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Religiosity at the Top and Annual Report Readability

Toufiq Nazrul *, Adam Esplin, Kevin E. Dow and David M. Folsom

Accounting and Information Systems Department, The University of Texas at El Paso, El Paso, TX 79968, USA
* Correspondence: tnazrul@miners.utep.edu

Abstract: This paper examines how individual religiosity at the top level of organizations affects the quality of their disclosure practices, as measured by the readability of annual reports. Our paper extends the recent accounting and finance literature that moves away from a location-based measure to an individual-based measure for capturing the effect of religiosity. Our findings suggest that the individual religiosity of C-suite executives matters in corporate decision-making and has positive implications for the quality of corporate disclosure practices, as reflected by more readable reports. This main finding is primarily driven by the religiosity of CEOs. Additional findings also suggest that the effect of religiosity is not solely driven by the religious denomination of the majority group within a given location-based setting. Previous research using religiosity proxies based on the majority religion in the locale of firms' headquarters may have measurement issues that disguise the effect of religiosity. This issue is particularly problematic when CEOs or other executives participate in minority religious denominations. Overall, our paper finds that CEO religiosity is an important attribute that affects the overall quality of business practice.

Keywords: readability; CEO religiosity; disclosure; machine learning; predictive analytic regression model

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1. Introduction & Literature Review

How important is top-management religiosity, and how does it impact business decision-making and information-sharing transparency? The topic of religion has been studied in varying capacities within multiple sub-disciplines of the broader social science literature since the late 1700s (Smith 1776). One potential explanation for this multi-stream focus lies in the connection between religion and human rationale (Smith 1776; Jung 1960). This connection has significant economic, psychological, and social implications for modern-day norms, behavior, and business practices (Anderson 1988; Wulff 1991; Sunstein 1996; Beit-Hallahmi and Argyle 1997; Iannaccone 1998; Kennedy and Lawton 1998; Guiso et al. 2003; Stulz and Williamson 2003). These far-reaching implications of religion on society and business may potentially explain the multiple sub-disciplinary foci of religion within the social sciences.

Recent studies examining religion's influence on business practices are generally clustered within the accounting or finance domain. These studies typically use location-based proxies for religiosity based on firm headquarters locations to examine how religion affects the quality of accounting, financial reporting practices, financial decision-making, or other observable indicators of quality of business practices. The consensus within the literature appears to be that religion has positive firm-level implications. In other words, firms that have headquarters in highly religious locations have less litigation, lower restatement rates, higher quality of management forecasts, higher quality of accruals, and less opportunistic earnings management (Grullon et al. 2009; Dyreng et al. 2012; McGuire et al. 2012; Du et al. 2015; Chourou et al. 2020). Measures of firm headquarter location-based religiosity also have been associated with positive audit-related implications for firms, as evidenced by the lower number of going-concern reports issued by auditors and lower audit fees charged by auditors to clients who are based in highly religious areas

(Leventis et al. 2018; Omer et al. 2018). Corporations based in religious areas generally find it easier to raise debt financing (Chen et al. 2016a; He and Hu 2016; Jiang et al. 2018; Cai and Shi 2019). Corporations headquartered in religious areas also tend to make less risky decisions as evidenced by their greater focus on long-term growth, litigation risk minimization, shareholder wealth creation, and less risky innovation (Hilary and Hui 2009; Al Rahahleh et al. 2019; Ma et al. 2020).

However, this location-based approach to measuring religiosity has limitations, which has created another avenue for research in recent years. Location-based studies assume that the religious beliefs and viewpoints of the majority of the inhabitants in a county are reflected in corporate decisions. However, these extant studies fail to demonstrate how the locational effect of religion translates to the firm level (Baxamusa and Jalal 2016; Cai et al. 2019; Chen et al. 2022). In other words, these research papers fail to consider the religious affiliations of the firm's decision-makers themselves (Baxamusa and Jalal 2016; Cai et al. 2019; Chen et al. 2022). Thus, the potential for misclassification of the religiosity of firm decision makers exists if a firm is classified as being religious solely based on its geographic location when its CEO or other C-suite members are not religious. Location-based studies also ignore that a C-suite executive's religion may differ from the affiliation of the majority of inhabitants of a given county (Baxamusa and Jalal 2016). For example, a positive firm-level implication may be attributed to Christianity, the dominant religion in most counties within the U.S.A. (America's Changing Religious Landscape 2015). However, in reality, it could be the decision-making quality of a religious CEO belonging to a non-Christian religious denomination that, in essence, drives previous findings. Thus, capturing religiosity at the executive or decision-maker level helps to solve these misclassification issues associated with the location-based religiosity measure, as suggested by Baxamusa and Jalal (2016), Cai et al. (2019) and Chen et al. (2022). Capturing religiosity at the individual level also shows that the effect of religiosity is not solely driven by the adherents of the religious group that constitutes the majority within a given locale. Overall, this measurement issue involving religiosity constitutes one of the three core motivations for this study.

The second motivation stems from the connection between the broader disclosure literature and religion. Although recent studies have examined how religion affects disclosure practices, there are gaps in the literature. These studies generally examine how religion affects disclosure practices using disclosure length of annual report sections (Aribi and Gao 2012; Elamer et al. 2020), earnings management and timely loss recognition, or optimism of management earnings forecasts (Chourou et al. 2020; Oh and Shin 2020). One concurrent working paper examines the relationship between religion and disclosure readability (Cano-Rodríguez and Moreno 2020), but it measures religiosity using a less-accurate, location-based proxy. Hence, to the best of our knowledge, our research is the first to employ an individual-based measure of top management religiosity to study how the religiosity of firm decision-makers affects the readability of firm disclosures.

