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Article

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Religiosity and financial development in Africa: evidence from panel quantile regression

Benard Ohene Kwatia[a], Godfred Amewu[b] and Mohammed Armah[c]

[a]Department of Finance, AIT Business School, Accra Institute of Technology, Kokomlemle, Ghana; [b]Department of Finance, School of Business, University of Ghana, Legon, Ghana; [c]Department of Accounting and Finance, School of Business, Ghana Institute of Management and Public Administration (GIMPA), Achimota Ghana

ABSTRACT

As secularism is increasing and religious diversity is regaining momentum worldwide, it is important to understand how systemic religious differences have influenced financial development in Africa. To this end, this study seeks to investigate the impact of religiosity on financial development in Africa by using freedom of religion to proxy religiosity and domestic credit to the private sector to proxy financial development covered from 2000 to 2020. The results from the panel quantile regression show that religiosity is negatively associated with the use of financial services across the quantile, whereas freedom of association, assembly, and civil society, and security and safety are marginally stronger within the lower, middle, and upper quantiles. The findings underscore that, fundamental human rights exert significant influence on financial development in Africa. Our findings contribute to literature by expanding knowledge on the role of personal freedom on economic activities hence, African governments and policymakers constitutionalize freedom as a fundamental human right, as freedom matters for financial development in Africa.

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1. Introduction

The relationship between financial development and economic growth within and across countries has long been known and not a new finding (Rousseau, 2003). This relationship was driven decades ago by Bagehot (1873) and Schumpeter (1911), but it received empirical content later, notably Sylla (1969). Financial development has empirically been linked to economic development (see Levine, 1997; Beck et al., 2000; Beck & Levine, 2002; Khan & Senhadji, 2003; Herwartz & Walle, 2014; Law & Singh, 2014; Guru & Yadav, 2019). Considering the impact of a properly regulated financial system on economic development, it is necessary to explore the factors that predict or trigger financial development, especially in developing economies such as Africa, where financial development has progressed over the past four decades, but there is still scope for further development (Mlachila et al., 2016). Finance and economics literature on the predictors of financial development has argued on diverse and multiple grounds such as geographical factors, government expenditure, power distance, foreign direct investment (FDI), digital financial technologies (FinTech), individualism, remittances, trade openness, trust, and institutions (La Porta et al., 1997; Levine, 2000; Rajan & Zingales, 2003; Guiso et al., 2004; Ashraf et al., 2016; Adeleye et al., 2017; Ang, 2019; Nguyen et al., 2020; Isiksal, 2023; Aduba et al., 2023; Dosso, 2023), making the discussions divergent.

However, as noted by Pew Research Center (2015), more than 80% of the world's population is identified as religious; as such, religiosity cannot be discounted in finance discourse. Religious factors have long played a substantial role in the influence of economic systems throughout history, supporting Adam Smith's (1776) inquiry into the nature and causes of wealth in nations (Roberts, 2015). The past two

CONTACT Godfred Amewu gamewu@ug.edu.gh P.O. Box LG 78, Legon – Accra, Ghana
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decades have seen a revival of interest in the role of culture in economics, more specifically religion (Goodell et al., 2023; Becker et al., 2021). Probably, the surge of interest in the subject is to help understand 'one of the great uncharted areas' in economics and finance – how individuals combine business life with personal religious values (Lagace, 2001). Religion, as an informal institution, plays a significant role in social and economic development (Feng et al., 2023; Zhong et al., 2016), and as predicted by the social norm theory, individuals who may or may not be religious are nonetheless affected by the religious norms of their geographic location because, the religious norms of the geographic areas are important elements of the environment in which they live (Cialdini & Goldstein, 2004; Kohlberg, 1984). As asserted by Deneulin and Rakodi (2011), religion cannot be ignored in development discourse. Over the past decades, international development institutions and faith community partnerships, and the literature on religion and development have multiplied. Therefore, there is a need to move from reference to general principles and beyond the instrumental use to the achievement of scheduled global developmental goals (Deneulin & Zampini-Davies, 2017).

Religion also forms part of a culture, and culture enhances the development of specific, value mindsets and wealth views within religious communities, which also impacts risk attitudes and behavioural inclinations such as borrowing choices (Acemoglu, 2009; Benjamin et al., 2016); or even defines individual traits and beliefs, values and cultural norms, organisations and social groups, and military and political power (Becker et al., 2021). Understanding the influence of religiosity on financial development is key because human behavior is known to be strongly influenced by social norms (Cialdini & Goldstein, 2004); and religion is an important social mechanism for controlling behavior and beliefs (Kennedy & Lawton, 1998). Thus, religion affects both the creation and implementation of informal rules in society (Amissah & Świerczyńska, 2021) and the effectiveness of contracts hinging on formal rules completed within informal ethical and behavioral norms – religiosity (Aggarwal & Goodell, 2014).

Religion is an important cultural element that influences many aspects of society. Religion, to the extent that people perceive and live according to their beliefs, is one of the obvious examples of cultural influence on economic outcomes. It shapes individual values and imposes an informal constraint on preferences and behaviour, which in turn affects individual economic choices and decision-making processes (Guiso et al., 2003). Religious beliefs are considered in the literature as one of the most important courses leading to the proliferation of economic growth (Burzynska & Berggren, 2015), and have been considered as one of the backbone of economic development (Haar & Ellis, 2006; Thomas et al., 2005), yet the literature on religion and religious beliefs and their impact on financial development is still in the embryonic stage. Empirical studies on the impact of religion on financial development are startling, given that religion has been identified as a key element during economic growth (Iannccone, 1998). Although most of the literature has examined the impact of financial development on various dimensions of economic growth, namely, poverty reduction (Abosedra et al., 2016), innovation (Ferreira et al., 2012), inequality (De Haan & Sturm, 2017) and economic growth (Nguyen, 2022; Ibrahim & Alagidede, 2019), few studies have focused on financial development and religiosity. Of the few studies on the effect of religion and religious beliefs on financial development (see Amissah & Świerczyńska, 2021; Guiso et al., 2003; Amin & Murshed, 2022; Haar & Ellis, 2006; Thomas et al., 2005; Burzynska & Berggren, 2015), none of them specifically deal with African countries that are highly religious and have been predicted to be the center of religiosity in the future (Pew Research Center, 2022).

As documented in the above strand of literature, it has been shown that religiosity can affect economic development. However, the direction in which religion affects financial development in Africa has not received much attention, given that the African region has been predominantly characterised by high levels of religiosity in contrast to other regions and has been predicted to be the region with four in ten Christians by the year 2060 and Islam to grow faster than any other religious group in the coming decades (Pew Research Center, 2022). Religion is an important dimension of cultural nomenclature, influencing many economic and financial decisions and deeply forming the characteristics of individuals (La Porta et al., 1999). Although religious beliefs are different, it is generally accepted that people who believe in religion tend to have personal characteristics such as honesty, thriftiness, and strong work ethics (McGuire et al., 2012). Hsieh et al. (2022) poist that extreme religiosity can lead to poltical instability, weakening of government power, and ultimately worsening the economy. In the work of Barro and McCleary (2003), excessive religious enthusiasm can consume resources that could otherwise be absorbed

into sectors that are directed towards increasing economic growth. On the basis of this conflicting hypothesis, we try to answer the research question; Does religiosity drive financial development in Africa? It is interesting to find that over the years researchers have measured religiosity based on church attendance and religious beliefs, which seems to be the survey report which comprises of International Social Survey Programme(ISSP) and Gallup Millennium Survey(GMS) (McGuire et al., 2012; Kanagaretnam et al., 2015; Hsieh et al.,2022). The World Survey (WVS) report contains six ways of survey with thousands of respondents from 100 countries between 1981 and 2014. Eight countries were included in the 1981-1984 survey, 18 in the 1990-1994 survey, 54 in the 1995-1998 survey, 40 in the 1999–2004 survey, 58 in the 2005–2009 survey, and 60 in the 2010–2014 survey.

However in recent time researchers have measured religiosity – and indeed, other freedom based on responses to questions such as; 'Do you think you have the freedom to practice your religion of choice?' and 'How free do you feel?'. These survey questions resulted in subjective data, hence, the shift towards a more objective data on freedom that consistently capture and align theory with operationalisation for empirical analysis (Graeff, 2012; Neumann & Graeff, 2010). A plethora of studies attempting to measure freedom have not separated the rights to liberty and actions. In most spheres of human life in which freedom is measured, such as law and media; citizen-led actions do not exist hence the need for freedom measurement that rest on the individual micro-level to country macro-level (De Haan & Strum, 2000). To fully capture society's overall freedom, a shift from earlier myopic measurement of freedom that focused only on either economic or civil aspects such as the Cingranelli-Richards Human Rights Dataset (CIRI), World Press Freedom Index, and the Economist Democracy Index to consider a more comprehensive index that bridges the gap between civil rights and market freedom (Doering, 2012). To this end, the Fraser Institute Human Freedom Index (HFI) (Fraser Institute, 2022), which explores a broader spectrum of freedom, clearly distinguishes personal freedom from economic freedom and captures contemporary liberties such as freedom of religion, freedom of association, assembly and civil society and, security and safety, to produce weighted comparable country scores, is used in this study. The HFI started in 2000 but has started has produced 8 globally comparable annual indexes since 2015 to 2022. In 2015, 2016-17, 2018, 2019-20, 2021 and 2022 the index was created employing 76, 79, 79, 76, 82 and 83 distinct indicators of personal and economic freedom in 152, 159, 162, 162, 165, and 165 countries respectively (Vásquez et al., 2022).

