

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

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Abstract:

It has been argued that historically, religion has been associated with economic success, which would also include, therefore, human capital developments. 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. Specifically, while previous studies of the religion-human capital link have mainly focused on only one religion; on developed countries, especially the US; and also have not allowed religious affiliation to be endogenously determined, these possibilities are explored here, examining a nationally representative household survey from Ghana. I find a strong relationship between individual religious affiliation and human capital as measured by years of schooling, with Christians as a group having completed more years of schooling than Muslims and Animists / Traditionalists, thus confirming the predictions from the conceptual framework. At the same time, while there is some heterogeneity in the strength of this relationship within different denominations of Christianity, this result does not appear to be driven by one particular Christian denomination. The instrumental variables estimation strategy proves to be preferable to OLS, while at the same time yielding higher impact estimates in the religion-human capital relationship. In turn, this indicates that previous studies, which have typically assumed religious affiliation was exogenous, may have systematically underestimated the strength of the religion-human capital link. Directions for future research are also discussed.

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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.

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 qualitative data, leading to results based on sometimes rather small samples.¹

The empirical application for this analysis is the West African country of Ghana. Ghana provides an exciting context for examining in more detail the possible linkages of religion and educational attainment. 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. Again, 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.

At the same time, in general Sub-Saharan Africa traditionally has more of 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

¹ 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.

would expect Christians to have completed more years of schooling than Animists / Traditionalists. Among Muslims in Ghana the Koran is frequently 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 be argued to be closer to an oral than a written tradition religion in the Ghanaian context. Additionally, 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). Hence, one would not a priori expect a shift towards Islam to increase the demand for schooling to the same extent as for Christians, 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.

In this context, four research questions are explored. First, does human capital in terms of years of schooling vary systematically with religion; more specifically, have individuals with a Christian religious background completed more years of schooling than individuals from relatively more oral religions—here, Traditionalism/Animism and Islam? Second, if so, does the relationship between religion and years of schooling hold up in a multivariate analysis, that is, with inclusion of other factors underlying human capital accumulation, including community characteristics such as school supply (including religious schools) and school quality? In other words, will a possible association between individual religious affiliation and years of schooling “go away” when other factors are included? Third, as a robustness check, is the result of more years of schooling for Christians than for other groups mainly driven by one or more Christian denominations? Fourth, 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?

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.

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

This section reviews the methodology applied in this paper. First, a simple economic model in the human capital tradition is presented; this is then followed by a discussion of the econometric techniques applied in the empirical analyses.

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 human capital investment may also be affected by that individual’s religious affiliation. This leads to the following simple model:

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

where Y is the educational attainment of individual i (years of schooling completed), R denotes the religion of an individual and A is additional individual characteristics related to individual human capital accumulation, for example gender, age and residence of individual i . The main variable of interest in the analyses here is individual religious affiliation. 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 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).

A number of other factors, however, are potentially important mediating 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. 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.²

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). 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 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.

Other, more disaggregated economic factors 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

² 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.

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. Local conditions of interest here also include labor market conditions more generally, including access to roads and infrastructure, which will affect both the supply and demand for labor—skilled and unskilled—in the community and therefore also the incentive to invest in human capital.

Estimation Strategy and Issues

The conceptual framework discussed in the previous subsection suggests that religion can directly affect educational attainment 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.³ 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.

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 references, for example, are unobserved and at the same time also main determinants of both formal educational attainment and religious affiliation—thus possibly generating omitted variables bias.

One widely applied approach to deal with endogeneity involves instrumental variables or

³ At a minimum, if these factors are not included, one may systematically over- or underestimate the strength of the religion-human capital relationship.

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 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.

