mathbf{X}_v , and \mathbf{X}_i are the same vectors of covariates as in equation (1).

Estimates of equation (2) are reported in table 2. Column (1) reports estimates with missionary activity measured at the ethnicity level, while column (2) measures missionary activity at the village level. The estimates show a positive and statistically significant impact of Protestant missions on educational attainment today. The estimates for Catholic missions are also positive, but smaller in magnitude and statistically insignificant. The results are consistent with Gallego and Woodberry's (2010) finding that Protestant missionaries had a larger positive impact on long-term education than Catholic missionaries. In column (3), I include both the village- and ethnicity-level variables together. All coefficients remain positive and approximately the same magnitude as in columns (1) and (2). The coefficients for Protestant missions remain statistically significant while the coefficients for Catholic missions remain insignificant.

In the previous section, we distinguished between location- and ethnicity-based channels of causality. In this section, we undertake an additional exercise to help distinguish between mechanisms. It is possible that the estimated long-term impact of missions arises because of changes in the perception of the value of education, which have been transmitted through time. Alternatively,

Table 2: OLS estimates of the relationship between colonial missionary activity and education today, allowing for differences between Catholic and Protestant missions.

	Dependent variable: Years of education								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<u>Ethnicity-based measure:</u>									
Catholic Missions	0.050 (0.034)		0.036 (0.031)				0.046 (0.032)		0.033 (0.029)
Protestant Missions	0.094* (0.049)		0.096** (0.045)				0.068* (0.040)		0.073* (0.037)
<u>Location-based measure:</u>									
Catholic Missions		0.106 (0.072)	0.124 (0.082)					0.131* (0.069)	0.141* (0.080)
Protestant Missions		0.163*** (0.049)	0.104** (0.048)					0.105** (0.046)	0.067 (0.046)
<u>Current Religion Indicator:</u>									
Catholic				1.852*** (0.162)	1.884*** (0.099)	1.810*** (0.159)	1.823*** (0.154)	1.859*** (0.098)	1.764*** (0.150)
Protestant				1.911*** (0.161)	1.962*** (0.100)	1.870*** (0.162)	1.876*** (0.149)	1.947*** (0.098)	1.828*** (0.147)
Other Christian				1.665*** (0.161)	1.681*** (0.102)	1.621*** (0.161)	1.652*** (0.151)	1.662*** (0.101)	1.597*** (0.149)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity-level controls	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Village-level controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Number of observations	20,914	20,914	20,914	20,836	20,836	20,836	20,836	20,836	20,836
Number of clusters	185	2,692	185/2,692	185	2,692	185/2,692	185	2,692	185/2,692
R-squared	0.337	0.336	0.343	0.355	0.356	0.359	0.356	0.357	0.361

Notes: The table reports OLS estimates. The unit of observation is an individual. The individual control variables are for age, age squared, a gender indicator variable, and an indicator variable for whether the respondent lives in an urban location. The ethnicity level controls include the log number of slaves exported per land area during the Atlantic and Indian Ocean slave trades, an indicator variable equal to one if the ethnicity was contacted by a European explorer prior to colonial rule (1885), an indicator variable equal to one if a railway line dissected the region in which the ethnicity was living during colonial rule, the proportion of the ethnic group's land that is suitable for agriculture, the proportion of land that is within 10 kilometers of a fresh water source, and average elevation. The village level controls include an indicator variable equal to one if the inhabitant's current village was contacted by a European explorer prior to colonial rule (1885), an indicator variable equal to one if a railway line dissected the village, the log number of slaves exported per land area during the Atlantic and Indian Ocean slave trades among the ethnic group that historically inhabited the village, the fraction of the land within the village (25 kilometer radius of the centroid) that is suitable for cultivation, the fraction of the village land that is within 10 kilometers of a fresh water source, and the average elevation of the village. Coefficients are reported, with clustered standard errors in brackets. ***, **, and * indicates significance at the 1, 5, and 10% level.

if, as documented by Nunn (2010), colonial missionary activity resulted in conversion, even in the long-run, then this may cause increased education. According to the second explanation, the persistence is through the transmission of religious values and not through the transmission of beliefs about the importance of education.

I attempt to distinguish between these two hypotheses in columns (4)–(9) of table 2. Columns (4)–(6) report estimates of the three specifications from columns (1)–(3), but with the missionary variables replaced with variables measuring the religion of the respondent. I include three indicator variables that equal one if the respondent is: (i) Catholic, (ii) Protestant, or (iii) another type of Christian. As shown, all three indicator variables are highly correlated with educational attainment. Those belonging to any of the three religions, on average, have 1.6–2.0 years more education.

