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Religion and Stock Price Crash Risk

Jeffrey L. Callen and Xiaohua Fang*

Abstract

This study examines whether religiosity at the county level is associated with future stock price crash risk. We find robust evidence that firms headquartered in counties with higher levels of religiosity exhibit lower levels of future stock price crash risk. This finding is consistent with the view that religion, as a set of social norms, helps to curb bad-news-hoarding activities by managers. Our evidence further shows that the negative relation between religiosity and future crash risk is stronger for riskier firms and for firms with weaker governance mechanisms measured by shareholder takeover rights and dedicated institutional ownership.

I. Introduction

The economics of religion has been viewed traditionally through the prism of either economic development or individual decision making (e.g., Smith (1776), Weber (1905), Barro and McCleary (2003), and Guiso, Sapienza, and Zingales (2003)). The latter perspective is encapsulated in Barro and McCleary's view that religion influences economic outcomes mostly by fostering religious beliefs that affect personality traits such as honesty and work ethics. But their view ignores an additional and arguably more important motivational feature of religion: the impact of social norms on economic behavior. Major religions uniformly condemn manipulation of one's fellow man (e.g., Ali (1983), Mawdudi (1989), Friedman (2002), Rai (2005), and Kim, Fisher, and McCalman (2009)). We conjecture that the antimanipulative ethos of religion forms a powerful social norm against withholding bad news from investors. If our conjecture is correct, religion should mitigate the incidence of stock price crash risk, a consequence of bad news hoarding.

*Callen, callen@rotman.utoronto.ca, University of Toronto, Rotman School of Management, Toronto, ON M5S 3E6, Canada; and Fang (corresponding author), xfang@gsu.edu, Georgia State University, Robinson College of Business, Atlanta, GA 30303. We are grateful to Gilles Hilary (the referee) and Paul Malatesta (the editor) for constructive comments. We thank Larry Brown, Siu Kai Choy, Kelly Huang, Baohua Xin, and Yi Zhao for helpful insights. Comments from other colleagues at the University of Toronto and Georgia State University are also appreciated. We are also thankful to Patty Dechow and Alastair Lawrence for expediting access to the Berkeley Accounting and Auditing Enforcement Release (AAER) database. Fang acknowledges financial support for this research from Georgia State University.

The social norm perspective of religion operates in three ways to reduce bad news hoarding. First, consistent with the view of Barro and McCleary (2003), religious managers are more likely to internalize the social norms associated with antimanipulation and so are less likely to manipulate the flow of corporate information. Second, even if their religiosity is only "skin deep," managers pay a potentially high price in terms of social stigma if they are caught violating social norms by manipulating the flow of corporate information, especially if they are employed in a more religious environment. Third, a religious milieu fosters potential whistleblowers who have internalized religious social norms and feel religion-bound to unmask manipulators (Javers (2011)). Thus, social norms generated by the religious ethos against manipulation, bolstered by religious adherents in the firm acting as potential whistleblowers, operate in tandem as a potentially powerful deterrent against managers manipulating the flow of corporate information by withholding bad news. Even if managers are tempted to withhold bad news for personal gain, say because their compensation is tied to earnings and the bad news affects earnings, they are likely to trade off the gain from additional compensation against the cost of social stigma should the manipulation become public knowledge. The potential social stigma costs mitigate against withholding bad news regarding earnings, especially if the expected marginal social stigma costs exceed the expected marginal compensation benefits.

A series of recent academic studies argues that bad news hoarding brings about future stock price crash risk. These studies maintain that managers withhold bad news from investors because of career and short-term compensation concerns and that when a sufficiently long run of bad news accumulates and reaches a critical threshold level, managers tend to give up. At that point, all of the negative firm-specific shocks become public at once leading to a crash, a large negative outlier in the distribution of returns (Jin and Myers (2006), Kothari, Shu, and Wysocki (2009), and Hutton, Marcus, and Tehranian (2009)). Empirical evidence supports the bad-news-hoarding theory of stock price crash risk by showing that financial opacity, tax avoidance, and chief financial officer's (CFO) equity incentives act to increase future crash risk (Jin and Myers (2006), Hutton et al. (2009), and Kim, Li, and Zhang (2011a), (2011b)). Thus, based on the arguments that bad news hoarding creates stock price crash risk and that the social norms engendered by religion exert a disciplinary effect on managerial manipulative behavior, we hypothesize that a more religious business environment reduces managerial bad-news-hoarding activities and decreases future stock price crash risk.

