

Religion and Human Capital in Ghana[†]

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Abstract:

This paper examines the religion-human capital link, examining a recent household survey for Ghana. Insights from the recent anthropological literature leads to a prediction of Islam being associated with lower human capital levels than Christianity, since Islam, perhaps surprisingly, may be clustered together with Traditional/Animist religion within the group of orally based religions for the case of Ghana. While previous studies typically have only considered the main religions, thereby not allowing for heterogeneous associations in the links at the sub-group level, and also have not allowed religious affiliation to be endogenously determined, these possibilities are explored here, as well.

I find a strong association between individual religious affiliation and human capital as measured by years of schooling, with Christians as a group being more literate and having completed more years of schooling than Muslims and Animists / Traditionalists, thus confirming the predictions from the conceptual framework. At the same time, there is a great deal of heterogeneity in the strength of this relationship within different types of Christianity.

The instrumental variables estimation strategy proves to be preferable to OLS, while at the same yielding higher associations in the religion-human capital relationship. In turn, this indicates that previous studies, which have typically used OLS, may have systematically underestimated the strength of the religion-human capital link. Directions for future research are also presented.

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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 leave room for other considerations in pursuing education and obtaining literacy skills than the anticipated future earnings. But is that really all there is to the investment in education – is there no scope for so-called "softer" factors to enter into the human capital investment decision?

This study argues that there is and examines one such pathway in detail, namely religion. The main premise of this study is that while it is generally accepted that religion has been a main determinant of literacy historically, for example, by motivating people to learn to read the Bible (Bobrick, 2001), the linkage really goes from religion to educational attainment to literacy and, additionally, there may be asymmetries in the religion-human capital linkage so that some religions or religious sub-groups exhibit a stronger association than others.

The empirical application for the analysis is the West African country of Ghana. Ghana provides an exciting context for examining in more detail the linkages of religion, educational attainment and literacy skills acquisition. Again, following Bobrick (2001),

religion may be a main driving force of increasing literacy in terms of urging people to learn to read, especially the translation of the bible from Latin into English. In the case of Ghana, however, the Bible has also been translated into local languages. At the same time, in general Sub-Saharan Africa traditionally has more an oral than a written tradition (Bhola, 1990). Traditional (or “animist”) religions in particular are mainly based on oral rather than written tradition. Hence, if the population as a whole moves from traditional or animist religion to Christianity, for example, one would expect to see an increase in the demand for literacy skills and, therefore, for schooling. Similarly, in a cross-section, one would expect Christians to be more literate than Animists/Traditionalists. In a Ghanaian context, this holds for both English and Ghanaian literacy, since the Bible is used both in the English and “local” version in Ghana, depending on where in Ghana the specific church is based (Herbert and Robinson, 2001). Note, however, 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). Hence, one would not a priori expect a shift towards Islam to increase the demand for neither Ghanaian nor English literacy to the same extent as for Christians, nor would one expect the Muslim population to demand literacy skills – or schooling – to the same extent as individuals of other beliefs, especially Christians, controlling for individual characteristics.

In this context, five research questions are explored. First, I examine whether adult literacy and numeracy rates – one of the most important measures of human capital, important in and by itself – vary systematically with religion; more specifically, whether individuals with a Christian religious background experience higher literacy rates than individuals from relatively more oral religions – here, traditional/animist and Islam?

Second, if so, does the differential in literacy rates related to religious background reflect differences in years of schooling, rather than religion per se? Finally, three, if so, will the association between religion and years of schooling hold up in a multivariate analysis, that is, with inclusion of other factors underlying human capital accumulation, such as school supply, school quality, poverty, and economic opportunities more generally? In other words, will a possible association between individual religious affiliation and years of schooling “go away” when other factors are included? Fourth, are there additional differences among Christian subgroups? Fifth, is the relationship between years of schooling and religion and other mediating factors robust to endogenizing religion, that is, to taking the selection into religious affiliation into account?

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. This will help both academicians and policy makers to better understand the motivation behind participating in educational activities, something which is important when wanting to maximize the impact of 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 side and faith-based NGOs and local churches on the other to promote education and literacy skills acquisition through joint educational programs, such as for example adult literacy classes. Additionally, the empirical framework addresses a potential weakness of previous studies in this area, which typically have not allowed religious affiliation to be endogenous.