In columns (7)–(8), I re-estimate the specifications from columns (1)–(3), but now include the three religion controls. If the importance of colonial missionary activities, estimated in columns (1)–(3), arises because of the current religious affiliation of the individual, then we would expect the estimated impact of historical missionary activity to be much smaller once we account for the current religion of respondents. Comparing the estimates in columns (1)–(3) to those in columns (7)–(8), I find that there is a small drop in point estimates of the Protestant mission variables after the inclusion of the religion controls. The decrease ranges from 24–35%. This suggests that a sizable part of the long-term impact of Protestant missions on education works through the long-term persistence of religious values. Interestingly, controlling for religion does not attenuate the estimated impacts of Catholic missions. The point estimates tend to stay constant or even increase after the inclusion of the religion controls. This suggests that the estimated impacts of Catholic missions on long-term education is not due to the persistence of a belief in Catholicism. This is consistent with the fact that the Catholic religion places much less importance on education and literacy than Protestantism.

6. Empirical Results: Missionaries, Education, and Gender

A number of existing studies examine how the Protestant religion may be responsible for reducing the gender gap in education, by emphasizing the importance of educating women. In Europe, Martin Luther urged the education of women so that they too would be able read the Bible. Becker and Woessmann (2008) empirically test for this effect of the Protestant religion. Examining

village-level data from the Prussian Census of 1816, they identify a negative relationship between the prevalence of the Protestant religion and the educational gender gap, measured as average male education minus average female education.

Motivated by Becker and Woessmann's finding, I examine whether, within the African context, the effect of colonial missions on current education is different for males relative to females. This is done by estimating a specification that allows the effect of missions on current education to differ depending on the gender of the respondent. In practice, this is done by interacting the baseline mission variables with an indicator variable that equals one if the respondent is female, I_i^{female} . The updated estimating equation is given by:

$$Y_{i,e,v,c} = \alpha_c + \beta_p M_e^{Prot} + \theta_p M_e^{Prot} \cdot I_i^{female} + \beta_c M_e^{Cath} + \theta_c M_e^{Cath} \cdot I_i^{female} + \mathbf{X}_i \Gamma + \mathbf{X}_e \Lambda + \mathbf{X}_v \Phi + \varepsilon_{i,e,v,c}$$

Estimates of equation (3) are reported in columns (1) and (2) of table 3. Column (1) reports estimates using the ethnicity-level Catholic and Protestant mission variables and column (2) reports estimates using the village-level variables. The findings show that for Protestant missions, the coefficient for the mission variable itself is positive, but not statistically different from zero, while the mission variable interacted with the female indicator variable is positive and highly significant. This suggests that historical missionary activity is associated with no long-term impact on the education of men, but a positive and statistically significant long-term impact on female education.

As reported in columns (3) and (4), the results are very similar even when controlling for the current religion of the respondent. This suggests that the long-term education effect primarily works through mechanisms other than the current religion of the respondent. Protestant missions may have created a persistent belief in the importance of female education.

For Catholic missions, the baseline mission variables in columns (1) and (2) are both positive and statistically significant while the coefficients for the mission variables interacted with the female indicator variable are negative and statistically significant. The sum of the two coefficients, which gives the total effect of Catholic missions on the long-run education attainment of females is very close to zero. Again, the results are similar when religion is controlled for (reported in columns (3) and (4)). These findings, which are in stark contrast to the findings for Protestants,

Table 3: OLS estimates of the relationship between missionaries and education, allowing for differential effects by gender.

	Dependent variable: Years of education			
	(1)	(2)	(3)	(4)
<u>Ethnicity-based measure:</u>				
Catholic missions	0.102** (0.042)		0.095** (0.040)	
Catholic missions x Female	-0.108* (0.057)		-0.102* (0.055)	
Protestant missions	0.016 (0.053)		-0.003 (0.046)	
Protestant missions x Female	0.158*** (0.052)		0.145*** (0.050)	
F-test for Catholic females = 0 (p-value)	0.902		0.885	
F-test for Protestant females = 0 (p-value)	0.003		0.004	
<u>Location-based measure:</u>				
Catholic missions		0.228*** (0.088)		0.248*** (0.086)
Catholic missions x Female		-0.244*** (0.087)		-0.234*** (0.086)
Protestant missions		0.086 (0.057)		0.022 (0.055)
Protestant missions x Female		0.154*** (0.050)		0.165*** (0.050)
F-test for Catholic females = 0 (p-value)		0.841		0.852
F-test for Protestant females = 0 (p-value)		0.000		0.000
Religion indicator variables	No	No	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes
Ethnicity-level controls	Yes	Yes	No	No
Village-level controls	No	No	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Number of observations	20,914	20,914	20,836	20,836
Number of clusters	185	185	2,692	2,692
R-squared	0.338	0.337	0.357	0.358