Within the realms of the individual religiosity literature in accounting and finance, our paper is one of the first studies to utilize publicly available data from BoardEx to identify the religiosity and the religious denominations of executives through their membership in religious organizations. This approach of identifying both the religiosity and the religious denominations of executives is likely to be more comprehensive and direct compared to Cai et al. (2019) and Chen et al. (2022). These two studies identify executive faith and religiosity through the religious affiliations of an executive's undergraduate or graduate degree issuing university. Such an approach could cause a mismatch where the religious denomination and/or religiosity of an executive does not match the religious denomination and/or religiosity of their undergraduate or graduate university. A religious executive who publicly discloses his/her religiosity, may not have attended a religious university, and therefore may not be accurately classified as per Cai et al. (2019) and Chen et al. (2022)'s approach. Additionally, our study expands the range of publicly available datasets on individual religiosity that can be utilized by future researchers. It provides a credible alternative

to the "Marquis Who's Who" magazine data that Baxamusa and Jalal (2016) utilize for gathering their data on individual religiosity. Overall, introducing and utilizing the benefits of a unique subsection of BoardEx data that contains publicly available information on the individual religiosity of C-suite executives, form another core motivation for this study.

Our study's findings suggest that the individual religiosity of the firm's top-level managers has important and positive implications for a firm's disclosure quality, as measured by the readability of those firms' annual reports. In subsample analyses, CEOs appear to be the drivers of this positive relationship between religiosity and readability compared to the other non-CEO executives. This finding is consistent with CEOs being at the center of firm-communication channels such as disclosure and annual report preparation-related decisions (Sherin 2010; Lee et al. 2012; Ke et al. 2019). Our main findings hold through multiple robustness tests using alternate samples matched on propensity scores and entropy-balancing firm and annual report characteristic-related controls. Additional subsample analysis also offers mixed evidence that executives with disclosed/identifiable religiosity from both Christian and non-Christian denominations significantly influence the readability levels of annual reports and the overall disclosure practices of firms. This finding is another novel contribution of our study as prior literature argues that the religion of the majority within a county in which a firm is located drives any positive associations between the overall religiosity of a county and the quality of accounting, financial reporting, or other business practices (Grullon et al. 2009; Dyreng et al. 2012; McGuire et al. 2012; Du et al. 2015; Leventis et al. 2018; Omer et al. 2018). Overall, our results help extend the scope of both the broader religiosity literature and the broader disclosure literature involving readability.

2. Hypothesis

The existing psychology and theological literature argue that two distinct viewpoints explain how humans use their religious identities when making decisions—the intrinsic dimension point of view and the extrinsic dimension perspective (Salsman et al. 2005; Vitell et al. 2009). Arguments from both these viewpoints affect how humans communicate information to one another. Firm financial disclosure is a common way corporate executives communicate with firm stakeholders. Thus, these different viewpoints provide a framework to predict how the religiosity of these executives affects corporate communication through disclosure.

The intrinsic dimension viewpoint of religiosity argues that humans rely on time-invariant forms of ascetic morality and do not increase or reduce their religiousness based on extrinsic needs (Middleton and Putney 1962; Salsman et al. 2005; Hardy 2006; Vitell et al. 2009). Furthermore, this perspective argues that religious individuals are highly morally conscious of the value implications of their actions to the overall society (Geyer and Baumeister 2005; Salsman et al. 2005; Vitell et al. 2009). Hence, based on the intrinsic dimension viewpoint, religious individuals try to avoid as much uncertainty and be as transparent as possible in their actions, as such choices maximize the overall value-related implications of their actions for the entire community to which they belong (Roccas 2005). This high moral consciousness and desire to be transparent for the common good is primarily driven by the sacredness with which religious individuals value the core of their belief systems (Johnson 1959). Philosophically, this would be similar to honorable merchants in ancient societies, who were viewed as highly rational individuals who were dedicated and committed to their responsibilities and duty of care in long-term business relationships (Milkau 2017; Bott and Milkau 2018). Thus, proponents of this intrinsic dimension-oriented viewpoint of theology and psychology argue that religious individuals generally do not try to mislead their community.

The intrinsic dimension perspective suggests that more religious individuals in executive positions will create financial disclosures that are not purposefully misleading to financial statement users. Annual reports contain mandatory and voluntary disclosures that help explain a firm's performance and business practices beyond what is provided in

summary financial statements (Loughran and McDonald 2011, 2014, 2016). Purposefully distorting this disclosed information has negative value implications for a firm's stakeholders (Gibbins et al. 1990). The opportunistic manipulation of information in annual reports would be similar to a purposeful distortion of the character and sanctity of religious fundamentals and core belief systems under the intrinsic dimension viewpoint (Johnson 1959; Pargament et al. 2005). Hence, given the arguments set forth by the proponents of the intrinsic dimension viewpoint, the religiosity of a firm's C-suite executives is likely to be associated with increased annual report readability.[1]

Conversely, the extrinsic dimension viewpoint of psychology and theology suggests that increased religiosity may be used to reduce transparency in financial reporting. This perspective advocates that humans increase or reduce their religiousness based on extrinsic needs (Salsman et al. 2005; Vitell et al. 2009). In other words, individuals use their religious identity opportunistically depending on the situation or context they are in. Differences in religious interpretations that exist between sects or religious scholars within a particular religious subgroup (Adhikari and Agrawal 2016; Baxamusa and Jalal 2016; Bhatti 2019), may amplify this religious identity-related opportunism and encourage individuals to undertake more risks (Salsman et al. 2005; Vitell et al. 2009). Rawwas et al. (2006) and Li (2008) provide evidence of religious identity-induced opportunism within the business literature by documenting that religious identity may be strategically marketed to fit one's personal or business-related objectives and needs. Hence, managers may use their religiosity as a form of window-dressing or cheap talk (Lyons and Mehta 1997; Chen et al. 2016b; Lizińska and Czapiewski 2019) to hide subpar business performance. These actions are similar to how superstar CEOs with media limelight use their media coverage as an attention-diverting tool (Malmendier and Tate 2009). In other words, executives may masquerade their religiosity to cover for their deliberate and opportunistic opacity in firm disclosures (Rawwas et al. 2006; Li 2008).