The remainder of the paper is structured as follows. The next section discusses the methodology of this paper, including the conceptual framework and estimation strategy. Section three presents the data and descriptive analysis, while Section four presents the results. Section five concludes and provides directions for further research.

2. Methodology

Conceptual Framework

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 (Becker, 1964; Mincer, 1974) – with the added twist that an individual’s religion also may affect human capital investment. This leads to the following simple model:

$$Y_i = Y(R_i, O_i), \quad (1)$$

where Y is the educational attainment of individual i (years of schooling or grade or level completed), R denotes the religion of an individual and O is other individual characteristics, for example gender, age and residence of individual i . The main variable of interest in the analyses here is religion. Again, in general Sub-Saharan Africa traditionally has more an oral than a written tradition (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. 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). Hence, one would not a priori expect the Muslim population to demand literacy skills – or schooling – to the same extent as individuals of other beliefs, especially Christians.

A number of other factors, however, are potentially important mediating factors in the religion-human capital relationship. At a minimum, if these are not included, one might overestimate the strength of the religion-human capital association. For example, one might expect females in Ghana to have less human capital than males (Chao, 1999). Due to a mix of supply (quantity) and quality factors, with there being both more schools in urban areas and these school 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 for much of the same reasons, too. Regions also capture economic conditions to some extent, however: Muslims are predominantly 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. Other, “cleaner,” variables for economic conditions might be relevant, too, for example the economic conditions in the household and/or the community more generally: when there are fewer economic resources available, individuals cannot afford to forego earnings to invest in human capital. Similarly, if the economic conditions in the area more generally are poor, there is less demand for skilled labor and therefore less of an incentive to invest in human capital.

Estimation Strategy and Issues

The conceptual framework in Section 2 suggests that religion can directly affect educational attainment through the relatively higher demand for schooling by Christians than by other religions and also suggest additional factors that are important for human capital accumulation. The empirical analysis will examine these relationships, using linear approximations of the optimal intermediate and final child health outcome equations.

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 the formal educational attainment and of religious affiliation. Again, individuals with a Christian background, in particular, may demand more schooling to be (better) able to read the Bible. At the same time, such individuals may come from households, where there are already higher levels of schooling due to the accumulated effects of this increased demand over generations. In turn, this would seem to generate increased demand for schooling independently from that related to individual religious affiliation per se, due to both stronger preferences for schooling in the household in general as well as due to parental support related to homework and support for private tutoring, textbooks and other teaching materials.

One widely applied approach to deal with endogeneity involves instrumental

variables or two stage least squares (2SLS). Valid instruments generally are hard to come by, however, since they must both be highly correlated with (predictive of) the potentially endogenous variable(s) and at the same time not affect the outcome directly. So, which variables may be valid instruments of individual religious affiliation but not affect educational attainment directly? One promising candidate is the share of the population in the area with a certain religious belief, so that Animist/Traditional religion is instrumented by the share of the population in the area subscribing to this belief, and similarly for Christianity, Islam, and so on. Now, while the predictive power of an instrument may be tested directly by examining the joint statistical significance of the (identifying) instruments when these are included in a regression on the potentially endogenous variable(s) together with all the other variables (the first-stage equation in 2SLS), the lack of direct effect from the identifying instruments on the outcome (also known as “the exclusion restriction”) has to be argued on theoretical grounds. In other words: do the proposed instruments belong directly in the main equation or not? One objection to the proposed instrument is that religion might have a direct effect on human capital accumulation through the supply of religious schools and education programs in the community. I would argue, though, that such an effect would still mainly go through individual religious affiliation, since it would seem that Christians would be most likely to attend Christian schools and education programs, Muslims most likely to attend Muslim schools and education programs, and so on (and similar for sub-religions, for example Anglican and Methodist Christians).

These considerations lead me to estimate (1) by 2SLS using the share of the population in the community with the various religious affiliations as identifying

instruments.¹ The first stage equations are all of the form:

$$Q_i = \alpha_0 + \alpha_1 B_i + \alpha_2 A_i + \varepsilon_i, \quad (2)$$

where Q_i is the potentially endogenous explanatory variable in question (individual religious affiliation), B_i is a vector of maternal birth cohort-region of birth interactions and A_i is a vector of all additional controls from the second stage regression (primarily included for efficiency). ε_i is an error-term capturing unobservables. The second stage equation (the estimating equation) then includes the predicted values of the potentially endogenous explanatory variables from the first stage:

$$X_i = \beta_0 + \beta_1 \hat{Q}_i + \beta_2 A_i + v_i, \quad (3)$$

where X_i is years of schooling; \hat{Q}_i is a vector of fitted potentially endogenous explanatory variables from the first stage equation (2), namely religious affiliation; A_i is a vector of all additional controls (the individual components of A_i are discussed in more detail in the next section); and v_i is an error-term capturing unobservables.