Notes: The table reports OLS estimates. The unit of observation is an individual. The individual control variables are for age, age squared, a gender indicator variable, and an indicator variable for whether the respondent lives in an urban location. The ethnicity level controls include the log number of slaves exported per land area during the Atlantic and Indian Ocean slave trades, an indicator variable equal to one if the ethnicity was contacted by a European explorer prior to colonial rule (1885), an indicator variable equal to one if a railway line dissected the region in which the ethnicity was living during colonial rule, the proportion of the ethnic group's land that is suitable for agriculture, the proportion of land that is within 10 kilometers of a fresh water source, and average elevation. The village level controls include an indicator variable equal to one if the inhabitant's current village was contacted by a European explorer prior to colonial rule (1885), an indicator variable equal to one if a railway line dissected the village, the log number of slaves exported per land area during the Atlantic and Indian Ocean slave trades among the ethnic group that historically inhabited the village, the fraction of the land within the village (25 kilometer radius of the centroid) that is suitable for cultivation, the fraction of the village land that is within 10 kilometers of a fresh water source, and average elevation of the village. Coefficients are reported, with clustered standard errors in brackets. ***, **, and * indicates significance at the 1, 5, and 10% level.

suggest that a history of Catholic missionary activity increased education in the long-run, but only for males.

The findings of table 3 raise an interesting possibility. It may be that the historical presence of Protestant missionaries also altered not only individual's beliefs about the importance of female education, but also of the role of women in society more generally. That is, the Protestant religion may have resulted in a stronger belief about the equality of men and women more generally.

To explore this possibility, I consider two questions about the perceived role of women relative to men from the Afrobarometer survey. The first question asks the respondent whether or not they agree with the following two statements: (A) In our country, women should have equal rights and receive the same treatment as men, (B) Women have always been subject to traditional laws and customs and should remain so. The respondent can choose to "agree very strongly" with (A), "agree strongly" with (A), agree strongly with (B), or "agree very strongly" (B). The second question asks the respondent their view on the following two statements: (A) Women should have the same chance of being elected to political office as men, (B) Men make better political leaders than women, and should be elected rather than women. Again, the respondents were given the same choices.

Using the responses, I code a variable that takes on the value 1, 2, 3, or 4, and is increasing in their agreement with statement (A) over statement (B). In other words, the variable is increasing in the respondent's belief that women and men should have equal rights.

I then estimate variants of equation (2) with the two gender beliefs variables as dependent variables. The estimates, which are reported in table 4, fail to provide consistent evidence that historical Protestant missionary activity promoted attitudes reflecting gender equality. For six of the eight Protestant variables, the coefficient is not statistically different from zero. As well, the coefficients for the Catholic mission variables are not consistently positive or negative and many or not statistically different from zero.⁶

Therefore, although the evidence is consistent with Protestant missionary activity affecting long-term female educational attainment, I do not find evidence of an effect on attitudes about gender equality. This finding is not surprising given the nature of missionary education. Although women were educated in reading, writing, and even arithmetic, the greatest emphasis was

⁶It is possible that only the attitudes of males or females were affected by missionary activity, and this is the reason for the weak results. However, I have checked for this by restricting the sample to include males only and continue to find similar results (not reported in the table).

Table 4: OLS estimates of the relationship between colonial missionary activity and gender role attitudes today.

	Dep var: Belief in female equality generally		Dep var: Belief in females as equal leaders		
	(1)	(2)	(3)	(4)	(5)
<u>Ethnicity-based measure:</u>					
Catholic Missions	-0.010 (0.009)		-0.009 (0.009)	0.014** (0.007)	0.015** (0.007)
Protestant Missions	0.005 (0.009)		0.004 (0.009)	-0.004 (0.008)	-0.006 (0.008)
<u>Location-based measure:</u>					
Catholic Missions		-0.025* (0.015)	-0.018 (0.017)		-0.032* (0.017)
Protestant Missions		0.024** (0.011)	0.016 (0.011)		0.014 (0.012)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Ethnicity-level controls	Yes	No	Yes	Yes	Yes
Village-level controls	No	Yes	Yes	No	Yes
Number of observations	19,533	19,533	19,533	20,603	20,603
Number of clusters	185	2,691	185/2,691	185	185/2,691
R-squared	0.108	0.103	0.109	0.106	0.107