Overall, the combined implications from both the intrinsic and extrinsic dimension perspectives suggest that religiosity at the top level of an organization could influence the degree of transparency of firm-level communications, such as in annual reports. Although the direction of this influence could be positive or negative, it can have important implications for observable measures of transparency such as readability. These arguments lead to our hypothesis.

H1. *Religiosity at the top influences a firm's annual report readability.*

3. Materials and Method

3.1. Sample Selection

Along with job experience history and educational history, BoardEx reports any social organizations of which a company director or C-suite executive may currently be or formerly have been a part. Examples of these social organizations include city councils, professional guilds/societies, university trust boards, hospital advisory boards, sports clubs like golf or soccer clubs, religious organizations like churches, mosques or temples, religious charities, etc. For this study, we focus on religious organizations in which a C-suite executive may currently be or formerly have been a part of. One challenge with identifying religious organizations is that not all organizations with religious names or religious-sounding names are religious in nature. For example, affiliations with Mount Sinai Hospital in Manhattan, New York or Southern Methodist University in Dallas, Texas, are unlikely to be religious. Thus, to overcome these unique data mining challenges associated with identifying precise religious organization names from BoardEx, we use the GuideStar directory of charities and nonprofit organizations offered by Candid.[2] GuideStar includes a comprehensive list of religious organizations in the U.S. for adherents of five of the largest global faith groups: Buddhism, Christianity, Hinduism, Islam, and Judaism. First, we use GuideStar to hand-collect keyword terms from religious organization names. Next, we match those keyword terms from GuideStar with the names of social organizations in BoardEx using text-based machine learning algorithms to identify the closest matches

to existing religious organizations listed on GuideStar. We then run multiple filtering commands on the raw dataset to take out various religious-neutral organizations like hospitals or universities and any potential religious-neutral locations with a religious name (e.g., "Saint Joseph Street."). This additional data cleaning step helps us better identify, match, and keep BoardEx-listed organizations that are religious.

We merge our hand-collected data with various publicly available data sources. First, we merge the cleaned religious organization data with organization, committee-level data available on BoardEx by the DirectorID identifier. We filter the data to keep only C-suite executives such as the CEO, CFO, CIO, COO, and CTO. Data relating to the Bog Index (Bonsall et al. 2017), our primary measure of annual report readability, is obtained from Professor Brian P. Miller's website.[3] Data relating to other relevant 10-K controls, such as gross file size or the number of 10-K exhibits, are obtained from Loughran and McDonald's summarized 10-K datasheet.[4] Financial data are obtained from Compustat. Finally, the Bog Index data, Loughran and McDonald data, and financial data are merged with the BoardEx and religious organization data. Our final dataset spans the years 1999 through 2020. This sample period is used primarily because of BoardEx data limitations pre-2000, which have also been highlighted by other studies such as Ke et al. (2019).

Panels A and B of Table 1 report summary and descriptive statistics relating to our sample, whereas Panel C reports Pearson correlations. Panel A reports that the mean Bog Score is 85.175. This average Bog Score is similar to the average Bog Score of 81.63 reported by Bonsall et al. (2017), even though their study's sample period spanned between 1994 to 2011. In addition, Panel A shows that 6.60 percent of the sample firm-year observations have some form of disclosed religiosity at the executive level. Panel B reports that 2717 firms and 6497 C-suite executives are covered. CEOs make up 5677 of the executives in our sample. Panel B reports that 513 religious C-suite executives, of which 457 are CEOs, have identifiable/disclosed religious affiliations. The number of religious CEOs is the same as is reported in Baxamusa and Jalal (2016). The Pearson correlations from Panel C show that readability has a significant positive correlation with executive-level religiosity, which offers some preliminary support to the subsequent findings in the study. Location-based religiosity has a significant positive correlation with disclosed executive-level religiosity, but the correlation coefficient is only 2.70 percent. This modest correlation coefficient indicates little overlap between executive-level measures of religiosity and community-based measures of religiosity. Further, this low correlation suggests that CEOs may act based on the core themes of their religious beliefs independent of their workplace community's religiosity. Therefore, this finding underscores the importance of using individual-based religiosity measures that have been advocated by recent religiosity studies in accounting and finance (Baxamusa and Jalal 2016; Cai et al. 2019; Chen et al. 2022).

Table 1. Summary statistics, sample selection and Pearson correlations.

Panel A: Summary Statistics					
	Mean	**SD**	**p25**	**Median**	**p75**
Bog Score	85.175	7.567	80	85	90
Disclosed Religiosity	0.066	0.249	0.000	0.000	0.000
Gross File Size	14.912	1.444	13.874	14.638	16.293
No. of Exhibits in 10-K	10.518	5.040	7	10	13
Tangibility	0.269	0.238	0.085	0.188	0.394
Profitability	−0.060	5.634	0.060	0.115	0.167
Loss Indicator	0.299	0.458	0	0	1
Size	6.741	2.238	5.284	6.882	8.197
MTB	3.064	65.057	0.840	1.225	1.980
Firm Age	26.490	17.659	12	22	40
Earnings Volatility	0.265	4.651	0.018	0.037	0.093
Cash Flow Volatility	0.134	1.956	0.024	0.041	0.077
Book Leverage	0.375	7.043	0.058	0.217	0.366
Debt Issue	0.320	0.467	0	0	1
Capital Expenditure	0.050	0.061	0.016	0.032	0.060
SGA Expense	0.419	5.839	0.103	0.205	0.368
Location Religiosity	0.594	0.159	0.470	0.587	0.685
Panel B: Sample Selection					
Details					**Count**
C-Suite Executives with Disclosed Religiosity					513
Total No. of C-Suite Executives					6497
CEOs with Disclosed Religiosity					457
Total No. of CEOs					5677
Total No. of Firms					2717