3. Data and Descriptive Analysis

The Ghana Living Standards Survey (GLSS), is a nationally representative multi-purpose household survey, carried out in 1987/88, 1988/89, 1991/92 and 1998/99 as four independent cross-section surveys. The most recent round of these (GLSS 4) is used for

¹ As is well known, there may be some concern about using 2SLS/OLS, or, in effect, the linear probability model (LPM), when the dependent variable is binary (individual religious affiliation in the first-stage regression). For example, predicted probabilities may fall outside the (0,1)-range and heteroskedasticity also is present by default. However, it can be argued that the LPM approximates the response probability well, especially if (1) the main purpose is to estimate the partial effect of a given regressor on the response probability, averaged across the distribution of the other regressors, (2) most of the regressors are discrete and take on only a few values and/or (3) heteroskedasticity-robust standard errors are used in place of regular standard errors (Wooldridge, 2002). All three factors seem to work in favor of the LPM for the purposes of the application here.

the analyses in this paper. The household survey contains information on individual religious affiliation, formal educational attainment, literacy and numeracy skills proficiency, as well as information on background variables such as age, gender, tribal association/ethnicity and region, which are also important factors in analyses of human capital processes.

Religious Affiliation

The measure of religious affiliation includes the categories “Animist/Traditional,” “Muslim,” “Christian” (given by 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.

Educational Attainment / Years of Schooling

The information on educational attainment from the GLSS 4 include the highest level completed, ranging from “none” through “university” and also includes vocational training. It is based on the 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.

Literacy and numeracy

The information on literacy skills from the GLSS 4 include Ghanaian reading and writing

proficiency and English reading and writing proficiency, while numeracy measures the ability to do written calculations. The question on English reading (writing) skills is: “Can (NAME) read (write) a letter in English?,” while the question on Ghanaian reading (writing) skills is: “In what Ghanaian language can (NAME) write a letter?.” The question on written calculations is: “Can (NAME) do written calculations?” The respondent to questions in the survey is either the household head or a knowledgeable adult member. The literacy and numeracy measures thus consist of five binary variables.

While the subjective nature of these questions and the use of indirect reports are sources of concern, analyses elsewhere validate the use of literacy and numeracy measures based on this information (Blunch, 2006).

Economic variables

Household expenditures, proxying the economic well-being of the household, may an important determinant of educational attainment. Household expenditures are the sum of all expenditures by households, some of which are actual, while others are imputed. The information was collected by survey enumerators during interviews over several visits to the household – over a 35 day period, containing 7 visits at 5-day intervals (see Coulombe and McKay (2000) for details). To ensure consistency at the national level, household expenditures have been deflated using a regional (Paasche) price index (GSS, 2000). To account for household size and to address endogeneity concerns, I first calculate per capita household expenditures and then take the average of these in the community – and so, effectively, use average per capita household expenditures in the community in the analyses.

Additionally, I include geographical variables (rural-urban location and region of residence). These variables capture economic conditions specific to the area (as well as everything else related to rural-urban residence or the region in question), which are potentially important in explaining individual educational attainment.

Other variables related to human capital production

Other variables related to human capital production not already captured by the previous groupings include the age 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, 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 are also captured by the variables for rural/urban location and region of residence.

Sample restrictions

In choosing the sample, one concern is that the individuals should not be too young. After all, while young children may be as religious as anybody else, they may not be exactly aware of what distinguishes Christianity, Islam, and so on, not to mention what distinguishes different fractions within the individual religions. There will also be much less variation in human capital for children. On the upper end of the spectrum, measurement error is more likely to kick in at older ages. The initial sample is therefore

individuals between 15 and 54 years of age, yielding a total of 12,049 observations.

Some explanatory variables are missing for some observations, which cause a drop in the sample size of 49 observations in arriving at the final analyses sample. A sample drop of this magnitude does not seem to be cause for concern regarding the representativeness of the estimation sample. Descriptive statistics of the variables from the final estimation sample are reported in Table A1 in the Appendix.