This study examines the empirical link between religion and future stock price crash risk with reference to U.S. firms headquartered in counties with different levels of religiosity. Consistent with the view that religion, as a set of social norms, effectively curbs bad news hoarding, we find robust empirical evidence that firms headquartered in counties with higher levels of religiosity exhibit significantly lower levels of future stock price crash risk. We further explore whether this negative relation varies with the protection of shareholder takeover rights, the monitoring of dedicated institutions, and firm risk. These additional analyses are motivated by extant studies on the influence of organizational context on the impact of religion. Tittle and Welch (1983) and Weaver and Agle (2002) indicate that weak organizational norms and authorities both enhance the salience

of religion in an organization and make religiously influenced behavior easier to put into effect. Grullon, Kanatas, and Weston (2010) and McGuire, Omer, and Sharp (2012) provide empirical evidence implying that the impact of religion on investor welfare is contingent on the strength of a firm's governance mechanism. We find that the observed negative relation between the degree of county-level religiosity and future crash risk is more salient for firms with weaker shareholder takeover rights, firms with lower ownership by dedicated institutions, and riskier firms. These findings enrich our understanding of the influence of religion on future stock price crash risk and shed light on how social norms interact with corporate monitoring mechanisms to reduce agency costs.

Our study contributes to the literature in several ways. First, to our knowledge, this is the first study to assess the relation between religion and future crash risk. By focusing on a unique perspective, higher moments of the stock return distribution (i.e., extreme negative returns), this study provides new evidence concerning the economic consequences of religion. In particular, our findings identify significant benefits that religion brings to firms and their shareholders. Xing, Zhang, and Zhao (2010) and Yan (2011) suggest that extreme outcomes in the equity market have a material impact on the welfare of investors and that investors are concerned about the occurrence of these extreme outcomes. Thus, our empirical evidence is useful for understanding the role that religion plays in influencing both corporate behavior and investor welfare.

Second, we extend the literature on corporate governance by showing that the inverse relation between religiosity and stock price crash risk is stronger (more negative) for firms with weaker corporate governance mechanisms. Reinforcing the governance perspective of religion, our results suggest that religious social norms serve as substitutes for conventional governance mechanisms in monitoring the flow of corporate information when corporate governance mechanisms are weak.

Third, this study extends research on the bad-news-hoarding theory of stock price crash risk. In particular, the implication of religion for future crash risk yields valuable insights into the behavioral–sociological nature of managerial manipulation of information. Recent studies on crash risk suggest that managerial bad news hoarding activities are related to corporate financial opacity, tax avoidance, and CFO's equity incentives. However, it is not clear what role manager's personality traits and/or social norms play in influencing her behavior to conceal bad news. Our study helps to fill this gap in the literature by providing evidence on a negative relation between religiosity and crash risk and implying as a consequence that religion has a disincentive effect on managerial bad-news-hoarding activities.

Finally, this study provides investors with a preliminary analysis of how the local social/religious business environment affects firm behavior, which may help them to predict and eschew future stock price crash in their portfolio investment decisions.

The paper proceeds as follows: Section II reviews the prior literature on religion in corporate decision making and further develops our hypotheses. Section III describes the sample, variable measurement, and research design. Empirical results are presented in Section IV. Section V concludes.

II. Literature Review and Hypotheses Development

Psychology research indicates that an individual's religiosity often has a positive and constructive impact on personality, cognition, attitude, and behavior in both nonbusiness and business contexts (see Miller and Hoffmann (1995), Khavari and Harmon (1982), Maltby (1999), Smith (2003), Waite and Lehrer (2003), and Lehrer (2004), among others). Cunningham (1988), Turner (1997), and Calkins (2000) argue that business ethics have a religious tradition and they illustrate how religious perspectives serve as a teaching tool in addressing ethical behavior. Kennedy and Lawton (1998) and Agle and Van Buren (1999), among others, show connections between individual religiosity and business ethics such as attitudes toward corporate social responsibility. Overall, psychology and ethics research maintains that individuals with stronger religious beliefs are: i) more likely to exhibit self-regulation and self-control, ii) more likely to have ethical intentions, and iii) less likely to accept morally questionable decisions in a business environment (Longenecker, McKinney, and Moore (2004), McCullough and Willoughby (2009), and Vitell (2009)).[1] Organizational behavior research provides theoretical justifications for the conjecture that religion induces social norms that foster sound moral judgment, and ethical behavior in organizations (Weaver and Agle (2002)).

