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# The relationship between religiosity and voluntary disclosure quality: a cross-country evidence from the banking sector

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## Abstract

This study examines whether there is a relationship between religiosity and voluntary disclosure quality (VD\_Q). We utilise a three-dimensional approach to capture the VD\_Q on an international sample of 1,484 bank-year observations in 12 countries of the Middle East and North Africa (MENA) region over 14 years period from 2006 to 2019. Our findings indicate that religiosity is positively associated with banks' VD\_Q. Our findings also show that the association between religiosity and VD\_Q is more noticeable in banks operating in countries with a low level of legal protection, low level of control of corruption and during the crisis period. We further illustrate that the influence of religiosity is more intense on the spread and usefulness of information dimensions than the quantity dimension. These empirical findings are robust to alternative proxies of religiosity and sample specification. This result supports the notion that religiosity enhances corporate disclosure quality and reduces the asymmetric information gap between managers and outside users of information.

**Keywords** Voluntary disclosure quality · Religiosity · Informal institutions · Legal protection and control of corruption

## 1 Introduction

In recent years, academics have drawn attention to the effectiveness of informal institutions in influencing managerial practices (North 1990) since they complement formal institutions when they are less effective. Prior studies document evidence that suggests the role

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of the non-conventional institution in various organisational outcomes (Lins et al. 2017; Anginer et al. 2018; Qian et al. 2018).

One key informal institution that has captured the attention of researchers is religiosity (Vitell 2009, Cantrell and Yust 2018, Chircop et al. 2017, Cui et al. 2019, Abdelsalam et al. 2020, Hilary and Hui 2009, Chen et al. 2020). For instance, a recent survey finds that almost 84% of the world population are classified as belonging to a particular faith or holding a religious belief (Sherwood 2018). The increasing relevance of religion is due to its influence on cultural (moral) values and ethical considerations in a business context (Hilary and Hui 2009; Abdelsalam et al. 2021). Social norm theory (Kohlberg 1984) suggests that cultural norms that favour morality and aversion to risk are developed when a high proportion of people adhere to religious values. These norms will drive the values and behaviour of groups and individuals.

Extant literature has documented the impact of religiosity on managerial behaviour (Kutcher et al. 2010; Vitell 2009; Ma et al. 2019; Hilary and Hui 2009). Abdelsalam et al. (2020) argue that religious norms influence a manager's sense of shame or guilt, resulting in a more accountable and ethically informed decision. Weaver and Agle (2002) find support for a strong influence of religiosity on an individual or group's decision. Similarly, Mazar et al. (2008) show that the likelihood of dishonest reporting is reduced when a moral code of conduct guides the actions of individuals.

The main objective of this study is to test whether there is a variation in banks' voluntary disclosure quality in countries where adherence to religious norms is more pronounced and is part of cultural and national identity. This objective is vital since prior studies suggest varying impacts of religious norms across different countries (Leventis et al. 2018; Kanagaretnam et al. 2015) and differences in a country's adherence to religious norms and institutional governance qualities (Chen et al. 2016). Specifically, studies on voluntary disclosure have also acknowledged differences across national boundaries (Zarzeski 1996; Jaggi and Low 2000). Therefore, this study examines the relation of religiosity to the voluntary disclosure of banks in 12 Middle East and North Africa (MENA) countries. Our research is interesting since these banks operate in countries with Islam as part of their national identity. Although different religions exist in some MENA countries, Islam is still the dominant religion (Abdelsalam et al. 2021). Platonova et al. (2018) and Asyraf Wajdi (2008) demonstrated that the ontological and epistemological principles of Islam alter managers' behaviour, indicating that religion has a considerable impact on managers' behaviour. Firms in MENA countries are strongly influenced by Islamic religious principles, regulations and values derived from "*Shariah*"—the Islamic law. All Muslims are obliged to follow *Shariah*, which provides guidance on various aspects of life of Muslims. Since Islam is the dominant religion in the MENA region, this study assumes its influence in moral behaviour and ethical standards that underpins business activities. For example, firms in MENA region are expected to operate on the basis of a transparent and ethical manner along the criteria of justice, equity, and *Ihsan* (benevolence) (Hassan and Harahap 2010). Therefore, these Islamic countries provide an ideal setting to examine the impact of religiosity on the voluntary disclosure of banks.

We are motivated to examine the impact of religiosity for the following reason. First, previous studies on voluntary disclosure have not paid attention to firms' religious environment. Previous literature has documented the need for voluntary disclosure (Leuz and Verrecchia 2000). Voluntary disclosure supplements mandatory disclosure (Graham et al. 2005). One of its main aims is to reduce the information asymmetry between principal and agent (Myers and Majluf 1984). The existing studies have identified several factors that affect managers' disclosure decisions such as corporate governance, firm characteristics,

managerial behaviour and institutional environment (Abdelsalam et al. 2021; CUI et al. 2015; Healy and Palepu 2001). However, few studies explore the relationship between religiosity and the quality of voluntary disclosure. Particularly, managers of banks operating in MENA countries have high discretion on the choice of voluntary disclosures' content (Piesse et al. 2012). Although the economic consequence of a firm's voluntary disclosure is well documented (Leuz and Verrecchia, 2000), extant literature has focused on corporate governance, firm characteristics and managerial behaviour and institutional environment (Cantrell and Yust 2018; Core 2001; Callen and Fang 2015; Chen et al. 2016; Chen et al. 2020; Gokcekus and Ekici. 2020).

Secondly, studies suggest that religiosity influences the ethical standard of managers and has a positive impact on their moral choices (Parboteeah et al. 2008; Cui et al. 2015; Leventis et al. 2018) and risk attitude (Chircop et al. 2017; Cantrell and Yust, 2018; Adhikari and Agrawal, 2016). Research also shows that firms that operate in a religious environment are more likely to engage in ethical behaviour (McGuire et al. 2012; Hilary and Hui 2009). Thus, it is expected that religiosity will promote honesty and higher moral standard among managers, thereby influencing their voluntary disclosure quality. The chosen sample in our study has distinctive cultural features. Religion substantially affects their managers' behaviours, especially in the banking sector (Asyraf Wajdi 2008). Managers' behaviours are shaped by Islam's ontological and epistemological sources (Platonova et al. 2018).

Third, our study focuses on banks that are considered one of the key pillars of every financial system but have received limited attention from earlier studies (Jizi et al. 2014). This study is relevant and ensures the integrity of the financial system of MENA countries by examining banks' disclosure quality. Furthermore, Levine (2004) argues that the complexity of banks transcends that of non-financial firms due to their role in the allocation and mobilisation of funds and their impact on overall national productivity.

Against this backdrop, our study examines the impact of religiosity on voluntary disclosure quality using 1484 bank-year observations in the 12 Middle East and North African (MENA) countries over 14 years. Consistent with Hilary and Hui (2009), we considered banks with their headquarters in any MENA country since the policies that guide a business are made at corporate headquarters. Unlike previous studies that examine the quantity of voluntary disclosure, this focused on the quality of voluntary disclosure using a three-dimensional approach. To ensure the robustness of our result, we isolated the influence of bank characteristics, corporate governance environment, institutional and macroeconomic factors.

Using three proxies on religiosity, we document a positive relationship between religiosity and voluntary disclosure quality. We also found that the influence of religiosity is more on the spread and usefulness of the information dimension compared with the quantity dimension. Our result also shows that the association between religiosity and VD\_Q is stronger for banks with headquarters in MENA countries with weaker legal protection, low level of control of corruption and during the crisis period. Additionally, we found that the influence of religiosity is more robust on the spread and usefulness of information dimensions than the quantity dimension.

Overall, we find evidence that religiosity enhances the voluntary disclosure quality and minimises the information gap between insiders (managers) and other users of firms' information. We conducted an additional analysis using an alternative proxy of religiosity and found a positive impact on banks' disclosure quality.

Our study makes significant contributions to the disclosure literature in the following ways. First, we provide evidence that informal institution (religion) influences the disclosure quality of banks in developing economies. Our result contributes to previous studies

on how informal institutions influence various organisational outcomes (North 1994). Secondly, this study has extended the ongoing debate on the relationship between religiosity and corporate disclosure practice. Additionally, we show that the interaction between the formal institution and religiosity positively impacts firms' disclosure quality. We also contribute to the debate on the influence of religiosity during the financial crisis. Our contribution is important to bank managers and policymakers since it helps them understand factors influencing the quality of disclosure in MENA regions.

## 2 Literature review and hypothesis development

### 2.1 Background, social norms and banks' disclosure quality

Although IFRS has become mandatory in MENA region, it still allows managers to use discretion when disclosing information.<sup>1</sup> Our rationale for connecting religiosity and voluntary disclosure quality is based on previous literature. Hambrick and Mason's (1984) upper echelons theory suggests that differences in managers' important personal values and cognitive styles could result in differences in behaviour. Previous studies also indicate that managers' personal values and interests are important factors for firms' disclosure decisions (e.g. Ba et al. 2013; Di Giuli and Kostovetsky 2014; Hemingway and Maclagan 2004; Rubin, 2008). Similarly, agency theory suggests that voluntary disclosure aims to mitigate conflict of interest between agents and principals (Dye 1985). In line with signalling theory, insiders of business should endeavour to convey information to less informed parties to decrease information asymmetry (Connelly et al. 2011; Shroff et al. 2013). Therefore, an ethical manager is expected to provide high-quality voluntary disclosures to reduce information asymmetry. Religion has been considered a source of ethical behaviour that will affect managers' disclosure. Social norms literature argues that religions establish a set of principles and thereby shape human ethical behaviour (e.g. Du et al. 2014a, b; El Ghoul et al. 2012; Weaver and Agle 2002). We argue that religiosity will influence managers' behaviours in relation to voluntary disclosures.

Voluntary disclosure transcends compulsory "regulated" disclosure requirements. It demonstrates managers' free choices to report information that is considered more relevant to assist users of the annual report in making a better decision (Salem et al. 2020). Interestingly, an increasing number of banks operating in the MENA region have started reporting more information voluntarily to signal their overall strategy (Elamer et al. 2020a, b). Dhaliwal et al. (2011) and Patten and Zhao (2014) indicated that voluntary disclosure attracts the interest of investors and other socially responsible parties because it is instigated by the ethical disposition of firm management and the significance of responsibility towards communities.

Sociologists have widely studied social norms to explain social behaviours and social order. Durkheim (1965) argues that social norms are the unwritten rules or patterns of behaviour in a certain group, where there is an agreement on how appropriate behaviour can be interpreted ontologically. The theory of social norms forms the basis for evaluating behavioural patterns surrounding rewards and sanctions (Leventis et al. 2018; Weaver &

<sup>1</sup> For example, IAS 38 requires listed firms to disclose a considerable amount and variety of important R&D information. However, it gives relevant high discretion in relation to the content of Corporate Social Responsibility reporting.

Agle, 2002). In a conceptual framework, religiosity is considered the main type of social norm. It refers to the extent people support the same set of principles of religious beliefs, values, and promulgations. Psychology literature has advocated that religion significantly affects human behaviours (e.g., Eriksson 2015). Prior research provides evidence that religiosity and moral behaviours are closely linked (Glover 1997; Sapp and Gladding 1989; Vitell 2009). They argue that religion constructs a set of principles and thereby provides frameworks for ethical business behaviour (Weaver and Agle 2002; Epstein 2002; Melé and Fontrodona 2017).

