Stairway to Heaven? Human Capital and Religion in Ghana[†]

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Abstract:
Addressing several methodological issues of previous related research this paper finds a strong relationship between individual religious affiliation and human capital of children and adults in Ghana. Allowing religious affiliation to be endogenous, the findings suggest that previous studies may have systematically underestimated the strength of the religion-human capital link. Further testing for the relative importance of supply and demand factors in the differential in human capital across religious affiliation mostly supports the main hypothesis of tastes for human capital related to one's religious affiliation being an important driving force of the observed human capital differentials across religious affiliation.

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1. Introduction

Arguably, pursuing education is one of the major strategies to improve one's livelihood in modern day society. Not surprisingly, therefore, the formalization of this idea by the concept of human capital and its associated analytical framework has been one of the main pillars of several literatures of economics, including labor, development and health economics, over the past several decades (Becker, 1964; Grossman, 1972; Mincer, 1974; Strauss and Thomas, 1995). As is well known, at the heart of the theory is the notion of an individual investing in education in order to increase future earnings, presumably through the skills acquired through education. As such, human capital theory in its "classic" form does not seem to leave much room for other considerations in pursuing education and obtaining literacy skills than the anticipated future earnings. Starting with the seminal work by Barry Chiswick (1983, 1988), however, recent years have seen increased attention towards the potential role of religion in human capital accumulation, especially for the US (Chiswick, 2006; Lehrer, 2006; Neal, 1997). Most of these studies focus on developed countries and frequently also focus on one religion, only.[1]

This study extends previous research in several directions. First, while it is generally accepted that religion has been a main determinant of human capital historically, for example, by motivating people to learn to read the Bible in their own language, especially the (English) first King James Version (Bobrick, 2001) and Luther's (German) translation (Becker and Woessmann, 2009), less attention has been paid to potential asymmetries in the religion-human capital linkage across different religious affiliations—so that some religions may innately be more prone to human capital accumulation than others. I here suggest that it might be useful to distinguish between innately oral and written tradition religions—where this distinction may likely be strongly contextual and, therefore sometimes give rise to somewhat surprising "members" in the two groups of this typology. The context of this study, Ghana, certainly is a case in point here. Second, most of the previous research has focused on developed countries, especially the US. Third, most previous studies treat religious affiliation as predetermined—if not exogenous—when in fact it is a choice variable; additionally (as will also be discussed later), omitted variables bias may be an even bigger concern. Lastly, some previous studies have used

[1] See Iannaccone (1998) for a seminal introduction to the economics of religion more generally, including religious household production and religious human capital.

qualitative data, leading to results based on sometimes rather small samples.[2]

The main contribution of this paper is to help shed additional light on whether—and to which extent—religion plays an important role in an individual's decision to invest in human capital, focusing specifically on the West African country of Ghana. In so doing, the aim is—in contrast with earlier studies—specifically to estimate a *causal* relationship, using two alternative IV-based identification strategies. This will help both academics and policy makers to better understand the motivation behind participating in educational activities, something which is important when wanting to maximize the impact of educational programs on socioeconomic outcomes. If, for example, being a Christian impacts the desire to learning to read the Bible positively, there is scope for increased collaboration between national governments and international organizations on one hand and faith-based NGOs and local churches on the other to promote education and literacy skills acquisition through joint educational programs.

2. Religion in Ghana: An Overview

There are currently three main religions in Ghana: Traditional/Animistic religion, Islam, and Christianity. To set the stage for the empirical analysis each of these are now briefly discussed in turn.[3]

Traditional/animistic religion in Ghana dates back to pre-historic times. Similar to Islam and Christianity, it operates with the concept of the High God (also described as the Supreme Being) but in addition to these also incorporate a number of small gods (or divinities); where the former is not the object of any organized worship, whereas the latter are—organized around shrines and involving priests, congregations, and followership. Additionally, the ancestors occupy a special place, frequently ranking even higher than the High God and the small gods. Here, it is believed that it is only the body that dies whereas the soul goes on to the land of spirits, from where the dead are able to watch over the living—including punishing and

[2] Two recent studies for Ghana both suffer from one or more of these issues. Examining the relationship between Muslim background and views on formal (non-Islamic) education in Ghana using a qualitative (i.e., small sample) approach, Atakpa (1996) found that some Muslim parents do not send their daughters to non-Islamic schools out of fear of indoctrination and/or conversion into Christianity. Focusing on educational attainment among three cohorts of married Ghanaian women, Takyi and Addai (2002) found that women with Christian background are more likely to have received some education than women with Muslim or Traditional/Animist background, though with no statistical differences in completion of higher levels of education—again, implicitly assuming that religious affiliation is exogenous.

[3] This section draws on Nukunya (2003), except where noted.

rewarding the living, as appropriate. In general, Sub-Saharan Africa traditionally has more an oral than a written tradition overall (Bhola, 1990)—this also includes Traditional/Animistic religion in Ghana—where, again, worship involves holy places (shrines) priests and congregations but no holy book(s).

Islam appears to have arrived in Northern Ghana with Moslem Wangara traders in gold and Hausa[4] immigrants trading in kola, most likely beginning before the 17th century. Islam is most prevalent in the three northern regions (Northern, Upper East and Upper West),[5] though there are substantial concentrations in most large cities and towns. In addition to the influence from traders in the north, the Islamic Ahmadiyya sect was introduced by the Indian missionary E. R. Hakeem in the early 1920s in Ghana's Central Region (Assimeng, 2010: 83). Unlike most Islamic denominations the Ahmadiyya sect has always emphasized formal education (as opposed to Koranic education), though their formal schools are limited mainly to the Central Region, where its influence has been greatest, and a few secondary schools in other regions. While clearly differing from Ghanaian Traditional/Animistic religion in many ways, its approval of polygamy is in line with traditional values (as opposed to Christianity's one-husband one-wife requirement). Perhaps surprisingly it appears that Islam—in the Ghanaian context—can be classified as more of an oral tradition religion than a written tradition religion. The reason for this is that the Koran, being used in its Arabic version also among the Muslims in Ghana, is often memorized rather than actually read (Herbert and Robinson, 2001).

The origins of Christianity in Ghana can be traced back to 1471, when the Portuguese arrived as the first Europeans in Ghana—so that Ghanaians had heard about Christianity even before the first churches were formally opened in the early 19th Century. From the beginning, Christianity therefore—unlike Islam—originated in the southern part of Ghana (where it remains relatively strongest to this day). Among the main churches were the Basel Mission (founders of the Presbyterian Church) in 1829, the Methodist Church in 1835, the Bremen Mission (founders of the Evangelical Presbyterian) in 1847, whereas the Roman Catholic Church was established somewhat later, in 1880—though their activities started much earlier than the year these churches were officially established.

Early on the churches had problems getting converts. With the churches, however,

[4] Since then, the Hausa and Islam in Ghana have been strongly related—which suggests omitting tribal association from regressions of human capital on religious affiliation.
[5] Ghana consists of a total of ten regions.

followed—unlike was the case with Traditional/Animistic religion—missionary schools. The importance of missionary schools is perhaps best illustrated by a statement credited to Nana Addo Dankwa, Chief of Akropong, to the Rev. Andreas Riis, a missionary of the Basel Mission: "When God created the world He made books for the White man and fetishes for the Black man. But if you can show us some Black man who can read White man's books, then we will follow you" (Pobee, 1988: 86). In line with the view inherent in this statement, the teaching of the Bible and formal classroom education in missionary schools subsequently were combined by the churches.[6] Additionally, churches would also frequently sponsor clinics and hospitals. Contrary to both Traditional/Animist religion and Islam, both of which can be characterized as orally based religions for the case of Ghana, Christianity clearly has a strong written tradition element. This is seen both from the strong use of English in Bible reading, preaching and singing in Baptist churches but also from the work of SIL and GILLBT, two Christian-based NGOs, who have been working to translate Scripture into local Ghanaian languages since 1962 and 1980, respectively (Herbert and Robinson, 2001).

During the last half century Christianity in Ghana has experienced a large increase in the number of new churches—mainly from increases in the so-called spiritual[7] churches, mostly Apostolic and Pentecostal, rather than the orthodox churches (the Catholic and the mainline Protestant churches: Methodist, Presbyterian (two flavors, stemming from the Basel and Bremen Missions), and Anglican). To put this development into perspective, only 17 such churches were recorded by the end of the 1950s (Acquah, 1958: 150), while by the mid-1970s the number was about five hundred (Assimeng, 2010: Appendix 1)—and likely much higher today.[8]

3. Theoretical Framework and Research Hypotheses

The theoretical framework for this analysis is standard human capital theory, according to which an individual builds up knowledge and skills through education, experience and training (formal and/or on-the-job) and subsequently gets rewarded in the labor market in terms of wages. Specifically, the theoretical framework of this paper builds on the work by Chiswick (1988), who presents a model of the supply and demand for funds for investments in education, and applies it

[6] In turn, this points towards potential issues that needs to be addressed in the estimation strategy.
[7] Sometimes also referred to as "Independent" Churches, meaning independent from the orthodox/established churches.
[8] Assimeng (2010: 245) suggests that "as of now (i.e. 2008), it is speculated that there could be more than 7000 separate religious establishments, mostly within Christendom in Ghana."

to analyses of education differentials across racial/ ethnic groups in the U.S., and Lehrer (1999), who applies this model to analyses of education differentials across religious groups in the U.S.—essentially tailoring that framework specifically to the Ghanaian context by considering the specific factors that affect the supply and demand for education across religious subgroups in Ghana.