Table 1. *Cont.*

Panel C: Pearson Correlations																
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**
Readability (1)																
Disclosed Religiosity (2)	**0.069**															
Gross File Size	**−0.315**	−0.011														
No. of Exhibits in 10-K (3)	**−0.215**	0.004	**0.652**													
Tangibility (4)	**0.226**	**0.015**	**0.038**	**0.069**												
Profitability (5)	**−0.006**	0.009	0.013	**0.015**	**0.028**											
Loss Indicator (6)	**−0.164**	**−0.061**	−0.003	**−0.021**	**−0.047**	**−0.052**										
Size (7)	**−0.064**	**0.051**	**0.308**	**0.332**	**0.181**	**0.136**	**−0.340**									
MTB (8)	**0.023**	−0.006	−0.012	−0.006	**−0.025**	**−0.693**	**0.030**	**−0.112**								
Firm Age (9)	**0.081**	**0.058**	**0.229**	**0.211**	**0.083**	**0.014**	**−0.217**	**0.397**	−0.009							
Earnings Volatility (10)	0.003	−0.012	−0.009	**−0.015**	**−0.037**	**−0.755**	**0.062**	**−0.143**	**0.515**	**−0.027**						
Cash Flow Volatility (11)	−0.010	−0.011	−0.012	**−0.020**	**−0.040**	**−0.633**	**0.063**	**−0.128**	**0.422**	**−0.034**	**0.930**					
Book Leverage (12)	0.009	−0.003	0.011	0.008	−0.010	**−0.576**	**0.022**	**−0.078**	**0.232**	−0.003	**0.572**	**0.621**				
Debt Issue (13)	0.008	0.013	**0.061**	**0.071**	**0.113**	**0.016**	**−0.027**	**0.169**	**−0.015**	**0.061**	**−0.018**	**−0.018**	−0.001			
Capital Expenditure (14)	**0.164**	−0.009	**−0.026**	−0.007	**0.597**	**0.017**	**−0.049**	**0.039**	−0.014	**−0.049**	**−0.017**	**−0.018**	−0.010	**0.137**		
SGA Expense (15)	**0.018**	−0.007	**−0.021**	**−0.022**	**−0.036**	**−0.998**	**0.040**	**−0.146**	**0.692**	**−0.015**	**0.757**	**0.637**	**0.576**	**−0.020**	**−0.020**	
Location Religiosity (16)	**0.111**	**0.027**	**−0.351**	**−0.195**	**−0.047**	**0.014**	**−0.049**	**0.021**	−0.007	**0.047**	**−0.017**	**−0.017**	−0.005	−0.003	**−0.018**	−0.011

All variables are defined in Appendix A. Correlation coefficients in bold are significant at the 1% level.

3.2. Methodology

We modify the Bog Index Scores to make the interpretation of our regression results easier. Traditional Bog Index Scores are created to be positive numbers, with higher Bog Score values indicating poor quality readability and vice versa. Thus, to make the interpretation of our regressions coefficient easier, we follow Cassell et al. (2019) and multiply the Bog Index Scores by negative one to create a new variable labeled *Readability Level*. Then, we estimate our baseline predictive analytic regression model using the following specification:

$$\textit{Readability Level} = ß_1\ \textit{Disclosed C-suite Religiosity} + ß_2\ \textit{Document Characteristic Controls} + ß_3\ \textit{Firm-Level Controls} + ß_4\ \textit{Location Religiosity} + \varepsilon.$$

Disclosed C-suite Religiosity, in our baseline predictive analytic regression model, is an indicator variable equal to one if a firm is led by one or more religious C-suite executives in a given year, whose religious identities are publicly identifiable from the religious organization affiliation data in BoardEx. In our baseline predictive analytic regression model, the vector *Document Characteristic Controls* include *Gross File Size*, which is the natural log of the file size of the 10-K and *No. of Exhibits in 10-K*, representing the total number of exhibits within the 10-Ks. Both control variables are obtained from Loughran and McDonald's summarized 10-K datasheet. Firm-level controls in our baseline predictive analytic regression model are determined based on the extant literature and include controls for asset tangibility, profitability, a loss indicator, firm size, market-to-book ratio, firm age, firm-risk measures including earnings and cash flow volatility, book leverage, a new debt issuance dummy, capital expenditures, and sales, general and administrative (SGA) expenses. All firm-level variables are scaled by total assets. Based on the extant-location literature on religiosity, we also add a control for county-level religiosity (i.e., *Location Religiosity*) to our regression models. We use county-level data collected by the American Religious Data Archive (ARDA) in their 2000 and 2010 surveys to construct this *Location Religiosity* measure and follow the approach employed by Hilary and Hui (2009). The *Location Religiosity* measure captures the proportion of religious people in a given county, regardless of their religion or sub-religious sect.

The first column of Tables 2–6 contains our baseline predictive analytic regression model. We modify our baseline predictive analytic regression model by adding industry and year fixed effects to the second column in Tables 2–6. Next, we run propensity-score matching and entropy-balanced models as robustness checks in Tables 7 and 8. As a final robustness check, we conduct a CEO turnover test to address endogeneity issues surrounding CEO religiosity in Table 9.