Previous research mainly focuses on investigating the relationship between religiosity and financial reporting quality (Abdelsalam et al. 2021; Adhikari and Agrawal 2016; Cantrell and Yust 2018). Managers in religious areas are more willing to avoid irregularities in their financial reporting (McGuire et al. 2012). Empirical evidence shows that religiosity is negatively associated with the level of accounting manipulation (Conroy and Emerson, 2004). Longenecker et al. (2004) find that religious practitioners and business managers are less likely to make unethical judgements and decisions. Additionally, Oh and Shin (2020) indicated that religious beliefs motivate individuals to enhance values and morality, which in turn improves social trust. Callen and Fang (2015) found that religiosity is associated with lower levels of future stock price crash risk since religion is considered as a set of social norms that leads to restraining bad news-hoarding activities by managers. Furthermore, firms located in religious countries are more likely to avoid risk-taking to ensure stable financial performance (Hilary and Hui 2009; Swaen and Chumpitaz 2008). Particularly, in the banking industry, CEOs that hold religious beliefs are more likely to engage in risk aversion (Adhikari and Agrawal, 2016; Chircop et al. 2020). Recent research has attempted to explore how religiosity affects disclosure quality. For instance, Dyreng et al. (2012) provide evidence that religion has an impact on managers' decisions in various contexts. They argue that firms' managers who reside in religious areas are more likely to voluntarily disclose negative information in a timely fashion. Moreover, Du et al. (2014a, b) found that religiosity has a significantly positive relationship with disclosure scores in Chinese listed firms. This result supports the view of religiosity as a type of social norm. Therefore, managers located in the stronger religious area are more likely to be influenced by such norms (Kennedy and Lawton 1998), and less likely to engage in unethical decisions such as accounting manipulation (Callen and Fang 2015; Dyreng et al. 2012; Hilary and Hui 2009).

Nevertheless, there is a possibility that firms in the religious area are less likely to be monitored since they are assumed to have higher morals (Gokcekus and Ekici 2020). This less monitoring will create more discretion for managers. Therefore, firms' managers may focus less on actions that benefit other stakeholders, such as releasing high-quality disclosures. Given the concerns about the cost of disclosures (Barnea and Rubin 2010; Grougiou et al. 2016; McWilliams and Siegel 2001), issuing a perfectly credible or, equivalently, completely unbiased disclosure might not be an optimal choice for the firm (Core 2001). Organisational strategies and attitudes will be affected by religious beliefs because managers interact with local contexts and populations (McGuire et al. 2012). Religiosity mitigates opportunistic behaviour (Callen and Fang 2015) and enhances ethics in business (McGuire et al. 2012). Prior studies link religiosity with moral judgment (Walker et al., 2012). Even Irreligious managers might be affected by religious norms in the local area as they tend to avoid the costs of rejecting religious norms (Cialdini and Goldstein 2004; Sunstein 1996; Kohlberg 1984; Le Bon 2002). Religion shapes peer behaviour and promotes appropriate corporate ethical decisions and practices (Weaver and Agle 2002). Empirical evidence supports that religion plays a significant role in corporate governance, and curbs

bad news-hoarding activities by managers (Callen and Fang 2015; Dyreng et al. 2012; Levantis et al. 2018; Kim et al. 2014; Baik et al. 2018).

Religions are assumed to be a source of morality (Geyer and Baumeister, 2005). Consequently, religiosity has an impact on people's level of acceptance of unethical accounting choices (Conroy and Emerson 2004; Longenecker et al. 2004). We expect that religious norms will positively affect managers' disclosure decisions in the banking industry. Chantziaras et al. (2020) support this conjecture by providing evidence of a positive relationship between religiosity and the extent of disclosure in the banking system. The banking industry is often categorised as an industry with significant uncertainty and opacity (Furfine, 2001) because of the complexity and diverse nature of its business (Heilpern et al. 2009). In line with the agency theory, a high disclosure quality will reduce information asymmetry (Brown and Hillegeist, 2007). Therefore, we expect that managers with religious beliefs will disclose more information voluntarily, which reduces information asymmetry and assist users in making better decisions. Collectively, we make the following hypothesis:

**H1** Religiosity is positively related to voluntary disclosure quality.

## 2.2 Religiosity, formal institutions and banks' disclosure quality

The modern business system was developed based on agency theory; hence information asymmetry inherently exists between the principals and agents (Fields et al. 2001). Formal institutions introduced rules and regulations aimed to reduce information asymmetry. They help structure and regulate the economic order and business activities so that the investors' rights can be protected and unethical behaviour, such as accounting manipulation, can be prevented.

Prior studies find that firms in a less strict legal environment are more likely to be involved in accounting manipulation (Cohen et al. 2008; Wang and Campbell, 2012; Zeng et al. 2012; Xie et al. 2003). Notably, previous studies suggest a strong association between governance system and disclosure quality (Yong and Thyl 2014). North (1990) suggests that the informal institutions' role in accounting disclosure quality is stronger in the weaker institutional settings. He proposes that informal institutions are considered as a result of social consensus and argues that customs, cultures, and ideals are unconsciously formed as a set of undocumented codes. These factors are entwined with religion and accepted as social norms. Moreover, it is eventually spread and inherited generation by generation (Tonoyan et al. 2010). Human behaviours will be unconsciously influenced by this set of beliefs that are informally institutionalised (Pearce 2013; Bruton et al., 2005).

In addition, studies have documented the influence of formal institutions on managerial practices (e.g., Cheng et al. 2020). When the formal institutions are strong, firms are more willing to comply with the framework, rules or regulations to avoid costs and sanctions. In this regard, Chen et al. (2016) found that religiosity has a significant and positive association with higher business ethics, risk aversion, and low cost of debt. Religiosity plays a major role in restricting opportunistic behaviour in a weaker legal environment. Cantrell and Yust (2018) found that religiosity is linked to fewer failures, higher ROAs and lower earnings manipulation in the banking sector. However, when formal institutions are weak, informal institutions will guide managers' ethical behaviour. In the context of disclosure quality, religiosity is expected to have a positive association with disclosure quality. One aim of disclosure is to mitigate information asymmetry (Chen et al. 2020). An ethical firm's manager is more likely to disclose more useful information that helps users in their

economic decision-making. This notion is consistent with Helmke and Levitsky (2004), who claimed that the relationship between formal and informal institutions relies on the effectiveness of the actors' target in the institutions. Collectively, religiosity is complementary to weak formal institutions (Horak and Yang 2018). Consistent with these arguments, we make our second hypothesis as follows:

**H2** The association between religiosity and voluntary disclosure quality is more pronounced in countries with weak formal institutions.

### 2.3 Religiosity, crisis and banks' disclosure quality

The 2008 financial crisis was the darkest time for most businesses in the world in the past two decades. Particularly, banks were in the middle of a storm and experienced bankruptcy, stock crashes, and dramatically increased liabilities with a lack of support from the state (Hawtrey and Johnson 2010).

A significant number of works have explored the accounting manipulations during financial crises. One stream of empirical evidence shows that managers are more likely to engage in accounting manipulation during the financial crisis for personal incentives (Ahmad-Zaluki et al. 2011; Türegün 2020). They fully take advantage of managers' discretion given by the flexibility of accounting standards (Gorgan et al. 2012). Earlier studies show that the choice of content in voluntary disclosure relates to managerial strategic decisions (Dye 1985; Li et al. 1997) and incentives (Bewley and Li 2000). Prior research finds an increase in accounting manipulations during the financial crisis (Salem et al. 2020). Balasubramanian et al. (2014) investigated annual reports of 469 commercial banks listed in 27 EU countries from 2005 to 2010 and found an increase in manipulations of loan loss provisions. In addition, Bornemann et al. (2012) analysed annual reports of German banks from 1997 to 2009. The study examined the extent to which insiders built hidden reserves to avoid a fall in earnings. They find an increase in the manipulation of accounting numbers as a result of bankers offsetting less favourable returns caused by the financial crisis. Furthermore, Abdelsalam et al. (2017) found that managers are more likely to engage in accounting manipulation to maintain consistently favourable performance in different periods, even if it is during a financial crisis. Those findings align with agency theory, which proposes that interest conflicts can be present because of information asymmetry (Kothari 2001; Schipper 1989).

In contrast, another stream of the literature shows contradictory results. For example, Filip and Raffournier (2012) investigated accounting manipulation during the 2006–2009 financial crisis. They interestingly find that the quality of financial disclosure increased over the crisis year. During a crisis, firms' managers are more likely to disclose high-quality information to attract potential investors (Cimini 2015). High-quality disclosure promotes trust between a firm, its stakeholders and investors during the most challenging time (Lins et al. 2017). The banking industry has been considered an essential element of the global economy (Scholtens 2009; Grougiou et al. 2016). Therefore, many stakeholders are interested in monitoring banks' sustainability, operation, and social contribution (Mehran et al. 2012). The whole industry is highly regulated by authorities and vigorously followed by the media, financial institutions, and various committees (Adhikari and Agrawal 2016). Banks will consider the general business environment when making strategic decisions (Jiang et al. 2018). It is rational that the banks' managers tend to provide high-quality disclosure during the crisis because of specific incentives whether they are religious or not.

Interestingly, in the context of religiosity, psychological studies suggest that religious people can easily deal with significant life events (McDougle et al. 2016). People maintaining spiritual stability benefit from their beliefs and religious community (Halikiopoulou and Vasilopoulou 2016; Orman 2019). Studies find that Islamic banks could sustain operations through the crisis, and that they performed better than conventional banks during crisis (Rosman et al. 2014; Parashar 2010). Díez-Esteban et al. (2019) find that religion is beneficial to individuals to maintain tranquillity during the financial crisis. Few studies explore how religious managers make decisions about firms' voluntary disclosure during a crisis period. Religion motivates adherents to ensure their behaviour is consistent with role expectations (Sunstein 1996; Weaver and Agle 2002). In line with Stewardship theory (Davis et al. 1997), managers are expected to protect and maximise shareholders' wealth, especially during a crisis. Consistent with this argument, it seems that religion will help bankers to remain ethical during the financial crisis. However, given the aforementioned argument regarding the disclosure incentives, we prudently give our non-direction hypothesis as follows:

**H3** The association between religiosity and voluntary disclosure quality is more or less pronounced during crisis periods.