It is important to state that over the years there has been a notable shift on measurement for freedom of religion and other freedom (safety and security, and freedom of association, assembly and civil society). For instance, from 2000 to 2020 religious freedom, security and safety, and freedom of association, assembly and civil society changed from an average of 7.66 to 7.71, 7.19 to 7.23 and 6.32 to 6.35 representing an improvement of 0.65%, 0.56% and 0.47% respectively. From economic bloc perspective, Northern and Western Africa, saw decline in freedom of religion from 4.75 to 3.8 and 8.97 to 8.52 representing 20% and 5.02% respectively. However Southern, Eastern and Central Africa saw an improvement in religious freedom from 8.57 to 8.85, 7.14 to 8.09 and 7.66 to 8.16 representing 3.27%, 13.31% and 6.53% an increase over the same period. For security and safety, Northern, Western and Eastern Africa reported a decline of 5.14% (7.59-7.20), 1.06% (7.58-7.50) and 5.50% (7.63-7.21) respectively while, Southern and Central Africa recorded and improvement of 12.37% (5.90-6.63) and 20.34% (5.85-7.04) respectively. Freedom of association, assembly and civil society also recorded a decline in Northern and Western Africa of 31.12% (5.43-3.74) and 1.08% (7.41-7.33) respectively while an increase of 3.63% (7.17-7.43), 17.57% (5.69-6.69) and 2.57% (5.05-5.18) were recorded for Southern, Eastern and Central Africa respectively.

Given the growing interest in religion and its impact on economic activities, this article aims to conduct a comprehensive study of the impact of religion on financial development. Second, unlike previous studies that proxy religion by the intensity of religion in the World Values Survey Report. Our approach departs from previous strands of literature where religiosity, predominantly measured by church attendance, other beliefs, and activities. In this regard, we argued that to uphold religious beliefs and values and be frequent in attending religious gatherings, there must first be the freedom to freely participate in religious activities without repression and hostility. Therefore, the freedom of religion, which has been associated with peace, stability, and development (James, 2019; Grim et al., 2014), was used to proxy religiosity.

We employed the Fraser Institute (2022) freedom of religion – comprising indicators that rates the liberty to peacefully proselytize, choose and practice religion of choice in a society and indicators that measures against government repression of religious organizations, to proxy religiosity. By analyzing the influence of religiosity on financial development, our paper bridges the gap between several strands of literature on religion and financial development. Third we include other socio-economic factors (freedom of association, assembly, and civil society, safety and security, foreign direct investment and macroeconomic variables), which may jointly influence the relationship between religiosity and financial development in Africa. Our findings are robust in controlling for a set of variables used in the literature to explain the impact of religiosity and financial development. We document that freedom of religion exerts significant influence on financial development within the lower middle and upper quantiles. We make an insightful conclusion that African countries will become more financially developed when there is a positive information asymmetry between financial services and religiosity. Fourth, given that the literature has documented the linearity between the nexus, this study goes beyond the linear relationship and examines nonlinearity using panel quantile regression, which will allow us to correctly describe skewed or heteroscedastic data, as they do not take normality and its robust influential points and deviations. Furthermore, this method will help analyse the relationship between the predictor variable and various distributions of independent variables (Koenker, 2005).

The rest of the paper is structured as follows: Section Two reviews the prior literature; Section Three outlines the data and methodology employed in the study; Section Four documents the empirical analysis and results of the study; and Section Five concludes the study with policy recommendations.

2. Literature review

Over the period, the literature has documented the significant role religion plays in the determinants of finance in economics. Arguably, economic development has been associated with a decrease in personal prayer, individual participation in formal religious services, religious beliefs, and the influence of organised religion on politics and governance (Wesley, 1760; Weber, 1905/1930; Wilson, 1966; Berger, 1967; McCleary & Barro, 2016). Hume (1757/1993) asserted that religious beliefs are a reflection of ignorance and fear declining following a shift from an agrarian economy to an industrialized economy characterized by technological and educational advancement (Inglehart, 2020). Thus, modernization inhibits religiosity and religion inhibits development. The work of Seguino (2011), also found that religiosity strongly correlates with gender inequitable attitudes across 93 countries, employing ordinary least squares (OLS), two-stage least squares (TSLS) and three-stage least squares (3SLS) estimators. Furthermore, the study found that the impact of religiosity is imperceptibly transmitted through everyday economic transactions, and no religion stands out as inequitable. Gender-inequitable attitudes negatively affect well-being and public policy, thus impeding development. In support of this, Barro and McCleary (2002) assert that religiosity when proxied by church attendance, declines economic development.

More recently, Amissah and Świerczyńska (2021) explored the relationship between religion and financial development to establish whether religion is a determinant of financial development. The study used the intensity of religion in the World Values Survey to represent religion and modelled financial development through private credit as a percentage of GDP to measure the depth of the financial system. Private credit from deposit money banks and other institutions was used to measure broader coverage, especially in less developed countries, stock market capitalization to measure the role of the financial market in financial system development, and liquid liability as a robustness check. The results of the quantile regression technique showed that religiosity and financial development were inversely related, highlighting low level of dedication to work which is not consistent with what one would anticipate in a highly religious environment. In support of the above, Amin and Murshed (2022) provide evidence that religious and ethnic diversity can hinder financial development using data from 102 developing countries, measuring financial development by private credit and M2 (as a percentage of GDP), and religious and ethnic diversity by the Alesina fragmentation index.

Divergent from the above, there is a strand of literature that asserts that religiosity matters for development. Guiso et al. (2003) explored the interconnectedness between religion and economic attitudes toward the government, legal rules, trust and cooperation, working women, thriftiness, and the market

economy using World Values Surveys. The study found that, on average, religious beliefs were associated with good economic attitudes conducive to higher economic growth and per capita income. The study also found that religious individuals tend to be more racist and less supportive of working women (Forman-Rabinovici & Sommer, 2018). However, they find that Christianity improves growth as it associates positively with attitudes that are supportive of economic growth. In line with the above, using Dutch survey data from the DNB Household Survey from 1995 to 2008 to explore the differences in economic attitudes and financial decisions between religious and non-religious households, Renneboog and Spaenjers (2012) found that religious households save more, consider themselves trusting, have longer planning horizons, and have stronger bequest motives. Again, the study finds that Catholics are more risk-averse, invest less frequently in the stock market, and attach more importance to thrift, while Protestants combine a more external locus of control with a greater sense of financial responsibility and conclude that religious beliefs may impact financial decision-making through differences in economic attitudes. Becker and Woessmann (2009) argued that regions dominated by Protestantism grew faster as a result of Protestants' emphasis on religious attitudes, such as reading of the Bible, which led to greater investment in human capital and literacy. Arruñada (2010) also finds Protestantism to be more favorable to capitalist economic development by promoting social ethics that enhance impersonal trade and religion influences ethical behavior in the workplace, such as dedication, hard work, honesty, and loyalty – work is considered a religious duty (Weaver & Agle, 2002; Quoquab & Mohammad, 2013). Henderson (2019) adopted a quantitative approach to study the relationship between religion, Roman Catholicism, and economic and financial development in the post-Famine era in Ireland. The focus was on development indicators such as education, commerce, and occupation over time to precisely determine whether differences occurred between denominations and whether such differences changed over the period. A cross-sectional approach was adopted, employing the ordinary least squares (OLS) and the negative binomial model, and it was found that Catholicism supports development, although initially lagged in development terms; over time, the gap with Protestants is closed, providing evidence that religion enhances development. Recently, Ozili et al. (2023) found that, in religious countries, bank branch expansion in the midst of high poverty significantly enhances economic growth, investigating the effect of financial inclusion on economic growth in religious and non-religious countries employing the two-stage least squares (2SLS) regression method.

Barro and McCleary (2002) also studied bidirectional causation between religion and economic and political development in a broad cross-country panel over a 20-year period, and found that economic growth is favorably linked to religious beliefs, refuting arguments that claim religion is a reflection of non-scientific thought. Grier (1997) examined whether Protestantism is correlated with economic growth rates and real per capita income, and whether religion can explain why Spanish ex-colonies perform worse than British ex-colonies and found that Protestantism is overwhelmingly correlated with growth and development, confirming Fanfani's (1939) assertion that religion enhances growth if it is separated from a country's economic and political life; otherwise, all religions adversely affects development, but the separation of state and church occurs in many Protestant countries, and is therefore the driving force behind their economic growth.