The starting point of this framework is the conjecture that the optimal level of schooling for a given individual is that where the demand for funds for investment in education intersects the supply. This is illustrated in Figure 1.

[Figure 1 about here]

In the figure, the demand schedule shows the marginal rate of return derived from each additional monetary unit (here, Ghanaian cedis) in schooling. The negative slope is due to the fact that as more years of schooling are obtained and productivity in the labor market increases accordingly, the cost in terms of foregone earnings also increases. Also, diminishing marginal returns to schooling set in eventually, if nothing else then due to an individual's fixed mental capacity and finite life. Similarly, the supply curve depicts the marginal rate of interest on funds borrowed (or not lent) to finance investments in education. Here, the positive slope is due to an assumption that obtaining additional funds become ever more expensive the more education investments have been undertaken already. In this framework, differences in individual schooling levels arise from individuals facing different circumstances and therefore different optimal supply and demand loci. Specifically, individuals with a demand curve further to the right in Figure 1 obtain more schooling and earn a higher return on their schooling investment, ceteris paribus, whereas individuals with a supply curve further to the right obtain more schooling and earn a lower return on their schooling investment, ceteris paribus.

I will now discuss in turn the main reasons why religious affiliation may affect the relative positions of the supply and demand curves due to affecting marginal costs and marginal benefits and, therefore, create differences in educational attainment for adherents of the three main religions in Ghana. Since I conjecture Christianity as being the "different" religion (and for Ghana, additionally, it is certainly also the "newer" one) by virtue of being based on written tradition, in contrast to both Animist/traditional religion and (though perhaps to a lesser degree) Islam, this discussion will be done in that same order of religious affiliations.

Animist/Traditional Religion

Again, in general Sub-Saharan Africa traditionally has more an oral than a written tradition in general, across all aspects of life (Bhola, 1990). Further, since Traditional (or "Animist") religions in particular are mainly based on oral rather than written tradition, their followers can be expected to be less literate and demand less schooling, ceteris paribus—that is, the demand curve for Traditionalists/Animists will be farther to the left than that of Christians. Additionally, adherents of traditional/animist religions are generally considered pro-natalist, something which has frequently been found empirically, also for Ghana (Doctor et al, 2009). In turn, having more children in the household would imply less human capital per child, so that adherents of animistic/traditional religion can be expected to have both less years of schooling (adults) and be less likely to be enrolled in school currently (children)—once more resulting in a demand curve further to the left. From Table A1 in the Appendix, this also comes out in the data examined here: the total number of children ever born to a woman, at 5.2, is much higher for Traditionalists/Animists than for either Muslims (4.6) or Christians (4.0).

Labor force participation of mothers is also important, since for the same level of fertility, greater female labor force participation implies greater household money income but less parental time with children—where the net impact on child quality of the tradeoff between money income and parental time is not clear a priori, since female employment would lead to less parental time in the household and therefore potentially less demand for human capital for children in general but also more income for consumption, including human capital (Chiswick, 1988: 588). Since the formal sector is relatively small in Ghana, and (subsistence) farming comparatively large, it becomes important to further distinguish between the *types* of employment: Paid employment would seem to potentially affect supply and demand, while unpaid—or at least less paid—work, including farming, herding livestock and/or working unpaid at a family enterprise is more likely to only affect demand. From Table A1 in the Appendix the share of women who have done work for wages or other payment is only 1.6 percent among Traditional/Animist women, 3.1 among Muslim women, and a whole 9.5 among Christian women. A similar pattern holds for the case of making money, incl. in-kind payment, through self-employment (20.5 percent, 38.8 percent, and 43.1 percent, respectively). On the other hand, at 68.3 percent the share of females working on a farm or field or herding livestock is greater among Traditionalist/Animist women than among both Muslim (43.3 percent) or Christian (34.6)

women. The same holds for women working unpaid for an enterprise belonging to a member of the household, where the shares are 7.2 percent (Animist/Traditional), 2.1 percent (Muslim) and 2.3 percent (Christian), respectively. While at the same time Animist/Traditional females work less in terms of hours worked, as a whole, it appears that the composition of female labor force participation would lead to less demand for human capital among adherents of Animist/ Traditional religion.

In sum, there are both supply and demand factors affecting the human capital attainment of adherents of Traditional/Animist religion. Also, while it appears that the net effect is that human capital attainment will be less than for both Muslims and Christians this is, of course, ultimately an empirical question—which is the object of the regression analysis in Section 6., taking into account several potentially important factors affecting human capital accumulation simultaneously.

Islam

It was earlier noted that among Muslims in Ghana the Koran is used in its Arabic version, although it is often memorized rather than actually read (Herbert and Robinson, 2001). Despite *formally* being based on Holy Scriptures Islam may thus—perhaps surprisingly—be argued to be closer to an oral than a written tradition religion in the Ghanaian context. Hence, one would not a priori expect the Muslim population to demand schooling to the same extent as individuals of other beliefs—especially Christians, who have a direct incentive to learn to read, specifically to be able to read the Bible (Bobrick, 2001). In turn, this would tend to leave the supply and demand schedules in Figure 1 unaffected, relative to adherents of Animistic-Traditional religion—while the demand curve would shift to the right, relative to adherents of Christianity.

On the other hand, the Islamic sect Ahmadiyya, unlike the larger Islamic community in Ghana, has always emphasized formal education—even if its formal schools are limited to the Central region and a few secondary schools elsewhere in Ghana (Nukunya, 2003). This may lead to additional demand for education, relative to the benchmark education demand of Animistic/Traditional religion adherents in Figure 1 (though the overall net effect would still seem to be lower levels of human capital investments than that of written tradition religion adherents (i.e., Christianity), ceteris paribus). Additionally, while Islam tend to be considered a pro-natalist religion, it has been found that it is still less pro-natalist than is Traditionalist/

Animist religion in Ghana (Doctor et al, 2009). This is also confirmed by the data here, where from Table A1 in the Appendix, the average total number of children ever born to a Muslim woman, at 4.6 is in-between that for Traditionalists/Animists (5.2) and Christians (4.0). In turn, this would lead to a demand schedule to the right of that of Traditionalists/Animists, though to the left of that of Christians.

On the other hand, it has been found that Muslims in many African countries, including Ghana, are frequently particularly entrepreneurial, especially in trade and commerce—for example, Elkan (1988: 173-74) notes that "Despite the diversity of background, there is one quality that most successful African businessmen have in common. They share the local (and often Muslim) equivalent of the Protestant Ethic that was so important in Europe's nineteenth-century economic development." In turn, this would seem to lead to additional demand for human capital for Muslims, ceteris paribus—at least more than for Animists/Traditionalists, if not as much as for Christians.

However, it has been found that Muslim parents in Ghana may not send their children to non-Islamic schools out of fear of indoctrination and/or conversion into Christianity (Atakpa, 1996), thus mitigating at least part of the earlier mentioned potential positive effects on human capital demand, relative to Traditional/Animist religion (the benchmark). Additionally, it has been found that girls' participation in Muslim areas was very low and that some classes, particularly in the Islamic schools, had no girls enrolled at all—indeed, interviews with officials in these areas revealed that these "felt that the interpretation and practice of the Islamic religion in the community was itself an obstacle to participation and performance of all children, particularly girls" (Sutherland-Addy, 2002: 162). Moreover, out of fear that it might undermine the traditional roles and power relations it is not considered socially right or proper for a woman to work outside the home or to own her own business in Muslim communities of sub-Saharan Africa (Amin and Staub, 2009: 198-199). Again, as was also briefly noted in the discussion of female labor market participation among adherents of Animist/traditional religion, this is confirmed in Table A1 in the Appendix, where Muslim women are seen to work fewer hours than both Traditionalist/Animist and Christian women and to engage far less in money-generating activities than Christian women (though somewhat more than Traditionalist/Animist women). All of these factors, in turn, would seem to lead to a supply curve to the left of that of Christians—though possibly somewhat to the right of Traditionalists/Animists.

Hence, overall, one would not a priori expect a shift from Animist/traditional religion towards Islam to increase the demand for schooling to the same extent as for Christians—though possibly somewhat more than that of Traditionalists/Animists. Nor would one expect the Muslim population to demand schooling to the same extent as individuals of other beliefs, especially Christians, controlling for individual characteristics. Again, this is ultimately an empirical question and will be further explored in Sections 5 and 6.

Christianity

Again, following Bobrick (2001) and Becker and Woessmann (2009) religion may be a main driving force of increasing literacy in terms of urging people to learn to read, so that they can read the holy book(s) of their particular faith (though, again, not Muslims in the Ghanaian case). For Christians this would be the Bible—which, in the case of Ghana, in addition to English (the official / government language in Ghana) also has been translated into several local languages. Among Christians in Ghana, therefore, there seem to be substantial incentives to accumulate human capital, specifically in terms of reading skills. In terms of the supply and demand framework depicted in Figure 1, that would imply a demand schedule for Christians to the right of that of both Traditionalists/Animists and Muslims.