Now, while the predictive power of the instruments may be tested directly by examining the joint statistical significance of the (identifying) instruments when these are included, together with all the (exogenous) explanatory variables in a set of regression on each of the potentially endogenous variables (i.e., the first-stage equation in 2SLS), the lack of a 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? The 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 must include fixed-effects at the level

of the local area.⁴ 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. 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 unobservables, such as preferences or innate ability. Exactly which characteristic(s) to interact the instruments with, however, is not necessarily clear a priori. Also, even if one might come up with reasons why interactions with *all* individual characteristics should be used, in practice, one faces a tradeoff between the strength of the first-stage regression—i.e. the predictive power of the instruments—and the validity of the instruments in terms of the results for the test for overidentifying restrictions in the second-stage regression.

After some experimentation, the alternative IV identification strategy is found to perform well using the religious affiliation community population shares interacted with ethnicity/tribal association and parental education. The intuition here is that individuals with different ethnic/tribal backgrounds may also be differently affected by the degree of the presence of the various religions. Similarly, the education of an individual’s parents might interact with the religious environment to affect human capital accumulation differentially. For example it has

⁴ While this formally only controls for time *invariant* 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.

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.

In sum, two alternative instrumental variables identification strategies will be pursued here: (1) religious affiliation community shares (and no community fixed-effects) and (2) interactions of these shares with individual characteristics (and including community fixed-effects)—this second strategy being the preferred estimation strategy.

For both of these alternative sets of instruments—the share variables, only, and the share variables interacted with individual characteristics—the instruments capture differences in the likelihood of participation for each of the groups defined by the instruments depending on marginal costs and benefits. For example, it is less “costly” to be(come) a Christian if there are relatively more Christians in the community; similarly, there might be stigma—i.e. a psychic cost—associated with being Christian in a predominantly Traditional/Animist or Muslim community. Again, while one would parental education (and, perhaps, ethnic/tribal background) to have a direct effect on individual human capital accumulation (which in turn indicates that they should be included as controls in the second-stage equation, also—which they therefore also are), it is unlikely that the *interactions* of these variables with the religious affiliation community

shares should have a direct effect on human capital accumulation, once observable and unobservable community characteristics have been controlled for through fixed effects.⁵

These considerations lead me to estimate the human capital equation from the conceptual framework by Two-Stage Least Squares using two alternative identification strategies in terms of the choice of identifying instruments: (1) religious affiliation community shares (and no community fixed-effects) and (2) interactions of these shares with individual characteristics (and including community fixed-effects)—the second of these being the preferred estimation strategy; additionally, so as to provide a (possibly biased) benchmark or reference equation, I will also estimate the human capital equation by Ordinary Least Squares. The first stage equations are all of the form:

$$R_i = \alpha_0 + \alpha_1 RS_i + \alpha_2 A_i + \varepsilon_i, \quad (2)$$

where R_i is the potentially endogenous explanatory variable in question (individual religious affiliation), RS_i is a vector including the identifying instruments, i.e. the share of the population in the community with the various religious affiliations (or these shares interacted with individual characteristics for the specification including cluster fixed-effects), and A_i is a vector of all additional controls from the second stage regression (primarily included for efficiency)—including gender, tribal association, parental education, and—for the OLS and the second IV specification—community fixed effects (the individual components of A_i are discussed in more detail in the next section). ε_i is an error-term capturing unobservables. The second-stage equation (the estimating or main equation) then includes the predicted values of the potentially endogenous explanatory variables from the first stage:

⁵ Again with the caveat that there may still be the possibility that time-varying community fixed-effects affect both individual religious affiliation and individual human capital accumulation—but without panel data, this issue cannot be addressed.

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

where Y_i is years of schooling; \hat{R}_i is a vector of predicted potentially endogenous explanatory variables from the first stage equation (2), namely individual religious affiliation; A_i is a vector of all additional controls (similar to the first-stage regression, (3)); and v_i is an error-term capturing unobservables.

Further, so as to allow for arbitrary heteroskedasticity, the estimations are carried out using Huber-White standard errors (Huber, 1967; White, 1980). Additionally, so as to allow for the possibility that observations are correlated within communities the standard errors are also adjusted for within-cluster correlation (Froot, 1989; Williams, 2000).

