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Christian Missionaries and Education in Former African Colonies: How Competition Mattered

FRANCISCO A. GALLEGO ROBERT WOODBERRY

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Christian Missionaries and Education in Former African Colonies: How Competition Mattered*

Francisco A. Gallego
Pontificia Universidad Católica de Chile

Robert Woodberry
University of Texas at Austin

September 24, 2009

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*Authors's email addresses: fgallego@alum.mit.edu, bobwood@austin.utexas.edu. We would like to thank an anonymous referee, Daron Acemoglu, David Autor, Dora Costa, and seminar participants at the Harvard University, Catholic University of Chile, and Universidad Alberto Hurtado for useful comments and suggestions; Norman Loayza and Koichi Kume for providing us the African data sets used in this paper; Carlos Alvarado, Luis Beltrán, and Freddy Cea for able research assistance, and Pamela Siska for editing help. Gallego thanks the MIT World Economy Laboratory, the Millenium Nuclei Research in Social Sciences, Planning Ministry (MIDEPLAN), Republic of Chile, and Fondecyt (Grant # 11070181) for financial support. This work has been supported by funding from the Spiritual Capital Research Program, sponsored by the Metanexus Institute on Religion and Science, with the generous support of the John Templeton Foundation and by a Louisville Institute General Grant, Lilly Endowment. The usual disclaimer applies.

1 Introduction

Educational attainment varies widely across countries. Average years of schooling are two years higher in the former British colonies than in non-British colonies. Within Africa, the median region in a Catholic state (defined according to Barro and McCleary, 2005) currently has a literacy rate of about 33% and an educational level of about 1.3 years of schooling. In contrast, the median region in a non-Catholic state has significantly better educational outcomes: a literacy rate of about 48% and about 3.3 years of schooling. These differences in schooling levels predate the present. In 1900 non-Catholic countries in Africa had an average primary enrollment of 4.6%, whereas Catholic countries had an average primary enrollment rate of 0.9%.

This paper analyzes how national identity, religion, and institutions explain educational outcomes in the former colonies by studying the effect of Christian missionaries in the past on current education in former colonies in Africa. Christian missionaries were central agents in the development of the educational systems in former African colonies. In most former colonies, the first schools were founded by missionaries (as in British colonies) or were managed by priests as agents of the colonial power (as in most Belgian, Portuguese, and Spanish colonies). Interestingly, different colonial powers had very different regulations affecting missionaries. In colonies of the British, US, Australia and New Zealand there was a relatively neutral policy allowing both Catholic and Protestant missionaries to operate under similar conditions, but in Spanish, Belgian, Italian and Portuguese colonies there were implicit or explicit policies favoring the Catholic Church.[1] The policies ranged from directly granting an educational monopoly to Catholic groups (including harsh barriers of entry to non-Catholic groups) on the one hand, to providing subsidies only to Catholic schools on the other (See Woodberry, 2002, 2004 and Gill, 1998 for detailed descriptions).

Economic theory predicts that these differences in the institutional environment should affect missionaries' education productivity. Missionaries want to maximize the number of converts. One way to encourage people to expose themselves (or their children) to missionary messages is to provide a valued service such as education. If parents choose schools considering differences in school quality, and production of school quality is costly for missionaries, un-protected missionaries should be more productive in areas in which they have to compete against protected groups. The latter result is due to the fact that they had to overcome their institutional handicap in the competition for

[1]The French originally favored Catholics and restricted Protestants. However, in the early 20th century the French imposed severe restrictions on both Protestants and Catholics.

converts. We argue and present evidence using regional data for 180 African provinces that this is the case for Protestant missionaries in Catholic areas.

This paper uses data on educational outcomes combined with detailed information on the number of Protestant and Catholic missionaries in the early 20^{th} century to examine their overall impact on current educational outcomes and whether this impact varies in Catholic and non-Catholic areas. Woodberry (2002, 2004) documents that Protestant missionaries were much more active in schooling than Catholic missionaries when country regulations benefited the Catholic Church. Anecdotal evidence (Bassey, 1999; Kalinga, 1985; Fairweather-Tall, 2002; Kitaev, 1999; and, Woodberry and Shah, 2004) suggests that both Catholic and Protestant missionaries competed for followers by expanding and improving their educational institutions in former British colonies, where both groups received the same treatment. This paper examines missionary activity in both Catholic and non-Catholic areas in Africa.

Studies of the relative importance of national identity, religion, and institutions have a long tradition in Economics. Weber (1958) argued that Protestant beliefs (particularly Calvinist beliefs) were related to the onset of capitalism and the subsequent development of areas with great Protestant influence. Recently, Becker and Woessmann (2008) present evidence from the late 19^{th} century Prussia suggesting it was the higher literacy related to Protestantism that explains differences in development and not differences in beliefs. Nunn (2009b) also shows some evidence that the presence of Protestant missionaries is more correlated with a number of educational and social outcomes than the presence of Catholic missionaries in the past. Interestingly, we find very similar results to Becker and Woessman (2008) and Nunn (2009b) when we do not control for the interaction between Christian missionaries and being a Catholic state. Therefore, our evidence suggests that the bigger average effects for Protestant missionaries seem to be especially related to bigger effects of this type of missionaries in Catholic states, as suggested by our theoretical rationale.

By emphasizing the importance of competition, our results are also related to the literature that emphasizes the effects of competition and institutions on long-term development. (e.g., Acemoglu et al.,2001, 2002; Glaeser et al., 2004; Landes, 1998; La Porta et al., 1998, 1999; North, 1990; North et al., 2000.)[2] In addition, this paper draws on the insights of three other literatures. One line of research studies the effect of historic

[2]However, it is worth noting that, when discussing educational differences, Landes (1998) stresses an argument closely related to Becker and Woessmann (2008) by stating that Protestants were more interested in instruction and literacy than Catholics because "good Protestants were expected to read the holy scriptures by themselves. (By way of contrast, Catholics were cathechized but did not have to read, and they were explicitly discouraged from reading the Bible)". (Landes, 1998, pp. 178.)

factors on the development of institutions and cross-country differences in educational outcomes (e.g., Engerman et al., 1997, Gallego, 2009; Lindert, 1999), concluding that institutions established in the past have long-lasting effects on educational outcomes. More generally, a significant number of recent contributions have in fact shown the existence of these long-lasting effects of history on a number of economic and social outcomes at the regional level for different countries (Nunn, 2009a presents an excellent review of the literature). The second literature studies the long term development of numeracy and other human capital indicators (e.g., A'Hearn et al., 2009, Baten and Crayen, 2008). However, we do not have estimates of human capital in the past, this paper is related to the study of the impact of historical factors in the development of human capital. The third stream of research examines how the incentives faced by providers of education affect the provision of education at the micro level (e.g., Hoxby, 2003).

This paper is organized as follows. Section 2 presents some historical background. Section 3 presents an economic interpretation that produces a number of testable empirical implications under different contexts. Section 4 describes the empirical strategy to contrast the theoretical predictions against the data. Section 5 present the results of testing the empirical predictions of the model using the sample of African regions and Section 6 briefly concludes.

2 Historical Background

The link between education and religious activity is very old. We know of no civilization in which the dominant religion has written texts in which instruction was not provided by the main religious institutions (e.g., consider the cases of Egypt, the Ottoman Empire, and some early Chinese and Indian dynasties). The same is true for most Christian denominations. In the Roman Empire, the Church had significant responsibilities in providing education. However, it was not until the Reformation and Counter-Reformation that the Catholic and Protestant Churches began to develop mass-education. Since then both Catholic orders and Protestant denominations have been heavily involved in providing education.[3] The motivation for providing education has ranged from altruistic concern for improving the quality of life of children, to instrumental ones related to gaining followers.