Additionally, in Sub-Saharan Africa and elsewhere Christianity is generally considered a "modern" religion (Stark, 2005), including being less pro-natalist than other (earlier) religions not least through more openness to the use of contraception, something which has also frequently been found empirically (Doctor et al, 2009). In turn, having less children in the household would imply a demand schedule further to the right and therefore more human capital per child—so that adherents of Christianity can be expected to have both more years of schooling (adults) and be more likely to be enrolled in school currently (children).

The patterns in female labor supply support this further: while female labor supply, in terms of total hours worked, is highest among Christian females the *composition* of their employment favors formal/wage and other paid employment, which would seem to secure more resources for consumption, including human capital.

Hence, a move from Animistic/Traditional religion (or Islam) to Christianity—which is what Ghana has experienced since Christianity emerged with the slave trade coming to Ghana in the 15th century—would seem to unambiguously lead to greater investments in human capital on

average, ceteris paribus.

Additional factors affecting human capital investments

A number of other factors, however, are potentially important determining factors in the religion-human capital relationship. Perhaps most importantly, the presence of religious / missionary schools in the community may affect human accumulation, though presumably still via individual religious affiliation. For example, one would probably not expect an individual to switch from Islam to Christianity merely to attend missionary school (though this possibility will still be addressed by the empirical strategy). So, perhaps the presence of religious schools might better be seen as an augmenting factor, i.e. as an additional effect to that of individual religious affiliation.[9]

Among the other—non-religious—factors perhaps most prominently is that of gender, where one would expect females in Ghana to have less human capital than males (Chao, 1999; Sutherland-Addy, 2002). Ethnicity is also potentially important, due to differences in access to and/or preferences for education historically across the different tribes in Ghana (Barr and Oduro, 2002; Foster, 1962). Socioeconomic background, perhaps most importantly parental education, is also important. Educated parents are likely to instill in their children relatively stronger preferences for education, as well as directly supporting their children with their human capital accumulation, both financially and through the help with home work—also known as intergenerational transmission of human capital (e.g., Currie and Moretti, 2003). Due to a mix of supply (quantity) and quality factors, with there being both more schools in urban areas and these schools also being of a better quality than in rural areas, rural-urban location is an important variable in this relationship; the same goes for region of residence and the cluster fixed effects, and for much of the same reasons, too. Regions also capture economic and aggregate religious conditions to some extent, however: Muslims are predominantly located in the Northern region, which is also one of the poorest regions in Ghana. Hence, if region is not included as a mediating (economic) factor, some of the estimated association in the religion-human capital relationship might arise from a mix-up with a poverty-human capital link.

[9] As will be discussed below, the identification strategy will still try to accommodate the possibility that there might be a direct effect on individual human capital from the presence of religious / missionary schools in the area, however, by including cluster fixed effects.

Research questions and hypotheses

In this context, four research questions are explored. First, does human capital in terms of years of schooling (for adults) and current school enrolment (for children/youth of school age) vary systematically with religion; more specifically, have individuals with a written tradition (here, Christian) religious background completed more years of schooling and/or are they more likely to be enrolled in school than individuals from relatively more oral religions (here, Traditional/Animistic religion and Islam), controlling for other factors? Second, if so, is the relationship between years of schooling and religion and other mediating factors robust to endogenizing religion, that is, to taking the selection into individual religious affiliation into account; in other words, is the relationship between religious affiliation and human capital causal? Third, as a robustness check, is the relationship between religious affiliation and human capital driven by one of the two oral tradition denominations—i.e., Traditional/Animistic religion and/or Islam? Fourth, what is the relative role of supply and demand in driving any observed differences in human capital?

4. Data and Descriptive Analysis

The Ghana Living Standards Survey is a nationally representative multi-purpose household survey. The analysis here examines the GLSS 4, carried out in 1998/99. The household survey contains information on individual educational attainment and religious affiliation, as well as information on background variables such as age, gender, tribal association/ethnicity, parental educational attainment, and geographical location of residence (including rural-urban location and region of residence), which are also important factors in analyses of human capital processes.

Starting with the dependent variables, the information on educational attainment from the GLSS 4 include the highest level completed, ranging from "none" through "university." It is based on responses to the question: "What was the highest level completed?" which was asked to individuals, who had previously responded "yes" to having ever attended school. These levels are then converted into years of schooling; for example, primary school completion corresponds to six years of schooling. Current school enrollment is based on the two questions "Did (NAME) attend school/college at any time during the past 12 months?" and "Has (NAME) left school now?" combined, so that only children who attended during the past 12 months but have

not left school yet are counted as enrolled. Lastly, for the Mincer regressions the dependent variable is the natural logarithm of the hourly wage rate for the person's main occupation (if any); it is calculated as the average hourly earnings, including all monetary and (monetized) non-monetary payments.

Moving to the explanatory variables, the most important for the analyses here is religious affiliation. The measure of religious affiliation includes the categories "Animist/Traditional," "Muslim," "Christian" (comprising the subgroups "Catholic," "Anglican," "Presbyterian," "Methodist," "Pentecostal," "Spiritualist," and "Other Christian"), "Other Religion," and "No Religion." It is based on the question: "What is (NAME's) religious denomination?" and is calculated as a set of dummy variables. Again, the main distinction is between oral (Traditional religion/Animism and Islam) and written (Christianity) tradition religions, with sensitivity analyses examining the robustness of results to decomposing those two main groups into their component parts. So as to focus on the main religions—where the strongest predictions are also possible—individuals with "Other Religion" and "No Religion" are excluded from the sample (see the discussion of sample restrictions below for details).

Among the economic control variables, parental education, proxying family background, including socioeconomic status, arguably may be an important determinant of individual educational attainment—again, essentially capturing potential intergenerational transmission of human capital (Currie and Moretti, 2003). This is captured by a series of dummy variables for maternal and paternal educational attainment: no education, primary, middle/junior secondary, secondary and above, technical-vocational, other education, and don't know (one set of dummies for the mother and one set of dummies for the father).

Additional control variables include geographical variables, namely a dummy variable for urban location, a set of dummies for region of residence, and community fixed effects. The objective here is to control for areal characteristics at the lowest level of aggregation possible, so as to render the identification strategy valid—in particular, it is possible that the religious affiliation shares may pick up "something else" from the community that also may at the same time affect human capital accumulation (for example, the presence of religious schools in the local community). I therefore include community fixed-effects for the OLS and the second IV specification. For the first IV specification, however, since the community fixed-effects essentially will be "washed out" due to perfect collinearity between the religious affiliation

community shares and the community fixed-effects, I here include dummy variables for rural-urban location and region of residence.

Other variables related to human capital production not already captured by the previous groupings include the age, gender, and ethnicity/tribal association of the individual. Age controls for where the individual is in the life cycle—for example, younger individuals are expected to have less years of schooling than older ones. Age enters with a linear and a quadratic term to allow for non-linearities. Further, females tend to receive less schooling in Ghana than males (Chao, 1999), thus calling for inclusion of a female dummy variable, as well. Lastly, educational attainment may be systematically related to cultural background, as reflected by ethnicity/tribal association of an individual. To take this into account, dummies for ethnicity/tribal association are included. Cultural and contextual factors, including norms and traditions, are also captured by the variables for urban residence and region of residence, the cluster fixed effects and the variables for parental education. While it would be preferable to include both parental education and parental religion, the dataset only includes information on the former. Due to the substantial association between individual human capital and religious affiliation in Ghana, as revealed both by Table 1 and the subsequent empirical analyses, however, including parental education at least partially controls for the potential intergenerational transmission of religious affiliation.

The age range of individuals in the analysis sample when examining determinants of completed years of schooling is a concern—specifically, one should restrict the sample to individuals in ages where most people in a given country have already completed their formal education. For the case of Ghana, 22 years of age appears as a reasonable lower age cut-off: this will give people an opportunity to have completed not only secondary school but additionally to have obtained a bachelor's degree (only few Ghanaians go on to tertiary education beyond a bachelor's degree), while at the same time still preserving a reasonable amount of observations for the analysis proposed here. As the upper age cut-off is chosen 64 years of age, yielding a total of 9,726 observations. Some individuals report having completed "other education." Since it is not clear what "other education" amounts to in terms of years of schooling, these observations are dropped; this leads to a reduction in the sample size of 16 observations. So as to focus the analysis on the three main religions in Ghana—Traditional/Animistic religion, Islam and Christianity—individuals reporting "other religion" (12 observations) and "no religion" (607

observations) as their religious affiliation are excluded, as well. Some explanatory variables are missing for some observations, which cause a further drop in the sample size of 24 observations in arriving at the final analysis sample of 9,067.