### 3 Research design

#### 3.1 Sample selection procedure

We gathered the financial data from DataStream and Osiris databases. We hand-collect the voluntary disclosure quality (VD\_Q) from each bank's annual reports. The religiosity proxies and the macro-economic variables were obtained from World Values Survey (WVS) and the World Bank, respectively. To test our hypothesis, the sample is constructed based on all conventional banks that are publicly listed and operating in MENA countries. Even though certain MENA countries have multiple religions, Islam is the dominant religion (Abdelsalam et al. 2021). As a result, these Islamic countries present an excellent scenario to investigate the relationship between religion and banks' voluntary disclosure. Although there is a slight difference in religiosity across MENA countries, it is usually confounded by a country's institutional and legal characteristics, which are difficult to be disconnected from religion. The conventional banks in MENA countries offer a more controlled and dynamic setting which is appropriate to examine our hypotheses. Following Pirinsky and Wang (2006), we used banks' headquarters as they are close to the bank's main financial activities. Our sample is limited to banks that report tier 1 capital ratios to guarantee that the analysis is not unduly affected by the variances in regulatory environments and non-comparable business practices. Islamic banks were excluded since they have other regulatory requirements than commercial banks. As a result of the late employment of IFRS by most banks in the MENA region in 2006, we filtered the sample by covering pre- and post-banking crisis. This study considers the annual data over 14 years from 2006 to 2019. We omitted 21 banks from the sample due to insufficient and missing financial information. Based on the above implications and our data specification, our sample is limited to 12 MENA countries.<sup>2</sup> Our final sample translated into 1,484 bank-year observations for our empirical analyses (see Appendix IV).

<sup>2</sup> These countries include; Lebanon, Palestine, Egypt, Morocco, Syria, Iraq, Yemen, Tunisia, Bahrain, Israel, Jordan and Iran.

### 3.2 Religiosity measurement

Following previous studies (Abdelsalam et al. 2021; Kanagaretnam et al. 2015; McGuire et al. 2012; Parboteeah et al. 2008), we define religious norms adherence using three different dimensions, (a) Cognitive dimension (**RP**),<sup>3</sup> which focus on religious knowledge or beliefs, (b) Affective dimension (**RI**)<sup>4</sup> that takes into account the feelings of individuals about religion, and (c) Behavioural dimension (**RAS**),<sup>5</sup> which highlights the attendance of religious services, prayer or constant donations. Utilising data from the World Values Survey (WVS), we collect and calculate the strength of the three religiosity dimensions. Therefore, we considered the responses to questions about the importance of religiosity, religious affiliation, and the attendance of religious services. We used the aggregate religiosity measure (**Aggregate-REL**) of the three religious' dimensions as our main variable of interest.

### 3.3 Quality of voluntary disclosure measurement

Following Salem et al. (2020), we gathered and measured the quality of disclosure by classifying the information into three dimensions that cover both quantitative and qualitative features of information. These dimensions are quantity, spread, and usefulness.

#### (A) Quantity Dimension

This dimension takes into account the level of information (quantity), and is adjusted by bank size as it has a direct influence on the business operation (Beretta and Bozzolan, 2008; Rezaee and Tuo, 2019). We employed the content analysis method collaboratively with a comprehensive index that contains relevant voluntary disclosure items (see Appendix I).<sup>6</sup> Therefore, we adjusted the total number of words by bank size and utilised it to capture the level of information disclosed voluntarily. Following prior studies (e.g., Beretta and Bozzolan, 2008; Salem et al. 2020), we used OLS regression to estimate the proxy of quantity dimension (QS\_TR). Below is the standardised equation:

$$QS\_TR_{it} = 1 - \frac{Max\_R\_Q_{it} - R\_Q_{it}}{Max\_R\_Q_{it} - MinR\_Q_{it}} \quad (1)$$

where:  $QS\_TR_{it}$  = standardised relative quantity index for the bank  $i$  at year  $t$ .  $R\_Q_{it}$  = is the relative quantity index, which is the residual for the banks  $i$  at year  $t$  that was obtained after controlling the size of the bank.

<sup>3</sup> **RP** = The percentage of respondents says that they are religious person "based on WVS".

<sup>4</sup> **RI** = is the percentage of respondents that indicates religion is important to them "based on WVS".

<sup>5</sup> **RAS** = is the percentage of respondents says that they attend religious services "based on WVS".

<sup>6</sup> We follow recent literature (Menicucci, 2013; Elamer et al. 2020a, b; Sarhan and Ntim, 2018) to capture the information disclosed by conventional banks. For example, we employed content analysis and constructed a comprehensive checklist that covers items relevant to MENA banks. Following Salem et al. (2020) number of words was adjusted by bank size to capture the quantity dimension. Further information can be found in Salem et al. 2020

## (B) The Spread Dimension

The second dimension focuses on the coverage (CO\_VE) and dispersion (DI\_SPE) of the disclosed information to satisfy numerous stakeholders. The ratio of information disclosed (items) from the overall number of items in the checklist is used as the coverage proxy. On the other hand, the dispersion (DI\_SPE) of items provided in the annual report within the disclosure checklist is employed to specify the concentration. Identifying the coverage and dispersion of information is adopted to capture whether bank managers offer a comprehensive and wide range of information or emphasis only certain items within the checklist. We used the below formulas to measure the dispersion and coverage<sup>7</sup>:

$$DI\_SPE_{it} = 1 - \sum_{j=1}^n H - j^2 \quad (2)$$

$$CO\_VE_{it} = \frac{1}{st} - \sum_{j=1}^s IN\_F \quad (3)$$

where;  $H-j$  is the ratio of revealed item  $i$  captured by the item disclosure frequency in category  $j$ .  $IN\_F=1$  if bank  $i$  revealed information about item  $j$  and 0 otherwise.  $s$  is the number of subcategories. Accordingly, we used the average of  $DI\_SPE$  and  $CO\_VE$  as a proxy for the spread dimension:

$$SP\_R_{it} = \frac{1}{2}(DI\_SPE_{it} + CO\_VE_{it}) \quad (4)$$

## (C) The Usefulness Dimension

The third dimension takes into consideration the qualitative characteristics of IFRS (understandability, comparability, faithful representation, relevance and timeliness) (IFRS 2010). To collect and measure the dimension of usefulness, we employed five points rating scales index of Salem et al. (2020) (see Appendix II). Nevertheless, timeliness is gained using the natural logarithm of the number of days between the auditor's signature and the year-end. To ensure reliability and consistency, we employed the weighted technique of the qualitative characteristics suggested by Alotaibi and Hussainey (2016) and Salem et al. (2020). The following is the formula used to capture the usefulness dimension:

$$US\_EFU = \frac{1}{5}(\text{understandability} + \text{comparability} + \text{faithfulness} + \text{relevance} + \text{timeliness}) \quad (5)$$

To achieve the quality of information revealed (VD\_Q), we utilised the following equation:

<sup>7</sup> A detailed explanation about the measurement of each dimension can be found at "Salem, R.I.A., Ezeani, E., Gerged, A.M., Usman, M. and Alqatamin, R.M., (2020). Does the quality of voluntary disclosure constrain earnings management in emerging economies? Evidence from Middle Eastern and North African Banks. *International Journal of Accounting & Information Management*".

$$VD\_Q = \frac{1}{3}(QS\_TR + SP\_R + US\_EFU) \quad (6)$$

Following Salem et al. (2020) and Lemma et al. (2020), we assess the validity of our measurement through several steps. First, the checklist was based on relevant research studies, an analysis of international trends and observations of standard reporting practice. Consequently, all disclosed items are appropriate, relevant and revealed by banks. In addition, we checked the reliability of our measurement by using several coders to score the research instrument (Alotaibi and Hussainey 2016). Following Salem et al. (2020), we also compared and resolved variances between coders accordingly.

### 3.4 Control variables

We specify several control variables at the bank and country levels. Following Du et al. (2014a, b), McGuire et al. (2012) and Sahyoun and Magnan, (2020), Usman et al. (2022), we have taken into account the auditing quality proxies (Big4, IA\_C, AC\_S, AC\_M and AC\_G), which may have a potential influence on enhancing the quality of disclosed information and its association with religiosity (Adhikari and Agrawal, 2016). In the face of contradictory aims and varying degrees of desire, Hambrick and Mason (1984) indicated that managers make business decisions not only on a logical analysis of techno-economic considerations but also on their personal beliefs and cognitive underpinnings. Previous literature found that managers' effects are linked to companies' policies (Bertrand and Schoar 2003), voluntary disclosures (Bamber et al. 2010) and tax avoidance (Dyreg et al. 2010). In this context, Salem et al. (2020) and Abdelsalam et al. (2021) indicated that managerial actions have an impact on the quality of corporate disclosure, and religion offers emotional support and consistency in managerial decision-making. Following Liu and Zhou (2020), we employed executives-gender to control for managerial effects. Previous studies argued that gender influences the presentation style of disclosure (Davis et al. 1997; Marquez-Illescas et al. 2019). In addition, other studies have documented the relationship between executives-gender and corporate financial reporting decision-making (Francis et al. 2015).

We include the governmental (G-Owner) and institutional (I-Owner) ownerships. These variables are expected to have a potential impact on the association between disclosure quality and religiosity. Institutional investors may stimulate managerial behaviour to be involved in unethical practices such as earnings management, thereby extending the asymmetric gap between other investors and the bank (Salem et al. 2020). In addition, Ghazali (2007) indicated that the activities of government-owned banks are more likely to be visible in the public eyes as they are expected to be conscious of their public duty. Therefore, government-owned banks tend to disclose extensive information to increase the level of trust and meet the expectations of their stakeholders. To control for the cross-sectional variances in bank characteristics, we counted in a set of several bank-level variables, which may affect the disclosure quality in the financial institutions. Following previous studies (Abdelsalam et al. 2021; Kanagaretnam et al. 2015; Salem et al. 2020; Core 2001), we isolated the effects of liquidity, capital adequacy ratio, profitability, growth, leverage and bank size.

Consistent with Chen et al. (2016), we also controlled for macro-economic conditions by including the log GDP per capita (L-GDPPC) as individuals' wealth may influence their utility function and values. In order to isolate the impact of religion from the influence

of other country characteristics, we control for corruption value (C-Corruption) and legal rights index (Legal-Prot) to proxy for bank environment and investor protection (Kanagaretnam et al. 2015). These two variables are more likely to provide meaning over time and ensure cross-country comparisons (Kaufmann et al. 2011). Following Abdelsalam et al. (2016), we control for the potential impact of countries experiencing political<sup>8</sup> problems (P\_T) from 2011 to 2019. We present the details of these variable definitions and measurements in Appendix III.

### 3.5 Empirical model

Our study model specification is built based on prior studies (e.g., Abdelsalam et al. 2021; Kanagaretnam et al. 2015; McGuire et al. 2012) and attempts to investigate whether religiosity is associated with voluntary disclosure quality in banks across 12 emerging countries. The following is the module used<sup>9</sup> for the whole sample:

$$VD\_Q_{it} = \alpha + \beta_0 Religiosity_{it} + \beta_1 Audit - Quality_{it} + \beta_2 Bank - Level - Control_{it} + \beta_3 Ownership - Control_{it} + \beta_4 Country - Level - Control_{it}. \quad (7)$$

To ensure consistent estimation, we have used the Generalised Method of Moments (GMM) and Panel regression. Using GMM estimators is appropriate for resolving any possible bias in a dynamic panel (Arellano and Bond 1991; Roodman 2006). GMM estimator has been adopted in several recent corporate studies (Alhazaimeh et al. 2014; Holtz-Eakin et al. 1988; Issa et al. 2021; Kouki 2021; Ezeani et al. 2022). Additionally, the GMM estimator is designed for datasets with few periods and many explanatory variables that are less likely to be strictly exogenous and correlated to current realisations of the error (Kim et al. 2014; Ezeani et al. 2021). Following Blundell and Bond (1998) and Dhaliwal et al. (2011), we utilised two-step GMM as it enhances estimates efficiency by eliminating issues resulting from weak instruments and avoiding proliferation.