Often missionary activity proceeded the colonization period. In these cases, colo-

[3]For instance, among Catholic groups, the Jesuits and a number of Catholic orders started actively working in educational institutions during the Counter-Reformation. Among Protestant groups, the Lutheran Church in Germany and the Scottish Presbyterians developed a mass-education system during the Reformation.

nizers often allowed missionaries to start or continue schooling in the colonies. The degree of missionaries' responsibility for education varied across colonial powers, but was generally substantial. For example, over 90% of Western education in sub-Saharan Africa during the colonial period was provide by missionaries (Woodberry 2004). In the 19th and 20th centuries, the British treated Protestant and Catholic missionaries similarly. Although the British had originally tried to block missionaries from many of their territories, political pressure by evangelical missionary supporters forced them to allow religious liberty after 1813 and provide grants for education that all religious groups could apply for. Unlike British colonies, Spanish, Portuguese, Italian, and Belgian colonies had a more explicit bias towards the Catholic Church's involvement in education. This bias took the form of a number of regulations favoring the Church and limiting the influence and actions of Protestant missionaries in general and on education in particular.

Various reasons motivated missionaries to provide education. Missionaries came to the colonies with a high degree of experience in working in schools in their homelands. At the same time, there was a low cost of entry in education (especially compared to health care). For instance, in the African context, schooling was a particularly useful way of converting people—a missionary working in Nigeria put it this way: "We knew the best way to make conversions in pagan countries was to open schools. Practically all pagan boys asked to be baptized. So, when the district (...) was opened (in 1916) we started schools even before there was any church or mission house." (Quoted in Bassey, 1999.)

A number of studies have noted the relationship between religious variables and education. A group of studies conclude that former British colonies tend to have more schooling. This pattern has been explained by the claim that Protestants put more emphases on formal instruction (Landes, 1998 Meyer, et al., 1992; Ramirez and Boli, 1987.)[4] More recently, Woodberry (2002, 2004) show that when controlling for Protestant missionary activity, colonizer identity is irrelevant for predicting education during the colonial period. Woodberry collected data on Protestant missionary activity in former colonies and presents an analysis linking missionary activity and schooling. His main empirical result is that the often-reported positive effect on schooling of being a former British colony disappears when controlling for missionary activity. Conceptually, he argues that Protestant missionaries had a significant effect on schooling for at least two reasons. First, using an argument similar to Landes (1998) and Becker and

[4]Some recent economics papers also find support for the idea that religious affiliation has a causal effect on economic and social outcomes (e.g., Gruber, 2005).

Woessmann (2008), Protestant missionaries were more interested in instruction because "...[they] wanted people to read the Scriptures in their own language (p.27)". In contrast, Woodberry (2002, 2004) argue that Catholic missionaries, in those times, did not put emphasis on whether people were able to read the Bible. Thus, Protestant missionaries were much more interested in having literate believers and, therefore, they initiated mass education.

Second, non-state Protestants pressured for religious liberty throughout the colonies. They were able to win this in most historically Protestant colonizers. This allowed missionaries to operate more independently of the colonial government. Therefore, they were able to implement the educational practices they wanted, even if the colonial officials either opposed or were not interested in providing good education for non-whites and non-elites.[5] From a more institutional perspective, religious liberty in British colonies fostered more missionary activity. Thus, Protestant missionaries's keener interest in providing education and their great ability to do so, combined with institutional features favoring more entry of Protestant missionaries in British colonies, would explain the difference in educational outcomes.

Analyses based on the role of missionaries in British colonies in Africa add another dimension to the potential role of missionaries' identity on schooling. Bassey (1999) describes Catholic missionaries competing with Protestant groups and often initiating innovations in schooling (e.g., English language education). Bassey's book provides numerous examples of how different missionaries innovated in order to get more students. For instance, he documents that "Catholics taught the English language in their schools from the early grades while the Church Missionary Society (CMS, a Protestant group) frowned upon the teaching of English in their schools. The teaching of English was of particular attention to students and parents alike... Perceiving the threat posed by the Roman Catholics curriculum to the CMS missionary field,... the CMS started teaching English in their schools..."(pp.72-73). Something similar happened regarding the establishment of high schools by Catholics in Onitsha in 1901.

Fairweather-Tall (2002) presents a similar account for the case of Malawi. In the early 1920s, there was discussion between colonial officials and Protestant missionaries about whether to establish secondary schools or not. In the mean time, the newly arrived French White Fathers established "illegal" secondary schools. This act immediately cre-

[5]This claim is supported by the historical record for Latin America, where some Catholic clergymen were interested in providing education but did not pursue this aim (or were even expelled from the country as the Jesuits were in Paraguay) because opposition from colonial officials and settlers (Deeds, 2004).

ated incentives for Protestant groups to open secondary schools when parents started sending their children to the Catholic schools. These examples show that in countries where Catholic missionaries were forced to compete with Protestants, they were innovative. Similar descriptions are presented by Kitaev (1999) for some regions of Kenya and Uganda, Kalinga (1985) for Malawi, Ilife (1979) for Tanzania, and Lomawaima (1994) for competition among missionaries for educating the Chilocco in North America.

The historical record provides interesting evidence suggesting that consumers (i.e., parents) cared about the quality of education. Bassey (1999) and Berman (1974) present anecdotal evidence supporting the view that consumers did consider the quality of missionary schools when deciding where to send their children. In addition, Bassey (1999) presents some detailed examples of how local chiefs in Nigeria decided which missionary group had the right to operate schools based on the quality of the offers they received. This evidence supports the notion that consumers considered the quality of education when choosing among different education providers.

Other papers suggest that missionaries made "rational" decisions in the sense that market conditions affected their behaviors.[6] For instance, Catholic missionaries offered different styles of education in Catholic vs. non-Catholic colonies. In Catholic states, Catholic missionaries were not as innovative and active as in non-Catholic states. But, in areas where Catholic missionaries faced direct competition from Protestant missionaries and had to compete for students, Catholic missionaries were innovative and pushed for the very same aspects that were absent in their work in Catholic countries.[7]

Overall, the anecdotal evidence discussed in this section suggests that (i) missionaries were important agents in the development of educational systems in former colonies, (ii) regulations affecting missionary work varied in Catholic and non-Catholic colonies, (iii) Protestant missionaries seem to have been more productive than their Catholic counterparts in countries with protections in favor of Catholic missionaries, and (iv) Catholic missionaries were at least as active and innovative as their Protestant counterparts regarding education in places where they did not have state protection and support. The next section develops an economic interpretation of the last two results.

[6]Research on the economics of religion and on the effects of religious market structure on churches' decisions shows that these institutions do strongly react to competitive incentives in a variety of ways (e.g., Iannaccone, 1998).

[7]For instance, in 1901 the Mill-Hill Fathers offered English, Math, Geography, and even Music in their mission schools in British Africa (Beck, 1966).

3 An Economic Interpretation

In this section, we present a simple economic interpretation of the main facts derived in the previous section. The key element in this interpretation is that different missionaries operated under dissimilar institutional/market structures in diverse areas. British colonies had a highly competitive environment in which missionaries from different denominations had to compete for students.

In contrast, Belgian, Portuguese, and Spanish former colonies (Catholic states hereafter) had a clear bias towards Catholic missionaries, which had a sort of monopolistic position there. Classifying the French among these two groups is not clear-cut. Over the initial period of colonization France favored the Catholic Church, however, in the 20th century the French colonies followed a "neutral" treatment of missionaries in that they restricted both Protestants and Catholics.[8] In British, U.S., Australian, New Zealand, and German colonies (non-Catholic states hereafter), the religious affiliation of missionaries was not relevant because they operated under competitive rules and, therefore, if missionaries were inefficient, they would lose students (and potential followers).

Formally, assume that there are two groups competing for a certain number of students. Parents value quality and are in the same location. Each group can decide how much education to provide given its resources and their objective functions and technologies. The last point is important. For instance, Landes' arguments imply that, ceteris paribus, Protestant missionaries may offer more formal instruction in equilibrium than Catholic missionaries (or at least they will initiate education and force competition), given that they care more about this dimension and/or have better technologies to provide formal schooling.[9] In addition, assume that missionaries can use their resources for objectives other than producing instruction (for instance, evangelizing or just consuming resources that are valuable for the missionaries themselves and not for students).

We first present the case in which both missionary groups are treated equally. Assume, moreover, that the market can be represented by a product differentiation model

[8] An exception to this, outside the African context, is Southeast Asia (Vietnam, Cambodia, and Laos) where the French colonial government continued to favor Catholics and restrict Protestants.