The estimation sample for current school enrollment is restricted to individuals 6-18 (both included) years of age. The lower cut-off is chosen since the official school start age is 6 years in Ghana (UNESCO, 2006), while above 18 years of age current school enrollment decreases dramatically—leading to an initial sample for the analysis of current school enrollment of 9,339 observations. Similar to the years of schooling analysis, so as to focus the analysis on the three main religions in Ghana—Traditional/Animistic religion, Islam and Christianity—individuals reporting "other religion" (12 observations) and "no religion" (284 observations) as their religious affiliation are excluded, as well. Some explanatory variables are missing for some observations, which cause a further drop in the sample size of 62 observations in arriving at the final analysis sample of 8,981.

Lastly, the analysis of returns to schooling across individual religious affiliation is based on the subsample of the 22-64 years olds reporting having done work for which a wage or any other payment was received and which at the same time also report the amount and the time unit, so that an hourly wage rate can be calculated. The estimation sample here therefore contains 6,632 individuals 22-64 years of age. About 80 percent of the sample has a written tradition (Christian) background, so that about 20 percent of the sample has a oral tradition (Animist/Traditional or Muslim) background—with the latter group comprised of about two thirds with a Muslim background and about a third with an Animist/Traditional background (Appendix Tables A2 and A3).

To get an initial grasp of the data and the association between human capital and religion, average years of schooling are depicted across the three different individual religious affiliations in Table 1. From the Table, Christians have both completed more years of schooling and are more likely to have their children currently enrolled in school (7.1 years of schooling and 80 percent current enrollment) than both Muslims (3.2 years of schooling and 66.3 percent current enrollment) and Traditionalists / Animists (1.1 years of schooling and 52.2 percent current enrollment). Splitting across gender, these patterns are repeated—but now with the difference that males systematically have more years of schooling than females and boys are more likely to be currently enrolled than girls, across all main religions. This gender gap in educational

attainment and current enrollment supports a conjecture of Ghana having more traditional gender roles (Chao, 1999). Further, it is clear from Table 1 that the gender gap in human capital is much higher—in relative terms—among oral tradition adherents than among written tradition adherents: among Christians, females have 40.9 percent less years of schooling than males, while this gap is 72.2 percent among Animists/Traditionalists and 63.3 percent among Muslims. Similarly, the enrollments gender gaps are 5.7 percent among Christians, 12.1 percent among Animists/Traditionalists and 18.8 percent among Muslims—where this last finding seems to lend support to the previously discussed findings/conjectures in Atakpa (1996) and Sutherland-Addy (2002) substantiating why religion per se may be a reason why fewer Muslim children, especially girls, are sent to (non-Koranic) school, in turn creating both a gap overall as well as a gender gap in completed years of (non-Koranic) schooling.

[Table 1 about here]

5. Estimation Strategy and Related Issues

The theoretical framework discussed previously suggests that religion can directly affect both educational attainment and current school enrollment through the relatively higher demand for schooling by Christians than by other—oral tradition—religions and also suggest additional factors that are important for human capital accumulation and therefore should be included in the empirical specifications.[10] The empirical analysis will examine this relationship, using linear approximations of the optimal human capital equation, where human capital is measured as years of schooling completed for adult and current school enrollment status of children and youth.

One potentially important econometric issue is that religious affiliation may be endogenous. While simultaneity may be one motivation for this, particularly for the younger part of the sample (since the timing of the religious affiliation decision for this part of the sample lies closer to the decision regarding human capital investments), the main concern is possible omitted variables bias. Religious and other preferences, for example, are unobserved and at the same time also main determinants of both formal educational attainment and/or current school enrollment status and religious affiliation—thus possibly generating omitted variables bias.

To address this issue, I pursue an instrumental variables (IV) strategy using the share of

[10] At a minimum, if these factors are not included, one may systematically over- or underestimate the strength of the religion-human capital relationship.

the population in the area with a certain religious belief—so that Animist/Traditional religious affiliation is instrumented by the share of the population in the area subscribing to this belief, and similarly for Christianity and Islam. The intuition behind this instrument is that the share of the population in an area of a given religion effectively measures the religious market density of that religion (Gruber, 2005) and therefore would seem to also affect religious affiliation at the individual level. A potential issue here is that there may be something about the community that is systematically correlated with both human capital accumulation and the presence (or non-presence) of various religions in the community. For example, as was also discussed in the conceptual framework, the community population religious affiliation shares might have a direct effect on human capital accumulation through the supply of religious schools and education programs in the community. To take this into account, one can include fixed-effects at the level of the local area.[11] Doing so, however, renders the identification strategy infeasible, since the instruments and the fixed-effects are perfectly correlated. That is, the instruments will simply "drop out" of the estimation.

It is, however, likely that different types of individuals will respond differently to the religious environment in the community. In that case a valid set of instruments would be the interactions of the originally proposed instruments (i.e., the share of the population in the area subscribing to a certain religion) with exogenous individual characteristics. For example it has been suggested that Christianity might be considered a "modern" religion (Stark, 2005), so that—applying a somewhat alternative version of the modernization or secularization hypothesis—if parents are educated, their children will be more likely to be Christian. Similarly, individuals with less educated parents are more likely to be affiliated with Traditional / Animist religion. At the same time, the religious environment might interact with these effects—thus leading to inclusion of the interactions between parental education and religious shares. For example, parental education would seem likely to have a larger effect of an individual being Christian in a predominantly Christian community than in a predominantly Traditional religion / Animist community. These interactions should have no direct effect on the outcome variables—especially conditional on the community fixed effects and the individual characteristics from the interactions, which are also included as main effects—and will not be correlated with

[11] While this formally only controls for time *in*variant community fixed-effects, there still may be community factors present that potentially vary systematically over time and also affect both individual religious affiliation and individual human capital accumulation. Without panel data, however, this issue cannot be addressed.

unobservables, such as preferences or innate ability; and they will also not be "washed" out by the cluster fixed effects.[12]

Even if the instrumental variables strategy appears well grounded for this application, it would seem potentially useful to use an alternative, additional estimation strategy, to strengthen any conclusions even further. One particularly relevant method here is that of matching, which matches treatment and control groups on observables and then estimates the treatment effect as the mean difference between the average effects between the matched samples (Rosenbaum and Rubin, 1983).[13] "Treatment" in the application here refers to religious affiliation—so that written tradition religious affiliation will be taken to indicate that an individual is a member of the treatment group, while oral tradition religious affiliation will be taken to indicate that an individual is a member of the control group. For this application, I use Mahalanobis covariate matching, which has the attractive property that it reduces differences in covariates within matched pairs in all directions (Imbens, 2004: 15) using 3 and 5 neighbors, and also implementing the robust analytical standard errors proposed by Abadie and Imbens (2006) to correct for possible heteroskedasticity, as well as imposing common support (as suggested by Rosenbaum and Rubin, 1983).

To examine whether a possible gap in human capital accumulation between Christians and non-Christians is driven either by one or more of the Christian denominations and/or by differences in the human capital achievement of adherents of Traditional/Animist religion and Islam, respectively. To examine this further, a sensitivity analysis separates oral tradition religion into Traditional/Animist religion and Islam.

6. Results

This section reviews the results from the multivariate models, focusing on the results pertaining

[12] Even so, there is a possibility that using community fixed effects might "over-control" in that the identification of the religion-human capital relationship is identified purely from the differences between individuals within the community—whereas if not including cluster fixed effects the identification would use differences between individuals across communities. In that sense one might argue that the identification of the individual level effect (self-selection) is actually weaker—in return for solving a potential non-random program placement effect at the community level (here, the possibility of direct effects from the instruments due to the presence of religious schools, for example). It therefore seems that what should matter for the overall conclusion vis-a-vis the potential religion-human capital relationship examined here is the sum total of all the evidence, rather than the estimates from any one individual set of regressions.

[13] For a recent review of the estimation of average treatment effects, including matching methods, see Imbens (2004).

to individual religious affiliation.[14] I will start out by first determining the preferred estimation method—where the two "candidates" are OLS and 2SLS—and then discuss the results concerning the religion-human capital relationship for the two measures of human capital, years of schooling and current enrollment, in turn. To examine whether the results are driven primarily by one of the two oral tradition religions or by one or a few of the several written tradition (i.e. Christian) denominations considered here, two sensitivity analyses are also performed. Lastly, I then attempt to "open up" the data a bit more, by trying to determine whether supply or demand factors are the most important for determining the observed human capital differentials by estimating the returns to education across the different religions in Ghana.

Starting with the main analysis, the results from specification tests indicate that the use of 2SLS is preferable for this application for both the years of schooling (Table 2) and the current school enrollment analysis (Table 3). First, the results from the F-tests of the joint significance of the identifying instruments from the first stage of the 2SLS procedure indicate that the identifying instruments are highly correlated with the potentially endogenous variables, with significance levels of 0.1 percent or better in all cases and all also with numerically large F-statistics, for the most part—thus indicating that weak instruments is not an issue here (Bound, Jaeger and Baker, 1995). Second, Wu-Hausman tests indicate that individual religious affiliation is mostly endogenous to individual educational attainment, by rejecting exogeneity at conventional levels of statistical significance (except for males, in some cases). In turn, this confirms that religious affiliation would seem to be more appropriately treated as a choice variable, at least in the empirical application here—so that the IV results are preferred over OLS.