The study of determinants of financial development is silent on the role of religion. However, as mentioned, the literature has documented the key role of religion in influencing other relevant economic behaviors such as trust, social capital, ethical behaviour, access to capital, risk tolerance, education, and human capital, which are also essential for financial development (Guiso et al., 2004; Weber, 1905/1930; Beck et al., 2013; Benjamin & Shapiro, 2006; Bénabou, 2016). The increasing evidence in the literature that financial development has a positive impact on economic growth and development indicates an increased interest in understanding the factors that determine financial development (Abosedra et al., 2016; Ferreira et al., 2012; De Haan & Sturm, 2017; Nguyen, 2022; Ibrahim & Alagidede, 2019). Despite the growing interest in this direction, less attention has been paid to the role of religion in financial development. Our goal is to bridge this gap by analysing the case of African countries that are predominantly characterised by high levels of religiosity and have been predicted to be the region with four-in-ten Christians in the world by 2060 and Islam growing faster than any other religious group in the coming decades (Pew Research Center, 2022).

Building on the rich literature between religiosity and economic growth, our study proposes national religiosity as a deep routing cultural factor in Africa to underneath the development of the financial

system in Africa. We therefore investigate a comprehensive and in-depth empirical analysis between the nexus to understand the unique underlying dynamics through which religiosity interacts with financial development. Therefore, we seek to bridge this gap by taking into account the intricate interplay of different financial landscapes with religious freedom across countries and regions in Africa. This will allow the study to determine the extent to which one's liberty to freely associates and practice religion of choice, translates into determining financial development in Africa. Finally, unlike previous works that predominantly employ a conditional mean-based approach which provides limited evidence for such a complex connection, we employ panel quantile regression to provide valuable insights on how religiosity might impact financial development across different quantiles.

3. Methodology and data

3.1. Panel quantile regression (PQR)

Most existing studies have adopted the traditional ordinary least squares approach to identify factors influencing financial development (Amissah & Świerczyńska, 2021; Albulescu et al., 2019), but this method provides only the conditional expectation (mean value) of the dependent variable and does not describe the whole picture of the conditional distribution (Xu et al., 2017). However, due to the enormous heterogeneity in Africa, the relationship between religiosity and financial development is likely to perform discriminately at different quantiles. These heterogeneous effects have proven to provide useful information that cannot be found in mean (standard) regression techniques, such as ordinary least squares (Bitler et al., 2006), which cannot provide a complete picture of the conditional distribution. In this regard, the quantile regression allows the coefficient to vary with multiple quantiles and has the distinctive advantage of addressing the problems of heteroscedasticity, outliers, and unobserved heterogeneity (Koenker, 2005). This technique incorporates asymmetry and nonlinearity by simultaneously addressing endogeneity and heterogeneity (An et al., 2021). Unlike standard regression (ordinary least squares), which is prone to distorting the effect of outliers, quantile regression is more robust in dealing with outliers emanating from the variables (Koenker, 2004). Ike et al. (2020) asserted that the conditional mean estimates cannot represent the full distribution impact between the regressors and the regresand in the model.

However, quantile regression has a more innate appeal, especially in panel regression, which stratifies the distributive effect of the variables independent of the dependent variables in different quantile distributions, which will aid policymakers (Gómez & Rodríguez, 2020). In view of the distinct advantage that quantile regression has over least squares regression, we employ panel quantile regression, which is more appropriate for measuring the varying effect of variables at the effect points of the conditional distribution and provides more information about the relationship between the nexus (Albulescu et al., 2019).

Following Koenker (2004), we set our model as follows:

$$Qy_{ij}\left(\tau x_{ij}\right)=\partial_i+x_{ij}^{'}\beta\left(\tau\right)+\mu_{ij}\ j=1,\ldots,m_i,\ldots i=1,\ldots n \tag{1}$$

where $Qy_{it}\left(\tau x_{it}\right)$ represents the τth quantile of the dependent variable x_{it} depicts the vector of explanatory variables ∂_i denotes the individual effect τ represents the quantile, $\beta(\tau)$ stands for the regression parameter of the τth quantile and can be estimated as follows:

$$\min_{(\partial,\beta)}\sum_{k=1}^{q}\sum_{j=1}^{n}\sum_{i=1}^{m_i}w_k\rho_{\tau k}\left(y_{ij}-\partial_i-x_{ij}^{'}\beta\left(\tau\right)\right) \tag{2}$$

where $\rho_{\tau(u)}=u\left(\tau-1\left(u<0\right)\right)$, represents the piecewise linear quantile loss function of Koenker and Bassett (1978). Weight w_k controls the relative influence of the quantile on the estimation of the ∂_i which is defined as:

$$\text{If} y_{ij}-\partial_i-x_{ij}^{'}\beta\left(\tau\right)<0, \tag{3}$$

then

$$w_{it} = \tau$$

$$y_{ij} - \partial_i - x_{ij}^{'}\beta(\tau) < 0, \tag{4}$$

$$w_{it} = 1 - \tau$$

From equations (3) and (4), we note that quantile regression is a type of weighted regression by setting $1\&\tau$ to be positive and negative residuals (Zhang et al., 2016) which ignores unobserved country heterogeneity. However, due to the limited yearly observations in our study, we follow Koenker's (2004) estimation approach, in which the unobservable individual effect ∂_i acts as one of the regression parameters. This is defined as follows.

$$\min_{(\partial,\beta)} \sum_{k=1}^{q}\sum_{j=1}^{n}\sum_{i=1}^{m_i} w_k \rho_{\tau k}\left(y_{it} - \gamma_{1\tau} FR_{it} + \gamma_{2\tau} FA_{it} + \gamma_{3\tau} FDI_{it} + \gamma_{3\tau} GDPG_{it} + \gamma_{4\tau} GGE_{it} + \gamma_{5\tau} INFL_{it} + \gamma_{6\tau} SS_{it} + \gamma_{7\tau} TO_{it} - \partial_i\right) + \lambda \sum_{i=1}^{n} \left|\partial_i\right| \tag{5}$$

Where λ is the turning parameter of individual effect, w_k is weight of k^{th} quantile, m is the index of the quantile FR, GDPG, GGE, INFL, TO, FDI, FA, SS freedom of religion, gross domestic product growth, general government expenditure, inflation, trade openness, foreign direct investment, freedom of association, assembly, and civil society and security and safety respectively of the nation i and the time t and y= financial development.

3.2. Panel unit root and cross-sectional dependence

Panel data are vulnerable to cross sectional dependence CDS, which is a common phenomenon in empirical estimates. Cross-sectional dependency may result from spatial and economic interactions, common external shocks and spillover effect (Hsiao, 2022). Analyzing first-generation panel data that do not take into account CSD and the effects of shocks that spread throughout the country, such as the economic crisis, can lead to biased results. Therefore, investigating potential cross sectional is imperative in panel modelling due to its reflection of the global economies. Similarly, panel root test underpins the validity of panel estimators hence neglecting these tests could lead to biased estimate, reduced statistical efficiency, incorrect inference and finally misleading policy implication (Baltagi, 2008). To this end we used Pesaran CD test which is presented as follows;

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=1+1}^{N}\hat{\rho}_{ij}\right) \tag{6}$$

Where N is the number of countries, T is the period and $\hat{\rho}_{ij}$ is the pairwise correlation of the residuals. Equation (7) provides CD test statistic with null hypothesis of 'cross-sectional independence'. In addition, employ Pesaran and Yamagata (2008) method to test the slope of heterogeneity. The H_a and H_o of the test are the 'slope for all cross sectional homogeneous' and the 'slope for all is not cross-sectional homogeneous'. The test statistics is described as follows:

$$\hat{\Delta}_{sh} = (N)^{\frac{1}{2}}(2k)^{-\frac{1}{2}}\left(\frac{1}{n}s - k\right) \tag{7}$$

$$\hat{\Delta}_{sh} = (N)^{\frac{1}{2}}(2k)^{-\frac{1}{2}}\left(\frac{1}{n}s - k\right) \tag{8}$$

$$\hat{\Delta}_{ash} = (N)^{\frac{1}{2}}\left(\frac{2k(T-k-1)}{T+1}\right)^{1/2}\left(\frac{1}{n}s-2k\right) \tag{9}$$

The delta tilde and adjusted, modified delta statistics form the basis of Pesaran and Yamagata (2008) test.

3.3. Data source

We investigated a panel of 42 African countries from 2000 to 2020 using data from different sources. The choice of countries and the time span for the study are primarily dictated by the availability of reliable data. The main dependent variable in this study was financial development. We proxy financial development as domestic credit to the private sector as a percentage of GDP, since the financial sector in African countries is dominated by the banking sector (Henri et al., 2019; Law et al., 2014). Furthermore, we utilize domestic credit as a percentage of GDP as it captures the depth of the financial system, contrary to monetary aggregate, which only measures the volume of funds channeled into the private sector (Calderón & Liu, 2002; De Gregorio & Guidotti, 1995).