The procedure of the dynamic modelling approach involves two vital steps. Firstly, we use the dynamic model (7) in the first-differenced form to eliminate any possible bias that may arise from potential omitted variables and time-invariant unobserved heterogeneity. Secondly, we incorporated the lag values of explanatory variables into the GMM system and used them as instruments. These lagged values are expected to overcome the potential endogeneity concerns by transforming the data internally, where a variable's value of the previous year is subtracted from its current value (Roodman 2006). Consequently, we used historical values of religiosity, audit quality, banks' ownership and country specific variables as instruments. Following Wintoki et al. (2012), we used one-year lagged values of our explanatory variables. These variables are uncorrelated with the error term in the main model (7) and are considered valid instruments. Besides, the Arellano-Bond test and the Hansen test are used to assess the validity of the dynamic GMM estimator and whether the used instruments are specified appropriately. The findings of these tests appeared insignificant, suggesting that our instruments are exogenous; hence, valid and the dynamic GMM model is an appropriate estimation to tackle the likelihood of endogeneity concerns.

<sup>8</sup> Our sample consists of banks operating in countries experiencing political issues, namely; Tunisia, Egypt, Yemen, Syria and Iraq.

<sup>9</sup> Appendix III shows the measurement and definitions of all study variables used in the model.

In addition, we used the Chow test to compare panel and pool regression. Our result indicates that the  $F$  statistics is highly significant at (0.001) for the overall sample, suggesting the appropriateness of panel data regression. Following Hedges and Vevea (1998), we used the Hausman specification test to investigate the appropriateness of fixed (bank-year effects) and random-effects regressions. We found that the fixed effects (untabulated) is the most appropriate for our dataset due to the significance of  $\text{Prob} > \text{Chi}^2 = 0.002$ . The fixed effects technique can eliminate the impacts of confounding factors without having to measure or even know what they are, as long as they are constant across time (Firebaugh et al. 2013).

#### 4 Baseline results and discussion

In Table 1, we provide the descriptive statistics of the variables involved in the analysis. The mean value of VD\_Q (our dependent variable) indicates that the average of quality-information disclosed by banks is 61%, with a maximum value of almost 77% compared with all banks operating in the same region. This finding is close to those reported by Lim et al. (2017), who found that the average quality of information is around 58% among firms listed on the Australian stock exchange. However, our finding is higher by 40% compared with those reported by Ghosh (2018). This variance could be attributed to the measurement approach of disclosure implemented and to the period examined, which covers the post-Basel II adoption period in the MENA region (Elnahass et al. 2014).

In addition, the mean values of religious dimensions (RAS, RI and RP) are 29, 79 and 68%, with maximum values of 83, 97 and 94%, respectively. These findings suggest that the respondents highly recognise the importance of the religious dimension compared to the other dimensions. Most importantly, the mean and median values of the aggregate proxy for religiosity (Aggregate-REL) are 0.58% and 0.55%. This result is consistent with Adhikari and Agrawal (2016). Regarding the audit quality proxies, the mean values of Big-4, IA\_C, AC\_S, AC\_M and AC\_G are 60%, 52%, 3, 4 and 4%, respectively. These outcomes are in line with previous studies (D'Amato and Gallo, 2017; Salem et al. 2020, 2021). In addition, the bank and country-control variables seem to be insensible ranges and align with prior studies (e.g., Abdelsalam et al. 2021; Kanagaretnam et al. 2015).

Table 2 (Panel A) shows the correlation analyses among the study variables. This analysis illustrates that the highest correlation is between leverage and growth and is below the cut-off point (80%) suggested by Gujarati and Porter (2009). Since the coefficients of all variables are below 80%, the multicollinearity issue does not exist in our study. Additionally, the variance inflation factor (VIF) test shows that the condition index is lower than 5. Table 3 (Panel B) confirms that the likelihood of a multicollinearity problem between the explanatory variables is below the conventional threshold.

Table 4 provides the results of the impact of religiosity on disclosure quality using both fixed effects and GMM regressions. Regarding the main variables of interest (i.e., VD\_Q and Aggregate-REL), Columns 1 and 5 of Table 4 shows that religiosity has a significant and positive influence on disclosure quality at a 1% level after employing several control variables at the bank-level and country level. Therefore, we accept  $H_1$ . These findings align with the argument that bank managers with religious beliefs promote appropriate corporate ethical decisions and practices (Leventis et al. 2018). One possible explanation is that these managers avoid risk-taking to ensure stable financial performance (Hilary and Hui 2009; Chircop et al. 2020) and are more likely to provide more information voluntarily

**Table 1** Summary statistics

	Mean	Median	SD	p25	p75	p95	Min	Max
VD_Q	0.612	0.628	0.089	0.588	0.666	0.735	0.264	0.769
RAS	0.292	0.303	0.147	0.231	0.341	0.667	0.084	0.838
RI	0.793	0.739	0.125	0.685	0.939	0.967	0.598	0.973
RP	0.682	0.688	0.14	0.536	0.808	0.942	0.517	0.942
Aggregate-REL	0.581	0.553	0.104	0.508	0.658	0.843	0.399	0.918
Big4	0.608	1	0.488	0	1	1	0	1
IA_C	0.528	0.667	0.419	0	1	1	0	1
AC_S	3.178	3	1.067	3	4	5	0	6
AC_M	4.732	4	1.251	4	5	7	2	11
AC_G	0.044	0	0.205	0	0	0	0	1
E_Gender	0.485	0	0.499	0	1	1	0	1
Bank_S	9.806	4.07	10.541	2.638	14.156	31.948	0	52.333
Growth	0.19	0.136	0.183	0.099	0.183	0.712	0	0.95
LEVER	0.771	0.864	0.246	0.801	0.902	0.949	-0.418	0.994
PROFIT	0.456	0.23	0.474	0.043	0.829	1.2	-0.444	2.299
LI_Q	2.904	1.169	7.981	1.109	1.388	12.087	-2.392	87.559
CA_P	0.168	0.138	0.159	0.099	0.184	0.358	0	2.369
G-OWNER	0.066	0	0.140	0	0.074	0.453	0	0.859
I-OWNER	0.279	0.123	0.309	0.001	0.555	0.835	6.68e	0.983
L-GDPPC	8.732	9.684	2.669	8.068	10.419	10.858	0	11.351
C-Corruption	1.706	1.837	0.366	1.723	1.908	1.924	0.159	1.960
Legal-prot	0.995	0	1.785	0	1	6	0	11
P_T	0.199	0	0.399	0	0	1	0	1

VD\_Q, stands for voluntary disclosure quality; RAS, is the percentage of respondents says that they attend religious services "based on WVS"; RI, is the percentage of respondents that indicates religion is important to them "based on WVS"; RP, the percentage of respondents says that they are religious person "based on WVS"; Aggregate-REL, is the aggregate religiosity of the three dimensions; Big-4, is a dummy variable that takes the value of one if the largest four auditing firms audit the bank and zero otherwise; IA\_C, is measured as the number of independent directors on the audit committee scaled by the total number of audit committee members; AC\_S, represents the size of the audit committee; AC\_M, stands for the total number of audit committee meeting held in a financial year; AC\_G, a dummy variable takes the value of one if at least one of the audit committee members is a female member and zero otherwise; E\_Gender, the value 1 is given if the manager is male in year t, and 0 if female; Bank\_S, is measured as a natural logarithm of total assets; Growth, is calculated as the change in total assets scaled by the lag of total assets; LEVER, is measured as total liabilities divided by total assets; PROFIT, is calculated as net income scaled by the lag of total assets; LI\_Q, is measured as current assets scaled by current liabilities; CA\_P, represents capital adequacy ratio and is measured as the proportion of actual regulatory capital (Tier 1 capital) divided by the total assets; G-OWNER, the ratio of stocks owned by government; I-OWNER, the ratio of stocks owned by institutional investors; L-GDPPC, the Log of GDP per capita; C-Corruption, represents the logarithm of the control of corruption value that illustrates the public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests; Legal-Prot, represent the strength of legal rights index which measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 12, with higher scores indicating that these laws are better designed to expand access to credit, P\_T, is a dummy variable that takes the value of one if a bank is based in Egypt, Yemen, Tunisia, or Iraq and zero otherwise

**Table 2** Matrix of correlations (Panel-A)

	VD_Q	RAS	RI	RP	Big4	IA_C	AC_S	AC_M	AC_G	E_Gender	Bank_s
VD_Q	1.000										
RAS	0.202	1.000									
RI	0.135	0.421	1.000								
RP	0.120	0.265	0.392	1.000							
Big4	0.030	-0.101	-0.273	-0.188	1.000						
IA_C	-0.144	-0.189	-0.028	-0.041	0.162	1.000					
AC_S	0.024	-0.129	-0.076	-0.037	0.214	0.314	1.000				
AC_M	0.018	-0.056	-0.072	-0.020	0.195	0.284	0.415	1.000			
AC_G	0.012	-0.106	-0.183	-0.051	0.138	0.116	0.289	0.112	1.000		
E_Gender	-0.059	-0.166	-0.068	-0.069	-0.072	-0.212	-0.150	-0.128	-0.122	1.000	
Bank_s	0.069	0.026	-0.114	-0.031	0.331	0.232	0.252	0.288	0.162	-0.313	1.000
Growth	0.124	0.080	-0.107	0.054	0.305	0.092	0.177	0.231	-0.003	-0.145	0.374
LEVER	-0.172	-0.045	0.108	-0.096	-0.220	-0.067	-0.153	-0.190	0.001	0.104	-0.293
PROFIT	-0.031	0.031	0.055	0.126	-0.182	-0.180	0.009	-0.017	-0.008	-0.038	-0.051
LI_Q	0.178	0.203	0.002	0.137	0.175	0.049	0.109	0.174	-0.009	-0.102	0.209
CA_P	-0.008	-0.055	-0.198	-0.102	0.218	0.036	0.018	0.043	0.059	-0.026	0.089
G-OWNER	0.157	0.066	0.021	0.027	-0.047	0.058	0.254	0.203	0.216	-0.087	0.017
I-OWNER	-0.019	0.015	0.054	-0.001	-0.075	0.155	0.034	0.090	0.051	-0.084	0.070
L-GDPPC	0.014	-0.050	-0.075	-0.215	0.468	0.048	0.122	0.150	0.101	0.032	0.187
C-Corruption	-0.012	-0.044	-0.140	0.007	0.341	0.079	0.011	0.122	-0.073	0.012	0.171
Legal-prot	0.073	0.010	-0.095	0.039	0.079	0.125	0.167	0.145	0.054	-0.057	0.044
P_T	0.012	-0.128	0.184	0.055	-0.423	-0.129	-0.135	-0.165	-0.107	0.186	-0.311
Growth		LEVER	PROFIT	LIQ	CAP	G-OWNER	I-OWNER	L-GDPPC	C-Corruption	Legal-prot	PT
VD_Q											
RAS											
RI											

Table 2 (continued)