[9] Although competition between Protestants might also have been important for expanding education, it is more difficult to measure with our data. Moreover, during the late 19th and early 20th centuries, most Protestant mission groups cooperated with each other. In fact, the ecumenical movement (e.g., the World Council of Churches) grew out of organizations created for missionary cooperation and our Protestant data come from documents used for cooperative Protestant missionary planning (e.g., Hogg 1952; Woodberry 2004). Competition between Catholic religious orders is not crucial to our data since each ecclesiastical jurisdiction was under the care of either the secular clergy or a particular religious order. This group of clergy was responsible for administering Catholic activity within that jurisdiction – which minimized competition at the local level.

in which missionaries supply quality of schooling and other goods valuable to the students. In this context, an increase in school quality supplied by one group, conditional on the quality supplied by other groups, increases the number of students attending its school. Let us assume first that both missionary groups have the same objective function, technologies, and level of resources, and that if both groups offer the same quality, half of the students go to schools of each denomination. In this simple set up, the optimal response is that both groups produce the same level of education given their resources, and that half of the students go to each school. The existence of another group of providers with potentially similar characteristics and the threat of losing students create incentives to provide a level of education such that missionaries do not earn rents. Also, in this scenario, missionary identity does not matter because parents choose the school that offers the highest quality. We may expect that each missionary that is operating in the market should provide the same level of quality given her resources. Thus, the main empirical implication is that market identity does not matter and both groups should have the same effect on schooling.

We may extend the previous simple model to include heterogeneous agents. For instance, following Landes, Protestant missionaries may have a different objective function putting more weight on school quality than Catholic missionaries. In this context, ceteris paribus, Protestant missionaries will provide more formal schooling in equilibrium than their Catholic counterparts and also will probably have more students. Then, in contrast to the previous model with homogeneous missionaries, different objective functions imply different market equilibria even when both groups are treated equally. In the empirical section of the paper we propose a simple approach to test among both results.

Now we turn to model the situation in areas having Catholic states. There were barriers to entry and subsidies favoring Catholic missionaries.[10] Thus, the implicit logic

[10]Protestant mission supporters worked hard to gain access to Catholic colonies. Through diplomatic pressure they had guarantees of religious liberty inserted into international treaties (such as the Treaty of Berlin) and into the charters of international organizations such as the League of Nations and the United Nations. The (Protestant) International Missionary Council set up a commission to monitor and pressure for international religious liberty and published a series of reports documenting and comparing abuses of religious liberty around the world. Most European colonizers were signatories to these treaties and thus either ignored the law or restricted Protestants by indirect means: favoring missionaries from the colonizing state (Spain, Portugal, etc.), requiring all education and printing to be in the colonial language, requiring teachers and medical personnel to have a credential from the colonizing state, etc. (see Woodberry 2004 for a full discussion). Because few Protestants lived in Spain, Portugal, etc., and acquiring the relevant degrees and linguistic facility took time, Protestant missionaries were diverted to non-Catholic colonies and areas that had not been colonized. Dedicated Protestant missionaries overcame these handicaps and entered Catholic territories, but in smaller numbers than elsewhere. Belgian Congo (Zaire/DRC) had more Protestant missionaries than many Catholic states in Africa

of the previous model does not apply to these markets. There are many ways of modeling the situation, but we present two simple cases motivated by the historical record:

- Protestant missionaries could only establish schools if they were located to a certain distance from Catholic missionaries. For instance, Woodberry (2002, 2004) mention that the Portuguese allowed Protestants to enter Angola and Mozambique, but banned Protestant mission stations from being located near Catholic missions (generally about 20 miles). In this case, the only way that Protestant missionaries could have positive enrollment is by offering a school quality level that was strictly *above* the quality offered by Catholic missionaries.[11]

- Catholic missionaries received a certain share of the student population irrespective of the level of education they provided. This could be an equilibrium result of the limited supply of Protestant missionaries –and, therefore, Protestant schools— in Catholic colonies. For instance, Woodberry (2002, 2004) document that some Catholic colonial powers, as Italy, banned the entry of new Protestant missionaries to their colonies. Other regulations limited the entry in a more indirect way. For instance, most Catholic colonizers required all education to be in the colonial language. As Protestant missionaries were primarily English speakers, they needed to spend some years to gain the required linguistic fluency before going to the colonies.

Therefore, in many cases in non-neutral states, Catholic missionaries had a captive population given by the absence of competitors. This situation allowed them to keep students without offering a high level of school quality. Protestant missionaries did not receive these protections, so they had to be especially productive if they were going to have students. Assuming that missionaries have to provide the same education for all students that attend their schools and also the typical properties of the benefits and costs functions (concave benefit functions and convex cost functions), we get the result

because they needed US, British, and Swedish support to lay claim to the Congo River basin. Latin American countries allowed Protestant missionaries to enter for internal political reasons or because of diplomatic pressure.

[11] Formally, assume a Hotelling (1929)-like model. Parents i maximize a utility function of the form $U_{ij} = q_j - t(l_j - l_i)^2$, where q_j is quality in school j, l_j is the location of school j, l_i is the location of parents i, and t is a transportation cost. Assume the location of all parents is the same: $l_i = 0$. The Catholic school is also located at $l_C = 0$ (where C refers to the Catholic school). Assume the Protestant school can only be located at $l_P = d > 0$ (P refers to the Protestant school). In this case, if $t > 0$ and the Protestant schools exists (i.e. has a positive enrollment level), $q_P > q_C$. In other words, Protestant missionaries have to offer a school quality above that offered by Catholic missionaries in order to have students.

that Protestant missionaries should have offered, in most cases, a quality level above that offered by Catholic missionaries.

Therefore, these two simple cases generate the same prediction: Protestant missionaries should have been more productive in areas in which Catholic missionaries received preferential treatment. We expect this theoretical prediction to be relevant in Catholic states.

Our interpretation is that these historical institutional differences persist to the present because educational outcomes and institutions present a high degree of inertia. There are several reasons why persistence is plausible in the case of education (Gallego, 2009, Glaeser et al., 2004; Nunn, 2009a). Firstly, setting up institutions is costly and there are irreversible complementary investments. Secondly, intergenerational inertia creates persistence in educational levels among members of several cohorts. Thirdly, the accumulation of human capital is endogenous. Increases in the supply of education increase the profitability of investing in human capital-related technologies, which, in turn, encourages schooling (Acemoglu, 2002). Finally, peer effects can explain low levels of education over several generations even though there are policies aiming to expand schooling. Consistent with this hypothesis, Gallego (2009) and Glaeser et al. (2004) present evidence that cross-country differences in schooling are highly persistent. Therefore, we expect the differences in the institutional setting to have an impact on educational outcomes both in the past and in the present.

In summary, the theoretical rationale presented in this section predicts that, although the education productivity of Catholic and Protestant missionaries may have been the same or different in non-Catholic states, Protestant missionaries should have been more productive in Catholic states. Since education presents a high degree of inertia, we expect that these historical differences also affect current educational outcomes. The next section presents the empirical framework we develop to test these predictions.

4 Taking the Model into the Real World: Estimating Equations and Data

Using the theoretical and historical background described above, we study whether the productivity of missionary educational activity depends on government regulation of religion by comparing countries having Catholic states with other former colonies. Unfortunately we do not have information on education productivity of missionaries so we have to rely in an indirect approach using proxies. We use measures of school quantity (average years of schooling) and school outcomes (literacy rates) to quantify school

outcomes. We use the number of missionaries per capita in the past or dummies for the presence of mission stations in different regions as a measure of missionary activity. Thus, our proxy for the education productivity of missionaries is how a change in the availability of missionaries in the past changes education outcomes, controlling on other observables.[12]

The main estimating equation is:

$$\begin{aligned} S_i &= \alpha + \beta_P PM_i^{1900} + \beta_C CM_i^{1900} + \gamma_P PM_i^{1900} \times CS_i^{1900} + \gamma_C CM_i^{1900} \times CS_i^{1900} \quad (1) \\ &\quad + \delta CS_i^{1900} + \mathbf{X}_i'\beta + e_i, \end{aligned}$$

where S is schooling in area i, PM is a proxy for Protestant missionary activity in area i, CM is Catholic missionary activity, CS is a dummy taking a value of 1 if the area i has a Catholic state, $\mathbf{X}$ is a vector of controls in area i, and e is an error term.