Again, the main focus here is on the difference in human capital in terms of years of schooling between adherents of oral and written tradition religions, respectively—where the former, as previously discussed, here include both Traditional/Animist religion and, again perhaps somewhat surprisingly, Islam, and the latter include Christianity. The main estimations will therefore involve only two religious affiliations. It may be, however, that 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, three sensitivity analyses are performed: (1) disaggregating Christianity into individual denominations (Catholic, Anglican, Presbyterian, etc); (2) separating Non-Christians into Traditional/Animist religion and Islam; and (3) both at the same time.

3. Data and Descriptive Analysis

The Ghana Living Standards Survey is a nationally representative multi-purpose household

survey. The analyses here examine 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 variable, 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.

Moving to the explanatory variables, the most important one 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/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 is 15 to 64 years of age. This yields a total of 13,231 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 religion/Animism, Islam and Christianity—individuals reporting “other religion” (13 observations) and “no religion” (728 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 40 observations in arriving at the final analysis sample of 12,434. Descriptive statistics for the variables from the final estimation sample are reported in Table A1 in the Appendix.

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 as a whole have completed more years of schooling (6.9 years) than both Muslims (3.7 years) and Traditionalists / Animists (1.4 years). There are some differences among different Christian denominations, ranging from 5 years of schooling for Spiritualists to 8.6 years of schooling for Anglicans, with the other groups somewhere in between. Again, this suggests that the overall human capital gap for Christians overall is not driven by any one or two Christian denominations.

[Table 1 about here]

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 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.

The results from specification tests indicate that 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 and all also numerically large—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 endogenous to individual educational attainment, by rejecting exogeneity at a 5 percent level of significance or less (in several cases much less). 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 exogenous.

[Table 2 about here]

Estimates from the second-stage regressions aggregating all Christian denominations and also combining Traditional religion/Animism and Islam into one group—thus focusing at the two main groups of written and oral tradition religion, respectively—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. 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 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 remains. At about 4.1 years, the oral-written tradition religion (or, similarly, Christian-non-Christian) years of schooling differential is highest for the preferred specification which simultaneously endogenizes individual religious affiliation and includes cluster fixed-effects. In turn, these results are consistent with Takyi and Addai (2002), which found women with Christian background in Ghana to be more likely to have received some education than women with Muslim or Traditional/Animist background⁶ (again, implicitly assuming that religious affiliation is exogenous).

⁶ Though with no statistical differences in completion of higher levels of education.

[Table 3 about here]

Again, this analysis may be viewed as somewhat crude, by both aggregating all Christian denominations into one group and also combining Traditional/Animist religion and Islam into one group, oral tradition religion. Next, I therefore perform three sensitivity analyses: (1) disaggregating Christianity into individual denominations (Catholic, Anglican, Presbyterian, etc), (2) separating oral tradition religion into Traditional/Animist religion and Islam, and (3) both (1) and (2) at the same time.

Starting with the decomposition of Christianity into its main denominations, Table 4 (presented with the benchmark results from the main analysis in Table 3 for comparison) reveals that while there are certainly differences in years of schooling across denominations, it is not the case that just one or two denominations drive the oral-written tradition religion human capital gap—most denominations (with Spiritualists as a possible exception, possibly due to the low incidence of this denomination, see Table A1) are characterized by substantively large and statistically significant positive human capital gaps relative to the oral religion / non-Christian category (the reference group).

[Table 4 about here]

Separating instead the oral / non-Christian religion group into Traditional/Animist religion and Islam, Table 5 shows that while there is a substantial human capital gap between Islam and Traditional / Animist religion (the reference group) for the first IV specification, the gap is less than a year for the other two specifications—and not statistically significant for the preferred specification, namely the second IV specification (i.e., using community religion shares interacted with individual characteristics and also including cluster fixed-effects). In turn, this indicates that the results are not too sensitive to grouping Traditional/Animist religion and

Islam into one group, oral religion, either—certainly not for the preferred specification, the second IV specification. 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), which 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 (at least for the preferred specification).