4. Results

4.1. Overall Findings

Table 2 examines the effect of executive-level religiosity on readability for all C-suite executives. The coefficient on *Disclosed Religiosity* from the baseline predictive analytic regression (coefficient = 1.639; *t*-statistic = 6.434) indicates that religiosity at the top of an organization has a strong positive impact on the readability of a firm's annual report. When industry and year-fixed effects are added to the baseline predictive analytic regression model in the second column, the finding from column one continues to hold, as evident from the strongly positive and statistically significant coefficient on *Disclosed Religiosity* (coefficient = 0.763; *t*-statistic = 3.126). This finding supports the intrinsic dimension viewpoint, which argues that religious individuals generally do not try to pursue self-serving needs and usually take actions that maximize the welfare of the entire community. Under this perspective, religiosity will be reflected in higher degrees of transparency because religious individuals transparently share information. The statistically significant positive relationship between readability and C-suite religiosity in both specifications provide strong support for the intrinsic dimension viewpoint of religiosity. The results also validate that the individual religiosity of C-suite executives matters for annual report

readability. It is not solely the religiosity of a firm's headquarters location which drives the impact of religion. Our findings offer incremental evidence that individual-level religiosity affects corporate decision-making beyond the community-level of religiosity of the locale of firm headquarters.

Table 2. Impact of Executive Level Religiosity on Annual Report Readability.

Variables	*Readability Level*	*Readability Level*
Disclosed Religiosity	1.639 ***	0.763 ***
	(6.434)	(3.126)
Gross File Size	−1.505 ***	−0.857 ***
	(−24.254)	(−8.458)
No. of Exhibits in 10-K	−0.065 ***	−0.080 ***
	(−4.004)	(−5.344)
Tangibility	7.461 ***	4.762 ***
	(21.282)	(11.170)
Profitability	3.012 ***	2.017 ***
	(5.561)	(4.165)
Loss Indicator	−1.738 ***	−1.404 ***
	(−10.855)	(−9.587)
Size	−0.323 ***	−0.532 ***
	(−8.216)	(−12.435)
MTB	0.005 ***	0.005 ***
	(8.142)	(8.882)
Firm Age	0.064 ***	0.067 ***
	(16.315)	(17.147)
Earnings Volatility	0.145 ***	0.125 ***
	(4.602)	(3.370)
Cash Flow Volatility	−0.332 ***	−0.212 **
	(−3.957)	(−2.267)
Book Leverage	−0.025 *	−0.048 ***
	(−1.724)	(−3.072)
Debt Issue	0.101	−0.004
	(0.746)	(−0.036)
Capital Expenditure	1.282	−0.519
	(0.885)	(−0.345)
SGA Expense	2.953 ***	1.948 ***
	(5.459)	(4.023)
Location Religiosity	−0.051	−0.120
	(−0.128)	(−0.300)
Constant	−64.286 ***	−71.237 ***
	(−64.155)	(−49.154)
Industry FE	N	Y
Year FE	N	Y
Observations	11,391	11,391
Adj. R-squared	0.220	0.361

T-statistics are reported in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in Appendix A.

In Tables 3 and 4, we conduct two subsample analyses to examine which executive within the management team drives the main results in Table 2. Recent research from Sherin (2010), Lee et al. (2012), and Ke et al. (2019) suggests that CEOs have the largest influence on corporate decision-making relative to other C-suite executives. CEO religiosity, therefore, should matter more than the religiosity of other executives to influence the readability of annual reports. As such, the evidence provided in Tables 3 and 4 suggests that this is the case. Table 3, which only includes CEOs, reports a highly significant and positive relationship between individual religiosity and readability (coefficient = 1.596, 0.734; *t*-statistic = 5.985, 2.873). Whereas Table 4, which only includes non-CEO executives, returns mixed and insignificant coefficients (coefficient = 0.160, −0.130; *t*-statistic = 0.206,

−0.177). These findings provide validation to the aforementioned evidence documented in Sherin (2010), Lee et al. (2012) and Ke et al. (2019) and indicate that CEO characteristics drive our results.

Table 3. Impact of CEO Religiosity on Annual Report Readability.

Variables	*Readability Level*	*Readability Level*
Disclosed Religiosity	1.596 ***	0.734 ***
	(5.985)	(2.873)
Gross File Size	−1.527 ***	−0.861 ***
	(−24.265)	(−8.435)
No. of Exhibits in 10-K	−0.060 ***	−0.076 ***
	(−3.641)	(−5.022)
Tangibility	7.446 ***	4.684 ***
	(20.861)	(10.916)
Profitability	3.010 ***	1.976 ***
	(5.464)	(4.053)
Loss Indicator	−1.770 ***	−1.447 ***
	(−10.889)	(−9.753)
Size	−0.320 ***	−0.532 ***
	(−8.021)	(−12.313)
MTB	0.005 ***	0.005 ***
	(7.778)	(8.602)
Firm Age	0.064 ***	0.067 ***
	(16.183)	(17.021)
Earnings Volatility	0.144 ***	0.122 ***
	(4.567)	(3.241)
Cash Flow Volatility	−0.331 ***	−0.207 **
	(−3.946)	(−2.239)
Book Leverage	−0.023	−0.050 ***
	(−1.631)	(−3.122)
Debt Issue	0.076	−0.027
	(0.554)	(−0.217)
Capital Expenditure	1.249	−0.484
	(0.840)	(−0.315)
SGA Expense	2.951 ***	1.907 ***
	(5.364)	(3.914)
Location Religiosity	−0.135	−0.126
	(−0.334)	(−0.311)
Constant	−63.948 ***	−71.160 ***
	(−62.834)	(−48.696)
Industry FE	N	Y
Year FE	N	Y
Observations	11,149	11,149
Adj. R-squared	0.220	0.363

T-statistics are reported in parenthesis. *, ** and *** indicates statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in Appendix A.