We interpret β_P and β_C as the education productivity of Protestant and Catholic missionaries in non-Catholic states, and γ_P and γ_C as the productivity differential of each group of missionaries in Catholic states. The previous literature (Becker and Woessman, 2008, Nunn, 2009b) suggests that if we does not include CS_i^{1900} and the interaction terms in (1)–i.e., if we impose that $\gamma_P = \gamma_C = \delta = 0$– we should find that:

$$\beta_P > \beta_C \approx 0$$

In a more general context, if we estimate (1) including all the terms, the empirical counterparts of our previous discussion in terms of the implications of having agents with different or similar objective functions and technologies:

$$\begin{aligned} \text{In a heterogeneous (Landes) world:} \quad & \beta_P > \beta_C \quad \text{(prediction 1)} \\ \text{In a homogeneous agents world:} \quad & \beta_P = \beta_C \quad \text{(prediction 1')} \end{aligned}$$

In a heterogeneous-world with Protestant missionaries caring more about formal schooling than Catholic missionaries, we would expect $\beta_P > \beta_C$. In contrast, in a homogeneous world competition among agents would imply $\beta_P = \beta_C$.

Next, we move to the central predictions of this paper:

$$\begin{aligned} \gamma_P &> 0 \geq \gamma_C. \quad \text{(prediction 2)} \\ \beta_P + \gamma_P &> \beta_C + \gamma_C \quad \text{(prediction 3)} \end{aligned}$$

[12]Some authors show a positive correlation between measures of school quantity and school quality (eg., Barro and Lee, 2001). Other papers present evidence of a causal impact of school quality on school quantity (eg., Hanushek et al., 2008). Therefore, variation in school quantity–as we use in our paper– is probably closely related to variation in school quality.

Prediction 2, the central prediction of our motivating theory, states that Protestant missionaries must have higher productivity in Catholic states than in neutral states, whereas Catholic missionaries may be less productive in Catholic states because they are protected and, therefore, do not have to work hard to have students in their schools.[13] Empirically, we also test whether the differential effect of Protestant missionaries in Catholic states was greater than the differential effect of Catholic missionaries in these areas (ie., $\gamma_P > \gamma_C$), which is a weaker implication of Prediction 2. This test has the virtue that there may be a third omitted factor that implies that both types of missionaries are equally more or less productive in Catholic states.

Finally, prediction 3 combines the first three ideas. In our setup Protestant missionaries have to be more productive than Catholic missionaries in Catholic states irrespective of predictions 1 and $1'$.

To test these predictions, we need information about (i) the presence of Catholic and Protestant missionaries in different areas, and, (ii) the regulations affecting those missionaries. We use data for around 1900 because missionary activity increases considerably after the foundation of a number of Protestant missionary societies in the first half of the 1800s and the London Conference (Johnson, 1997). At the same time, Catholic missions were revived after the 1750-1815 period when missionary interest diminished, the Spanish empire disintegrated, and the Society of Jesus (i.e. the Jesuits) was suppressed. Subsequently, new missionary orders were founded and native clergy and bishops were ordained to serve new churches in Asia, Africa, and throughout the world. Consistent with this, we use information on the existence of Catholic states during the same period.

We use data on Protestant missionaries from Woodberry (2002, 2004). We use two indicators of Protestant activity: (i) the number of Protestant missionaries per capita working in a particular area in the early 1900s and (ii) a dummy that takes a value of one if Protestant missionaries worked in a particular region in the early 1900s. Woodberry (2002, 2004) collected data using information on the location of mission stations and linked that information with modern borders of countries. In this paper, we linked this information with the modern borders of regions/provinces in 17 African countries. The definition of missionary in the sources Woodberry (2002, 2004) compiled corresponds to "one who is doing religious work away from his own national home and among the people of another race or religion."

[13]However, this prediction is difficult to test empirically with our available data because Catholic missionaries in areas with a Catholic state may have more resources for education than in non-Catholic areas, which may imply $\gamma_C > 0$.

Data on Catholic missionaries come from linking three groups of sources: (i) the Catholic Encyclopedia (1907), which presents information on the number of religious personnel per diocese in the early 1900s; (ii) a number of country-specific sources to construct proxies for the presence of Catholic missionaries across African regions in the 1900s,[14] and (iii) "Catholic Hierarchy" (http://www.catholic-hierarchy.org), which collects information about current and past Catholic dioceses, allowing us to match historical dioceses (in the early 1900s) with current regions.

The basic measure of Catholic missionaries is the total number of priests in a particular diocese—there is also information for other related variables, such as the number of schools and the number of pupils attending Catholic schools for a sub-sample of countries. In our sample of African regions in the early 20^{th} century, all Catholic religious activities were related to foreign missionaries and, therefore, the information is comparable to Woodberry's.

In order to identify which countries had regulations favoring Catholic missionaries, in our central exercises using regional African data, we classify regions having regulations favoring Catholic missionaries as those located in areas controlled by the Belgian and the Portuguese. These two colonial powers had explicit regulations favoring the Catholic Church. In contrast, French colonies starting from the early 20th century did not have regulations that directly favored Catholic missionaries in most of their colonies.

5 African Cross-Region Evidence

In this section, we test the theoretical predictions presented in section 4 using cross-region data for 17 African countries. This cross-region sample presents some important characteristics to validate our identification strategy. First, the allocation of different regions to different colonial powers followed a more or less arbitrary process. In particular, the shape of many African countries was determined arbitrarily after negotiations between European colonial powers in the late 1800s (notice the number of straight lines in the map of Africa). Between May 1884 and February 1885, Germany announced its claims to territory in South West Africa (now South West Africa/Namibia), Togoland, Cameroon, and part of the East African coast opposite Zanzibar. In reaction other European powers scrambled to lay their own claims to parts of Africa. Even less militarily powerful nations such as Belgium, Italy, Portugal and Spain were able to claim significant African territory. Because these territorial claims were made in Europe be-

[14] Appendix Table 1 presents a description of the sources to construct the proxies for Catholic missionary activity in the regions of each country.

fore Europeans knew much about the resources, geography, and people in the interior parts of Africa, the allocation of areas to different colonial powers is arguably "more exogenous" than the allocation in a cross-country setting.

Second, educational sectors in the countries in this sample started to be developed around 1900, with Christian missionaries playing a central role. Thus, this sample provides a "clean" test of the effects of institutional features affecting missionaries on the development of educational systems. Third, our measure of missionaries is more closely related to the idea of a foreign agent operating in a third country. Finally, most central African regions/countries started with relatively similar levels of development circa 1900 (as documented in Madison, 2003) and many ethnic groups ended up divided between countries with different colonizers. Thus, we can use the entry of missionaries and the arbitrary definition of boundaries between colonial powers as a source of exogenous variation in the number of missionaries and colonial policies regarding them.

Our sample includes about 180 regions/provinces that belong to 17 African countries located in two African areas:

- Central-West Africa: Benin, Burkina Faso, Cameroon, Central African Republic, Cote d'Ivoire, Gambia, Ghana, Guinea, Nigeria, and Togo.
- Central and South-East Africa: Angola, Burundi, Kenya, Malawi, Rwanda, Tanzania, and Zambia.

We use two measures of educational outcomes in the present: average years of schooling of the adult population and literacy rates at the provincial level. Table Appendix 1 presents the sources of data for each country. The choice of countries was determined by the availability of data about educational outcomes. We consider the identity of the colonizer around 1920 and therefore we consider Angola (Portuguese colony) and Burundi and Rwanda (Belgian colonies) as Catholic states.

Table 1 presents descriptive statistics for educational outcomes and missionary activity. As expected, educational outcomes are low. Average attainment is below three years of schooling and literacy rates are below 50% on average. At the same time, the variability of both dimensions is high: average schooling varies from roughly no schooling to over seven years.

Table 1 also presents descriptive statistics of the presence of Catholic and Protestant missionaries at the province level in the early 1900s. Missionaries were working in about 60% of the provinces. Provinces within a Catholic state tended to have fewer areas with missionary activity than areas outside Catholic states. The number of missionaries

per 1000 people was roughly the same in regions with and without a Catholic state, but the composition of the missionaries changed significantly. In Catholic states there were about 1.2 Catholic missionaries per Protestant missionary, whereas in the other areas there more than two Protestant missionaries per Catholic missionary. The data also suggest that Protestant missionaries only entered some areas in Catholic states. This evidence is confirmed in Map 1 where we present the dummies for the presence of missionaries in different regions in the countries included in our paper.