Descriptive analysis

To get an initial grasp of the data and the association between human capital and religion, means of literacy and numeracy proficiency and years of schooling are depicted across different individual religious affiliations in Table 1. In the following, I will focus on the findings related to Christian, Muslim and Traditional/Animist religion, since these are the religions for which there are the strongest prior expectations to the association with human capital.

Arguably, literacy and numeracy is both an important human capital measure and important in and by itself. But does it vary systematically with individual religious affiliation? From Table 1, the answer appears to be “yes.” Overall, Christians as a whole are relatively more literate than both Muslims and Traditionalists / Animists. For the case of English reading, for example, the literacy rate is about 60 percent for Christians, about 34 percent for Muslims and for individuals with no religion, and only about 13 percent for Traditionalists / Animists. A similar pattern holds for English writing, Ghanaian reading and writing, and numeracy.

Table 1. Adult Literacy and Numeracy Rates, Years of Schooling, and Religious Affiliation for Estimation Samples

	<i>Ghanaian reading</i>	<i>Ghanaian writing</i>	<i>English reading</i>	<i>English writing</i>	<i>Written calculations</i>	<i>Years of schooling</i>	<i>N</i>
Traditional/Animist	0.105	0.099	0.128	0.115	0.195	1.5	779
Christian	0.526	0.485	0.603	0.584	0.729	7.2	8,988
Catholic	0.502	0.475	0.573	0.557	0.691	6.5	1,964
Anglican	0.505	0.450	0.731	0.701	0.856	8.9	219
Presbyterian	0.606	0.557	0.685	0.662	0.782	8.3	1,327
Methodist	0.560	0.518	0.667	0.649	0.762	8.0	1,026
Pentecostal	0.501	0.450	0.569	0.545	0.729	6.9	1,944
Spiritualist	0.403	0.353	0.431	0.420	0.572	5.5	527
Other Christian	0.539	0.500	0.612	0.594	0.744	7.3	1,981
Muslim	0.254	0.222	0.341	0.328	0.436	3.9	1,564
Other religion	0.477	0.477	0.661	0.661	0.742	8.2	9
No religion	0.296	0.288	0.344	0.336	0.475	4.4	660

Notes: Calculations incorporate sampling weights and clustering.

Source: Ghana Living Standards Survey (Round 4, 1998/99).

Among the different types of Christianity, however, literacy rates differ, also. For English reading literacy, for example, Anglicans have the highest literacy rate, about 73 percent, while Spiritualists have the lowest, about 43 percent, with Catholics, Presbyterians, etc, falling in between. These patterns, however, are not as robust across the different literacy / numeracy measures as was the patterns for the “aggregated” religions. Most notably, Anglicans, perhaps not surprisingly, have higher literacy rates (indeed, *the* highest) when it comes to English reading and writing skills (and numeracy), while they fall behind on Ghanaian reading and writing literacy.

Does this mean that religion “cause” literacy and numeracy directly? Clearly not: schooling is one of the most important inputs into the production of literacy and numeracy (Blunch, 2006), so that what really is going on, conceptually, is religion affecting the demand for schooling which, in turn, affects literacy and numeracy rates. This is supported by the results in Table 1. At 7.2 years of schooling, Christians again

have the highest level of human capital, while Muslims have about half of this, 3.9 years of schooling, while Traditionalists / Animists on average only have completed 1.5 years of schooling. There are again substantial differences among different Christian fractions, ranging from 5.5 years of schooling for Spiritualists to 8.9 years of schooling for Anglicans, with the other groups somewhere in between.

While suggestive, however, the descriptive analyses do not take into account the possible endogeneity of religion, and also do not simultaneously control for the joint effect of all the explanatory variables on years of schooling completed. In other words: can we make the apparent association between religion and years of schooling “go away”? This, therefore, is the object of the multivariate analyses to which I now turn.

4. Results

This section reviews the results from the multivariate models, focusing at the results pertaining to individual religious affiliation. I will again focus on the findings related to Christian, Muslim and Traditional/Animist religion, since these are the religions for which there are the strongest prior expectations to the association with human capital. I will start out by first determining the preferred estimation method – where the two “candidates” are OLS and 2SLS – and then discuss the results: first the primary results, related to individual religious affiliation, and then the secondary results, related to the control variables.