The main independent variable was the freedom of religion. This variable was obtained from the Fraser Institute's Human Freedom Index (Fraser Institute, 2022). To support the relationship between financial development and religion, we included control variables that are considered important for the analysis of financial development to help determine whether the effect of religion still holds after considering the effects of these covariates on financial development. Following Amin and Murshed (2022), Amissah and Świerczyńska (2021), and Adeleye et al. (2017), seven control variables were included–GDP growth, government expenditure, inflation, trade openness, foreign direct investment, freedom of association, assembly and civil society and security and safety – to ensure that the estimated results are not biased. GDP growth captures the annual percentage growth rate of GDP at market prices based on constant local currency, and the aggregates are based on constant 2015 prices, expressed in US dollars. We utilize GDP in our model following the growth-led finance hypotheses, which assert that an expanding economy will culminate in a high demand for financial sector services leading to financial development; thus, economies with higher GDP growth rates will spur financial sector development (Robinson, 1952; Calderón & Liu, 2002; Zhuang et al., 2009; Amin & Murshed, 2022). General government expenditure captures the government's final consumption expenditure on goods and services and most expenditures on national defense and security, except for the military expenditure part of government capital formation. This helps us to understand the role the government plays in each country through its spending, and it is expected that high government expenditure, which is likely to cover the enhancement of the financial sector infrastructure, will possibly promote financial development and growth (Poku et al., 2022; Chen et al., 2023; Kapaya, 2023). Inflation, as measured by the Consumer Price Index, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods. Inflation is expected to hamper financial development, as financial intermediaries lend less and allocate capital less efficiently (Boyd et al., 2001; Khan & Senhadji, 2003; Batayneh et al., 2021, Rousseau & Yilmazkuday, 2022; Agarwal & Baron, 2023). Trade openness is the sum of exports and imports of goods and services measured as a share of GDP, and is expected to enhance financial development (Baltagi et al., 2007; Zhang et al., 2015; Le et al., 2015; Banga et al., 2020; Abeka et al., 2021; Thuy et al., 2021). Foreign direct investment is the transnational transfer of resources (net inflows as % of GDP) coupled with long-term partnerships and some degree of control in the management of invested businesses, and it is expected to improve financial development (Alfaro & Charlton, 2009; Dunning & Lundan, 2008). Freedom of association, assembly, and civil society captures the ease of forming and running groups ranging from social, economic, to political, expressing opinion in public space to contribute to public good without government and external influence. This is expected to facilitate financial sector development (Beck et al., 2007; Djankov et al., 2002; Fisman & Khanna, 2004). Security and safety encompass protection against acquired value and being free from harm, risk, or danger, and it is expected to be conducive to financial development (Beck & Demirgüç-Kunt, 2009; La Porta et al., 1997). Data for dependent and control variables were obtained from World Development Indicators (WDI) except freedom of association, assembly, and civil society, and

security and safety, which was sourced from the Fraser Institute Human Freedom Index (Fraser Institute, 2022).

4. Results and discussion

4.1. Descriptive statistics

From Table 1, we establish some characteristics of the variables of interest. We observe that the variance of the variables is relatively large, with financial development (DC) and inflation (INFL) dominating with high variability among the variables. From the summary statistics, we observe that the series are lepto-kurtic distributions, meaning that the distribution has a fatter tail. This supports Jarque and Bera (1980) argument that normality tests are significantly non-normally distributed.

We check the stationary properties for all variables and detail the results of Levin, Lin, and Chut (Levin et al., 2002) and Im, Pesaran, and Shin W-stat (Im et al., 2003), ADF-Fisher Chi-. square (Choi, 2001), and PP - Fisher Chi-square (Pesaran, 2007) are shown in Table 2. We find that all series are I(0). Recent studies have shown that the panel data model presents a considerable cross-sectional dependence error, which may be due to the presence of common shocks and unobserved components (De Hoyos & Sarafidis, 2006).

The first-generation panel unit root test, which commonly assumes cross-sectional independence, may not be adequate to address the presence of cross-sectional dependence in our model (Gómez & Rodríguez, 2020). The 2nd generation panel unit root test was developed to consider the possible dependence on cross-sectional data (Pesaran & Baltagi, 2007). In this regard, we employ Breusch-Pagan LM, Pesaran scaled LM, Bias-corrected scaled LM, and Pesaran CD. Table 3a shows the results of the cross-sectional dependence. The null hypothesis of no cross-sectional dependence was rejected with a significance level of 1%. The slope of heterogeneity reported in Table 3b indicate that the values of the delta and the modified delta are statistically significant. The results of the evaluation confirmed the rejection of the null hypothesis (H0) of the homogeneous slope coefficient.

Table 1. Statistics for financial development and religiosity in Africa.

	DC	FR	GDPG	GGE	INFL	TO	FDI	FA	SS
Mean	1.181	0.877	0.539	1.164	0.594	1.802	0.300	0.795	0.855
Median	1.197	0.932	0.630	1.191	0.640	1.766	0.366	0.844	0.883
Maximum	2.975	0.996	1.939	2.000	2.746	3.000	1.665	0.988	0.983
Minimum	−0.999	0.364	−1.932	−0.215	−1.436	0.000	−2.679	0.148	0.017
Std. Dev.	0.516	0.135	0.416	0.370	0.554	0.322	0.557	0.157	0.112
Skewness	−0.194	−1.718	−1.165	−1.047	−0.036	−0.226	−1.299	−1.273	−2.387
Kurtosis	4.464	5.569	7.638	5.826	4.001	11.994	7.076	4.761	12.080
Jarque-Bera	84.361	676.354	990.225	454.638	36.985	2980.506	814.733	334.213	3669.917
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	882	882	882	882	882	882	882	882	882

Note. DC: financial development; FR: freedom of religion; GDPG: gross domestic product growth; GGE: general government expenditure; INFL: inflation; TO: trade openness; FDI: foreign direct investment; FA: freedom of association, assembly, and civil society, assembly, and civil society and SS security and safety.

Table 2. Unit root test.

Variables	DC	FR	GDPG	GGE	INFL	TO	FDI	FA	SS
Levin, Lin & Chu t*	−4.443	−10.977	−2.912	−4.049	−7.508	0.036	−2.028	−6.191	−7.425
Im, Pesaran and Shin W-stat	−3.359	−7.337	−6.637	−4.103	−8.412	−1.828	−3.600	−4.344	−2.334
ADF - Fisher Chi-square	136.287	422.560	199.551	154.101	231.397	110.946	135.743	165.482	146.713
PP - Fisher Chi-square	137.645	209.164	350.556	223.810	372.395	253.229	236.275	186.399	167.901

Note. (***), (**), and (*) denote a rejection null hypothesis at 1%, 5%, and 10%, respectively.

Table 3a. Test for cross-sectional dependence.

	DC	FR	GDPG	GGE	INFL	TO	FDI	FA	SS
Breusch-Pagan LM	3722.843	3680.553	1297.619	2423.296	1583.876	2836.323	1907.371	4042.140	3337.714
Pesaran scaled LM	68.965	67.946	10.522	37.648	17.420	47.602	25.216	76.660	59.684
Bias-corrected scaled LM	67.915	66.896	9.472	36.598	16.370	46.552	24.166	75.610	58.634
Pesaran CD	28.279	2.778	17.649	3.346	12.752	14.274	8.713	14.199	0.001

Note. (***), (**), and (*) denote rejection of the null hypothesis at 1%, 5%, and 10%, respectively.

Table 3b. Slope of heterogeneity test.

$\hat{\Delta}$	*p*-Value	$\hat{\Delta}_{adj}$	*p*-Value
8.133[a]	0.000	7.621[a]	0.000

Note. ([a]), ([b]), and ([c]) denote a rejection null hypothesis at 1%, 5%, and 10%, respectively.

Table 4. Religiosity and financial development in Africa.

	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
POLS	−7.3818[a]	−3.0734[a]	3.7481[a]	−2.4983[b]	2.5122[b]	−2.6816[b]	11.3840[a]	1.7210[c]
τ	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
0.05	−0.4371	0.0417	2.3209[a]	−0.5668	0.2290	0.7769	1.2668	0.2849
0.10	−0.1429	0.6631	5.3285[a]	−1.4140	−0.5466	0.0920	1.0551	0.2712
0.15	−0.6210	−0.5231	7.6972[a]	−1.7363[c]	−0.6628	−0.8953	1.8428[c]	0.5983
0.20	−1.4210	−1.0691	6.5849[a]	−1.9793[c]	−0.0604	−1.4436	2.3125[b]	1.2496
0.25	−2.4181[b]	−1.3207	5.5961[a]	−2.0150[b]	0.3392	−1.4238	3.4333[a]	1.5612
0.30	−2.6517[a]	−1.4462	5.0006[a]	−1.9559[c]	−0.4497	−0.1769	4.6589[a]	0.8639
0.35	−3.0372[a]	−2.2130[b]	7.1125[a]	−2.0985[b]	0.0766	−0.4801	5.3405[a]	1.2243
0.40	−3.4694[a]	−2.8376[a]	8.5851[a]	−2.2072[b]	1.2700	−0.4873	6.0384[a]	0.8801
0.45	−3.5959[a]	−3.5861[a]	9.1440[a]	−2.4101[b]	1.3187	−0.9041	5.5855[a]	1.5248
0.50	−3.6485[a]	−3.6546[a]	9.2310[a]	−2.5121[b]	1.5171	−0.7463	6.0799[a]	1.5842
0.55	−3.8520[a]	−2.6778a	10.7820[a]	−2.3904[b]	1.6706[c]	−1.3477	6.7002[a]	1.9912[b]
0.60	−3.9143[a]	−1.3139	11.4752[a]	−2.3984[b]	1.7970[c]	−2.1626[b]	7.2619[a]	2.0389[b]
0.65	−3.2812[a]	−1.6800[c]	9.7957[a]	−2.7563[a]	1.8800[c]	−2.2682[b]	6.1331[a]	2.2306[b]
0.70	−3.1023[a]	−1.7784[c]	9.8316[a]	−2.7462[a]	1.9444[b]	−2.4866[b]	4.7107[a]	3.3800[a]
0.75	−5.0399[a]	−3.0571[a]	6.7426[a]	−1.1321	3.7761[a]	−4.1255[a]	6.1337[a]	1.3670
0.80	−9.9811[a]	−8.9674[a]	5.3379[a]	−1.7608[c]	5.4527[a]	−5.4453[a]	8.6204[a]	1.0226
0.85	−9.1124[a]	−6.6406[a]	2.6781[a]	−1.8759[c]	4.6408[a]	−4.2961[a]	6.2263[a]	−0.7341
0.90	−10.5730[a]	−8.1608[a]	3.0631[a]	−2.4075[b]	4.0591[a]	−3.1267[a]	10.3468[a]	−3.7898[a]
0.95	−14.6334[a]	−0.6798	2.5790[b]	−1.6182	4.9728[a]	−5.5569[a]	20.7922[a]	−7.2462[a]