[Table 5 about here]

Finally allowing for differential effects both among Christian denominations and among oral tradition religions, Table 6 reveals that the main results still hold: individuals of Christian observance clearly have higher levels of human capital, though there are some differences across denominations—again with Spiritualists as a possible outlier, possibly owing to the relatively low incidence of this denomination in this sample. Again the difference in human capital levels between individuals following Islam versus Traditional religion / Animism (the reference group) is negligible for the preferred specification—and also not statistically significant. Altogether, this supports the previous hypotheses that individuals of Christian observance will tend to have higher human capital levels than others and also that adherents of Traditional religion / Animism and Islam do not differ significantly (substantively as well as statistically), consistent with Islam being viewed as an oral religion along with Traditional religion / Animism in Ghana.

[Table 6 about here]

5. Conclusion

This paper examines the relationship between individual religious affiliation and human capital in Ghana, distinguishing between religions based on oral and written traditions. To examine the robustness of the main results for oral and written religions, sensitivity analyses allow for different types of main oral tradition religion and additionally allow for several denominations Christian religion. The analyses also allow for individual religious affiliation to be endogenous by pursuing an instrumental variables estimation strategy in addition to ordinary least squares, using two alternative sets of identifying instruments. This contrasts with previous research, which has mostly focused on developed countries, especially the US; mostly focused on one religion, only; and also typically treated religious affiliation as exogenous.

The descriptive analysis revealed a strong relationship between religion and human capital in terms of years of schooling, 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 analysis, the results from specification tests supported the use of 2SLS for this application. This contrasts with the bulk of the literature examining the relationship between human capital and individual religious affiliation, which has mostly treated individual religious affiliation as exogenous. 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, parental educational attainment, and economic and other conditions in the community (captured by cluster fixed-effects), 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. 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 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 2 years of schooling—or slightly more than twice the OLS estimate. While there was some variation in the results among different Christian denominations, the main results did not appear to be driven by one or more denominations—and also not by any of the two oral tradition religions, either.

While the multivariate results 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 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.

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. Years of Schooling and Religious Affiliation for Estimation Sample

	<i>Years of schooling</i>	<i>N</i>
Christian	6.9	9,821
Catholic	6.2	2,185
Anglican	8.6	244
Presbyterian	8.2	1,479
Methodist	7.7	1,147
Pentecostal	6.7	2,050
Spiritualist	5.0	605
Other Christian	7.2	2,111
Non-Christian	2.9	2,613
Traditional	1.4	911
Muslim	3.7	1,702
Total	6.1	12,434

Notes: Estimations incorporate survey weights.

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

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

<i>Main Analysis:</i>			<i>Sensitivity Analysis I: Decomposing Christianity into Individual Denominations</i>		<i>Sensitivity Analysis II: Decomposing Non- Christian Religions into Individual Denominations</i>		<i>Sensitivity Analysis III: Decomposing Both Christianity and Non- Christian Religions into Individual Denominations</i>	
<i>IV Spec 1: IV Spec 2:</i>	<i>IV Spec 1:</i>	<i>IV Spec 2:</i>	<i>IV Spec 1:</i>	<i>IV Spec 2:</i>	<i>IV Spec 1:</i>	<i>IV Spec 2:</i>	<i>IV Spec 1:</i>	<i>IV Spec 2:</i>
<i>(1) Predictive power:</i>								
Christian	409.05 [0.000]	15.88 [0.000]			213.92 [0.000]	12.16 [0.000]		
Catholic			192.66 [0.000]	2212.03 [0.000]			169.80 [0.000]	2340.93 [0.000]
Anglican			66.11 [0.000]	81.99 [0.000]			59.12 [0.000]	89.22 [0.000]
Presbyterian			340.31 [0.000]	1302.53 [0.000]			324.66 [0.000]	1614.84 [0.000]
Methodist			89.35 [0.000]	378.12 [0.000]			79.55 [0.000]	391.04 [0.000]
Pentecostal			366.94 [0.000]	20.65 [0.000]			327.97 [0.000]	23.93 [0.000]
Spiritualist			113.07 [0.000]	606.14 [0.000]			117.96 [0.000]	1150.04 [0.000]
Other Christian			523.62 [0.000]	1423.57 [0.000]			468.19 [0.000]	1343.10 [0.000]
Non-Christian	Ref.	Ref.	Ref.	Ref.				
Animist / Traditional					Ref.	Ref.	Ref.	Ref.
Muslim					347.26 [0.000]	7.96 [0.000]	94.16 [0.000]	2171.71 [0.000]
<i>(2) Wu (1973)-Hausman (1978) endogeneity test</i>								
	4.55 [0.033]	6.31 [0.012]	2.51 [0.016]	2.41 [0.020]	16.61 [0.000]	22.51 [0.000]	5.69 [0.000]	9.77 [0.000]
<i>(3) Sargan (1958)-Hansen (1982) overidentification test:</i>								
	NA	14.42 [0.493]	NA	131.17 [0.228]	NA	41.31 [0.081]	NA	131.75 [0.199]
N	13,162	13,162	13,162	13,162	13,162	13,162	13,162	13,162