The results from specification tests indicate the use of 2SLS is preferable for this application (Table 2). 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

instruments are highly correlated with the potentially endogenous variables, with significance levels of 0.1 percent or better in all cases. Second, Wu-Hausman tests indicate that individual religious affiliation is endogenous to individual educational attainment. This contrasts with the bulk of the literature examining the association between human capital and individual religious affiliation, which has mostly treated individual religious affiliation as predetermined.

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

	<i>Model 1: Composite variable for Christian religion</i>	<i>Model 2: Multiple variables for different types of Christian religion</i>
<i>(1) Predictive power:</i>		
Christian	233.86 [0.000]	
Catholic		173.52 [0.000]
Anglican		49.88 [0.000]
Presbyterian		199.07 [0.000]
Methodist		74.19 [0.000]
Pentecostal		344.37 [0.000]
Spiritualist		104.43 [0.000]
Other Christian		311.40 [0.000]
Muslim	192.26 [0.000]	81.48 [0.000]
Other religion	15.04 [0.000]	7.79 [0.000]
No religion	614.62 [0.000]	280.30 [0.000]
<i>(2) Wu (1973)-Hausman (1978) endogeneity test</i>	7.69 [0.000]	4.60 [0.000]
N	12,000	12,000

Notes: Terms in brackets are the p-values of the corresponding test-statistic. The tests employ robust Huber-White (Huber, 1967; White, 1980) standard errors and also incorporate sampling weights and clustering.

Source: Ghana Living Standards Survey (Round 4, 1998/99).

Estimates from the second stage regression are presented in Table 3. The table presents estimated parameters and standard errors with 2SLS and OLS results presented next to each other to facilitate comparison. Starting with the results of main interest here,

the overall patterns of association between religious affiliation and years of schooling from the descriptive analyses hold up here in the multivariate analysis, as well. In other words, even when controlling for factors related to gender, general economic conditions in the community, ethnic/tribal background and geographical location, the religion-human capital link still remains. The estimated coefficients are larger for Christians (OLS: about 3.4 years, 2SLS: about 5.9 years) than for Muslims (OLS: about 1.6 years, 2SLS: about 3.7 years) – and since Animist / Traditionalist is the reference category that means that this group have completed less schooling still, controlling for other factors. There is again large variation in the results among different Christian groups, with Anglicans, Presbyterians, and Methodists being in the “top-three” for both OLS and 2SLS. The 2SLS estimates are larger than the OLS estimates, though, typically around 70-80 percent larger, but still generally preserve the pattern as far as the relative magnitudes of the “religion premium” are concerned. A few additional specification tests are performed for the religion coefficients; the results from these are provided in Table 4. I first test whether all the religion coefficients are equal, then whether the Christian/Christian subgroups and Muslim religion coefficients are equal and, finally, whether the coefficients for the different Christian subgroups are equal. All of these tests are rejected at 0.1 percent or better. In turn, this indicates that there is a great deal of heterogeneity in the religion-human capital link, which also supports the earlier results.

A number of interesting results come out from Table 3 regarding the control variables, as well. One of the most consistent findings is that females on average have roughly three years less schooling than males – this result hold for both estimation methods and for both specifications of religious affiliation.