Notes: The table reports OLS estimates. The unit of observation is an individual. The individual control variables are for age, age squared, a gender indicator variable, and an indicator variable for whether the respondent lives in an urban location. The ethnicity level controls include the log number of slaves exported per land area during the Atlantic and Indian Ocean slave trades, an indicator variable equal to one if the ethnicity was contacted by a European explorer prior to colonial rule (1885), an indicator variable equal to one if a railway line dissected the region in which the ethnicity was living during colonial rule, the proportion of the ethnic group's land that is suitable for agriculture, the proportion of land that is within 10 kilometers of a fresh water source, and average elevation. The village level controls include an indicator variable equal to one if the inhabitant's current village was contacted by a European explorer prior to colonial rule (1885), an indicator variable equal to one if a railway line dissected the village, the log number of slaves exported per land area during the Atlantic and Indian Ocean slave trades among the ethnic group that historically inhabited the village, the fraction of the land within the village (25 kilometer radius of the centroid) that is suitable for cultivation, the fraction of the village land that is within 10 kilometers of a fresh water source, and average elevation of the village. Coefficients are reported, with clustered standard errors in brackets. ***, **, and * indicates significance at the 1, 5, and 10% level.

typically placed on teaching women practical domestic skills, such as laundry, housework, and cooking, rather than providing them with the highest levels of education. Missionaries believed that African women should be taught how to prepare a suitable Christian home for their husbands who were to be more highly educated and serve in positions of responsibility and authority.⁷

7. Conclusions

Combining information on the locations of Catholic and Protestant missions in colonial Africa, I have examined the long-term impacts of Protestant and Catholic missionary activity during the colonial period on educational attainment. Using variation across villages and ethnicities from 17 sub-Saharan African countries, I have provided evidence that Protestant missionary activity had a positive long-term impact on educational attainment. Catholic missions are estimated to have a quantitatively much smaller impact on education that is not statistically different from zero. The finding of a much larger impact of Protestant missions relative to Catholic missions on education is consistent with the previous findings of Gallego and Woodberry (2010).

Interestingly, these findings, which are an average across the full Afrobarometer sample, mask stark differences of the impacts by gender. The positive impact of Protestant missions is concentrated almost solely among females. Protestant missions are estimated to have a small positive and insignificant effect on male education and a large significant positive effect on female education. The positive but insignificant impact of Catholic missions on education is composed of a large and significant positive impact on male education, but a precisely estimated zero effect on female education. These findings are consistent with the greater importance placed on the education of women by Protestants relative to Catholics.

⁷See Labode (1993) for a discussion of this aspect of missionary education within Southern Africa and Kanogo (1993) for a description for Kenya.

References

- Bai, Ying and James Kai-sing Kung**, "Diffusing Knowledge While Spreading God's Message: Protestantism and Economic Prosperity in China, 1840–1920," 2011. Mimeo, Hong Kong University of Science and Technology.
- Barro, Robert J. and Rachel McCleary**, "Religion and Economic Growth across Countries," *American Sociological Review*, October 2003, 68 (5), 760–781.
- Becker, Sascha O. and Ludger Woessmann**, "Luther and the Girls: Religious Denomination and the Female Education Gap in 19th Century Prussia," *Scandinavian Journal of Economics*, 2008, 110, 777–805.
- **and** —, "Was Weber Wrong? A Human Capital Theory of Protestant Economic History," *Quarterly Journal of Economics*, May 2009, 124 (2), 531–596.
- **and** —, "The Effect of Protestantism on Education before Industrialization: Evidence from 1816 Prussia," *Economics Letters*, 2010, p. forthcoming.
- Berman, Edward H.**, "African Responses to Christian Mission Education," *Africa Studies Review*, December 1974, 17 (3), 527–540.
- Brown, William**, *The History of Christian Missions, Volume II*, London: Thomas Baker, 1864.
- E.W.S.**, "Review of: An Ethnographic Map of Africa," *Journal of the Royal African Society*, April 1925, 24 (95), 263.
- Gallego, Francisco A. and Robert Woodberry**, "Christian Missionaries and Education in Former Colonies: How Competition Mattered," *Journal of African Economies*, 2010, 19 (3), 294–329.
- Grier, Robin**, "The Effect of Religion on Economic Development: A Cross-National Study of 63 Former Colonies," *Kyklos*, 1997, 50 (1), 47–62.
- Horton, Robin**, "African Conversion," *Africa: Journal of the International African Institute*, 1971, 41 (2), 85–108.
- Huillery, Elise**, "History Matters: The Long-Term Impact of Colonial Public Investments in French West Africa," *American Economic Journal: Applied Economics*, 2009, 1 (2), 176–215.
- Johnson, Hildegard Binder**, "The Location of Christian Missions in Africa," *Geographical Review*, 1967, 57 (2), 168–202.
- Kanogo, Tabitha**, "Mission Impact on Women in Colonial Kenya," in Fiona Bowie, Deborah Kirkwood, and Shirley Ardener, eds., *Women and Missions: Past and Present*, Oxford: Berg, 1993, pp. 165–186.
- Keith, Arthur Berriedale**, *The Belgian Congo and the Berlin Act*, Oxford: Clarendon Press, 1919.
- Labode, Modupe**, "From Heathen Kraal to Christian Home: Anglican Mission Education and African Christian Girls, 1850–1900," in Fiona Bowie, Deborah Kirkwood, and Shirley Ardener, eds., *Women and Missions: Past and Present*, Oxford: Berg, 1993, pp. 126–144.
- McCleary, Rachel and Robert J. Barro**, "Religion and Economy," *Journal of Economic Perspectives*, 2006, 20 (2), 49–72.
- Murdock, George Peter**, *Africa: Its Peoples and Their Cultural History*, New York: McGraw-Hill Book Company, 1959.