[Table 2 about here]

[Table 3 about here]

Estimates from the second-stage completed years of schooling and current school enrollment regressions from the main analysis focusing on the two main groups of written and oral tradition religion—that is, aggregating all Christian denominations and also combining Traditional/Animistic religion and Islam into one group—are presented in Table 4. The table shows estimated parameters and standard errors with 2SLS and OLS results presented next to each other for each of the two human capital measures to facilitate comparison. The overall patterns of association between religious affiliation and both years of schooling and current

[14] The full set of results tables is available upon request.

school enrollment from the descriptive analyses hold up here in the multivariate analysis, as well. In other words, even when endogenizing individual religious affiliation and controlling for factors related to gender, age, ethnic/tribal background, geographical location, and (for two of the specifications) cluster fixed-effects, the religion-human capital patterns from Table 1 still remain. At about 3.5 years for the full sample for the first IV specification (using religion shares but not cluster fixed effects) the oral-written tradition religion (or, similarly, Christian-non-Christian) years of schooling differential is substantial. To put this into perspective, primary school in Ghana (as in most other countries) is six years, so that the average oral-written tradition religion years of schooling gap amounts to more than half of a completed primary education. Further, the gender gap is small to non-existent (certainly not statistically differently so).

[Table 4 about here]

Again, while the specification without cluster fixed effects may yield a stronger identification of the individual religion-human capital relationship, there might be reasons why there could be indirect effects from the instruments for this specification for example due to the presence of religious schools in the area. Including cluster fixed effects (and therefore now using instead community religion shares interacted with individual characteristics as identifying instruments instead of the shares per se, lest the instruments be "washed" out by the cluster fixed effects due to perfect collinearity) for the second IV specification, the oral-written tradition religion years of schooling differential, at about 5.2 years for the full sample, is now close to an entire completed primary education. Here again the gender gap is both small in magnitude and not statistically significant.

Similarly, current school enrollment strongly favors children with a written tradition (Christian) background over children with an oral tradition (Animist/Traditional or Muslim) background. For the full sample children with a Christian background are about 17 and 20 percentage-points more likely to attend school for the two alternative IV specifications, respectively. Unlike the case of years of schooling completed, however, there is a religious affiliation gender gap in current school enrolment, favoring girls—so that girls with a written tradition/Christian background have about a 22-24 percentage-points higher probability of currently attending schools than girls from an oral tradition background—whereas the difference for boys, though also here substantively large, at about 11-13 percentage points, is not statistically significant. One way to interpret this is that Christianity, which may be considered a

"modern" religion (Stark, 2005), acts as a catalyst to help close the gender gap that can be found in Ghana, where boys (males) historically have been favored over girls (females) (Chao, 1999; Sutherland-Addy, 2002).[15]

To check the robustness of the previous results I also estimate the religious affiliation human capital premium using matching on observables as an alternative identification strategy. Table 5 presents the results from matching on observables, using Mahalanobis matching and incorporating the heteroskedasticity-consistent analytical standard errors proposed by Abadie and Imbens (2006), and reveals that the results are consistent with the previous results overall. There are some differences in magnitude and statistical significance, of course. While the magnitude of the matching estimates for years of schooling are mostly roughly on par with the similar OLS estimates (and therefore again lower than the IV estimates), the estimates are somewhat larger for the specification using cluster FEs, especially for males. The matching estimates for current enrolment status, on the other hand, are mostly somewhat lower than the similar OLS estimates and are also mostly not statistically significant, except for the specification using cluster FEs. An issue with the latter specification, however (both for the case of years of schooling and current enrolment status) is that there is a large drop in the sample size when including cluster FEs, due to the cluster FEs perfectly predicting religious affiliation in several cases. Taking this additional evidence as a whole, however, the results support the previous findings of consistently higher human capital levels for adherents of written tradition religion, both in terms of years of schooling completed and current school enrolment.

[Table 5 about here]

In turn, the combined results for both years completed and current enrollment from all of these estimation methods are consistent overall with Takyi and Addai (2002), who found women with Christian background in Ghana to be more likely to have received some education than women with Muslim or Traditional/Animist background[16] (again, in that study implicitly assuming that religious affiliation is exogenous). Additionally, the results here seem to imply the lack of a strong religious affiliation gender gap in years of schooling completed—which is what one might expect if Christianity can be interpreted as a "modern" religion (Stark, 2005), in contrast to both Animist/Traditional religion and Islam, where more traditional gender roles (and

[15] From Table A2 in the Appendix it can be seen that for this dataset males have almost double the amount of years of schooling completed of females: about 8 years versus about 4.6 years, respectively.
[16] Though with no statistical differences in completion of higher levels of education.

asymmetric intra-family division of labor) can be expected.

Again, this analysis may be viewed as somewhat crude, by combining Traditional/Animist religion and Islam into one group, oral tradition religion. Next, I therefore perform a sensitivity analyses, separating oral tradition religion into Traditional/Animist religion and Islam. Table 6 reveals that there is a substantial human capital gap between Islam and Traditional / Animist religion (the reference group) for the first IV specification for both years of schooling and current school enrollment—for the full sample about 3.6 years and about 24 percentage-points, respectively. For the second IV specification, the gap is seen to now be both small in magnitude and also not statistically significant. In turn, this indicates that the results are not too sensitive to grouping Traditional/Animist religion and Islam into one group, oral religion, either. Also, when comparing the relative magnitudes of the religion coefficients for the female and the male subsamples, the gender gap is far higher in relative terms both in terms of years of schooling completed and current school enrollment for adults and children with a Muslim background than with a Christian background.

Again, while these results are still consistent with those of Takyi and Addai (2002) discussed previously, they also are in line with those of Atakpa (1996), who found that some Muslim parents did not send their daughters to non-Islamic schools out of fear of indoctrination and/or conversion into Christianity—though with the added twist that the human capital gap between Muslims and Christians is about the same as that between Traditionalists / Animists and Christians for the second IV specification (though, again, that strategy relies on some potentially fairly strong assumptions, being identified off of within-cluster religious affiliation differences rather than exploiting the between-community variation (such as the first IV strategy does)).

[Table 6 about here]

Despite possible methodological issues, including quibbles regarding instruments and so on, the previous analysis overall provides solid evidence establishing a positive human capital gap favoring adherents of a religion based on written tradition—here, specifically Christianity—over adherents of a religion based on oral tradition—here, specifically Traditional/Animist religion and Islam—in the Ghanaian context. But why is there a gap; that is, is it possible to test the relevance of the various conjectured pathways in the conceptual framework discussed previously? And, ultimately, perhaps to test whether differences in supply or demand conditions

are dominant in explaining the observed patterns? While this is data permitting, of course, a few of the potentially underlying causes from the conceptual framework can be examined for this dataset.

First, if returns to human capital can be estimated, it is possible to at least add one piece of evidence to a possible answer to these questions, thus going a bit into the "black box" of what drives the differential human capital demand determined above. Specifically, from Figure 1, if observed human capital levels are high and returns also are high, we may conclude that demand forces are relatively more important in determining human capital outcomes. Similarly, if observed human capital levels are high but returns are relatively low, we may conclude that supply forces are relatively more important in determining human capital outcomes. Lastly, if observed human capital levels are high but returns are similar across groups, we may conclude that supply and demand forces are equally important in determining human capital outcomes.

One contender for returns to human capital is labor market earnings or wages. Since earnings and labor supply information is available from this dataset so that hourly earnings can be calculated, I therefore next estimate OLS regressions of hourly earnings by religious affiliation and gender. The results are shown in Table 7. From the Table, the estimated coefficients are roughly comparable across written and oral tradition religion for the full sample—thus indicating that supply and demand forces are equally strong overall in determining the observed human capital differential across religious affiliation. Disaggregating oral tradition religion into Animist/Traditional and Islam, however, reveals that while there is virtually no (economic) return to education adherents of Animist/Traditional religion overall[17], the returns are substantial to Muslims (though somewhat smaller than the returns to Christians): 4.2 percent per year of schooling (as compared to 5.4 percent for Christians). Moreover, while males have slightly higher returns for both religions, the differences are rather small in substantive terms—and certainly not statistically significant. It therefore appears that while supply and demand forces may exert similar pressure on human capital demand overall, supply forces are much stronger determinants of the lower human capital of Muslim women and children.

In turn, this supports the main hypothesis of tastes for human capital related to one's

[17] But with a substantial return to educated females here—though this group turns out to be a very select group, indeed, comprising only 16 females with any education completed, so that this is a very select—and small!—group, indeed. Any inference here is shaky, at best; suffice it to say that for the few females with any education here, the returns are large—though possibly owing to the fact that these females are very unusual to begin with, in terms of personal characteristics such as drive, motivation, and ability.

religious affiliation—as well as the fear of losing one's faith, or the faith of one's children—being an important driving force of the observed human capital differentials across religious affiliation rather than just the consideration of pure economic returns.

[Table 7 about here]

In sum, the combination of the results established so far can be summarized in two main stylized facts, namely (1) Educational attainment is highest for Christians, lower for Muslims, and lowest for adherents of Animist/Traditional/ religion; with the human capital gender gap (favoring boys/males) being much greater for both Muslims and adherents of Animist/Traditional/ religion—and this result is causal, being estimated using an instrumental variables strategy with two alternative—and arguably fairly reasonable, if not perfect, exclusion restrictions; and (2) the return to Christians being somewhat larger than that to Muslims, though not by much—and with a much smaller gender gap than was the case for the human capital stock.