Table 2 complements this evidence. We present simple and partial correlations of our measures of missionary activity in different areas. Although in Catholic states the correlation of Protestant and Catholic missionary activity is negative or insignificant, in "neutral" states the correlation is positive and significant. The results using a partial correlation index present a similar pattern.[15] The results using our measures of missionaries per person in Panel B of Table 2 suggest a similar pattern, but the correlations are not precisely estimated. Overall, the results in this table suggest that the degree of competition between Protestant and Catholic missionaries was higher in non-Catholic states.

First, we estimate equation (1) imposing that $\gamma_P = \gamma_C = \delta = 0$, as a benchmark to previous papers studying the direct effect of Catholic and Protestant missionaries on educational outcomes (see Table 3). Panels A and B present results both with and without including regional controls. In all the cases in which we use dummies for the presence of missionaries, we find a similar result to the previous papers: the points estimates on the effects on Protestant missionaries are bigger than point estimates on Catholic missionaries (and in three of the four cases the difference being statistically different from 0). These results are also economically relevant–using results from our preferred specifications (Panel B). For instance while areas with the presence of Protestant missionaries increased their literacy rates in about 16 p.p. (equivalent to about 0.35 standard deviations of this variable) and 1.63 years of schooling (equivalent to about 0.55 standard deviations of this variable), the same effects for the presence of Catholic missionaries are not different from zero, and the point estimates are just 0.03 p.p. of additional literacy and 0.23 additional years of schooling. We find similar results when using proxies for Christian missionaries per capita, especially in our preferred specifications including controls (although notice the effect are less precisely estimated).

[15]When computing partial correlations, we control for population density, distance to the sea, dummies for the presence of rivers, lakes, and sea access, a dummy that takes a value of one if capital city of the country is located in the region, and broad-region dummies (i.e., if the province is located in Central-West Africa or Central and South-East Africa).

Therefore, this evidence is consistent with previous papers finding that generally Protestant missionaries present a higher correlation with educational outcomes than Catholic missionaries and, moreover, in most cases the impact of Catholic missionaries on educational outcomes is close to 0.

Next, we estimate equation (1) without imposing any restriction (see Table 4). Our theoretical discussion and the above-mentioned anecdotal evidence suggest that there may be heterogeneous effects of missionaries in different areas, depending on the market structure. This idea is supported by the data. First, as in Table 3, Protestant missionaries have a bigger effect on schooling than Catholic missionaries in areas with neutral states, but in this case the estimates are more imprecise and it is never possible to reject the null hypothesis that they are equally productive in these areas. Second, Protestant missionaries are significantly more productive than Catholic missionaries in areas with a Catholic state, except in one of eight specifications presented in Table 4 (where the F-test for $\beta_P+\gamma_P = \beta_C+\gamma_C$ has a p-value of about 0.14). The prediction that Protestant missionaries are more productive in Catholic states than in neutral states is significant in five of eight regressions in the table. Third, point estimates imply that in six out of the eight specifications Catholic missionaries are less productive than in neutral states (even though they are not statistically significant in any of the regressions included in this table).

In order to study whether the lack of significance of some of the previous results is due to a lack of precision in the estimates, we present in Table 5 results of imposing the restriction that $\beta_P = \beta_C$. In this case, as expected if the restriction is right, estimates are more precisely estimated and we reject the null hypothesis that $\gamma_P = \gamma_C$ in all specifications. The null hypothesis that $\gamma_P = 0$ is rejected in the four specifications where we included region controls. The hypothesis that $\gamma_C < 0$ receives support in two out of the same four specifications. All in all, these results present at least partial evidence in favor of the prediction that Protestant missionaries are more productive than Catholic missionaries in Catholic states.

Finally, we implemented three additional robustness checks aimed at controlling for country characteristics that may be correlated with the variables of interest in this paper. In the three cases we do not aim to identify the causal impact of each control variable, but to simply study whether our results are robust to including them in the main equation. We present the results in Table 6, where we run the same regressions as in Panel B of Table 5 but now include each control variable in each panel. In Panel A we add per student expenditure in primary education from Barro and Lee (2001) as

a control for investment in education (we lose Nigeria from these regressions because of missing data). In Panel B we add an indicator of the rule of law from Easterly and Levine (2003) and in Panel C we add a dummy variable indicating whether the country has had any civil war since independence using data from Sarkees (2000). In the three panels results imply that the estimated effects of the missionary variables are similar to previous results and are, therefore, robust to including country level controls.[16]

In all, these results are robust to using two alternative measures of schooling (years of schooling and literacy), two alternative proxies for missionary activity (a dummy for presence of any missionary activity and a measure of missionaries per person), and to including three country level controls.[17]

The estimated effects are also economically relevant. Regions with Protestant missionaries have a literacy rate about 10 p.p. higher (equivalent to about 0.40 standard deviations of this variable) and 1.31 more years of schooling (equivalent to about 0.63 standard deviations of this variable). While Protestant missionaries added about 45 p.p. of additional literacy when operated in Catholic areas with respect to their contribution in neutral areas, Catholic missionaries produced none or less additional literacy when operating in Catholic areas with respect to their peers operating in neutral areas. Similar results, appear with respect to years of schooling: The presence of Protestant missionaries in a Catholic state produces an effect two times bigger than in neutral areas.

Overall, the results using a sample of African regions support our theoretical predictions. Since educational systems in these African regions started to develop in the early 1900s and missionaries played a significant role in the development of these systems, these results provide a clean test of the effects of institutional regulations in terms of the effect of missionaries on educational outcomes.

6 Concluding Comments

We started this paper documenting the big differences in educational attainment existing between Catholic and non-Catholic states in our African cross-region sample and asked whether these differences were driven by national identity, religious affiliation, or institutional features. Our estimated effects suggest that rules affecting market pressure play an economically relevant role to explain differences in educational attainment.

[16]Notice that in some cases, the control variables may be caused by the variables of interest (most notably in the case of education expenditure), so these exercises are actually quite demanding as robustness checks.

[17]Regressions present standard errors clustered at the country level. If we include country fixed effects, all coefficients become statistically insignificant because standard errors increase. This result suggests that most of the variation we are identiying is related to between-country differences, as expected.

For instance, our estimates suggest that if Catholic missionaries in Catholic states had been as productive as Catholic missionaries in non-Catholic states, the same number of Catholic missionaries would have spurred 5 additional percentage points of literacy and about 0.5 additional years of schooling . Therefore, differences in the productivity of Catholic missionaries between Catholic and non-Catholic states explain one-third to one-quarter of the differences in educational outcomes between these two groups of African provinces.

We interpret these differences as rational reactions to regulations: in non-Catholic colonies there was a relatively neutral policy allowing most missionaries to work under equal conditions, whereas in Catholic colonies there were implicit or explicit policies favoring the Catholic Church and restricting Protestants. This institutional feature created differences in the competitive pressures faced by Catholic and Protestant missionaries in different places. We support our theoretical predictions using two different sources of information. First, we present a number of historical examples. Second, we use cross-region data about educational outcomes in the 1990s for a sample of 17 African countries.

Our results lend additional evidence to the ongoing literature on the role that institutions established in the past play in current educational outcomes. We show that regulations that affected educational systems and actors in the past have long-lasting effects on educational outcomes.