Table 3. Results from 2SLS and OLS Years of Schooling Regressions

	<i>Model 1: Composite variable for Christian religion</i>		<i>Model 2: Multiple variables for different types of Christian religion</i>	
	<i>OLS</i>	<i>2SLS</i>	<i>OLS</i>	<i>2SLS</i>
Female	-2.911*** [0.113]	-3.014*** [0.123]	-2.898*** [0.116]	-2.943*** [0.131]
Age	0.351*** [0.031]	0.362*** [0.031]	0.366*** [0.031]	0.403*** [0.034]
Age squared	-0.005*** [0.000]	-0.005*** [0.000]	-0.006*** [0.000]	-0.006*** [0.001]
Ewe	-0.503 [0.316]	-0.33 [0.338]	-0.555* [0.315]	-0.367 [0.399]
Ga-Adangbe	-1.479*** [0.405]	-1.485*** [0.413]	-1.500*** [0.380]	-1.492*** [0.376]
Other ethnicity	-1.529*** [0.307]	-1.328*** [0.369]	-1.550*** [0.306]	-1.293*** [0.384]
Log (per cap exp)	1.658*** [0.282]	1.605*** [0.258]	1.628*** [0.274]	1.461*** [0.244]
Urban	1.194*** [0.257]	1.028*** [0.248]	1.175*** [0.251]	1.073*** [0.241]
Western	-0.955** [0.380]	-1.190*** [0.389]	-0.925** [0.387]	-0.908** [0.437]
Central	-2.275*** [0.476]	-2.411*** [0.475]	-2.189*** [0.472]	-1.941*** [0.472]
Eastern	-0.414 [0.523]	-0.3 [0.501]	-0.488 [0.507]	-0.374 [0.509]
Volta	-0.469 [0.373]	-0.54 [0.375]	-0.456 [0.354]	-0.395 [0.360]
Ashanti	-0.859** [0.339]	-0.897*** [0.339]	-0.800** [0.335]	-0.717** [0.355]
Brong-Ahafo	-0.947*** [0.343]	-1.084*** [0.334]	-0.935*** [0.329]	-1.030*** [0.352]
Northern	-1.949*** [0.577]	-1.869*** [0.503]	-2.000*** [0.574]	-1.886*** [0.512]
Upper West	-0.624 [0.666]	0.177 [0.632]	-0.687 [0.666]	0.237 [0.636]
Upper East	-0.843 [0.536]	-0.859 [0.588]	-0.989* [0.550]	-0.928 [0.670]
Christian	3.348*** [0.301]	5.927*** [0.714]		
Catholic			3.459*** [0.311]	5.826*** [0.731]
Anglican			4.455*** [0.568]	6.511*** [2.169]
Presbyterian			4.155*** [0.366]	8.253*** [1.009]
Methodist			3.761*** [0.356]	8.539*** [1.459]
Pentecostal			2.649***	4.529***

Spiritualist			[0.333]	[0.971]
			2.098***	1.208
Other Christian			[0.426]	[1.802]
			3.115***	5.249***
Muslim	1.652***	3.772***	[0.332]	[0.825]
	[0.419]	[0.694]	1.619***	3.735***
Other religion	4.590***	-4.345	[0.420]	[0.719]
	[1.417]	[22.014]	4.588***	-10.732
No religion	0.464	-0.581	[1.427]	[18.620]
	[0.334]	[1.619]	0.415	0.677
Constant	-21.602***	-23.278***	[0.331]	[1.788]
	[4.090]	[3.899]	-21.334***	-21.982***
			[3.986]	[3.675]
R ²	0.3		0.31	
N	12,000	12,000	12,000	12,000

Notes: Robust Huber-White (Huber, 1967; White, 1980) standard errors with correction for clustering in brackets under parameter estimates. Estimations also incorporate sampling weights. *: statistically significant at 10 percent; **: statistically significant at 5 percent; ***: statistically significant at 1 percent.

Source: Ghana Living Standards Survey (Round 4, 1998/99).

Table 4. Additional Specification Tests: Tests for Equality of Religion Coefficients

	<i>Model 1: Composite variable for Christian religion</i>		<i>Model 2: Multiple variables for different types of Christian religion</i>	
	<i>OLS</i>	<i>2SLS</i>	<i>OLS</i>	<i>2SLS</i>
All religions	53.68 [0.000]	35.71 [0.000]	23.75 [0.000]	57.94 [0.000]
Christian/Christian subgroups and Muslim, only	27.24 [0.000]	14.78 [0.000]	14.27 [0.000]	42.90 [0.000]
Christian subgroups, only			12.78 [0.000]	28.40 [0.000]
N	12,000	12,000	12,000	12,000

Notes: Terms in brackets are the p-values of the corresponding test-statistic. The tests employ robust Huber-White (Huber, 1967; White, 1980) standard errors and also incorporate clustering and sampling weights.

Source: Ghana Living Standards Survey (Round 4, 1998/99).

Ga-Adangbe and other ethnicities consistently have completed less years of schooling than Akan (the reference group), with magnitudes ranging between about 1.3 and about 1.5 years of schooling. Economic factors prove important, too, with a one percentage-point in average per capita expenditures in the community being associated

with roughly 1.6 years increase in schooling. Not surprisingly, urban areas fare better than rural ones, all else equal, being associated with about one more year of schooling completed. There is also substantial between-regional variation, with most regions experiencing lower levels of schooling completion than the Greater Accra region, the reference region (although the only two positive associations are both substantively small and statistically insignificant).