Returning to the analytical supply-demand framework, which was illustrated graphically in Figure 1, these two main stylized facts come together within that framework as follows. First, both the demand curve and the supply curve of funds for education investments for Christians are located to the right of those of both adherents of Animist/Traditional religion and of Islam—and in that order, so that Islam becomes the intermediate case, with adherents both having more human capital (for both children and adults) and also facing higher returns than adherents of Animist/Traditional religion. Furthermore, the combination of the narrow difference in returns between female and male Muslims and the large difference in human capital stocks (favoring males/boys) implies that the supply factors are the most important in explaining the lower female human capital accumulation among adherents of Islam—again consistent with the findings in Atakpa (1996) and Sutherland-Addy (2002), who found that some Muslim parents did not send their daughters to non-Islamic schools out of fear of indoctrination and/or conversion into Christianity.

7. Conclusion

It has been argued that historically, religion has been associated with economic success. Perhaps most well known among the suggested pathways is Weber's "Protestant ethic," presumably explaining the historical differentials between Protestant and Catholic economic success. I argue

here—focusing explicitly at human capital accumulation as the criterion for "economic success"—for an even more fundamental religious distinction, namely between oral and written tradition religions and also address several issues from previous studies.

Again, since the evidence here suggests that the IV specification (where individual religious affiliation is treated as endogenous) is preferable over OLS in turn this suggests that previous studies may have systematically underestimated the written-oral tradition human capital differential. Indeed, for the application here the difference between IV and OLS is frequently more than 3 years of schooling for adults and more than 10 percentage-points for children and youth—with the IV estimate being double that of OLS, and sometimes much bigger, in several cases.

Additionally, the evidence here seemed to suggest that supply and demand forces are equally strong overall in determining the observed human capital differential across religious affiliation. For Muslim girls and women, however, the evidence indicated that supply forces were relatively stronger, consistent with earlier findings that some Muslim parents in Ghana frequently do not send their daughters to non-Islamic schools out of fear of indoctrination and/or conversion into Christianity (Atakpa, 1996; Sutherland-Addy, 2002).

While the results here confirm previous findings on the relationship between religion and human capital, they also extend previous results. For one thing, previous studies have mainly examined the relationship between main religions and human capital and have not distinguished between different sub-groups within the main religions—most notably the many denominations within Christianity—that is done here. Previous studies also typically do not allow religious affiliation to be endogenously determined. Again, the results here suggest that this implies that previous studies have likely systematically underestimated the oral-written tradition religion human capital differential—based on the results here by as much as two years or about twice the OLS estimate.

On the policy-side, the results here suggest that there is scope for increased collaboration between national governments and international organizations on the one hand and faith-based NGOs and local churches on the other to promote education and literacy skills acquisition through joint educational programs. This is in line with current undertakings to incorporate religious and spiritual issues more in development work, for example with international agencies such as the World Bank—the Bank's establishment of Development Dialogue on Values and

Ethics, a unit specifically dealing with issues related to the intersection of faith and development being a case in point. The results here thus suggest that to help improve human capital among developing nations, such efforts may fruitfully be increased even more in the future. Especially that finding that supply factors seem more important than demand factors for Muslim girls suggests that public policy might want to engage in information campaigns specifically regarding the usefulness of educating of girls, the widespread positive effects of which have been documented elsewhere (Schultz, 2002), especially among the Muslim population.

At the same time, however, there is still much to be learned about the religion-human capital link. In particular, future research may want to extend these analyses to other countries. If such research should confirm the results here, most notably that religion should be treated as endogenous and that the resulting religion-human capital relationship resulting from doing so is higher than the one obtained from OLS, then the results from previous studies should be treated with caution, since these have most likely underestimated the strength of the religion-human capital link.

Additionally, future studies may wish to explore the religion-human capital link in other directions, by examining other measures of religion. This is clearly data dependent, however. The data examined here provided only a measure of religious affiliation but it might be interesting to extend the analyses to look at measures of religious practice—for example, church attendance. While the data examined here did not contain this type of information, future surveys—for Ghana and elsewhere—may want to collect such information. More generally, it would be preferable if future studies would be able to examine data that were purposely collected for the analysis of issues related to the study of religion, preferably including several measures of religious affiliation, religiosity and/or the strength of religiosity (for example, measures of the intensity of church attendance, prayer and/or other spiritual practices). This, in turn, would help us understand the religion-human capital link better still.

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Table 1. Adult Years of Schooling Completed and Child & Youth Current School Enrollment across Religious Affiliation: Full Sample and Across Gender

	Adult Years of Schooling Completed			*Child & Youth Current School Enrollment*		
	Full sample	*Females*	*Males*	*Full sample*	*Females*	*Males*
Written tradition/Christian	7.1	5.5	9.3	0.800	0.776	0.823
Catholic	6.2	4.5	8.1	0.804	0.793	0.816
Anglican	8.9	7.4	11.3	0.803	0.747	0.862
Presbyterian	8.6	6.9	10.7	0.802	0.756	0.849
Methodist	7.9	6.2	10.3	0.8	0.753	0.849
Pentecostal	6.9	5.3	9.2	0.795	0.781	0.808
Spiritualist	4.9	3.3	8.0	0.752	0.744	0.761
Other Christian	7.3	5.7	9.4	0.808	0.789	0.826
Oral tradition/Non-Christian	2.5	1.3	3.9	0.623	0.561	0.676
Animist/Traditional	1.1	0.5	1.8	0.522	0.485	0.552
Muslim	3.2	1.8	4.9	0.663	0.590	0.727
Total (across all religious affiliations)	6.1	4.6	8.0	0.765	0.736	0.792
N	9,067	5,164	3,903	8,981	4,459	4,522

Notes: The shares of the different groups can be seen from Tables A1 in the Appendix. Estimations incorporate survey weights.
Source: Ghana Living Standards Survey 4 (1998/99).

Table 2. Specification Tests for 2SLS Adult Years of Schooling Completed Regressions: Predictive Power of Identifying Instruments (First Stage), Endogeneity (Second Stage) and Overidentification (Second Stage)

	IV Spec 1: Religious affiliation shares in community (no cluster FE)			*IV Spec 2: Religious affiliation shares in community X individual characteristics (with cluster FE)*		
	Full sample	*Females*	*Males*	*Full sample*	*Females*	*Males*
(1) Main analysis: Oral vs. written tradition religion						
(i) Predictive power						
Written tradition/Christian	406.28	388.58	283.19	123.72	112.09	8.25
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Oral tradition/Non-Christian	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
(ii) Wu (1973)-Hausman (1978) endogeneity test	5.17	9.69	0.72	5.55	8.96	1.75
	[0.024]	[0.002]	[0.396]	[0.019]	[0.003]	[0.186]
(iii) Sargan (1958)-*Hansen (1982) overidentification test*	NA: Exactly identified	NA: Exactly identified	NA: Exactly identified	15.20	8.83	12.15
				[0.295]	[0.786]	[0.433]
(2) Sensitivity analysis I: Decomposing oral tradition religions into individual denominations						
(i) Predictive power						
Christian	217.92	195.97	163.98	149.06	69.46	10.46
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Animist / Traditional	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Muslim	351.41	402.95	211.38	249.17	107.14	6.77
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
(ii) Wu (1973)-Hausman (1978) endogeneity test	13.04	15.10	4.72	4.36	4.56	1.79
	[0.000]	[0.000]	[0.010]	[0.013]	[0.011]	[0.169]
(iii) Sargan (1958)-*Hansen (1982) overidentification test*	NA: Exactly identified	NA: Exactly identified	NA: Exactly identified	29.73	30.18	24.18
				[0.279]	[0.217]	[0.451]
(3) Sensitivity analysis II: Decomposing both oral and written tradition religions into individual denominations						
(i) Predictive power						
Catholic	193.23	173.35	68.56	5.25	2.94	3.56
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Anglican	61.11	30.70	10.67	26.29	24.77	13.39
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Presbyterian	195.66	109.39	50.96	89.88	28.47	5.63
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Methodist	118.08	34.90	48.14	31.47	4.89	4.36
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Pentecostal	181.77	159.41	62.62	5.51	4.31	3.86
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Spiritualist	48.40	43.41	15.36	18.77	7.64	6.01
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Other Christian	220.29	182.70	43.07	7.41	5.27	6.10
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Animist / Traditional	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Muslim	99.22	109.19	61.32	182.82	131.92	7.96
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
(ii) Wu (1973)-Hausman (1978) endogeneity test	4.68	4.61	3.55	2.44	1.70	2.33
	[0.000]	[0.000]	[0.001]	[0.014]	[0.097]	[0.019]
(iii) Sargan (1958)-*Hansen (1982) overidentification test*	NA: Exactly identified	NA: Exactly identified	NA: Exactly identified	103.01	93.88	93.32
				[0.345]	[0.571]	[0.559]
N	9,067	5,164	3,903	9,067	5,164	3,903

Notes: Terms in brackets are the p-values of the corresponding test-statistic. Estimations incorporate survey weights and robust Huber-White (Huber, 1967; White, 1980) standard errors, adjusted for within-community correlation/clustering (Wooldridge, 2010) (in brackets under parameter estimates). Ref.: Reference category.
Source: Ghana Living Standards Survey 4 (1998/99).