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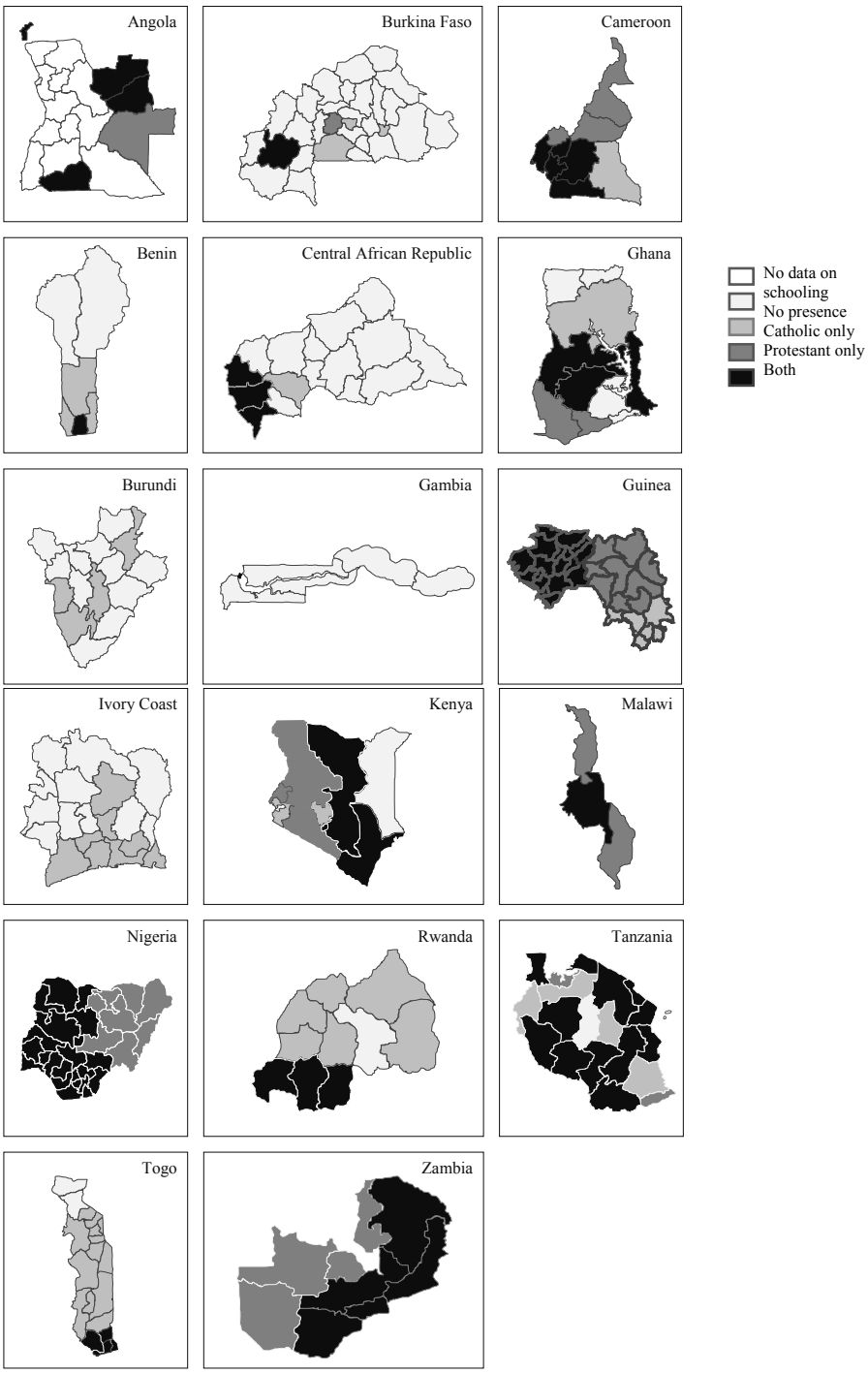
Map 1: Missionaries Presence by Country



Notes: Each country map depicts the dummies for the presence of any mission station in each region of each country.

Table 1

African Cross-Region Data: Summary Statistics

Panel A: Complete Sample

Variable	N	Mean	Median	S.D.	Min	Max
Dummy: Catholic missionaries	189	0.41	0.00	0.49	0.00	1.00
Dummy: Protestant missionaries	189	0.42	0.00	0.49	0.00	1.00
Dummy: Missionaries	189	0.57	1.00	0.50	0.00	1.00
Cath. missionaries per 1000 people	189	0.02	0.00	0.04	0.00	0.30
Prot. missionaries per 1000 people	189	0.04	0.00	0.10	0.00	0.83
Missionaries per 1000 people	189	0.05	0.01	0.10	0.00	0.85
Literacy rate	189	0.43	0.46	0.25	0.02	0.96
Average years of schooling	179	2.89	2.96	2.06	0.01	7.14

Sources: Authors' own calculations based on the sources presented in Appendix Table 1.

Panel B: Regions in areas with and without protection of the Catholic Church

	Catholic State	"Neutral" State
Variable	Mean	
Dummy: Catholic missionaries	0.45	0.40
Dummy: Protestant missionaries	0.23	0.44
Dummy: Missionaries	0.50	0.58
Cath. missionaries per 1000 people	0.03	0.02
Prot. missionaries per 1000 people	0.03	0.04
Missionaries per 1000 people	0.06	0.05

Sources: Authors' own calculations based on the sources presented in Appendix Table 1.

Table 2

Protestant and Catholic Missionaries: African Cross-Region Correlations c. 1900

Panel A: Measure of Missionary Activity: Dummy for Presence	
Simple correlation	
All regions	0.35***
	(0.00)
Catholic State in 1900	0.38*
	(0.08)
Non-Catholic State in 1900	0.35***
	(0.00)
Partial correlation controlling for region characteristics	
All regions	0.25***
	(0.00)
Catholic State in 1900	0.05
	(0.87)
Non-Catholic State in 1900	0.30***
	(0.00)

Panel B: Measure of Missionary Activity: Missionaries per Person	
Simple correlation	
All regions	0.04
	(0.55)
Catholic State in 1900	-0.12
	(0.60)
Non-Catholic State in 1900	0.08
	(0.30)
Partial correlation controlling for region characteristics	
All regions	0.03
	(0.69)
Catholic State in 1900	-0.21
	(0.43)
Non-Catholic State in 1900	0.07
	(0.37)

Sources: See Table 1

Notes: p-values are presented in parentheses. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level. Region characteristics are population density, distance to the sea, dummies for the presence of rivers, lakes, and access to the sea, a dummy that takes a value of one if the capital city of the country is located in the region, and broad-region dummies (i.e. if the province is located in Central-West Africa or Central and South-East Africa).

Table 3

Benchmark Regressions without Interactions: Educational Outcomes

Panel A: Not including Region Controls

Proxy for Missionaries	Dummy for Presence		Missionaries per 1000 people	
Dependent Variable	Literacy	Schooling	Literacy	Schooling
	(1)	(2)	(3)	(4)
Independent Variable				
Catholic missionaries	0.11***	0.92***	0.80*	5.04
	(0.03)	(0.28)	(0.40)	(3.64)
Protestant missionaries	0.18***	1.86***	0.60*	5.01*
	(0.06)	(0.39)	(0.32)	(2.53)
Constant	0.31***	1.69***	0.39***	2.61***
	(0.05)	(0.47)	(0.06)	(0.57)
Controls	No	No	No	No
Area Effects	Yes	Yes	Yes	Yes
F-Test: $\beta_p = \beta_c$	1.27	4.81**	0.14	0.00
(p-value)	(0.28)	(0.04)	(0.72)	(0.99)
R^2	0.55	0.43	0.42	0.20
Number of Observations	189	179	189	179

Panel B: Including Region Controls

Proxy for Missionaries	Dummy for Presence		Missionaries per 1000 people	
Dependent Variable	Literacy	Schooling	Literacy	Schooling
	(1)	(2)	(3)	(4)
Independent Variable				
Catholic missionaries	0.03	0.23	0.04	-1.81
	(0.03)	(0.36)	(0.31)	(2.88)
Protestant missionaries	0.16**	1.63***	0.52*	4.00
	(0.06)	(0.43)	(0.30)	(2.49)
Constant	0.34***	2.20***	0.40***	2.93***
	(0.08)	(0.69)	(0.07)	(0.61)
Controls	Yes	Yes	Yes	Yes
Area Effects	Yes	Yes	Yes	Yes
F-Test: $\beta_p = \beta_c$	3.71*	7.11**	0.80	1.95
(p-value)	(0.07)	(0.02)	(0.38)	(0.18)
R^2	0.62	0.51	0.56	0.40
Number of Observations	189	179	189	179

Sources: See Table 1

Notes: Clustered standard errors at country level reported in parentheses. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level. Region characteristics are population density, distance to the sea, dummies for the presence of rivers, lakes, and access to the sea, a dummy that takes a value of one if the capital city of the country is located in the region, and broad-region dummies (i.e. if the province is located in Central-West Africa or Central and South-East Africa).