Note. $\beta_{1*}(\tau)$ = freedom of religion, $\beta_{2*}(\tau)$ = GDP growth, $\beta_{3*}(\tau)$ = general government expenditure, $\beta_{4*}(\tau)$= inflation, and $\beta_{5*}(\tau)$ = trade openness, $\beta_{6*}(\tau)$ = foreign direct investment, $\beta_{7*}(\tau)$ = freedom of association, assembly, and civil society $\beta_{8*}(\tau)$ = safety and security. (a), (b), and (c) represent the significance levels at 1%, 5%, and 10%, respectively. OLS ordinary least squares.

4.2. Empirical results

Table 4 supported pictorially in Figure 1 displays the relationship between religiosity and financial development in Africa. We also employ pool ordinary least square (POLS) to further compare the quantile estimate as depicted in Table 4 of the full sample and Table 5 sub-sample. The results from POLS affirmed the same results with almost the same impact as the PQR. We classify quantiles into ranges for ease of analysis. We designate the quantile range 0.05-0.35 as the lower quantile (short-term), 0.40-0.65 as the middle quantile (medium-term) and 0.70-0.95 as the upper quantile (long-term). Given the aforementioned delineation, we observed that freedom of religion is negative across all quantiles. However, as the quantiles move from the lower to the middle and upper quantiles, the negative relationship moves from an insignificant to a significant negative relationship at the 1% significance level. This is evidenced from the quantiles range of 0.05-0.20 and 0.25-0.95, respectively. This finding suggests that the intensity of freedom of religion is linked to financial development in Africa, especially in the middle to long-term. A priori expectation of a highly religious region like Africa is that, the strong morals required of religion are expected to drive high self-commitment, which translates into high work ethics to enhance development. However, the results of the current study indicate otherwise. This possibly implies that a low level of engagement between religiosity and financial service providers could lead to information asymmetry challenge and have a detrimental impact on the financial system necessary for development in the region. Concomitantly, the results may also highlight how religion has traditionally provided hope for Africans in coping with the prevalence of underdevelopment in the region. These findings corroborate the work of Amissah and Świerczyńska (2021), Amin and Murshed (2022), and Burzynska and Berggren (2015), who also found a negative relationship between religiosity and financial development, asserting that secularisation affects the involvement of religion in financial services development and, hence, economic growth; but contrary to the study findings of Weaver and Agle (2002), Quoquab and Mohammad

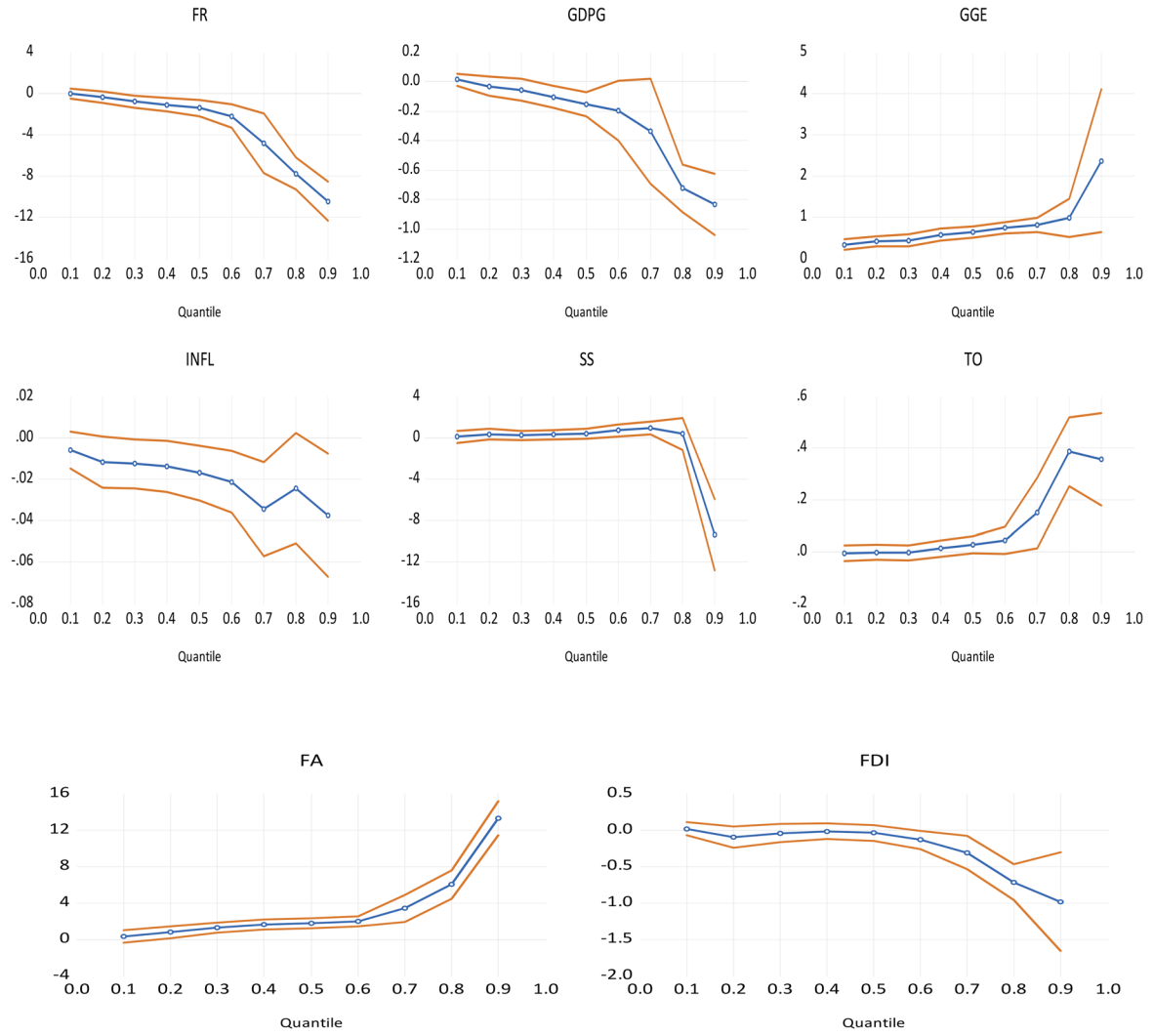

Figure 1. Quantile process estimate between financial development and religiosity. *Note*. Panel quantile process. The confidence band and the blue line depicts the impact of the estimates between the nexus across various quantile distributions. In each plot, the test statistics are shown vertically with the matching quantiles on the horizontal axis. The red line presents 95%.

(2013), Guiso et al. (2003), Renneboog and Spaenjers (2012), and Henderson (2019), who found religiosity impacts ethical attitudes that fosters financial and economic development. Turning to the control variables, we observe that at the lower, median, and upper quantiles, GDP is negatively related to financial development. A cursory examination shows that the financial system in most of these countries is low or lower-middle income; hence, the growth rate in these countries shows an inverse relationship with financial development, which highlights the prevalence of underdeveloped economies within the African region characterised by costly fees and insufficient and inefficient financial infrastructure.

The significant relationship between the growth rate in GDP and financial development can be attributed to the low GDP in African economies, which will stimulate adequate fund demand for financial service products. This finding is consistent with that of Reinhart and Rogoff (2009) who also found a negative relationship between GDP growth and financial development. General government expenditure reports a positive significant association with financial development in all quantiles. This provides evidence that within the short to long-term, African governments have made a cautious effort to allocate budgets to support new technologies and innovations that have fostered the deepening of the financial system, with credit now being provided to more households and enterprises (Beck et al., 2011). From the empirical findings, we also observe that there is a significant negative relationship between inflation and financial development at all quantiles. These findings imply that a high level of inflation or a persistent

Table 5. North Africa - Religiosity and financial development in Africa.