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 (Froot, 1989; Williams, 2000) (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 (1998/99).

Table 3. Main Analysis Results for Religious Affiliation from IV and OLS Years of Schooling Regressions: Combined Comparison Group of “Non-Christian Religions” (Animist/Traditional and Islam Combined into One Group)

	<i>OLS</i>	<i>IV Spec I</i>	<i>IV Spec II</i>
Christian	1.727*** [0.187]	3.088*** [0.640]	4.147*** [0.910]
Cluster FEs?	YES	NO [†]	YES
N	12,434	12,434	12,434

Notes: Additional control variables include dummies for female gender, ethnicity/tribe, age, parental education, urban location, region (the two last variables for IV Spec I, only). 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 (Froot, 1989; Williams, 2000) (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 (1998/99).

Table 4. Sensitivity Analysis I: Decomposing Christianity into Individual Denominations (Shown with the Benchmark Results from Main Analysis (Table 3) for Comparison)

	<i>Benchmark: Results from Main Analysis (Table 3)</i>			<i>Sensitivity Analysis I:</i>		
	<i>OLS</i>	<i>IV Spec I</i>	<i>IV Spec II</i>	<i>OLS</i>	<i>IV Spec I</i>	<i>IV Spec II</i>
Christian	1.727*** [0.187]	3.088*** [0.640]	4.147*** [0.910]			
Catholic				1.800*** [0.223]	2.715*** [0.659]	6.174*** [1.363]
Anglican				2.378*** [0.382]	2.692 [1.764]	3.941* [2.154]
Presbyterian				2.261*** [0.283]	5.313*** [0.947]	2.807** [1.407]
Methodist				1.923*** [0.263]	5.738*** [1.422]	3.414** [1.399]
Pentecostal				1.362*** [0.220]	2.095*** [0.795]	2.375*** [0.870]
Spiritualist				0.685** [0.312]	-1.725 [1.419]	-0.209 [1.910]
Other Christian				1.759*** [0.226]	2.474*** [0.705]	4.321*** [1.470]
Cluster FEs?	YES	NO [†]	YES	YES	NO [†]	YES
N	12,434	12,434	12,434	12,434	12,434	12,434

Notes: Additional control variables include dummies for female gender, ethnicity/tribe, age, parental education, urban location, region (the two last variables for IV Spec I, only). 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 (Froot, 1989; Williams, 2000) (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 (1998/99).

Table 5. Sensitivity Analysis II: Decomposing Non-Christian Religions into Individual Denominations (Shown with the Benchmark Results from Main Analysis (Table 3) for Comparison)

	<i>Benchmark: Results from Main Analysis (Table 3)</i>			<i>Sensitivity Analysis II:</i>		
	<i>OLS</i>	<i>IV Spec I</i>	<i>IV Spec II</i>	<i>OLS</i>	<i>IV Spec I</i>	<i>IV Spec II</i>
Christian	1.727*** [0.187]	3.088*** [0.640]	4.147*** [0.910]	2.219*** [0.304]	6.541*** [0.787]	4.770** [1.887]
Muslim				0.825** [0.409]	4.422*** [0.729]	0.779 [1.968]
Cluster FEs?	YES	NO [†]	YES	YES	NO [†]	YES
N	12,434	12,434	12,434	12,434	12,434	12,434

Notes: Additional control variables include dummies for female gender, ethnicity/tribe, age, parental education, urban location, region (the two last variables for IV Spec I, only). 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 (Froot, 1989; Williams, 2000) (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 (1998/99).