Table 4

Cross-Region Regressions: Educational Outcomes

Panel A: Not Including Region Controls

Proxy for Missionaries	Dummy for Presence		Missionaries per 1000 people	
Dependent Variable	Literacy	Schooling	Literacy	Schooling
	(1)	(2)	(3)	(4)
Independent Variable				
Protestant missionaries	0.122*	1.573***	0.469	3.783
	(0.0630)	(0.480)	(0.352)	(2.711)
Catholic missionaries	0.109**	0.904**	1.108**	6.987
	(0.0385)	(0.313)	(0.434)	(4.087)
Protestant missionaries * Catholic State	0.368	1.816	0.523	5.345
	(0.221)	(1.741)	(0.509)	(3.834)
Catholic missionaries * Catholic State	-0.00179	0.0785	-1.288	-7.333
	(0.0453)	(0.668)	(0.746)	(6.556)
Catholic State	-0.194*	-0.899	-0.138	-1.063
	(0.0951)	(0.784)	(0.166)	(1.191)
Constant	0.344***	1.879***	0.408***	2.755***
	(0.0557)	(0.516)	(0.0531)	(0.578)
Controls	No	No	No	No
Area Effects	Yes	Yes	Yes	Yes
F-Test: $\beta_p = \beta_c$	0.03	1.39	1.25	0.53
(p-value)	(0.86)	(0.26)	(0.28)	(0.48)
F-Test: $\gamma_p = \gamma_c$	2.90	0.96	6.87**	4.14*
(p-value)	(0.11)	(0.34)	(0.02)	(0.06)
F-Test: $(\beta_p + \gamma_p) = (\beta_c + \gamma_c)$	4.09*	2.41	16.74***	9.7***
(p-value)	(0.06)	(0.14)	(0.00)	(0.01)
R^2	0.60	0.44	0.46	0.24
Number of Observations	189	179	189	179

Panel B: Including Region Controls

Proxy for Missionaries	Dummy for Presence		Missionaries per 1000 people	
Dependent Variable	Literacy	Schooling	Literacy	Schooling
	(1)	(2)	(3)	(4)
Independent Variable				
Protestant missionaries	0.0987	1.316**	0.384	2.628
	(0.0620)	(0.482)	(0.332)	(2.656)
Catholic missionaries	0.0404	0.238	0.230	-1.130
	(0.0322)	(0.408)	(0.315)	(3.392)
Protestant missionaries * Catholic State	0.385*	1.909	0.682	7.130**
	(0.213)	(1.647)	(0.419)	(3.120)
Catholic missionaries * Catholic State	-0.0134	0.0733	-0.683	-1.384
	(0.0446)	(0.562)	(0.426)	(3.521)
Catholic State	-0.206***	-1.025	-0.155	-1.248
	(0.0700)	(0.624)	(0.128)	(0.812)
Constant	0.361***	2.311***	0.420***	3.122***
	(0.0784)	(0.719)	(0.0780)	(0.687)
Controls	Yes	Yes	Yes	Yes
Area Effects	Yes	Yes	Yes	Yes
F-Test: $\beta_p = \beta_c$	0.82	2.78	0.08	0.65
(p-value)	(0.378)	(0.116)	(0.785)	(0.431)
F-Test: $\gamma_p = \gamma_c$	3.26*	1.00	6.18**	3.2*
(p-value)	(0.090)	(0.334)	(0.024)	(0.094)
F-Test: $(\beta_p + \gamma_p) = (\beta_c + \gamma_c)$	5.2**	3.34*	91.34***	59.99***
(p-value)	(0.037)	(0.088)	(0.000)	(0.000)
R^2	0.67	0.52	0.6	0.45
Number of Observations	189	179	189	179

Sources: See Table 1

Notes: Clustered standard errors at country level reported in parentheses. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level. Region characteristics are population density, distance to the sea, dummies for the presence of rivers, lakes, and access to the sea, a dummy that takes a value of one if the capital city of the country is located in the region, and broad-region dummies (i.e. if the province is located in Central-West Africa or Central and South-East Africa).

Table 5

Cross-Region Regressions: Educational Outcomes

Panel A: Without Including Region Controls

Proxy for Missionaries	Dummy for Presence		Missionaries per 1000 people	
Dependent Variable	Literacy	Schooling	Literacy	Schooling
	(1)	(2)	(3)	(4)
Independent Variable				
Missionaries	0.205***	2.209***	0.828***	6.246**
	(0.0621)	(0.523)	(0.251)	(2.482)
Protestant missionaries * Catholic State	0.426**	2.713*	0.316	4.035
	(0.176)	(1.284)	(0.388)	(2.885)
Catholic missionaries * Catholic State	-0.0612	-0.841	-0.964	-6.259
	(0.0692)	(0.644)	(0.589)	(5.090)
Catholic State	-0.177*	-0.754	-0.132	-0.997
	(0.0900)	(0.707)	(0.164)	(1.176)
Constant	0.321***	1.654***	0.401***	2.685***
	(0.0536)	(0.450)	(0.0532)	(0.569)
Controls	No	No	No	No
Area Effects	Yes	Yes	Yes	Yes
F-Test: $\gamma_p = \gamma_c$	10.02***	15.91***	23.86***	12.76***
(p-value)	(0.006)	(0.001)	(0.000)	(0.003)
R^2	0.609	0.458	0.475	0.254
Number of Observations	189	179	189	179

Panel B: Including Region Controls

Proxy for Missionaries	Dummy for Presence		Missionaries per 1000 people	
Dependent Variable	Literacy	Schooling	Literacy	Schooling
	(1)	(2)	(3)	(4)
Independent Variable				
Missionaries	0.130*	1.536**	0.584***	3.735
	(0.0680)	(0.534)	(0.197)	(2.271)
Protestant missionaries * Catholic State	0.446**	2.786*	0.574*	6.573**
	(0.181)	(1.312)	(0.308)	(2.393)
Catholic missionaries * Catholic State	-0.0741	-0.889	-0.986**	-5.876*
	(0.0663)	(0.541)	(0.347)	(3.120)
Catholic State	-0.204***	-1.009	-0.140	-1.113
	(0.0662)	(0.586)	(0.128)	(0.818)
Constant	0.351***	2.213***	0.410***	3.012***
	(0.0810)	(0.684)	(0.0757)	(0.682)
Controls	Yes	Yes	Yes	Yes
Area Effects	Yes	Yes	Yes	Yes
F-Test: $\gamma_p = \gamma_c$	8.63***	9.45***	95.67***	56.43***
(p-value)	(0.0097)	(0.008)	(0.000)	(0.000)
R^2	0.671	0.526	0.617	0.454
Number of Observations	189	179	189	179

Sources: See Table 1

Notes: Clustered standard errors at country level reported in parentheses. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level. Region characteristics are population density, distance to the sea, dummies for the presence of rivers, lakes, and access to the sea, a dummy that takes a value of one if the capital city of the country is located in the region, and broad-region dummies (i.e. if the province is located in Central-West Africa or Central and South-East Africa).