	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
POL	−8.2337[a]	−4.8511[a]	2.0262[b]	3.9586[a]	1.7849[c]	1.2622	8.3239[a]	9.0320[a]
τ	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
0.05	−0.4336	−0.2957	0.0978	0.8619	0.7994	−0.4820	0.4717	0.7887
0.10	−0.6775	0.6659	0.8373	0.7815	−0.8321	−0.2148	0.7748	0.7640
0.15	−4.3344[a]	1.0092	1.3237	4.7946[a]	−1.6219	0.5262	6.3221[a]	6.7075[a]
0.20	−3.8098[a]	0.7740	0.8756	4.3216[a]	−1.3796	0.1513	5.7274[a]	6.1809[a]
0.25	−4.3170[a]	0.4700	0.6322	4.6720[a]	−1.0214	0.9110	6.1530[a]	6.9528[a]
0.30	−3.9621[a]	−0.4978	0.3563	4.5230[a]	−0.4353	0.8040	5.7522[a]	6.9844[a]
0.35	−4.1582[a]	−0.6309	0.1271	4.5154[a]	−0.3148	0.5789	5.9490[a]	7.2501[a]
0.40	−4.6517[a]	−0.7181	−0.1009	4.6607[a]	−0.3545	0.5440	6.2966[a]	7.9109[a]
0.45	−5.5836[a]	−0.9523	−1.1696	4.9257[a]	0.3743	0.4651	6.8812[a]	6.9625[a]
0.50	−5.3487[a]	−1.3317	−0.6087	4.6283[a]	0.5305	0.9375	5.9719[a]	6.9562[a]
0.55	−4.1089[a]	−1.0047	−0.2495	3.6369[a]	1.1351	0.5565	3.3805[a]	4.8945[a]
0.60	−4.2890[a]	−1.1981	−0.1722	3.4899[a]	1.1980	0.8702	3.4268[a]	4.9395[a]
0.65	−4.3894[a]	−1.1527	−0.2660	3.6950[a]	1.2721	0.8880	3.4880[a]	4.6447[a]
0.70	−3.8157[a]	−1.2365	−0.0763	2.9408a	1.2207	0.5678	3.0281[a]	3.9529[a]
0.75	−3.6324[a]	−0.9742	−0.2042	0.4957	1.4477	0.1354	3.0532[a]	3.8398[a]
0.80	−3.0152	−1.0719	−0.1179	0.8871	1.4126	−0.0914	2.4699[b]	3.3825[a]
0.85	−4.0752[a]	−1.6230	0.2635	0.2145	0.3658	0.8354	3.0011[a]	2.5087[b]
0.90	−3.8532[a]	−1.4356	−0.1518	0.3858	0.7921	0.3727	2.8788[a]	2.0875[b]
0.95	−5.2537[a]	0.2311	0.2069	0.2915	0.2884	0.2750	3.9643[a]	1.6483
Western Africa								
	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
POL	−3.0716[a]	−3.6124	4.0925[a]	−5.7010	−3.8754[a]	−3.3963[a]	7.4165[a]	−3.9669[a]
τ	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
0.05	−8.3063[a]	−0.3647	0.2497	−0.7617	5.6793[a]	−0.7162	4.8664[a]	−0.2224
0.10	−7.6494[a]	−0.3515	0.4958	−1.0985	5.6449[a]	−1.6906	5.1765[a]	0.0956
0.15	−6.3040[a]	−0.8573	0.8025	−1.9857[c]	4.9059[a]	−2.0383[b]	5.0301[a]	−0.5452
0.20	−5.5468[a]	−1.1254	0.9008	−2.8638[b]	4.7683[a]	−2.2591[b]	5.0297[a]	−1.2658
0.25	−4.1827[a]	−1.0709	1.2071	−3.9105[a]	5.0894[a]	−2.2659[b]	4.8571[a]	−1.7500[c]
0.30	−4.1798[a]	−1.3865	0.9330	−4.7446[a]	5.3903[a]	−2.3475[b]	4.9337[a]	−1.6263
0.35	−3.6003[a]	−1.3226	1.0565	−4.9996[a]	5.3058[a]	−2.4739[b]	4.8997[a]	−1.6716
0.40	−2.4540[b]	−1.4276	1.2873	−5.0493[a]	5.3883[a]	−2.5716[b]	4.8075[a]	−1.9152[c]
0.45	−1.9276[c]	−1.5466	1.5654	−4.7495[a]	4.8553[a]	−1.3752	4.9891[a]	−1.8840[c]
0.50	−1.5056	−1.5892	1.5464	−4.8611[a]	4.6920[a]	−1.2059	4.5961[a]	−1.9259[c]
0.55	−2.3475[b]	−1.9203[c]	1.4016	−4.7478[a]	4.3428[a]	−0.5147	5.0790[a]	−1.4768
0.60	−0.9607	−1.7441[c]	1.6523	−4.6316[a]	4.1602[a]	0.1445	4.6065[a]	−2.2137[b]
0.65	−0.0822	−1.7440[c]	1.9980[c]	−4.6341[a]	4.2091[a]	0.0579	4.3695[a]	−2.5123[b]
0.70	0.4953	−1.9365[c]	2.5272[b]	−2.8170[a]	4.0339[a]	−0.3059	4.1809[a]	−2.9212[b]
0.75	1.1070	−1.8563[c]	2.2581[b]	−2.7198[b]	3.5703[a]	−0.1190	4.2235[a]	−2.6156[b]
0.80	1.1562	−1.7543[c]	2.0727[b]	−0.5897	3.5183[a]	−0.6356	3.3176[a]	−2.6893[b]
0.85	0.0463	−3.5124[a]	3.6981[a]	−0.4561	3.4903[a]	−0.3074	2.8730[b]	−3.3234
0.90	0.0334	−2.7812[a]	2.9708[a]	−1.2511	2.4383[a]	−0.1824	4.0635[a]	−1.6191
0.95	−0.4331	−4.5733[a]	3.7242[a]	−0.3984	4.4956[a]	−3.3158[a]	4.2842[a]	−2.3986
Southern Africa								
	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
POLS	3.5056[a]	−2.6925[a]	−8.8070[a]	−2.5250[b]	−4.0604[a]	−2.6225[b]	2.6457[b]	−7.7486[a]
τ	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
0.05	2.5144[a]	−3.2785[a]	−6.4489[a]	−0.4321	−4.1691[a]	2.0716[b]	−0.5970	−5.1550[a]
0.10	3.3625[a]	−2.6044[b]	−5.4170[a]	−0.7213	−3.6608[a]	−0.4371	−1.3368	−4.7358[a]
0.15	3.6438[a]	−1.4240	−4.6545[a]	−0.6185	−3.7944[a]	−0.4039	−1.5176	−3.8768[a]
0.20	3.0100[a]	−1.4973	−4.9056[a]	−0.8880	−4.1368[a]	−0.4344	−0.7718	−4.3176[a]
0.25	2.5764[b]	−1.5935	−5.2666[a]	−0.8267	−4.0801[a]	−1.2727	−0.4660	−4.1058[a]
0.30	2.5978[b]	−1.6185	−6.4920[a]	−0.9313	−4.0322[a]	−1.7013[c]	−0.4025	−4.7434[a]
0.35	2.4643[b]	−1.7168[c]	−7.7398[a]	−1.1543	−4.0310[a]	−1.8651[c]	−0.1947	−5.8474[a]
0.40	2.1433[b]	−1.8266[c]	−7.5751[a]	−1.1309	−4.0171[a]	−2.5053[b]	−0.1317	−5.5403[a]
0.45	1.1396	−1.7546[c]	−6.7559[a]	−1.0210	−3.7036[a]	−2.6011[b]	0.9449	−6.0669[a]
0.50	1.1369	−1.7527[c]	−6.7429[a]	−1.0184	−3.6957[a]	−2.1068[b]	0.9427	−6.0529[a]
0.55	1.1700	−1.7862[c]	−6.9817[a]	−1.0792	−3.7293[a]	−2.1023[b]	0.9971	−6.3649[a]
0.60	0.9937	−1.9426[c]	−7.5379[a]	−0.7558	−2.0316[b]	−2.1590[b]	1.1372	−6.6664[a]
0.65	0.9925	−2.5227[b]	−7.5428[a]	−0.5832	−1.7764[c]	−2.0189[b]	1.4957	−6.1474[a]
0.70	1.2384	−2.3632[b]	−7.8034[a]	−0.6444	−1.9541[c]	−1.9689[c]	1.3806	−5.3444[a]
0.75	1.4106	−2.0633[b]	−7.7695[a]	−0.6777	−1.9728[c]	−1.9656[c]	1.2629	−4.5336[a]
0.80	1.6700[c]	−2.0637[b]	−8.1079[a]	−0.3560	−1.5414	−1.9140[c]	1.1147	−3.5124[a]
0.85	1.7698[c]	−2.1259[b]	−7.9111[a]	0.0706	−1.5556	−1.6519[c]	1.1146	−3.4969[a]
0.90	2.2120[b]	−2.2486[b]	−7.8644[a]	0.4376	−1.6134	−1.3596	1.4604	−3.1749[a]
0.95	1.4238	−0.5917	−9.8517[a]	−0.2720	−4.5237[a]	−1.0460	2.0716[b]	−1.4993

(*Continued*)

Table 5. Continued.