Table 4. Impact of Non-CEO Executive Religiosity on Annual Report Readability.

Variables	*Readability Level*	*Readability Level*
Disclosed Religiosity	0.160	−0.130
	(0.206)	(−0.177)
Gross File Size	−1.259 ***	−0.682 **
	(−6.739)	(−2.273)
No. of Exhibits in 10-K	−0.139 ***	−0.132 **
	(−2.675)	(−2.580)
Tangibility	8.383 ***	6.360 ***
	(9.213)	(4.609)

Table 4. *Cont.*

Variables	*Readability Level*	*Readability Level*
Profitability	1.181	0.590
	(1.011)	(0.819)
Loss Indicator	−2.796 ***	−1.567 ***
	(−6.100)	(−3.699)
Size	−0.367 ***	−0.690 ***
	(−2.988)	(−5.034)
MTB	0.011	−0.006
	(0.621)	(−0.425)
Firm Age	0.031 **	0.056 ***
	(2.480)	(4.483)
Earnings Volatility	−0.038	0.124
	(−0.449)	(1.500)
Cash Flow Volatility	−1.748 *	−0.095
	(−1.853)	(−0.104)
Book Leverage	−0.313 ***	−0.167 *
	(−2.805)	(−1.727)
Debt Issue	0.003	−0.067
	(0.008)	(−0.182)
Capital Expenditure	−5.392	0.649
	(−1.314)	(0.209)
SGA Expense	1.658	0.803
	(1.453)	(1.125)
Location Religiosity	−0.298	−1.562
	(−0.229)	(−1.084)
Constant	−63.600 ***	−69.806 ***
	(−21.707)	(−16.968)
Industry FE	N	Y
Year FE	N	Y
Observations	1287	1284
Adj. R-squared	0.198	0.419

T-statistics are reported in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in Appendix A.

The overall findings reported in Tables 2–4, fail to find any evidence of C-suite executives using religion in an opportunistic, self-serving manner, as argued by the proponents of the extrinsic dimension viewpoint.

4.2. Subsample Analysis—Christians vs. Non-Christian Religious Groups

Prior studies examine the overall religiosity levels within a given county without regard to whether the effect is driven by the adherents of the majority religion or whether the effect is driven by all religious groups. The analyses reported in Tables 5 and 6 seek to understand whether minority religious groups within the U.S. have as much influence on corporate decision-making as the religious affiliation of the majority. Table 5 compares the Christian C-suite executives with their non-religious counterparts and excludes the religious C-suite executives who belong to non-Christian religious denominations. The coefficient on *Disclosed Religiosity* is positive and significant (coefficient = 1.970; *t*-statistic = 6.443). This evidence suggests that firms with executives who are affiliated with Christian faiths produce annual reports that are more readable.

Table 5. Impact of Executive Level Religiosity on Annual Report Readability—Christian Group.

Variables	*Readability Level*	*Readability Level*
Disclosed Religiosity	1.970 ***	1.076 ***
	(6.443)	(3.748)
Gross File Size	−1.504 ***	−0.877 ***
	(−24.021)	(−8.599)
No. of Exhibits in 10-K	−0.066 ***	−0.080 ***
	(−3.996)	(−5.306)
Tangibility	7.514 ***	4.757 ***
	(21.192)	(11.156)
Profitability	2.962 ***	2.022 ***
	(5.456)	(4.122)
Loss Indicator	−1.763 ***	−1.414 ***
	(−10.941)	(−9.562)
Size	−0.338 ***	−0.542 ***
	(−8.532)	(−12.652)
MTB	0.005 ***	0.005 ***
	(8.094)	(8.782)
Firm Age	0.064 ***	0.068 ***
	(16.367)	(17.508)
Earnings Volatility	0.144 ***	0.124 ***
	(4.570)	(3.333)
Cash Flow Volatility	−0.332 ***	−0.211 **
	(−3.980)	(−2.254)
Book Leverage	−0.027 *	−0.051 ***
	(−1.885)	(−3.200)
Debt Issue	0.108	0.002
	(0.793)	(0.015)
Capital Expenditure	1.034	−0.608
	(0.703)	(−0.398)
SGA Expense	2.903 ***	1.953 ***
	(5.355)	(3.982)
Location Religiosity	0.035	0.032
	(0.087)	(0.080)
Constant	−64.240 ***	−71.015 ***
	(−63.685)	(−48.799)
Industry FE	N	Y
Year FE	N	Y
Observations	11,223	11,223
Adj. R-squared	0.221	0.363

T-statistics are reported in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in Appendix A.

Table 6, conversely, compares non-Christian, but religious C-suite executives with their non-religious counterparts and excludes the religious C-suite executives who belong to the Christian faith. The evidence from Table 6 is mixed. First, the baseline predictive analytic regression model results suggest that executive-level religiosity arising from non-Christian religious groups has a weakly significant and positive influence on annual report readability (coefficient on *Disclosed Religiosity* = 0.744; *t*-statistic = 1.726). This evidence is consistent with the broader conjecture of the intrinsic viewpoint, relating to religious individuals being responsible and transparent in their decision-making and actions, due to the potential implications of their actions on their communities. However, when industry and year fixed effects are included, the coefficient on *Disclosed Religiosity* is no longer significant (coefficient = 0.758; *t*-statistic = 0.684). Consistent with Tables 2–4, no evidence is found in Tables 5 and 6 relating to the opportunistic use of religion by C-suite executives as conjectured by the proponents of the extrinsic dimension viewpoint.

Table 6. Impact of Executive Level Religiosity on Annual Report Readability—Non-Christian Religious Groups.