5. Conclusion

This paper examined the association between individual religious affiliation and human capital in Ghana. The analyses allowed for different types of main religion and additionally allowed for several sub-groups of Christian religion and also for different types of human capital. The analyses also allowed for individual religious affiliation to be endogenous by pursuing an instrumental variables estimation strategy in addition to ordinary least squares.

The descriptive results revealed a strong association between religion and human capital. First, Christians as a whole had higher literacy and numeracy rates than both Muslims and Traditionalists / Animists. Among the different types of Christianity, however, literacy rates were found to differ substantially, although the patterns were not as robust as was the case when considering main religions, only. Here, the most notable finding was that Anglicans, perhaps not surprisingly, have higher literacy rates (indeed, *the* highest) when it comes to English reading and writing skills (and numeracy), while they fall behind on Ghanaian reading and writing literacy. It was argued that the process underlying this was the link between religion and education demand. Tabulations of

years of schooling across religions affiliation supported this, with Christians having more years of schooling on average than both Muslims and Animists / Traditionalists – and with the latter again having the lowest levels of human capital on average.

Moving to the multivariate analyses, the results from specification tests supported the use of 2SLS for this application. This contrasts with the bulk of the literature examining the association between human capital and individual religious affiliation, which has mostly treated individual religious affiliation as predetermined. The results from the descriptive analyses were found to hold up in the multivariate analysis, as well. In other words, even if controlling for a host of mediating factors, including gender, ethnicity/tribal association, economic conditions in the community, and geographic location, the religion-human capital link still remains. This was true for both the OLS and 2SLS results, although the latter estimates were found to be substantially larger, typically around 70-80 percent larger.

There was again large variation in the results among different Christian groups, with Anglicans, Presbyterians, and Methodists being in the “top-three” for both OLS and 2SLS. Additional specification tests supported the findings of a heterogeneous association in the religion-human capital link, both across main religions as well as within the different types of Christianity.

A number of interesting results came out regarding the control variables, as well. One of the most consistent findings was that females on average have roughly three years less schooling than males – this result hold for both estimation methods and for both specifications of religious affiliation. Ga-Adangbe and other ethnicities consistently had completed less years of schooling than Akan. Economic factors also proved important.

Not surprisingly, urban areas were found to fare better than rural ones, and there was also substantial between-regional variation, with most regions experiencing lower levels of schooling completion than the Greater Accra region.

While the multivariate results confirm previous findings on the association between religion and human capital, they also extend previous results. For one thing, previous studies have mainly examined the association between main religions and human capital and have not distinguished for different sub-groups within the main religions – most notably the many sub-groups within Christianity – that I do here. Previous studies also typically do not allow religious affiliation to be endogenously determined. 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 association 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 for Ghana – and elsewhere – 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 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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Appendix

Table A1. Descriptive Statistics for Estimation Samples

	<i>Mean</i>	<i>Std. Dev.</i>
<i>Dependent variable:</i>		
Years of schooling	6.211	5.344
<i>Explanatory variables:</i>		
Female	0.532	0.499
Age	30.326	11.028
Age squared	1041.296	721.968
Akan	0.472	0.499
Ewe	0.140	0.347
Ga-Adangbe	0.092	0.289
Other ethnicity	0.296	0.457
Per capita exp (Cedis)	1,035,501	603,165
Urban	0.366	0.482
Western	0.115	0.319
Central	0.080	0.271
Greater Accra	0.137	0.344
Eastern	0.116	0.320
Volta	0.120	0.325
Ashanti	0.171	0.377
Brong-Ahafo	0.086	0.281
Northern	0.101	0.302
Upper West	0.042	0.201
Upper East	0.032	0.175
<i>Religion:</i>		
Traditional	0.061	0.239
Christian	0.743	0.437
Catholic	0.173	0.379
Anglican	0.017	0.128
Presbyterian	0.102	0.303
Methodist	0.082	0.275
Pentecostal	0.159	0.365
Spiritualist	0.038	0.191
Other Christian	0.172	0.377
Muslim	0.143	0.350
Other religion	0.001	0.030
No religion	0.052	0.223
N	12,000	

Notes: Calculations incorporate sampling weights and clustering.
Source: Ghana Living Standards Survey (Round 4, 1998/99).