Eastern Africa								
	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
POLS	−3.2130[a]	−3.1370[a]	−0.1118	−3.2437[a]	11.8585[a]	−6.6512[a]	3.1906[a]	−3.0423[a]
τ	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
0.05	−2.1547[b]	−1.0596	1.2217	−0.8644	2.8314[b]	0.0319	0.9696	−0.3794
0.10	−4.3392[a]	−1.5768	0.7511	−1.7027[c]	3.1623[a]	−0.6194	3.1189[a]	−2.4161[b]
0.15	−4.1520[a]	−1.8694[c]	0.6655	−1.5964	2.8591[b]	−0.4899	2.7240[b]	−1.2650
0.20	−4.1276[a]	−2.1903[b]	0.7451	−1.6284	2.6658[b]	−0.4192	2.5085[b]	−1.7219[c]
0.25	−3.0671[a]	−2.4666[b]	0.4258	−1.7800[c]	2.5417[b]	−0.4735	3.0023[a]	0.1144
0.30	−2.4438[b]	−1.2769	−0.1086	−1.6043	1.8146[c]	−0.6785	2.4349[b]	−0.0253
0.35	−3.8031[a]	−1.7543[c]	−0.0488	−1.6609[c]	1.7337[c]	−0.7014	2.1152[b]	−0.2759
0.40	−3.0096[a]	−0.7758	0.3651	−3.2584[a]	4.8568[a]	−2.2153[b]	2.3018[b]	−0.9935
0.45	−2.7856[b]	−0.7802	−0.3284	−3.3853[a]	5.4523[a]	−2.3686[b]	2.8348[b]	−0.8250
0.50	−2.6330[c]	−0.8980	0.5608	−3.6662[a]	5.8691[a]	−3.4993[a]	2.9146[b]	−1.1557
0.55	−2.6345[c]	−0.9285	0.3286	−3.7844[a]	7.3329[a]	−4.1725[a]	3.1362[a]	−1.0006
0.60	−2.6122[c]	−1.0143	−0.2000	−3.8952[a]	7.4055[a]	−4.3891[a]	3.8011[a]	−0.3975
0.65	−3.1631[a]	−1.5527	0.3648	−4.3976[a]	9.1539[a]	−4.8621[a]	4.7959[a]	0.0804
0.70	−3.3055[a]	−1.5678	0.6709	−4.3834[a]	8.2670[a]	−5.3767[a]	4.7651[a]	0.2123
0.75	−3.2166[a]	−1.6533	0.6681	−4.1893[a]	6.3536[a]	−4.5997[a]	4.3208[a]	0.4419
0.80	−3.6115[a]	−2.8988[b]	0.9970	−6.1144[a]	10.1656[a]	−6.1576[a]	4.9707[a]	0.9529
0.85	−3.8364[a]	−3.1893[a]	1.2054	−7.5579[a]	9.3667[a]	−6.7407[a]	6.2656[a]	1.8422[c]
0.90	−3.8762[a]	−2.5698[b]	1.5794	−7.9272[a]	9.5368[a]	−8.9487[a]	7.3099[a]	2.9929a
0.95	−4.4343[a]	−2.0037[b]	2.1686[b]	−8.0464[a]	10.9415[a]	−10.8634[a]	8.8045[a]	3.4689[a]
Central Africa								
	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
POLS	3.1661[a]	−3.1651[a]	3.6009[a]	−2.3445[b]	−3.5963[a]	1.8519[c]	0.5680	2.6957[b]
τ	$\beta_{1*}(\tau)$	$\beta_{2*}(\tau)$	$\beta_{3*}(\tau)$	$\beta_{4*}(\tau)$	$\beta_{5*}(\tau)$	$\beta_{6*}(\tau)$	$\beta_{7*}(\tau)$	$\beta_{8*}(\tau)$
0.05	2.8942[a]	−0.2301	2.3114[b]	−1.1338	−2.8434[a]	0.5803	0.9957	2.9352[a]
0.10	2.9582[a]	0.6084	2.3084[b]	−0.8184	−3.1874[a]	0.7817	0.7734	3.2306[a]
0.15	2.7940[a]	0.5962	2.2484[b]	−0.9658	−3.1942[a]	0.6404	0.9831	3.1979[a]
0.20	3.0039[a]	0.2694	2.3994[b]	−1.1695	−3.7059[a]	0.7915	0.8293	2.6589[b]
0.25	2.1993[b]	−0.1840	2.7042[b]	−1.2791	−4.5099[a]	0.7555	0.4193	1.6241[c]
0.30	2.7085[a]	−1.1355	1.6171	−1.4448	−3.7296[a]	0.7024	0.5905	1.8291[c]
0.35	2.1911[b]	−0.9976	1.2585	−1.4897	−4.0202[a]	0.4164	0.2274	2.6324[b]
0.40	2.3026[b]	−1.0768	1.1029	−1.5042	−4.1203[a]	0.6655	−0.1824	3.0081[a]
0.45	2.6798[b]	−1.2904	0.7633	−1.5905	−3.5534[a]	0.7760	−0.0735	3.1056[a]
0.50	2.3250[b]	−0.7410	0.6136	−1.6836[c]	−3.5160[a]	0.6667	0.0482	2.1340[b]
0.55	2.4226[b]	−1.1498	0.7292	−1.7809[c]	−3.6956[a]	0.6152	−0.0928	2.1157[b]
0.60	3.2351[a]	−1.4386	0.3606	−2.3148[b]	−2.8510[a]	0.8343	0.2517	2.2269[b]
0.65	2.1200[b]	−1.2628	0.6948	−2.3203[b]	−2.3664[b]	0.6390	0.7051	1.8045[c]
0.70	3.2213[a]	−2.9025[a]	2.3145[b]	−2.4284[b]	−0.9715	1.2864	0.3190	1.4866
0.75	3.8805[a]	−3.3362[a]	2.2924[b]	−2.7086[b]	−0.8909	1.3005	0.2608	1.5423
0.80	3.5193[a]	−3.5147[a]	2.3930[b]	−2.9597[a]	−0.9205	1.5847	0.2891	2.1600[c]
0.85	3.0658[a]	−2.4525	2.2297[b]	−2.4177	−0.4489	1.1616	0.7228	0.6417
0.90	0.6531	−3.9319[a]	2.4450[b]	−1.5817	0.3638	1.1174	0.2552	1.3554
0.95	0.3335	−4.7583[a]	3.4435a	−4.3546[a]	0.1878	0.6358	0.4832	2.1416[b]

Note. $\beta_{1*}(\tau)$ = freedom of religion, $\beta_{2*}(\tau)$ = GDP growth, $\beta_{3*}(\tau)$ = general government expenditure, $\beta_{4*}(\tau)$ = inflation, and $\beta_{5*}(\tau)$ = trade openness, $\beta_{6*}(\tau)$ = foreign direct investment, $\beta_{7*}(\tau)$ = freedom of association, assembly, and civil society $\beta_{8*}(\tau)$ = safety and security. (a), (b), and (c) represent the significance levels at 1%, 5%, and 10%, respectively. POLS = Pool ordinary least square.

increase in inflation in Africa hinders the capacity of the financial system to allocate resources efficiently and effectively. These findings partially align with the work of Ehigiamusoe et al. (2021), who asserted that an increase in inflation lessens the real rate of return on money, which exacerbates credit market friction. Trade openness is significantly and positively related to financial development within the median and upper quantiles. This finding implies that trade openness has a causal effect on the level of financial development in Africa in the long term and underlines the importance of financial development on growth. This is in line with the finding of Bekaert et al. (2005) that trade openness encourages financial sector diversification which enhances financial sector development. A negative relationship between foreign direct investment and financial development is also recorded in the lower, middle, and upper quantiles. However, this negative relationship is insignificant within the lower and middle quantiles, but becomes significant in the upper quantile. This could possibly be as a result of volatility in the African financial sector, hence unable to attract the needed FDI to enhance development as seen in the study by Alfaro et al. (2004). We also observed that freedom of association, assembly, and civil society has a

significant positive relationship with financial development within the lower, middle, and upper quantiles. This possibly implies that in Africa, freedom of association, assembly and civil society empowers marginalized individuals to come together to form community-based unions and organizations that enable them have access to financial services from formal financial systems that will have otherwise excluded them.

In support of this finding is Beck et al. (2007) found that active and diverse institutions such as community-based groups positively influenced financial development. Security and Safety, on the other hand, records a positive but insignificant relationship at the lower and middle quantiles except for quantiles 0.55-0.65 which reports a significant relationship. However, in the upper quantile the positive relationship turns into a negative relationship at quantiles 0.85-0.95. This may suggest that security and safety are essential for creating the safeguarded environment that is needed to encourage participation in the financial system in Africa. However, otherwise, as seen in the upper quantile, may be pointing to perceived shortfalls in security and safety hindering financial development in the long term. This is in line with Beck and Demirgüç-Kunt (2009) who found that when individuals and businesses feel their financial assets are secured, they are more likely to participate in formal financial systems.