Table 6. Sensitivity Analysis III: Decomposing Both Christianity and Non-Christian Religions into Individual Denominations (Shown with the Benchmark Results from Main Analysis (Table 3) for Comparison)

	<i>Benchmark: Results from Main Analysis (Table 3)</i>			<i>Sensitivity Analysis III:</i>		
	<i>OLS</i>	<i>IV Spec I</i>	<i>IV Spec II</i>	<i>OLS</i>	<i>IV Spec I</i>	<i>IV Spec II</i>
Christian	1.727*** [0.187]	3.088*** [0.640]	4.147*** [0.910]			
Catholic				2.279*** [0.314]	5.863*** [0.702]	6.453*** [1.828]
Anglican				2.870*** [0.453]	6.301*** [1.808]	4.822* [2.687]
Presbyterian				2.746*** [0.376]	8.398*** [0.876]	3.508* [1.970]
Methodist				2.419*** [0.355]	9.164*** [1.453]	3.493* [1.932]
Pentecostal				1.855*** [0.341]	5.558*** [0.899]	3.384** [1.681]
Spiritualist				1.172*** [0.403]	1.511 [1.418]	0.11 [2.340]
Other Christian				2.250*** [0.338]	5.830*** [0.836]	4.561** [2.069]
Muslim				0.815** [0.411]	4.125*** [0.678]	0.746 [1.586]
Cluster FEs?	YES	NO [†]	YES	YES	NO [†]	YES
N	12,434	12,434	12,434	12,434	12,434	12,434

Notes: Additional control variables include dummies for female gender, ethnicity/tribe, age, parental education, urban location, region (the two last variables for IV Spec I, only). 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 (Froot, 1989; Williams, 2000) (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 (1998/99).

Appendix

Table A1. Descriptive Statistics for Estimation Sample

	<i>Mean:</i>	<i>Std Dev:</i>
<i>Dependent variable:</i>		
Years of schooling	6.1	5.4
<i>Explanatory variables:</i>		
<i>Religion:</i>		
Christian	0.781	0.414
Catholic	0.184	0.388
Anglican	0.018	0.132
Presbyterian	0.109	0.311
Methodist	0.088	0.284
Pentecostal	0.162	0.369
Spiritualist	0.043	0.202
Other Christian	0.177	0.381
Non-Christian	0.219	0.414
Traditional	0.070	0.254
Muslim	0.150	0.357
<i>Other (control) variables:</i>		
Female	0.540	0.498
Age	32.5	13.2
Age squared	1229.3	962.1
Akan	0.473	0.499
Ewe	0.135	0.342
Ga-Adangbe	0.091	0.288
Other ethnicity	0.300	0.458
Mother no education	0.783	0.412
Mother less than primary	0.026	0.158
Mother primary	0.064	0.244
Mother middle/junior secondary	0.109	0.312
Mother secondary and above	0.014	0.118
Mother technical-vocational	0.015	0.121
Mother other education	0.0003	0.016
Mother education don't know	0.010	0.101
Father no education	0.593	0.491
Father less than primary	0.015	0.122
Father primary	0.049	0.216
Father middle/junior secondary	0.215	0.411
Father secondary and above	0.071	0.256

Father technical-vocational	0.042	0.200
Father other education	0.001	0.032
Father education don't know	0.034	0.181
Urban	0.368	0.482

N	12,434	
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Notes: Estimations incorporate survey weights and adjusts for within-community correlation/clustering (Froot, 1989; Williams, 2000).

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