	Growth	LEVER	PROFIT	LIQ	CAP	G-OWNER	I-OWNER	L-GDPPC	C-Corruption	Legal-port	PT
RP											
Big4											
IA_C											
AC_S											
AC_M											
AC_G											
E_Gender											
Bank_s											
Growth	1.000										
LEVER	-0.353	1.000									
PROFIT	-0.031	0.022	1.000								
LI_Q	0.496	-0.451	-0.042	1.000							
CA_P	0.161	-0.098	-0.051	0.128	1.000						
G-OWNER	0.007	-0.013	-0.003	0.028	-0.047	1.000					
I-OWNER	-0.092	0.041	-0.044	-0.013	-0.037	0.038	1.000				
L-GDPPC	0.152	-0.114	-0.065	0.085	0.161	0.037	-0.064	1.000			
C-Corruption	0.153	-0.118	-0.309	0.077	0.101	-0.046	0.018	0.096	1.000		
Legal-port	0.149	-0.176	0.032	0.177	0.059	0.215	-0.061	0.010	-0.182	1.000	
P_T	-0.127	0.118	0.115	-0.084	-0.075	-0.155	-0.044	-0.403	-0.135	-0.008	1.000

**Table 3** Variance inflation factor (Panel-B)

	VIF	1/VIF
Bank-s	3.001	0.327
E_Gender	2.568	0.389
Growth	2.09	0.478
LEVER	2.043	0.489
P_T	1.869	0.535
Big4	1.819	0.55
RI	1.692	0.591
C-Corruption	1.645	0.608
LI_Q	1.618	0.618
L-GDPPC	1.602	0.624
RAS	1.552	0.644
AC_S	1.465	0.682
AC_M	1.384	0.723
RP	1.346	0.743
IA_C	1.34	0.746
G-OWNER	1.248	0.801
AC_G	1.219	0.82
Legal-prot	1.216	0.822
PROFIT	1.19	0.84
CA_P	1.113	0.898
I-OWNER	1.076	0.929
Mean VIF	1.626	

(Dyrenge et al. 2012). In addition, Big-4 and IA\_C, as proxies of audit quality, positively impact the quality of information disclosed by banks. The result is significant at 1% levels in both Fixed and GMM models, respectively. Based on the fixed-effects model, the Growth, G-OWNER and LI\_Q have a positive and significant association with VD\_Q at 1% and 5%, respectively. This result suggests that governmentally owned banks with a high level of growth are more likely to disclose high-quality information to increase the level of trust and meet the expectations of their stakeholders (Ghazali 2007). The rest of the control variables have the predicted sign.

To test our second and third hypotheses, we examine the influence of religiosity on VD\_Q in two different forms, including; (1) across banks that are operating in a low legal protection environment and low level of control of corruption ( $H_2$ ), (2) during the period of the financial crisis ( $H_3$ ). Following Qian et al. (2018), we employed the legal rights<sup>10</sup> and control of corruption indexes to gain each country's legal protection strength and corruption level. The median values of the legal protection and control of corruption are used as a cut-off point to generate proxies for "*REL\*Low-legal-prot*" and "*REL\*Low-C-Corruption*". The value of one is given to those banks that operate in a low legal protection environment and low level of control of corruption and zero otherwise. Table 4 Columns (2,3, 6 and 7) illustrate that the interaction

<sup>10</sup> The data of legal rights index is achieved from the *Doing Business Project*. More information could be found at <http://www.doingbusiness.org/>

Table 4 Regression results

VDQ	Fixed effects			GMM				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
REL*Low-legal-prot	-	0.009 (2.79)***	-	-	-	0.006 (2.04)***	-	-
REL*Low-C-Corruption	-	-	0.034 (3.42)***	-	-	-	0.075 (4.13)***	-
REL*Crisis	-	-	-	0.036 (3.49)***	-	-	-	0.109 (6.63)***
Aggregate-REL	0.085 (3.51)***	0.084 (3.46)***	0.063 (2.60)***	0.069 (2.78)***	0.165 (4.53)***	0.167 (4.57)***	0.096 (2.41)***	0.127 (3.49)***
Big4	0.015 (2.59)***	0.015 (2.59)***	0.016 (2.58)***	0.016 (2.69)***	0.021 (2.74)***	0.021 (2.79)***	0.023 (2.68)***	0.020 (2.57)***
IA_C	0.016 (2.33)***	0.014 (1.96)**	0.015 (2.15)**	0.013 (1.86)*	0.003 (2.04)***	0.003 (0.33)	0.007 (0.70)	0.006 (0.57)
AC_S	0.002 (0.86)	0.002 (0.81)	0.003 (0.94)	0.002 (0.58)	0.001 (0.32)	0.001 (0.18)	0.001 (0.22)	0.001 (0.12)
AC_M	-0.001 (-0.55)	-0.001 (-0.52)	-0.001 (-0.29)	-0.001 (-0.26)	-0.002 (-0.43)	-0.002 (-0.49)	-0.001 (-0.16)	-0.002 (-0.61)
AC_G	-0.001 (-0.06)	-0.005 (-0.04)	0.001 (0.05)	0.001 (0.12)	-0.015 (-0.57)	-0.018 (-0.66)	-0.024 (-0.89)	-0.004 (-0.15)
E_Gender	-0.004 (-0.56)	-0.005 (-0.61)	-0.006 (-0.67)	-0.006 (-0.68)	0.008 (0.69)	0.007 (0.59)	0.009 (0.75)	0.012 (1.04)
Bank_S	0.004 (1.30)	0.003 (1.27)	0.001 (1.50)	0.002 (0.91)	0.001 (2.85)***	0.001 (2.74)***	0.001 (3.01)***	0.001 (1.94)**
Growth	0.041 (2.44)***	0.041 (2.45)***	0.039 (2.29)**	0.034 (2.03)**	0.033 (1.53)	0.030 (1.38)	0.034 (1.60)	0.004 (0.18)
LEVER	-0.013 (-1.02)	-0.012 (-0.98)	-0.013 (-1.01)	-0.013 (-1.00)	-0.011 (-0.68)	-0.012 (-0.72)	-0.007 (-0.45)	-0.009 (-0.59)
PROFIT	0.002 (0.33)	0.009 (0.14)	0.006 (0.97)	0.001 (0.10)	0.001 (1.01)	0.010 (1.05)	0.011 (1.02)	0.012 (1.25)

**Table 4** (continued)

VDQ	Fixed effects				GMM			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LI_Q	0.001 (2.04)**	0.006 (2.05)**	0.001 (1.72)*	0.001 (1.77)*	0.002 (0.53)	0.001 (0.44)	0.001 (0.11)	0.001 (0.14)
CA_P	0.001 (0.04)	-0.002 (-0.10)	-0.002 (-0.17)	-0.001 (-0.04)	0.001 (0.09)	0.004 (0.18)	0.003 (0.13)	-0.012 (-0.50)
G-OWNER	0.118 (5.83)***	0.117 (5.69)***	0.114 (5.62)***	0.110 (5.40)***	0.028 (0.78)	0.015 (0.42)	0.005 (0.14)	0.007 (0.18)
I-OWNER	0.001 (0.15)	0.002 (0.16)	0.002 (0.14)	0.002 (0.13)	0.004 (0.35)	0.006 (0.46)	0.011 (0.94)	0.003 (0.28)
L-GDPPC	-0.002 (-1.41)	-0.001 (-1.40)	-0.002 (-1.34)	-0.002 (-1.41)	-0.006 (-1.43)	-0.006 (-1.59)	-0.005 (-1.47)	0.005 (1.43)
C-Corruption	0.016 (1.30)	0.016 (1.31)	0.009 (0.82)	0.011 (0.88)	0.023 (0.90)	0.014 (0.53)	-0.007 (-0.25)	0.010 (0.40)
Legal-prot	0.001 (0.87)	0.006 (0.53)	0.001 (0.82)	0.001 (0.67)	0.003 (1.96)**	0.001 (0.51)	0.002 (1.34)	0.002 (1.77)*
Crisis	-0.002 (-0.30)	-0.001 (-0.27)	-0.001 (-0.21)	-0.017 (-2.60)***	-0.006 (-1.30)	-0.006 (-1.29)	-0.004 (-0.87)	-0.053 (-6.28)***
P_T	-0.015 (-1.07)	-0.015 (-1.04)	-0.021 (-1.45)	-0.023 (-1.19)*	-0.047 (-1.11)	-0.054 (-1.61)	-0.099 (-2.84)***	-0.041 (-1.26)
Constant	0.543 (14.87)***	0.538 (14.55)***	0.545 (14.98)***	0.552 (15.17)***	0.224 (3.28)***	0.205 (2.97)***	0.250 (3.68)***	0.233 (3.47)***

The values presented in the table are the *Coef* and *z-statistics* in parentheses for all variables

Number of Obs = 1,484

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Prob > chi2 = 0.001

(1) R-squared = 0.17 (3) R-squared = 0.21

(2) R-squared = 0.19 (4) R-squared = 0.13

**REL#Low-legal-prot** = the interaction term between low legal protection countries and religion, **REL\*Low-C-Corruption** = the interaction term between low level of control of corruption countries and religion, **REL\*Crisis** = the interaction term between the crisis period (2007–2009) and religion

terms of *REL\*Low-legal-prot* and *"REL\*Low-C-Corruption* are positively and significantly related to VD\_Q at 1% levels in both models. This result indicates that the influence of religiosity on the quality of information revealed by banks is more prominent in countries with a low level of legal protection and a low level of control of corruption. This evidence confirms that unofficial institutions have a greater impact in regions where official institutions are less efficient (Abdelsalam et al. 2021; Qian et al. 2018). Therefore, we accept ( $H_2$ ).

We also generate an indicator "*REL\*Crisis*" to examine whether the impact of religiosity on VD\_Q differs over time, especially during the financial crisis. An indicator is used to test our hypothesis ( $H_3$ ). We also employed a *Crisis* variable which takes the value of one for the crisis period (2007–2009) and zero otherwise. Table 4 Columns (4 and 8) report that the interaction term *REL\*Crisis* is positively and significantly linked to VD\_Q at 1% levels in both models, suggesting that the influence of religiosity is stronger during the period of turmoil and recessions. This result is in line with the notion that religion provides emotional support and consistency in managerial decision-making during a crisis. Our result is consistent with previous studies (Abdelsalam et al. 2021; Jiang et al. 2018). It also indicates that bank managers tend to be more spiritual and socially supportive during crises. Therefore, we accept our hypothesis  $H_3$ .

## 5 Additional and sensitivity analysis

We conduct additional analysis to examine the robustness of our inferences for the positive relationship between religiosity and disclosure quality. We use the three dimensions of religiosity separately as alternative measures of religiosity (Aggregate-REL), namely RAS, RI and RP. Table 5 shows that all three dimensions have a positive and significant association with VD\_Q at 1% levels in both models. In addition, Big-4 and IA\_C are positive and statistically significant at 1% and 5%, respectively. These findings align with those reported in Table 4, suggesting that religiosity positively impacts VD\_Q regardless of the measurement approach.