Variables	*Readability Level*	*Readability Level*
Disclosed Religiosity	0.744 *	0.758
	(1.726)	(0.684)
Gross File Size	−1.529 ***	−0.296 ***
	(−24.203)	(−3.079)
No. of Exhibits in 10-K	−0.056 ***	0.005
	(−3.449)	(0.342)
Tangibility	7.443 ***	0.460
	(20.880)	(0.451)
Profitability	2.954 ***	0.051
	(5.452)	(0.212)
Loss Indicator	−1.742 ***	−0.675 ***
	(−10.744)	(−5.097)
Size	−0.327 ***	−0.552 ***
	(−8.231)	(−3.022)
MTB	0.005 ***	0.005 **
	(8.150)	(2.525)
Firm Age	0.061 ***	−0.775 ***
	(15.442)	(−8.844)
Earnings Volatility	0.146 ***	−0.072
	(4.668)	(−0.702)
Cash Flow Volatility	−0.336 ***	−0.105
	(−4.045)	(−0.233)
Book Leverage	−0.026 *	0.025
	(−1.785)	(0.840)
Debt Issue	0.119	−0.005
	(0.866)	(−0.049)
Capital Expenditure	1.327	1.155
	(0.908)	(0.844)
SGA Expense	2.895 ***	−0.033
	(5.350)	(−0.136)
Location Religiosity	−0.123	1.490
	(−0.300)	(1.018)
Constant	−63.835 ***	−56.228 ***
	(−62.523)	(−16.764)
Industry FE	N	Y
Year FE	N	Y
Observations	10,969	10,969
Adj. R-squared	0.214	0.342

T-statistics are reported in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in Appendix A.

4.3. Robustness Tests

In Tables 7 and 8, we use propensity-score matching (PSM) and entropy-balancing to validate our core finding that individual religiosity at the top level of management affects the overall quality of firm disclosure practices. For the PSM and entropy-balanced specifications, we match the religious executive-led firms to the non-religious executive-led firms based on all firm-level and document characteristic controls. After the matching procedure, we follow Baxamusa and Jalal (2016) and estimate firm-level fixed effect regressions for the PSM specifications. For the entropy-balanced specification, we use standard linear regressions. Consistent with our earlier findings the coefficient on *Disclosed Religiosity* is positive and highly significant for both PSM specifications in Tables 7 and 8 (coefficient = 1.324, 1.321; *t*-statistic = 3.648, 3.813) and the entropy balanced specifications in Tables 7 and 8 (coefficient = 1.540, 1.274; *t*-statistic = 6.124, 4.912). The PSM and entropy-balancing-based matching procedures result in stricter comparisons between firms led by executives whose

religious affiliations are identifiable versus those led by executives whose religious affiliations are not disclosed. Hence, these findings reiterate and validate the importance of individual religiosity in firm disclosure practices.

Table 7. Impact of Executive Level Religiosity on Annual Report Readability—PSM & Entropy Approach.

	PSM	**Entropy Balancing**
Variables	***Readability Level***	***Readability Level***
Disclosed Religiosity	1.324 ***	1.540 ***
	(3.648)	(6.124)
Gross File Size	−1.632 ***	−1.586 ***
	(−9.204)	(−13.147)
No. of Exhibits in 10-K	−0.097 **	−0.086 **
	(−2.234)	(−2.396)
Tangibility	7.482 ***	7.387 ***
	(7.375)	(10.367)
Profitability	3.249 **	3.595 ***
	(2.098)	(5.833)
Loss Indicator	−1.277 **	−1.796 ***
	(−2.136)	(−3.927)
Size	−0.293 **	−0.112
	(−2.007)	(−1.187)
MTB	0.152	0.055
	(0.810)	(0.431)
Firm Age	0.075 ***	0.068 ***
	(6.420)	(8.155)
Earnings Volatility	−2.207	−4.975 **
	(−0.720)	(−2.297)
Cash Flow Volatility	−6.153	−1.036
	(−1.167)	(−0.357)
Book Leverage	−0.360	−0.277
	(−0.384)	(−0.547)
Debt Issue	0.500	0.197
	(1.163)	(0.682)
Capital Expenditure	0.545	0.643
	(0.099)	(0.190)
SGA Expense	5.108 ***	4.783 ***
	(6.123)	(11.751)
Location Religiosity	−1.299	−0.492
	(−1.065)	(−0.575)
Constant	−62.114 ***	−64.382 ***
	(−22.538)	(−34.553)
Observations	1520	11,391
R-squared	0.246	0.259

T-statistics are reported in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in Appendix A.

Table 8. CEO Religiosity and Readability—PSM & Entropy Approach.

	PSM	**Entropy Balancing**
Variables	***Readability Level***	***Readability Level***
Disclosed Religiosity	1.321 ***	1.274 ***
	(3.813)	(4.912)
Gross File Size	−1.479 ***	−1.535 ***
	(−8.511)	(−12.092)
No. of Exhibits in 10-K	−0.151 ***	−0.103 ***
	(−3.281)	(−2.918)

Table 8. *Cont.*

	PSM	Entropy Balancing
Variables	***Readability Level***	***Readability Level***
Tangibility	7.598 ***	8.734 ***
	(7.631)	(11.504)
Profitability	2.274 **	3.895 ***
	(2.105)	(5.977)
Loss Indicator	−1.338 **	−1.724 ***
	(−2.205)	(−3.440)
Size	−0.075	−0.184 *
	(−0.502)	(−1.890)
MTB	0.215	
	(1.022)	
Firm Age	0.068 ***	0.068 ***
	(6.308)	(8.214)
Earnings Volatility	−8.854 ***	−7.325 ***
	(−3.149)	(−3.420)
Cash Flow Volatility	−1.333	0.381
	(−0.221)	(0.098)
Book Leverage	−0.970	0.031
	(−1.159)	(0.062)
Debt Issue	0.860 **	0.175
	(2.260)	(0.598)
Capital Expenditure	−0.671	−7.281 *
	(−0.151)	(−1.667)
SGA Expense	4.529 ***	4.960 ***
	(7.031)	(12.029)
Location Religiosity	−1.744	−1.474 *
	(−1.418)	(−1.682)
Constant	−64.516 ***	−63.952 ***
	(−23.381)	(−32.716)
Observations	1378	11,857
R-squared	0.264	0.250

T-statistics are reported in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in Appendix A.