From the above discussion, we document that there is nonlinear relationship between religiosity and financial development. Within the quantile range of 0.25-0.95, we find that freedom of religion significantly exerts direct effect of financial development. The negative coefficient divulges that freedom of religion view as a negative factor to financial development in Africa. Noticeably, freedom of association, assembly, and civil society, and security and safety are marginally stronger within the lower middle and upper quantiles. Thus, the direction of relationship between religiosity and financial development is determined by the fundamental human right an individual possesses in the African region. Our results contribute to the existing literature by expanding knowledge of the role of personal freedom on economic activities, and hence policymakers should be keen in institutionalizing freedom as fundamental human right in the African region.

Given on the above insight of the full sample, we delve into cross country analysis[1] to provide robustness check of our empirical findings. The results from the sub-samples reported in Table 5 explicate that across the quantile distribution for North Africa, Eastern Africa and central Africa our empirical results indicate that freedom of religion significantly affect financial development. This finding substantiates the assertion made by Ji (2020), who claim that the religious faith, which is largely associated with the use of financial services as unobserved input, and this may influence the economic activities. The findings of our empirical results complement and validate the importance of religiosity and economic development (Kose & Cinar, 2020; Ji, 2020; Wijaya et al., 2023). Therefore, the findings of the sub-sample analysis highlight the a priori expectation of a heterogeneous effect of religiosity in the quantile distribution.

Turning to the control variables, we observed that freedom of association, assembly, and civil society is positively correlated with financial development for Western, Northern, and Eastern Africa within the lower, middle and upper quantiles. Our empirical findings reveal that freedom of association, assembly, and civil society drives financial development, as suggested by Beck and Demirgüç-Kunt (2009). We also find a positive relationship between financial development and Security and safety within the lower and upper quantile for Northern and Central Africa, and negative relationship for Western, Southern Africa across the quantile distribution. Noticeably at the upper quantile for Eastern Africa we observed a positive relationship between the nexus.

This finding highlights the importance of security and safety in promoting financial development in Africa. Therefore, governments and policymakers must be cautious as unsafe and unsecured economic environments do not encourage active participation in financial systems leading to their underdevelopment and poor economic growth (Beck & Demirgüç-Kunt, 2009). GDP growth shows an insignificant negative relationship with financial development in Northern Africa, while a significant negative relationship is found within the middle and upper quantile for Western & Southern, and Eastern & Central Africa, respectively. This confirms the findings of the full sample in Table 4 are valid and remain the same. On the impact of inflation on financial development, with the exception of Northern Africa that reported a positive association that was significant at the 1% level, contrary to full-sample findings possibly highlighting low inflation rate within the region, allows better operation of financial institutions as seen in

Beck et al. (2010). The findings of the FDI, trade openness and government expenditure in sub-sample validate the full sample results as reported in Table 4.

5. Conclusion and policy implications

Recognition of religiosity as a driving force for financial development in Africa can ignite a diverse angle toward economic development, which either favours economic growth or hampers structural transformation (Patterson, 2014). Propelled by the contributions of properly regulated financial systems to economic development in relation to high levels of religiosity in African, this study seeks to investigate whether religiosity proxy's freedom of religion, which is a determinant of financial development in Africa. Additionally, gross domestic product growth, general government expenditure, inflation, trade openness, foreign direct investment, freedom of association, assembly and civil society, and security and safety are also under observation as explanatory variables for Africa's economy during 2000-2020 using the quantile distribution for financial development, as expressed through a panel quantile regression model. The findings of the present study are quite significant since there has been growing concern about the determinants of financial development, especially in Africa, which is highly characterized by strong religious affiliations and has been predicted to be the future center of religion (Pew Research Center, 2022). This spurred interest in investigating whether religiosity is a determinant of financial development in Africa.

The study found that freedom of religion is negatively associated with financial development within the quantiles of ranges of 0.25-0.95. This finding implies that a high freedom of religion is associated with negative effect on financial development in Africa. Thus, the study provides an insightful conclusion to explain that African countries will become more financially developed when there is a positive asymmetry of information between financial services and religiosity. Furthermore, the findings reveal that general government expenditure, trade openness, freedom of association, assembly and civil society, and security and safety have a positive impact on financial development in the African economy. This indicates that the more African governments spend right, open to intraregional and global trade and allow individuals to form groups and unions within the confines of a secure and safeguarded environment, there will be more progress from a financial perspective in the region. In contrast, GDP growth, inflation, and foreign direct investment have a negative impact on the determination of financial development in the region, pointing to the negative impact of predominantly underdeveloped and developing economies characterized by high inflation rates that erode potential growth and attract low foreign direct investment needed for development within the region.

The results suggest that fundamental human rights are a recipe for economic growth, therefore, for African countries to see the needed growth and development in their financial sector, there is a need for African governments to promote fundamental human right to enable members to practice their religion of choice in peace and security. The study also recommends that African policymakers must continuously create awareness and facilitate increased freedom of religious association, as restrictions and repression of this fundamental freedom have been the source of the most drawn out and bloodiest conflicts throughout history and continue to animate conflict in many countries, hindering development. Regarding general government expenditure, it is recommended that African governments increase public spending on profitable current expenditure, as it enhances financial development, and policymakers should focus on better screening of expenditures and not be biased toward capital expenditures to the detriment of recurrent expenditure that enhances financial deepening and inclusion. To maintain the positive impact of trade openness on financial development in Africa, African governments and policy makers must intensify trade liberalization efforts, such as removing trade restrictions, high tariffs, and exchange controls, and strengthening the case for unlocking the region's business potential by developing an intra-African regional value chain through the African Continental Free Trade Area (AfCFTA). Similarly, based on freedom of association, assembly, and civil society, and security and safety, it is recommended that policymakers and governments create a safeguarded environment that allows citizens to freely form and join organisations or unions of choice to foster cooperation, social capital, and trust that enhances positive attitudes towards financial development. For

GDP growth, inflation, and foreign direct investment, it is essential that African governments and policymakers aim at building an efficient and sufficient financial infrastructure that can help reduce transaction costs associated with engaging in financial services and improve credit accessibility to foster development. Strategies such as exchange rate pegging, increasing in taxes, regulating government spending, and deregulation of some sectors should be put in place to reduce the regulatory burden on businesses to lower the cost of production and reduce prices. These can help attract more foreign direct investment and keep inflation at a lower rate, as small increases in price levels appear to be able to erode the relatively large growth effects of financial development, resulting in reduced lending and financial instability.

This research suggests a nonlinear relationship between religiosity and financial development in Africa, and the depth of the relationship was different at different quantiles, indicating a threshold effect that requires further investigation, as this study did not explore such a relationship.

Note

1. North Africa comprise of Algeria, Egypt, Tunisia, Libya, Morocco, Sudan. Western Africa comprises of Benin, Burkina Faso Cabo Verde, Cote d'Ivoire Gambia, Ghana, Guinea, Guinea Bissau, Mali, Mauritania, Niger, Nigeria, Senegal, sierra Leone, Togo. Southern Africa comprise of Botswana, Eswatini, Lesotho, South Africa. Eastern Africa comprises of Rwanda, Tanzania, Uganda, Zambia, Zimbabwe, Burundi, Comoros, Kenya, Madagascar, Mauritius, Mozambique. Central Africa comprise of Cameroon, Central African Republic, Chad, Congo, Gabon and Congo Dem Republic.

Author contributions

BOK: Conceptualization, Validation, Formal Analysis, Data curation, Writing-original draft, Writing-review & editing. GA: Validation, Formal Analysis, Data curation, Writing-original draft, Writing-review & editing, supervision. MA: Methodology, Validation, Formal Analysis, Data curation, Writing-review & editing.

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About the authors

Benard Ohene Kwatia is a doctoral research candidate with interests in religiosity, financial development, institutions and financial econometrics. He holds MBA in Finance and a Fellow of the Association of Chartered Certified Accountants – UK, a member of the Institute of Chartered Accountant and the Institute of Internal Auditors – Ghana.

Godfred Amewu is a Senior Lecturer in finance at the University of Ghana Business School. He is currently leading the efforts in the development of impact investing as an asset class in Africa. His research interests are in corporate finance, corporate governance, risk management, capital market, and corporate social investments.

Mohammed Armah is a doctoral research student at the Ghana Institute of Management and Public Administration (GIMPA). He holds MPhil and MBA in Finance from Kwame Nkrumah University of Science and Technology and Coventry University College. His research interests are in the areas of financial market integration, monetary policy, and financial economies.

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ORCID

Benard Ohene Kwatia http://orcid.org/0009-0001-9383-3874
Godfred Amewu http://orcid.org/0000-0002-6721-5909
Mohammed Armah http://orcid.org/0000-0003-2021-7410

Data availability statement

The data used in the study will be made available on request.

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