To address the concern that the main measurement of VD\_Q may have a skewed distribution, we conduct a sensitivity test to investigate whether our main findings are robust when utilising a different measure of disclosure quality. Consequently, we use the three dimensions of VD\_Q separately as alternative measures of disclosure quality, namely, (1) ST\_RQ, which represents the level of revealed information by the banks, and (2) spread which exemplifies the coverage and dispersion of the disclosed information, and (3) Usefulness of information based on the qualitative characteristics of IFRS. Table 6 reports that religiosity is positively and significantly associated with both spread and Usefulness dimensions at 1%. Nevertheless, both models show that religiosity has less influence on disclosure levels than the other dimensions at 10% and 5%, respectively. These outcomes are in line with the main findings in Table 4.

## 6 Substitutional sampling and endogeneity model

In this section, we use the substitution sample constructed to achieve the confidence that our main findings do signify the influence of religiosity on VD\_Q. Consequently, we split the sample into several sub-sets and re-estimate all models. We identify the sub-sets<sup>11</sup>

<sup>11</sup> The median value is used as a cut-off point to create 7 subsets.

**Table 5** Additional analysis: the effect of each religion dimensions on VD\_Q

VD_Q	RAS		RI		RP	
	Fixed effects	GMM	Fixed effects	GMM	Fixed effects	GMM
RAS/RI/RP	0.054 (3.10)***	0.115 (4.32)***	0.071 (3.30)***	0.078 (2.61)***	0.028 (2.71)***	0.085 (3.39)***
Big4	0.016 (2.45)***	0.023 (2.69)***	0.016 (2.39)***	0.022 (2.64)***	0.016 (2.37)***	0.022 (2.59)***
IA_C	0.013 (2.01)**	0.008 (0.14)	0.016 (2.27)**	0.003 (0.04)	0.016 (2.27)**	0.003 (0.12)
AC_S	0.004 (0.98)	0.003 (0.45)	0.002 (0.69)	0.002 (0.21)	0.003 (0.71)	0.002 (0.23)
AC_M	0.001 (0.43)	0.002 (0.35)	0.001 (0.54)	0.001 (0.47)	0.001 (0.70)	0.002 (0.64)
AC_G	0.006 (0.019)	- 0.017 (0.59)	0.002 (0.13)	- 0.01 (0.36)	0.007 (0.12)	- 0.008 (0.21)
E_Gender	- 0.008 (- 0.98)	0.006 (0.48)	- 0.009 (- 1.00)	0.003 (0.24)	- 0.010 (- 1.12)	0.009 (0.71)
Bank_S	0.001 (1.34)	0.001 (2.96)***	0.001 (1.21)	0.001 (2.96)***	0.001 (1.42)	0.001 (3.20)***
Growth	0.039 (2.33)**	0.024 (1.13)	0.046 (2.73)***	0.038 (1.77)*	0.039 (2.62)***	0.033 (1.66)*
LEVER	- 0.017 (1.05)	0.017 (0.90)	- 0.017 (1.03)	- 0.017 (0.70)	- 0.014 (0.83)	- 0.007 (0.31)
PROFIT	0.003 (0.50)	0.011 (1.10)	0.001 (0.41)	0.009 (0.91)	- 0.001 (0.28)	0.011 (1.02)
LI_Q	0.001 (2.10)**	0.001 (0.56)	0.001 (2.40)***	0.001 (1.89)**	0.001 (2.66)***	0.001 (1.40)
CA_P	0.003 (0.10)	0.005 (0.19)	0.004 (0.02)	0.005 (0.04)	0.001 (0.25)	- 0.007 (0.33)
Country effect variables	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)
Constant	0.585 (18.67)***	0.256 (3.81)***	0.551 (14.28)***	0.201 (3.10)***	0.585 (18.22)***	0.235 (3.44)***
(Coef/St.Err)						
Overall r-squared	0.6312		0.6413		0.4498	
Prob > chi2	0.0001		0.0001		0.0001	

\*\*\*p < .01; \*\*p < .05; \*p < .1

based on banks with relatively poor incentives to provide more information voluntarily. Zang (2011) argues that banks with high leverage, low profitability, low growth, low liquidity, and small size are less likely to disclose more information voluntarily and more frequently involved in unethical practices to avoid losses. Also, we have taken into account the impact of the financial crisis on our analysis and controlled it by dividing the sample into "before and after the crisis". Table 7 (Panel A and B) illustrates that the outcomes are similar to those presented in Table 4 and confirms that religiosity is positively and significantly correlated to VD\_Q. In addition, the F-test of coefficient equality is adopted to

**Table 6** Sensitivity analysis: the effect of Religion on VD\_Q dimensions

VD_Q	ST_RQ		Spread		Usefulness	
	Fixed effects	GMM	Fixed effects	GMM	Fixed effects	GMM
Aggregate-REL	0.077 (1.76)*	0.167 (2.02)**	0.081 (4.04)***	0.219 (7.65)***	0.534 (3.25)***	0.717 (3.26)***
Big4	0.023 (2.15)**	0.026 (1.61)	0.026 (4.67)***	0.024 (2.52)***	0.142 (3.62)***	0.232 (4.83)***
IA_C	0.012 (0.98)	0.009 (0.45)	0.028 (4.87)***	0.049 (2.97)***	0.191 (4.02)***	0.011 (1.47)
AC_S	0.003 (0.57)	0.008 (1.06)	0.003 (0.15)	0.004 (0.24)	0.034 (0.94)	0.034 (0.96)
AC_M	0.004 (0.98)	0.018 (2.02)**	0.072 (3.68)***	0.008 (1.76)*	0.033 (2.11)**	0.048 (2.45)**
AC_G	-0.032 (1.23)	0.169 (3.17)***	0.03 (2.24)**	0.046 (1.89)*	0.075 (0.74)	0.13 (0.87)
E_Gender	0.028 (1.89)	0.008 (1.39)	-0.005 (-0.68)	0.011 (1.06)	-0.013 (-0.23)	0.100 (1.26)
Bank_S	0.002 (3.39)***	0.002 (2.92)***	0.001 (0.64)	0.001 (2.51)***	0.003 (1.05)	0.001 (0.20)
Growth	0.055 (1.84)*	0.063 (1.37)	0.061 (4.47)***	0.032 (1.81)*	0.013 (0.32)	0.234 (1.82)*
LEVER	-0.023 (1.02)	0.004 (0.10)	-0.041 (4.51)***	-0.068 (5.68)***	0.104 (1.21)	-0.242 (2.37)**
PROFIT	0.014 (1.01)	0.039 (1.88)*	0.019 (3.42)***	0.027 (2.41)***	0.097 (2.17)**	0.047 (1.07)
LI_Q	0.002 (3.02)***	0.002 (1.81)*	0.001 (2.57)***	0.001 (2.80)***	0.008 (3.44)***	0.006 (2.45)**
CA_P	0.061 (2.01)**	0.131 (2.65)***	0.038 (1.74)*	0.023 (1.17)	0.028 (0.25)	0.216 (1.20)
Country effect variables	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)
Constant	0.169 (2.91)***	0.294 (2.88)***	0.43 (16.38)***	0.510 (9.12)***	2.45 (10.89)***	1.358 (3.36)***
Overall r-squared	0.2501		0.2903		0.1980	
Prob > chi2	0.0001		0.0001		0.0001	

\*\*\*p < .01; \*\*p < .05; \*p < .1

ensure the reliability of the outcomes and compare the coefficients of the main variable of the three dimensions (AggregateREL) in the high versus low sub-samples. The F-test (un-tabulated) confirms the presented outcomes in Table 7. These findings are in line with the suggestion that religiosity has a significant impact on disclosure quality even within banks that struggle to maintain overall stability with relatively inferior capital, poor profitability and higher equity cost.

**Table 7** Robustness analysis

VD_Q	Small-Bank-Size		Low-Growth		Low-profitability		High-leverage	
	Fixed effects	GMM	Fixed effects	GMM	Fixed effects	GMM	Fixed effects	GMM
	(Panel A)							
Aggregate-REL	0.0777 (1.99)**	0.1073 (1.89)*	0.1501 (3.89)***	0.1290 (5.78)***	0.0797 (2.24)**	0.1362 (2.52)***	0.0855 (2.68)***	0.1121 (2.29)***
Big4	0.0164 (1.86)*	0.0241 (1.88)*	0.0036 (0.43)	0.0142 (1.26)	0.0236 (2.95)***	0.0385 (3.58)***	0.0137 (1.69)*	0.0277 (2.08)**
IA_C	0.022 (2.09)**	0.0051 (0.35)	0.0201 (1.95)**	0.0028 (0.21)	0.0046 (0.49)	0.0072 (0.49)	0.0165 (1.70)*	0.0165 (0.96)
AC_S	0.0039 (0.88)	0.0015 (0.23)	0.0033 (0.79)	0.0079 (1.31)	0.0003 (0.08)	0.0020 (0.35)	0.0036 (1.02)	0.0044 (0.69)
AC_M	0.0017 (0.42)	0.0024 (0.34)	0.0028 (0.73)	0.0049 (0.71)	0.0041 (1.14)	0.0006 (0.13)	0.0008 (0.27)	0.0021 (0.38)
AC_G	0.0204 (0.53)	0.0320 (0.49)	0.0071 (0.27)	0.0422 (1.08)	0.0347 (1.63)	0.0064 (0.18)	0.0209 (1.09)	0.0354 (0.93)
E_Gender	-0.021 (-0.42)	-0.008 (-0.12)	-0.001 (-0.09)	0.011 (0.59)	-0.012 (-0.99)	-0.019 (-1.13)	0.005 (0.45)	0.018 (0.71)
Bank_S	0.0009 (0.23)	0.0080 (1.22)	0.0008 (1.44)	0.0001 (0.11)	0.0006 (1.59)	0.0006 (1.15)	0.0005 (1.56)	0.0013 (1.79)*
Growth	0.0033 (0.10)	0.0720 (1.66)*	0.7195 (6.29)***	0.0014 (0.01)	0.0064 (0.29)	0.0283 (0.94)	0.0306 (1.65)*	0.0469 (1.54)
LEVER	-0.0196 (-0.92)	-0.0031 (-0.11)	-0.0438 (-2.12)**	-0.0210 (-0.73)	-0.0461 (-2.79)***	-0.0264 (-1.06)	-0.0518 (-3.24)***	-0.0351 (-1.24)
PROFIT	0.0131 (1.49)	0.0050 (0.39)	0.0064 (0.70)	0.0037 (0.31)	0.1010 (1.41)	0.1378 (1.10)	0.0078 (0.95)	0.0294 (1.81)*
LI_Q	0.0021 (2.62)***	0.0012 (1.20)	0.0032 (2.89)***	0.0020 (2.23)**	0.0007 (1.75)*	0.0001 (0.35)	0.0006 (1.89)**	0.0005 (0.98)

Table 7 (continued)