In Table 9, we conduct a CEO turnover test to address endogeneity issues surrounding CEO religiosity. We specifically focus on CEO turnovers from a non-religious to a religious CEO relative to CEO turnovers from a non-religious CEO to another non-religious CEO to examine the impact of CEO religiosity on the readability of 10-Ks. For this analysis, we define the two years prior to the CEO turnover as the *PRE* period and the two years following the CEO turnover as the *POST* period. The interaction variable *PRE* × *Disclosed Religiosity* does not differ from zero (coefficient = −5.845; *t*-statistic = −0.892) but *POST* × *Disclosed Religiosity* is positive and significant at the 1% level in the post-CEO turnover period (coefficient = 2.265; *t*-statistic = 3.648). These results suggest that a change from a non-religious to a religious CEO has a strong positive impact on the quality of corporate disclosure practices as measured by 10-K readability.

Table 9. Impact of CEO Religiosity on Annual Report Readability–Non-Religious to Religious CEO Turnover Sample.

Variables	***Readability Level***
PRE × *Disclosed Religiosity*	−5.845
	(−0.892)
POST × *Disclosed Religiosity*	2.265 ***
	(3.648)

Table 9. *Cont.*

Variables	*Readability Level*
Gross File Size	−1.085 ***
	(−6.671)
No. of Exhibits in 10-K	−0.066 **
	(−2.497)
Tangibility	3.376 ***
	(5.213)
Profitability	1.875 ***
	(6.022)
Loss Indicator	−0.948 ***
	(−4.197)
Size	−0.801 ***
	(−12.243)
MTB	−0.010 **
	(−1.967)
Firm Age	0.057 ***
	(7.852)
Earnings Volatility	0.153 ***
	(5.921)
Cash Flow Volatility	−0.283 ***
	(−3.742)
Book Leverage	0.061
	(0.361)
Debt Issue	−0.008
	(−0.036)
Capital Expenditure	1.862
	(0.941)
SGA Expense	1.919 ***
	(6.193)
Location Religiosity	0.261
	(0.446)
Constant	−66.793 ***
	(−29.621)
Industry FE	Y
Year FE	Y
Observations	4437
Adj. R-squared	0.383

T-statistics are reported in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5%, and 1% levels, respectively. There are 60 transitions from a non-religious to religious CEO, and 1207 transitions from a non-religious to non-religious CEO in our sample. All variables are defined in Appendix A.

5. Conclusions

This study extends the literature highlighting the importance of examining individual measures of religiosity to understand how religion affects corporate decision-making. The study also extends the strand of literature connecting religiosity with the quality of corporate disclosure practices. We find that firms with religious managers have more readable annual reports. Subsample analysis finds that CEOs drive the effect of individual religiosity at the C-suite level.

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Appendix A

Variable	Definition
Readability Level	Bog Index *(−1) following Cassell et al. (2019).
Disclosed Religiosity	A dummy variable equal to 1 if a firm has one or more religious C-suite executives.
Gross File Size	Natural Log of 10-K file size.
No. of Exhibits in 10-K	Number of the firm's 10-K exhibits.
Tangibility	Net PPE/Total Assets.
Profitability	Operating Income Before Income Tax & Depreciation/Total Assets.
Loss Indicator	Dummy variable equals 1 if income before extraordinary items < 0.
Size	Natural Log of Total Assets.
MTB	Market Value of Assets/ Book Value of Assets.
Market Value of Assets	Sum of the market value of equity plus debt in current liabilities plus long-term debt plus the liquidation value of the preferred stock less the deferred taxes and the investment tax credit following Baxamusa and Jalal (2016).
Firm Age	Age of firm.
Earnings Volatility	Measured as the standard deviation of earnings before extraordinary items scaled by total assets in 5-year rolling windows with a minimum of 5 observations, and winsorized at percentiles 1 and 99.
Cash Flow Volatility	Measured as the standard deviation of cash flows from operations scaled by total assets in 5-year rolling windows with a minimum of 5 observations, and winsorized at percentiles 1 and 99.
Book Leverage	(Current Liabilities + Long-Term Debt)/Total Assets.
Debt Issue	A dummy variable that takes a value of 1 if long-term debt issuance less long-term debt reduction is more than 1% of the total assets of the firm.
Capital Expenditure	Capital Expenditures/Total Assets.
SGA Expense	Selling, General and Administrative Expenses/Total Assets.
Location Religiosity	The overall religiosity of a county per 1000 members of population as reported by ARDA.
PRE	Year t − 1 and t − 2 prior to the CEO turnover.
POST	Year t + 1 and t + 2 following the CEO turnover.

Notes

1 Evidence that firms led by religious CEOs engage in less opportunistic earnings management and generally tend to have higher financial reporting quality (Cai et al. 2019; Chen et al. 2022) further supports this conjecture.

2 The GuideStar directory can be found at: https://www.guidestar.org/NonprofitDirectory.aspx (accessed on 18 February 2022).

3 Brian Miller's website is located at: https://host.kelley.iu.edu/bpm/activities/bogindex.html (accessed on 27 March 2022).

4 The Loughran and McDonald data is available at: https://sraf.nd.edu/sec-edgar-data/lm_10x_summaries/ (accessed on 27 March 2022).

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