Table 6

Cross-Region Regressions: Educational Outcomes

Panel A: Controlling for Expenditure at the Country Level

Proxy for Missionaries	Dummy for Presence		Missionaries per 1000 people	
Dependent Variable	Literacy	Schooling	Literacy	Schooling
	(1)	(2)	(3)	(4)
Independent Variable				
Missionaries	0.128**	1.261**	0.593***	3.127
	(0.676)	(0.498)	(0.185)	(1.891)
Protestant missionaries * Catholic State	0.457**	4.027*	0.588*	10.319***
	(0.188)	(1.980)	(0.307)	(3.432)
Catholic missionaries * Catholic State	-0.085	-0.969*	-1.018***	-6.052*
	(0.069)	(0.530)	(0.318)	(3.182)
Catholic State	-0.207***	-0.798	-0.143	-0.701
	(0.062)	(0.668)	(0.125)	(0.960)
Per Student Expenditure in Primary	(0.044)	(17.415)	(0.055)	(11.732)
Education (in US$1,000)	(0.042)	(9.223)	(0.040)	(10.060)
Constant	0.333***	4.009***	0.389***	4.700***
	(0.097)	(1.323)	(0.085)	(1.252)
Controls	Yes	Yes	Yes	Yes
Area Effects	Yes	Yes	Yes	Yes
F-Test: $\gamma_p = \gamma_c$	8.47**	6.84**	85.45***	12.76***
(p-value)	(0.011)	(0.020)	(0.000)	(0.003)
R^2	0.696	0.611	0.643	0.254
Number of Observations	185	175	185	179

Panel B: Controlling for Rule of Law at the Country Level

Proxy for Missionaries	Dummy for Presence		Missionaries per 1000 people	
Dependent Variable	Literacy	Schooling	Literacy	Schooling
	(1)	(2)	(3)	(4)
Independent Variable				
Missionaries	0.133*	1.724***	0.573***	3.887*
	(0.066)	(0.520)	(0.185)	(1.836)
Protestant missionaries * Catholic State	0.412**	2.200	0.521*	5.810**
	(0.178)	(1.303)	(0.276)	(2.096)
Catholic missionaries * Catholic State	-0.088	-1.192*	-0.977**	-5.817**
	(0.067)	(0.655)	(0.334)	(2.730)
Catholic State	-0.114	0.727	-0.052	0.246
	(0.095)	(1.103)	(0.128)	(1.145)
Rule of Law	0.089	1.777*	0.106	1.686*
	(0.069)	(0.906)	(0.064)	(0.932)
Constant	0.404***	3.100***	0.475***	3.922***
	(0.075)	(0.815)	(0.077)	(0.878)
Controls	Yes	Yes	Yes	Yes
Area Effects	Yes	Yes	Yes	Yes
F-Test: $\gamma_p = \gamma_c$	9.44***	8.83***	63.86***	37.01***
(p-value)	(0.007)	(0.010)	(0.000)	(0.000)
R^2	0.685	0.591	0.637	0.514
Number of Observations	189	179	189	179

Panel C: Controlling for Civil Wars at the Country Level

Proxy for Missionaries	Dummy for Presence		Missionaries per 1000 people	
Dependent Variable	Literacy	Schooling	Literacy	Schooling
	(1)	(2)	(3)	(4)
Independent Variable				
Missionaries	0.124*	1.484**	0.572**	3.664
	(0.069)	(0.529)	(0.207)	(2.285)
Protestant missionaries * Catholic State	0.438**	2.718**	0.538	6.184**
	(0.177)	(1.268)	(0.320)	(2.565)
Catholic missionaries * Catholic State	-0.062	-0.758	-0.945**	-5.454*
	(0.694)	(0.565)	(0.349)	(3.098)
Catholic State	-0.270***	-1.699*	-0.207	-1.790*
	(0.080)	(0.813)	(0.129)	(0.912)
Dummy for Civil War since Independence	0.085	0.865	0.092	0.926
	(0.056)	(0.558)	(0.055)	(0.585)
Constant	0.329***	1.959***	0.383***	2.711***
	(0.089)	(0.785)	(0.086)	(0.805)
Controls	Yes	Yes	Yes	Yes
Area Effects	Yes	Yes	Yes	Yes
F-Test: $\gamma_p = \gamma_c$	8.43***	9.76***	90.34***	49.52***
(p-value)	(0.0104)	(0.007)	(0.000)	(0.000)
R^2	0.681	0.542	0.629	0.4727
Number of Observations	189	179	189	179

Sources: See Table 1 and the main text

Notes: Clustered standard errors at country level reported in parentheses. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level. Region characteristics are population density, distance to the sea, dummies for the presence of rivers, lakes, and access to the sea, a dummy that takes a value of one if the capital city of the country is located in the region, and broad-region dummies (i.e. if the province is located in Central-West Africa or Central and South-East Africa).

Table Appendix 1
African Cross-Region Data Sources

Human capital	
Country	Survey
Angola	Inquerito Prioritario Sobre as Condicoes de Vida dos Domicilios, 1995
Benin	Enquête Démographique et de Santé, 1996
Burkina-Faso	Enquête prioritaire, 1998
Burundi	Enquête prioritaire 1998 - Etude nationale sur les conditions de vie des populations
CAR	Enquête Démographique et de Santé 1994/95
Cameroon	Enquête Camerounaise auprès des Ménages, 1996
Cote d'Ivoire	Enquête à Indicateurs Multiples, 1995
Gambia	Household Education and Health Survey, 1993
Ghana	Demographic and Health Survey 1998/99
Guinea	Enquête démographique et de santé en Guinée 1999
Kenya	Demographic and Health Survey 1998
Malawi	Integrated Household Survey 1997
Nigeria	Demographic and Health Survey, 1993
Rwanda	Enquête Démographique et de Santé 1992
Tanzania	Human Resources and Development Survey 1993
Togo	Enquête Démographique et de Santé 1988
Zambia	Demographic and Health Survey 1996

Catholic Missionaries	
Country	Reference
Angola	Catholic Encyclopedia (1907) L. W. Henderson (1979) Angola : five centuries of conflict C. P. Groves (1975) The planting of Christianity in Africa B. de Vaulx, (1961) A History of Missions.
Benin	Catholic Encyclopedia (1907) Patrick Manning (1982) Slavery, colonialism, and economic growth in Dahomey, 1640-1960.
Burkina-Faso	World Christian Encyclopedia P. Englebert (1996). Burkina Faso : unsteady statehood in West Africa.
Burundi	World Christian Encyclopedia J.P. Chrétien (2003). The great lakes of Africa : two thousand years of history.
CAR	Catholic Encyclopedia (1907) World Christian Encyclopedia B. de Vaulx, (1961) A History of Missions.
Cameroon	Catholic Encyclopedia (1907)
Cote d'Ivoire	Catholic Encyclopedia (1907) World Christian Encyclopedia B. de Vaulx, (1961) A History of Missions.
Gambia	Catholic Encyclopedia (1907) World Christian Encyclopedia B. de Vaulx, (1961) A History of Missions.
Ghana	Catholic Encyclopedia (1907) World Christian Encyclopedia C. P. Groves (1975) The planting of Christianity in Africa W. Ward, (1963) A history of Ghana.
Guinea	World Christian Encyclopedia C. P. Groves (1975) The planting of Christianity in Africa Harold D. Nelson et al. (1975) Area handbook for Guinea.
Kenya	Catholic Encyclopedia (1907)

	World Christian Encyclopedia
	C. P. Groves (1975) The planting of Christianity in Africa
	Robert L. Tignor (1976). The colonial transformation of C. Kenya : the Kamba, Kikuyu, and Maasai from 1900 to 1939
	C. Eliot (1976) The East Africa Protectorate
Malawi	Catholic Encyclopedia (1907)
	World Christian Encyclopedia
Nigeria	Catholic Encyclopedia (1907)
	World Christian Encyclopedia
	E. A. Ayandele (1976). Nigerian historical studies
Rwanda	Catholic Encyclopedia (1907)
	World Christian Encyclopedia
	C. P. Groves (1975) The planting of Christianity in Africa
	R. Nyrop, et al. (1969) Area handbook for Rwanda.
	J.P. Chrétien (2003). The great lakes of Africa : two thousand years of history.
Tanzania	Catholic Encyclopedia (1907)
	World Christian Encyclopedia
	C. P. Groves (1975) The planting of Christianity in Africa
	J.P. Chrétien (2003). The great lakes of Africa : two thousand years of history
	John Iliffe (1979) A modern history of Tanganyika.
	R. Bennett (1963). Studies in East African history.
	J.P. Moffett (1958) Handbook of Tanganyika
Togo	Catholic Encyclopedia (1907)
	World Christian Encyclopedia
	W. Ward, (1963) A history of Ghana.
	Arthur J. Knoll (1978) Togo under Imperial Germany, 1884-1914 : a case study in colonial rule.
Zambia	Catholic Encyclopedia (1907)
	World Christian Encyclopedia
	Robert I. Rotberg (1965). The rise of nationalism in Central Africa; the making of Malawi and Zambia, 1873-1964.
	L. Gann (1964) A history of Northern Rhodesia, early days to 1953.
	A.J. Wills (1985) An introduction to the history of central Africa : Zambia, Malawi, and Zimbabwe.

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