VD_Q	Small-Bank-Size		Low-Growth		Low-profitability		High-leverage					
	Fixed effects	GMM										
CA_P	0.0213 (1.05)	0.0427 (1.63)	0.0040 (0.12)	0.0001 (0.02)	0.0446 (1.58)	0.0678 (1.31)	0.0171 (0.85)	0.0116 (0.32)				
Country effect variables	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)				
Constant	0.5649 (16.81)***	0.2141 (3.95)***	0.5099 (14.67)***	0.3396 (5.16)***	0.6064 (18.64)***	0.2590 (4.17)***	0.5738 (19.42)***	0.2575 (4.56)***				
Overall r-squared	0.2311	0.1941	0.1941	0.2107	0.2107	0.1901	0.0001	0.0001				
Prob > chi2	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001				
	Low-Liquidity				Before-Crisis				After-Crisis			
VD_Q	Fixed effects		GMM		Fixed effects		GMM		Fixed effects		GMM	
(Panel B)												
Aggregate-REL	0.0944 (5.04)***	0.0840 (2.80)***	0.0167 (4.57)***	0.0930 (6.24)***	0.0174 (3.97)***	0.1085 (3.38)***						
Big4	0.0172 (1.98)**	0.0148 (1.81)*	0.0183 (1.95)**	0.3726 (1.93)**	0.0154 (2.24)**	0.0223 (2.46)**						
IA_C	0.0170 (1.67)*	0.0023 (0.19)	0.0061 (0.49)	0.0031 (0.67)	0.0157 (1.88)*	0.0096 (0.80)						
AC_S	0.0027 (0.68)	0.0179 (2.93)***	0.0064 (1.19)	0.0123 (1.98)**	0.0048 (1.52)	0.0006 (0.14)						
AC_M	0.0011 (0.33)	0.0147 (1.96)**	0.0012 (0.21)	0.0604 (4.67)***	0.0005 (0.21)	0.0003 (0.09)						
AC_G	0.0206 (0.86)	0.0854 (1.71)*	0.0166 (0.50)	0.0012 (1.21)	0.0049 (0.30)	0.0014 (0.05)						
E_Gender	-0.008	0.020	-0.021	(.004)	-0.012	0.009						

**Table 7** (continued)

VD_Q	Low-Liquidity		Before-Crisis		After-Crisis	
	Fixed effects	GMM	Fixed effects	GMM	Fixed effects	GMM
	(- 0.54)	(0.81)	(- 1.08)	(0.02)	(-1.26)	0.69
0.0008	0.0012	0.0010	0.0040	0.0004	0.0011	
(1.37)	(1.31)	(1.58)	(0.02)	(1.20)	(2.74)***	
0.0478	0.0241	.0071	0.0221	0.0428	0.0072	
(1.17)	(0.26)	(0.22)	(0.16)	(2.22)**	(0.31)	
0.0336	0.0385	- 0.0098	- 0.0115	- 0.0188	- 0.0425	
(1.34)	(1.02)	(- 0.41)	(- 1.30)	(- 1.30)	(- 2.39)***	
0.0155	0.0001	0.0123	0.0011	0.0020	0.0116	
(1.61)	(0.01)	(0.96)	(0.21)	(0.28)	(1.05)	
0.0250	0.0428	0.0007	0.3714	0.0004	0.0001	
(1.24)	(1.43)	(0.70)	(0.38)	(1.38)	(0.23)	
0.0623	0.0530	0.0180	0.0271	0.0065	0.0163	
(1.56)	(0.82)	(0.67)	(0.46)	(0.32)	(0.66)	
(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	
0.4966	0.5117	0.5170	0.3706	0.5345	0.2191	
(14.05)***	(4.98)***	(11.64)***	(5.40)***	(19.33)***	(4.61)***	
0.1101	0.1101	0.1618	0.1618	0.1401	0.1401	
0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	

\*\*\*p<.01, \*\*p<.05, \*p<.1

**Table 8** Endogeneity test:  
2SLS—IV regression

VD_Q	
Lag-Aggregate-REL	0.158 (3.47)***
Big4	0.014 (2.37)***
IA_C	0.016 (2.24)**
AC_S	0.002 (0.72)
AC_M	0.001 (0.57)
AC_G	0.002 (0.015)
E_Gender	− 0.004 (− 0.52)
Bank_S	0.001 (1.61)*
Growth	0.043 (2.47)***
LEVER	− 0.015 (− 1.13)
PROFIT	0.002 (0.37)
LI_Q	0.001 (2.52)***
CA_P	0.007 (0.04)
Country effect variables	(Yes)
Constant	0.474 (11.15)***
Overall r-squared	0.1904
Prob > chi2	0.001

\*\*\*p &lt; .01; \*\*p &lt; .05; \*p &lt; .1

Beyond the aforementioned analyses, 2SLS regression is conducted to control for endogeneity and reassess the main results. Previous studies (e.g., Andreou et al. 2017b, a; Rezaee and Tuo 2019; Salem et al. 2020) suggested that managerial decisions influence corporate disclosure, which may lead to endogeneity issues. In addition, executives' characteristics such as gender, over-confidence, tenure and background could have an impact on corporate disclosure, organisational policies, tax avoidance, earnings management and bad news hoarding (Andreou et al. 2017b, a; Bamber et al. 2010; Baik et al. 2018, 2011; Bertrand and Schoar 2003). Durbin-WuHausman is utilised because there may be an endogeneity concern between the study variables. Although the finding of Durbin-WuHausman is insignificant (0.6908), we have taken into account several variables and techniques to mitigate any potential endogeneity (Wintoki et al. 2012). Following Liu and Zhou (2020), firstly, executives-gender is used as a proxy to control

for managerial effects. Secondly, the lead-lag approach with the lagged values for all control variables is employed (Dhaliwal et al. 2011). Finally, we used regional variations of levels of social trust to construct the instrumental variable. Following McCleary and Barro (2003) we adopt religiosity to deal with any potential econometric problem in a cross-sectional framework. Consequently, the lag value of Aggregate-REL is treated as an endogenous variable and utilised in an instrumental variable estimation (lag-Aggregate-REL) (Chantziaras et al. 2020; Dhaliwal et al. 2011). We used F-statistic to ensure that our selected instrument is sufficiently strong. The F-statistic test illustrates that  $F(2, 10,129) = 11.63$  which implies that the 2SLS estimator is valid. The result reported in Table 8 supports the main results reported earlier in Table 4. This outcome confirms the robustness of the key findings and is not impacted by the potential existence of endogeneity problems.

## 7 Conclusion

Our paper explores the impact of religiosity on voluntary disclosure quality. It employs a sample of 1,484 bank-year observations from 12 countries in the Middle East and North Africa (MENA) region over 14 years period (from 2006 to 2019). The empirical findings confirm the importance of religion in enhancing the quality of disclosed information in financial institutions. Our result indicates that religiosity is positively and significantly correlated with VD\_Q after controlling for country and bank characteristics. In addition, we also report that the influence of religiosity on VD\_Q is more pronounced among banks operating in countries with poor legal protection and weak control of corruption. Furthermore, we document that religion positively impacted VD\_Q during the financial crisis period (2007–2009). We employed several sensitivity tests and additional analysis to test the robustness of our findings. The results of these tests indicate that religiosity enhances managerial decision-making, which improves the quality of disclosed information and reduces the risk of bank failure.

Our findings significantly contribute to the disclosure quality literature in the following ways. Firstly, our study bridges the gap in the prior study by Salem et al. (2021) and provides evidence that informal institution (religion) influences the disclosure quality (managerial decision) of banks in developing economies. Our result contributes to previous studies on how informal institutions influence organisational outcomes (North 1994). Secondly, this study has extended the ongoing debate on the role of religiosity in corporate disclosure practice. Particularly, we show that the interaction between the formal institution and religiosity positively impacts firms' disclosure quality. Our study also contributes to the debate on the importance of religiosity during the financial crisis. Our contribution is important to bank managers and policymakers since it helps them understand factors influencing the quality of disclosure in MENA regions.

These contributions have significant implications for policymakers to develop an effective regulatory framework that enhances disclosure quality in emerging economies. Our results have implications for investors since it helps investors to consider investments, especially in countries with strong religiosity but poor formal institutions. Also, we provide useful insights into the determinants of VD\_Q in banks operating in the MENA region. Our findings have implications for societies. For instance, the positive impact of the interaction term between religiosity and crisis on VD\_Q signifies that bank managers tend to be more spiritual and socially supportive during crises. This outcome is in line with the notion

that religion provides emotional support and consistency in managerial decision-making during crisis periods.

The following limitations are attributed to our research design and may create an opportunity for further research. First, our measurement of religiosity considered only three dimensions and is taken as a country-level aggregated value. Therefore, it is difficult to generalise our results to those banks operating in developed economies. Further research could consider measuring religiosity across decision-makers within banks and the influence of managerial characteristics. The dataset excludes Islamic banks as they are regulated differently than their competitors. Further studies could consider Islamic banks to enrich our understanding of the subject. Moreover, our study focuses mainly on VD\_Q in the banking sector. Further research can dig deeper into the impact of religiosity on "regulated" disclosure quality in different sectors. In addition, this study is limited to banks that are operating in Islamic countries within the MENA region, which may influence the generalisation of our findings. Therefore, further research is needed to consider more religiously diverse countries, including the U.S, Canada, the UK, France, and Singapore.

## Appendix I: Checklist of voluntary disclosure (VD) categories and items

### 1. Background about the bank / general corporate information (7)

Brief narrative history of the Bank  
 Basic organization structure / chart / description of corporate structure  
 General description of business activities  
 Date of establishment  
 Official address / registered address / address for correspondence  
 Web address of the bank / email address  
 Other background information

### 2. Corporate Strategy (4)

Management's objectives and strategies / corporate vision  
 Future strategy- general development of business  
 Impact of strategy on future results  
 Other corporate strategy information

### 3. Corporate Governance (18)

Details about the chairman (other than name / title)  
 Details about directors (other than name / title)  
 Duties of board members  
 Number of shares held by directors  
 List of top five shareholders of the bank  
 Number of shares held by managers  
 Details of CEO's contact address  
 Definition of independent directors  
 Nature of chairman of the board of directors  
 Directors' engagement / directorship of other companies  
 Picture of all directors/board of directors  
 Picture of chairperson only  
 Information about changes in board members  
 Number of board of members meetings held and date

List of audit committee

Chairman's statement

CEO's statement

Classification of managers as executive or outsider

#### **4. Accounting Policies (8)**

Accounting valuation of fixed assets (e.g., fair value or historical cost)

The depreciation methods used

Foreign currency transactions

Events after the balance sheet date

Disclosure of accounting standards uses for its accounts

Statements of compliance with approved IFRS/IASs

Treatment of contingent liabilities

Other accounting policies

#### **5. Financial Performance (ratios) and other statistics information (15)**

Brief discussion of the bank's financial position

Disclosure on non-performing loans (NPLs) / Impaired loans

Analysis of bank's liquidity position

Return on assets (ROA)

Return on equity (ROE)

Liquidity ratios

Earnings per share (EPS)

Capital adequacy ratios

Total dividends

Dividends per share for the period

Number of branches extension during the current fiscal year

Financial statistics / financial highlights for more than one year

Comparative Income statement for 2 years

Comparative balance sheet for 2 years

Key achievement during the current year

#### **6. General Risk Management (6)**

Discussion of overall risk management policy

Narrative discussions on risk assets, risk measurement

Discussion on how risk are managed and controlled

Information on risk management committee

Information on assets-liability management committee

Information on risk management structure

#### **7. Credit Risk Exposure (6)**

Disclosure on credit exposure

Information on credit risk management structure

Disclosures about the current loan

Details of problem on loans and other assets

Disclosure of credit rating system

Disclosure about risk management process (use of risk-mitigating tools such as collaterals, guarantees, netting agreement, managing concentrations)