Table 3. Specification Tests for 2SLS Child & Youth Current School Enrollment Regressions: Predictive Power of Identifying Instruments (First Stage), Endogeneity (Second Stage) and Overidentification (Second Stage)

	IV Spec 1: Religious affiliation shares in community (no cluster FE)			*IV Spec 2: Religious affiliation shares in community X individual characteristics (with cluster FE)*		
	Full sample	*Females*	*Males*	*Full sample*	*Females*	*Males*
(1) Main analysis: Oral vs. written tradition religion						
(i) Predictive power						
Written tradition/Christian	356.03	265.50	335.41	10.71	12.65	7.43
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Oral tradition/Non-Christian	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
(ii) Wu (1973)-Hausman (1978) endogeneity test	3.17	8.21	0.63	4.45	2.96	0.34
	[0.076]	[0.004]	[0.427]	[0.036]	[0.086]	[0.562]
(iii) Sargan (1958)-*Hansen (1982) overidentification test*	NA: Exactly identified	NA: Exactly identified	NA: Exactly identified	12.68	14.96	15.58
				[0.472]	[0.310]	[0.272]
(2) Sensitivity analysis I: Decomposing oral tradition religions into individual denominations						
(i) Predictive power						
Christian	208.50	139.22	199.85	9.34	25.46	6.17
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Animist / Traditional	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Muslim	459.71	244.13	401.58	6.39	27.56	5.15
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
(ii) Wu (1973)-Hausman (1978) endogeneity test	3.90	4.89	2.94	3.37	1.27	1.12
	[0.021]	[0.008]	[0.054]	[0.036]	[0.281]	[0.329]
(iii) Sargan (1958)-*Hansen (1982) overidentification test*	NA: Exactly identified	NA: Exactly identified	NA: Exactly identified	25.90	33.05	24.88
				[0.469]	[0.161]	[0.526]

(3) Sensitivity analysis II: Decomposing both oral and written tradition religions into individual denominations						
(i) Predictive power						
Catholic	413.77	188.39	120.28	1.76	2.10	2.02
	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]
Anglican	48.04	17.12	14.93	8.93	7.34	3.50
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Presbyterian	189.65	100.18	133.53	2.54	3.66	2.08
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Methodist	84.36	53.25	27.81	4.90	4.14	2.81
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Pentecostal	193.33	101.84	107.36	3.72	3.22	2.44
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Spiritualist	84.47	37.32	43.95	2.18	2.49	2.94
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Other Christian	273.68	142.00	77.93	3.10	1.95	3.22
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Animist / Traditional	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Muslim	179.75	75.61	129.24	7.70	5.51	7.33
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
(ii) Wu (1973)-Hausman (1978) endogeneity test	1.48	1.65	1.62	3.00	4.43	0.99
	[0.165]	[0.111]	[0.118]	[0.003]	[0.000]	[0.445]
(iii) Sargan (1958)-*Hansen (1982) overidentification test*	NA: Exactly identified	NA: Exactly identified	NA: Exactly identified	46.12	33.63	45.83
				[0.824]	[0.992]	[0.832]
N	8,981	4,459	4,522	8,981	4,459	4,522

Notes: Terms in brackets are the p-values of the corresponding test-statistic. Estimations incorporate survey weights and robust Huber-White (Huber, 1967; White, 1980) standard errors, adjusted for within-community correlation/clustering (Wooldridge, 2010) (in brackets under parameter estimates). Ref.: Reference category. *: statistically significant at 10 percent; **: statistically significant at 5 percent; ***: statistically significant at 1 percent.
Source: Ghana Living Standards Survey 4 (1998/99).

Table 4. Main Analysis Results for Religious Affiliation from IV and OLS Adult Years of Schooling Completed and Child & Youth Current School Enrollment Regressions: Combined Comparison Group of "Written tradition/Non-Christian religions" (Animist/Traditional and Islam Combined into One Group)

	OLS Spec 1: Dummies for urban location and region of residence, no cluster FEs			*OLS Spec 2: Cluster FEs (instead of dummies for urban location and region of residence)*			*IV Spec 1: Religious affiliation shares in community (no cluster FE)†*			*IV Spec 2: Religious affiliation shares in community X individual characteristics (with cluster FE)*		
	Full sample	*Females*	*Males*	*Full sample*	*Females*	*Males*	*Full sample*	*Females*	*Males*	*Full sample*	*Females*	*Males*
Years of schooling:												
Christian	2.282***	1.879***	2.814***	1.912***	1.386***	2.489***	3.495***	3.659***	3.452***	5.220***	5.518***	5.009***
	[0.243]	[0.226]	[0.353]	[0.226]	[0.243]	[0.333]	[0.687]	[0.742]	[0.920]	[1.256]	[1.280]	[1.788]
N	9,067	5,164	3,903	9,067	5,164	3,903	9,067	5,164	3,903	9,067	5,164	3,903
Current enrollment:												
Christian	0.062*	0.068*	0.056	0.051*	0.035	0.072*	0.170**	0.236***	0.117	0.197***	0.226**	0.125
	[0.035]	[0.036]	[0.041]	[0.028]	[0.034]	[0.038]	[0.083]	[0.076]	[0.100]	[0.071]	[0.111]	[0.092]
N	8,981	4,459	4,522	8,981	4,459	4,522	8,981	4,459	4,522	8,981	4,459	4,522

Notes: Additional control variables include dummies for female gender, ethnicity/tribe, age, parental education, region of birth, urban location, region of current residence (the two last variables for IV Spec I, only, due to perfect collinearity between these variables and the cluster FEs). Note that for IV Specification I the cluster fixed-effects would "wash out" the instruments (due to perfect multicollinearity), which is why region FEs (and an urban dummy) are included instead. Estimations incorporate survey weights and robust Huber-White (Huber, 1967; White, 1980) standard errors, adjusted for within-community correlation/clustering (Wooldridge, 2010) (in brackets under parameter estimates). *: statistically significant at 10 percent; **: statistically significant at 5 percent; ***: statistically significant at 1 percent. †: Cluster fixed-effects would be "washed out" by the instruments (due to perfect multicollinearity).
Source: Ghana Living Standards Survey 4 (1998/99).

Table 5. Main Analysis Results for Religious Affiliation from Alternative Estimation Method Using Mahalanobis Matching on Observables for Adult Years of Schooling Completed and Child & Youth Current School Enrollment: Combined Comparison Group of "Written tradition/Non-Christian religions" (Animist/Traditional and Islam Combined into One Group)

	(A) Full sample:			(B) Female sample:			(C) Male sample:		
Number of neighbors:	1	3	5	1	3	5	1	3	5
(1) No cluster FEs:									
Years of schooling:									
Christian	2.209***	2.436***	2.513***	2.049***	2.278***	2.444***	2.457***	2.719***	2.891***
	0.260	0.210	0.189	0.313	0.268	0.237	0.312	0.279	0.276
N	9,000	9,000	9,000	5,077	5,077	5,077	3,876	3,876	3,876
Current enrollment:									
Christian	0.024	0.023+	0.023+	0.015	0.014	0.023	0.040	0.050*	0.046*
	0.024	0.017	0.017	0.040	0.025	0.026	0.034	0.030	0.026
N	8,980	8,980	8,980	4,454	4,454	4,454	4,522	4,522	4,522
(2) With cluster FEs:									
Years of schooling:									
Christian	2.779***	3.205***	3.387***	2.202***	3.040***	3.261***	3.434***	4.306***	4.463***
	0.227	0.180	0.191	0.242	0.174	0.160	0.351	0.347	0.420
N	6,347	6,347	6,347	3,124	3,124	3,124	2,430	2,430	2,430
Current enrollment:									
Christian	0.067***	0.061***	0.056***	0.053*	0.101***	0.140***	0.086***	0.061***	0.056***
	0.022	0.016	0.015	0.030	0.032	0.039	0.027	0.022	0.023
N	4,976	4,976	4,976	2,181	2,181	2,181	2,172	2,172	2,172

Notes: Additional control variables include dummies for female gender, ethnicity/tribe, age, parental education, region of birth, urban location, region of current residence (the last two variables not included in the specification with cluster FEs due to perfect collinearity). Estimations incorporate the heteroskedasticity-consistent analytical standard errors proposed by Abadie and Imbens (2006) (in brackets under parameter estimates). The lower numbers of observations for the specifications with cluster FEs are due to some of the communities being homogenous in terms of religious affiliation. ***: statistically significant at 1 percent; **: statistically significant at 5 percent; *: statistically significant at 10 percent; ++: statistically significant at 15 percent; +: statistically significant at 20 percent.
Source: Ghana Living Standards Survey 4 (1998/99).