- Nunn, Nathan**, "The Long-Term Effects of Africa's Slave Trades," *Quarterly Journal of Economics*, 2008, 123 (1), 139–176.
- , "Religious Conversion in Colonial Africa," *American Economic Review Papers and Proceedings*, 2010, 100 (2), 147–152.
- **and Leonard Wantchekon**, "The Slave Trade and the Origins of Mistrust in Africa," *American Economic Review*, 2011, 101 (7), 3221–3252.
- Roome, William R.M.**, "Ethnographic Survey of Africa: Showing the Tribes and Languages; Also the Stations of Missionary Societies [map]," 1924. 1:5,977,382.
- Schaltegger, Christoph A. and Benno Torgler**, "Was Weber Wrong? A Human Capital Theory of Protestant Economic History: A Comment on Becker and Woessmann," 2009. Mimeo, Queensland University of Technology.
- The Century Company**, "The Century Atlas, Africa [map]," 1897.
- Woodberry, Robert D.**, "The Shadow of Empire: Christian Missions, Colonial Policy, and Democracy in PostColonial Societies," PhD Dissertation in Sociology, University of North Carolina at Chapel Hill 2004.
- , "Dividing Elites: Religious Liberty, Protestant Competition, and Democracy in the Global South," Working Paper 002, Project on Religion and Economic Change March 2009.
- **and Timoth S. Shah**, "The Pioneering Protestants," *Journal of Democracy*, 2004, 15 (2), 47–61.

Data Appendix

Contemporaneous Individual-Level Data

All information at the individual level, such as age, gender, education, religion, occupation, etc. are from the third round of the Afrobarometer surveys, which were conducted in 2005. The data are publicly available and can be downloaded at: www.afrobarometer.org. The Afrobarometer is an independent and non-partisan research project conducted by the Center for Democratic Development (CDD), Institute for Democracy in South Africa (IDASA), and Michigan State University (MSU).

Data on Missionary Activity

Data on the location of Catholic and Protestant mission stations in the 1920s are from Roome (1924). The mission location data are combined with information about the boundaries of Africa's ethnic groups in the late 19th century from Murdock (1959) to calculate the number of Catholic and Protestant mission stations in the area inhabited by each ethnic group. This is the ethnicity-based measure of missionary activity. The information is also combined with information about the location of each respondent in the Afrobarometer surveys to construct a measure of the number of Catholic and Protestant mission stations within a 25 kilometer radius of the location where the respondent is currently living. This is the village-based measure of missionary activity.

Ethnicity- and Village-Level Control Variables

The information of the exploration routes of early European explorers is from The Century Company (1897). The map includes the routes of 27 expeditions occurring before 1895. Information on the location of colonial rail-lines is also from the same map.

Data on the suitability of a location for agricultural cultivation are from the FAO's GAEZ 2002 database. The FAO provides a suitability index for 5 arc minute by 5 arc minute (approx. 56 km by 56 km) grid cells globally. Data on the location of fresh water sources and on elevation is from Global Mapping International's (GMI) Seamless Digit Chart of the World Version 3.2.

The data used to control for the number of slaves taken from each ethnicity during the trans-Atlantic and Indian Ocean slave trade are from Nunn and Wantchekon (2011), and the primary sources are described in Nunn (2008).