#### **8. Currency and market Risk (4)**

Broken down by assets and liabilities

Maturity of foreign currency assets and liabilities

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General descriptions of market risk segments

Other information on market risk

### 9. Liquidity Risk Exposure (3)

Information about the bank's available liquid assets as well as sources and uses of funds

Maturity information about deposits and other liabilities

Other information on liquidity risk

### 10. Key Non-financial Statistics (7)

Details of branch location

Number of branches

Number of branch expansion during the year—2007

Information on branch computerizations

Information on ATM

Location of ATM and their address

Other non-financial information statistics

### 11. Corporate Social Disclosure (5)

Sponsoring public health, sporting of recreational and social projects and education

Information on donations to charitable

Supporting national pride / government sponsored campaigns

Information on social banking activities / banking for the society

Other corporate social disclosure

### 12. Employee information (5)

Total number of employees

Number of employees trained

Policy on employees training

Average compensation per employee

Information on welfare of employees

### 13. Others

General voluntary disclosure information (e.g. On-line banking, international banking facilities, Information on credit card)

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## Appendix II: the usefulness dimension index

	Depth of information disclosed	Operationalization
Relevance	To what extent does the company use fair value instead of historical cost?	1 = Only historical cost 2 = Mostly historical cost 3 = Balance fair value / historical cost 4 = Most fair value 5 = Only fair value
	To what extent does the presence of non-financial information in terms of business opportunities and risks complement the financial information?	1 = No non-financial information 2 = Limited non-financial information, not very useful for forming expectations 3 = Sufficient useful non-financial information 4 = Relatively much useful non-financial information, helpful for developing expectations 5 = Very extensive non-financial information presents additional information which helps developing expectations

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Depth of information disclosed	Operationalization
To what extent does the risk section provide good insights into the risk profile of the company?	1=No insights into risk profile 2=Limited insights into risk profile 3=Sufficient insights into risk profile 4=Relatively much insights into risk profile 5=Very extensive insights into risk profile
To what extent does the annual report contain forward- looking information?	1=No forward-looking information 2=Limited forward-looking information 3=Sufficient forward-looking information 4=Relatively much forward-looking information 5=Very extensive forward-looking information
To what extent does the annual report contain information on CSR?	1=No information on CSR 2=Limited information on CSR 3=Sufficient information on CSR 4=Very much information on CSR 5=Very extensive information on CSR
To what extent does the annual report contain disclosure of the extraordinary gains and losses?	1=No proper disclosure 2=Limited proper disclosure 3=Sufficient proper disclosure 4=Very much proper disclosure 5=Very extensive proper disclosure
To what extent does the annual report contain information regarding employee policies?	1=No information regarding personnel policies 2=Limited information regarding personnel policies 3=Sufficient information regarding personnel policies 4=Very much information regarding personnel policies 5=Very extensive information regarding personnel policies
To what extent does the annual report contain an analysis concerning cash flows?	1=No analysis 2=Limited analysis 3=Sufficient analysis 4=Very much analysis 5=Very extensive analysis
To what extent are the intangible assets disclosed?	1=No disclosure 2=Limited disclosure 3=Sufficient disclosure 4=Very much disclosure 5=Very extensive disclosure

	Depth of information disclosed	Operationalization
	To what extent are the “off-balance” activities disclosed?	1 = No disclosure 2 = Limited disclosure 3 = Sufficient disclosure 4 = Very much disclosure 5 = Very extensive disclosure
	To what extent is the financial structure disclosed?	1 = No disclosure 2 = Limited disclosure 3 = Sufficient disclosure 4 = Very much disclosure 5 = Very extensive disclosure
	To what extent does the annual report contain information concerning the bank’s going concern?	1 = No information concerning going concern 2 = Limited information concerning going concern 3 = Sufficient information concerning going concern 4 = Very much information concerning going concern 5 = Very extensive information concerning going concern
	To what extent do the reported results provide feedback to users of the annual report as to how various market events and significant transactions affected the company?	1 = No feedback 2 = Little feedback on the past 3 = Feedback is present 4 = Feedback helps understanding how events and transactions influenced the company 5 = Comprehensive feedback
Faithful representation	To what extent are valid arguments provided to support the decision for certain assumptions and estimates in annual report?	1 = No valid arguments 2 = Limited valid arguments 3 = Sufficient valid arguments 4 = Very much valid arguments 5 = Very extensive valid arguments
	To what extent does the company base its choice for certain accounting principles on valid arguments?	1 = No valid arguments 2 = Limited valid arguments 3 = Sufficient valid arguments 4 = Very much valid arguments 5 = Very extensive valid arguments
	Which type of auditor’s report is included in the annual report?	1 = Adverse opinion 2 = Disclaimer of opinion 3 = Qualified opinion 4 = Unqualified opinion: financial figures 5 = Unqualified opinion: financial figures + internal control
	To what extent does the company provide information on corporate governance?	1 = No description of corporate governance 2 = Limited description of corporate governance 3 = Sufficient description of corporate governance 4 = Very much description of corporate governance 5 = Very extensive description of corporate governance

	Depth of information disclosed	Operationalization
	To what extent does the annual report contain disclosure related to both positive and negative contingencies?	1 = No disclosure 2 = Limited disclosure 3 = Sufficient disclosure 4 = Very much disclosure 5 = Very extensive disclosure
	To what extent does the annual report contain information concerning bonuses of the board of directors?	1 = No information concerning bonuses 2 = Limited information concerning bonuses 3 = Sufficient information concerning bonuses 4 = Very much information concerning bonuses 5 = Very extensive information concerning bonuses
Understandability	To what extent is the annual report presented in a well organized manner?	1 = Very bad presentation 2 = Bad presentation 3 = Poor presentation 4 = Good presentation 5 = Very good presentation
	To what extent does the presence of graphs and tables clarify the presented information?	1 = No graphs and tables 2 = 1-5 graphs 3 = 6-10 graphs 4 = 11-15 graphs 5 = > 15 graphs
	To what extent is the use of language and technical jargon in the annual report easy to follow?	1 = Very much jargon 2 = Much jargon 3 = Moderate use of jargon 4 = Limited use of jargon 5 = No/hardly any jargon
	What is the size of the glossary?	1 = No glossary 2 = Less than 1 page 3 = Approximately 1 page 4 = 1-2 pages 5 = > 2 pages
	To what extent does the annual report contain information concerning mission and strategy?	1 = No information concerning mission and strategy 2 = Limited information concerning mission and strategy 3 = Sufficient information concerning mission and strategy 4 = Very much information concerning mission and strategy 5 = Very extensive information concerning mission and strategy
	To what extent is the annual report understandable in the perception of the researcher?	1 = Very badly understandable 2 = Badly understandable 3 = Poorly understandable 4 = Good understandable 5 = Very good understandable

	Depth of information disclosed	Operationalization
	To what extent are the notes to the balance sheet and the income statement sufficiently clear?	1 = No explanation 2 = Very short description, difficult to understand 3 = Explanation that describes what happens 4 = Terms are explained (which assumptions etc.) 5 = Everything that might be difficult to understand is explained
Comparability	To what extent are changes in accounting policies disclosed?	1 = No disclosure 2 = Limited disclosure 3 = Sufficient disclosure 4 = Very much disclosure 5 = Very extensive disclosure
	To what extent are changes in accounting estimates disclosed?	1 = No disclosure 2 = Limited disclosure 3 = Sufficient disclosure 4 = Very much disclosure 5 = Very extensive disclosure
	To what extent does the company provide a comparison of the results of current accounting period with previous accounting periods?	1 = No comparison 2 = Only with previous year 3 = With 5 years 4 = 5 years + description of implications 5 = 10 years + description of implications
	To what extent does the company present financial index numbers and ratios in the annual report?	1 = No ratios 2 = 1–5 ratios 3 = 6–10 ratios 4 = 11–15 ratios 5 = > 15 ratios
	To what extent does the annual report contain information concerning companies' shares?	1 = No information concerning companies' shares 2 = Limited information concerning companies' shares 3 = Sufficient information concerning companies' shares 4 = Very much information concerning companies' shares 5 = Very extensive information concerning companies' shares
	To what extent did the company adjust previous accounting period's figures, for the effect of the implementation of a change in accounting policy or revisions in accounting estimates?	1 = No adjustments 2 = Described adjustments 3 = Actual adjustments (one year) 4 = 2 years 5 = > 2 years + notes
Timeliness	How many days did it take for the auditor to sign the auditors' report after book year end?	Natural logarithm of amount of days 1 = 1–1.99 2 = 2–2.99 3 = 3–3.99 4 = 4–4.99 5 = 5–5.99

## Appendix III: Variables measurement and definition

Symbol	Definition
Religiosity	VD_Q stands for the quality of voluntary disclosure
	RAS is the percentage of respondents saying that they attend religious services "based on WVS"
	RI is the percentage of respondents that indicates religion is important to them "based on WVS"
	RP is the percentage of respondents says that they are religious person "based on WVS",
Audit-Quality	Big-4 is a dummy variable the takes the value of one if the largest four auditing firms audit the bank and zero otherwise
	IA_C is measured as the number of independent directors on the audit committee scaled by the total number of audit committee members,
	AC_S represents the size of the audit committee
	AC_M stands for the total number of audit committee meeting held in a financial year
Bank-Level-Control	AC_G a dummy variable takes the value of one if at least one of the audit committee members is a female member and zero otherwise,
	E_Gender the value 1 is given if the manager is male in year t, and 0 if female
	Bank_s is measured as a natural logarithm of total assets
	Growth is calculated as the change in total assets scaled by the lag of total assets
	LEVER is measured as total liabilities divided by total assets,
	PROFIT is calculated as net income scaled by the lag of total assets
	LI_Q is measured as current assets scaled by current liabilities
	CA_P represents capital adequacy ratio and is measured as the proportion of actual regulatory capital (Tier 1 capital) divided by the total assets
Ownership-Control	G-OWNER the ratio of stocks owned by government
	I-OWNER the ratio of stocks owned by institutional investors
Country-Level-Control	L-GDPPC The Log of GDP per capita
	C-Corruption represents the logarithm of the control of corruption value that illustrates the public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests
	<b>Legal-Prot</b> represent the strength of legal rights index which measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 12, with higher scores indicating that these laws are better designed to expand access to credit,
	<b>P_T</b> is a dummy variable that takes the value of one if a bank is based in Egypt, Yemen, Tunisia, or Iraq and zero otherwise

## Appendix IV: Banks' Specialisation by Countries

No	Country	Number of banks
1	Lebanon	6
2	Palestine	3
3	Egypt	15
4	Morocco	7
5	Syria	10
6	Iraq	22
7	Yemen	2
8	Tunisia	12
9	Bahrain	17
10	Israel	7
11	Jordan	17
12	Iran	9
Initial sample	<b>127</b>	Observations
Excluded Banks	21	
<b>Final sample</b>	<b>106</b>	<b>1,484</b>

Source DataStream and Osiris databases

## Declarations

**Conflict of interest** We are hereby to confirm that the authors declare that they have no conflict of interest.

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