Table 6. Sensitivity Analysis I: Decomposing Oral Tradition Religion into Individual Denominations (Both Analysis Samples)

	OLS Spec 1: Dummies for urban location and region of residence, no cluster FEs			*OLS Spec 2: Cluster FEs (instead of dummies for urban location and region of residence)*			*IV Spec 1: Religious affiliation shares in community (no cluster FE)* †			*IV Spec 2: Religious affiliation shares in community X individual characteristics (with cluster FE)*		
	Full sample	*Females*	*Males*	*Full sample*	*Females*	*Males*	*Full sample*	*Females*	*Males*	*Full sample*	*Females*	*Males*
Adult Years of Schooling Completed:												
Christian	3.175***	2.112***	4.510***	2.248***	1.120***	3.437***	6.280***	5.636***	7.195***	5.757*	3.926*	5.486
	[0.301]	[0.269]	[0.451]	[0.301]	[0.276]	[0.479]	[0.778]	[0.873]	[1.005]	[2.972]	[2.309]	[4.704]
Muslim	1.413***	0.373	2.672***	0.564	-0.445	1.600***	3.590***	2.608***	4.686***	0.402	-1.375	0.169
	[0.363]	[0.319]	[0.531]	[0.408]	[0.398]	[0.610]	[0.731]	[0.728]	[1.047]	[3.032]	[2.466]	[4.537]
N	9,067	5,164	3,903	9,067	5,164	3,903	9,067	5,164	3,903	9,067	5,164	3,903
Child & Youth Current School Enrollment:												
Christian	0.136***	0.125**	0.146**	0.106**	0.085	0.144**	0.355***	0.373***	0.346***	0.338***	0.238*	0.381**
	[0.047]	[0.052]	[0.057]	[0.044]	[0.055]	[0.063]	[0.108]	[0.120]	[0.117]	[0.111]	[0.128]	[0.185]
Muslim	0.106	0.081	0.131	0.087	0.079	0.117	0.242*	0.181	0.300**	0.219*	0.1	0.357*
	[0.065]	[0.064]	[0.083]	[0.055]	[0.067]	[0.077]	[0.134]	[0.142]	[0.143]	[0.128]	[0.159]	[0.202]
N	8,981	4,459	4,522	8,981	4,459	4,522	8,981	4,459	4,522	8,981	4,459	4,522

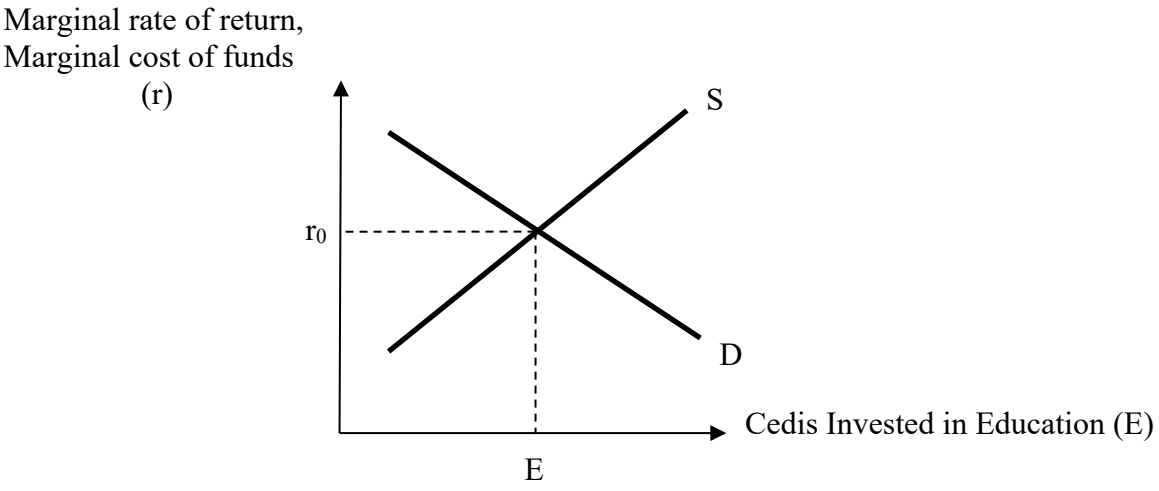
Notes: Additional control variables include dummies for female gender, ethnicity/tribe, age, parental education, region of birth, urban location, region of current residence (the two last variables for IV Spec I, only, due to perfect collinearity between these variables and the cluster FEs). Note that for IV Specification I the cluster fixed-effects would "wash out" the instruments (due to perfect multicollinearity), which is why region FEs (and an urban dummy) are included instead. Estimations incorporate survey weights and robust Huber-White (Huber, 1967; White, 1980) standard errors, adjusted for within-community correlation/clustering (Wooldridge, 2010) (in brackets under parameter estimates). *: statistically significant at 10 percent; **: statistically significant at 5 percent; ***: statistically significant at 1 percent. †: Cluster fixed-effects would be "washed out" by the instruments (due to perfect multicollinearity).
Source: Ghana Living Standards Survey 4 (1998/99).

Table 7. Adult Hourly Earnings Analysis: Results for Adult Years of Schooling Completed Coefficient from OLS Hourly Earnings Regressions by Religion and Gender (dependent variable: *ln* hourly earnings)

	Written tradition/Christian			*Oral tradition/Non-Christian*								
				Overall (aggregated group)			*Animist/Traditional*			*Muslim*		
	Full sample	*Females*	*Males*	*Full sample*	*Females*	*Males*	*Full sample*	*Females*	*Males*	*Full sample*	*Females*	*Males*
Years of schooling	0.054***	0.050***	0.056***	0.052***	0.052**	0.056***	0.016	0.059**	-0.004	0.042***	0.043**	0.045***
	[0.005]	[0.007]	[0.006]	[0.008]	[0.020]	[0.010]	[0.019]	[0.024]	[0.025]	[0.008]	[0.020]	[0.010]
R^2	0.218	0.189	0.23	0.245	0.294	0.257	0.408	0.558	0.406	0.266	0.37	0.264
N	5,328	2,910	2,418	1,304	565	739	459	187	272	845	378	467

Notes: Each cell in the table corresponds to the years of schooling coefficient for a given subsample regression, i.e. for all individuals with a given religious affiliation. Additional control variables include all the variables from the years of schooling regressions (gender, age cohort, parental education, and so on). Estimations incorporate survey weights and robust Huber-White (Huber, 1967; White, 1980) standard errors, adjusted for within-community correlation/clustering (Wooldridge, 2010) (in brackets under parameter estimates). *: statistically significant at 10 percent; **: statistically significant at 5 percent; ***: statistically significant at 1 percent.
Source: Ghana Living Standards Survey 4 (1998/99).

Figure 1. The Supply and Demand of Funds for Investment in Education



Appendix: Descriptive Statistics[18]

Table A1. Demographic Characteristics for Adult Females across Religious Affiliation

	Full sample	*Traditional*	*Muslim*	*Christian*
(i) Fertility:				
Total number of children ever born	4.2	5.2	4.6	4.0
(ii) Labor market status and hours worked:				
Past 12 months:				
Done work for wage or other payment	0.081	0.016	0.031	0.095
Made money, incl. in-kind payment, through self-employment	0.408	0.205	0.388	0.431
Worked on a farm or field or herding livestock	0.383	0.683	0.433	0.346
Worked unpaid for enterprise belonging to member of household	0.026	0.072	0.021	0.023
Past 7 days:				
Working for pay, profit, family gain, or produced anything for barter or home use	0.815	0.815	0.737	0.829
Total hours worked	29.5	27.5	24.5	30.5

Notes: Number of observations: 3,718 (Fertility); 5,146 (labor market status past 12 months); 4,801 (labor market status past 7 days); 5,164 (hours worked past 7 days). Estimations incorporate survey weights.
Source: Ghana Living Standards Survey 4 (1998/99).

[18] Descriptive statistics for additional variables omitted for brevity (available upon request).

Table A2. Religious Affiliation Incidence: Adult Years of Schooling Completed Regressions

	Full sample		*Females*		*Males*	
	Mean:	*Std Dev:*	*Mean:*	*Std Dev:*	*Mean:*	*Std Dev:*
Christian	0.774	0.418	0.787	0.410	0.758	0.428
Not Christian	0.226	0.418	0.213	0.410	0.242	0.428
Traditional	0.077	0.266	0.074	0.261	0.080	0.272
Muslim	0.149	0.356	0.140	0.347	0.162	0.368
N	9,067		5,164		3,903	

Notes: Estimations incorporate survey weights and adjust for within-community correlation/clustering (Wooldridge, 2010).
Source: Ghana Living Standards Survey 4 (1998/99).

Table A3. Religious Affiliation Incidence: Child & Youth Current School Enrollment Regressions

	Full sample		*Females*		*Males*	
	Mean:	*Std Dev:*	*Mean:*	*Std Dev:*	*Mean:*	*Std Dev:*
Christian	0.803	0.398	0.815	0.388	0.791	0.407
Not Christian	0.197	0.398	0.185	0.388	0.209	0.407
Traditional	0.057	0.231	0.052	0.221	0.061	0.240
Muslim	0.141	0.348	0.133	0.340	0.148	0.355
N	8,981		4,459		4,522	

Notes: Estimations incorporate survey weights and adjust for within-community correlation/clustering (Wooldridge, 2010).
Source: Ghana Living Standards Survey 4 (1998/99).