Economics and business research supports the social norm perspective of religion. Economic studies show for the most part that religiosity reduces criminal activity (see the surveys by Torgler (2006), Akers (2010), and Johnson and Jang (2010)). Recent empirical business research examines the role of religion in corporate decision making. Most of the findings suggest that religiosity constrains manipulative, and even illegal, managerial behavior in firms.[2] Grullon et al. (2010) find that firms located in counties with higher levels of religiosity are less likely to be targets of class action securities lawsuits, engage in backdating options, grant excessive compensation packages to their managers, and practice aggressive earnings management.[3] McGuire et al. (2012) provide evidence that firms headquartered in areas with stronger religious social norms display fewer financial reporting irregularities as measured by accounting risk, shareholder lawsuits, and accounting restatements. They also find a negative association between religiosity and accruals manipulation. Similarly, Dyreng, Mayew, and Williams (2012) find that firms in counties with higher levels of religiosity are less likely to meet or beat analyst earnings forecasts, engage in fraudulent accounting practices,

[1]Admittedly, the evidence in the literature is not unanimous. For instance, Smith, Wheeler, and Diener (1975) and Hood, Spilka, Hunsberger, and Gorsuch (1996) find no difference between religious and nonreligious persons regarding dishonesty or cheating. The mixed results could reflect a number of issues, including the generalizability of student samples, the social desirability biases induced by self-reported attitudinal measures of ethics, and the use of varying definitions of religiosity (Weaver and Agle (2002)).

[2]In a different vein, Hilary and Hui (2009) argue that community religion is associated with risk aversion at the individual level (Miller and Hoffmann (1995), Diaz (2000), and Osoba (2003)), and this is reflected in corporate culture and behavior. They find that firms headquartered in U.S. counties with higher levels of religiosity are associated with higher degrees of risk aversion in investment decision making.

[3]Again, the evidence is not unanimous. In a small-sample, cross-country study, Callen, Morel, and Richardson (2011) fail to find a relation between religiosity and earnings management.

restate financial reports, and exhibit low accruals quality. The latter two studies conclude that religious social norms mitigate managerial manipulative behavior in corporate financial reporting decisions.

This article extends prior research by examining the relation between religion and future stock price crash risk, which is based on the idea that managers withhold bad news as long as possible (i.e., bad news hoarding) from investors because of career and short-term compensation concerns.[4] Consistent with this idea, Graham, Harvey, and Rajgopal's (2005) survey finds that managers with bad news tend to delay disclosure more than do those with good news. Focusing on dividend changes and management earnings forecasts, Kothari et al. (2009) provide empirical evidence consistent with the view that managers, on average, delay the release of bad news to investors.

Anecdotal evidence during the past two decades also highlights the issue of bad news hoarding in public firms. Enron set up off-balance-sheet Special Purpose Vehicles to hide assets that were losing money until accumulated losses were no longer sustainable (Powers, Troubh, and Winokur (2002), Beresford, Katzenbach, and Rogers (2003)). Similarly, WorldCom used fraudulent accounting methods to mask a declining earnings trend until the accounting data were no longer deemed realistic (Special Investigative Committee of the Board of Directors of WorldCom Inc. (2003)). New Century failed to disclose dramatic increases in early default rates, loan repurchases, and pending loan repurchase requests until this was no longer sustainable with the collapse of the subprime mortgage business (Schapiro (2010)).

Longenecker et al.'s (2004) survey also suggests that the influence of religiosity on business judgment extends to bad news hoarding. They conducted a questionnaire survey of 1,234 business managers and professionals in the United States. Respondents were asked to evaluate the moral issues inherent in 16 business scenarios, 3 of which relate to bad news hoarding.[5] The authors find that respondents who indicate that religion is of high or moderate importance to them demonstrate a significantly higher level of moral judgment regarding these 3 scenarios than do other respondents.[6]

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[4]Basu (1997) claims that managers often possess valuable inside information about firm operations and asset values, and that if their compensation is linked to earnings performance, they are inclined to hide any information that will negatively affect earnings and, hence, their compensation. Ball (2009) argues that empire building and maintaining the esteem of one's peers motivate managers to conceal bad news. Kothari et al. (2009) contend that managers will leak or reveal good news immediately to investors but they will act strategically with bad news by considering the costs and benefits of disclosing bad news, for example, litigation risk, career concern, compensation plan, and other considerations. Kim et al. (2011b) maintain that the linking of compensation to equity incentives (e.g., stock holdings and option holdings) induces managers to hide poor performance from investors to maintain equity prices.

[5]These three scenarios are: i) Because of pressure from his brokerage firm, a stockbroker recommended a type of bond that he did not consider a good investment. ii) An engineer discovered what he perceived to be a product design flaw that constituted a safety hazard. His company declined to correct the flaw. The engineer decided to keep quiet rather than taking his complaint outside the company. iii) A controller selected a legal method of financial reporting that concealed some embarrassing financial facts that would otherwise become public knowledge.

[6]However, Longenecker et al. (2004) do not further explore the intention to follow that moral judgment and the ultimate behavioral resolution.

Jin and Myers (2006) provide a theoretical analysis linking bad news hoarding to stock price crash risk. They maintain that managers control the disclosure of information about the firm to the public and that a threshold level exists at which managers will stop withholding bad news. Jin and Myers argue that lack of full transparency concerning managers' investment and operating decisions and firm performance allows managers to capture a portion of cash flows in ways not perceived by outside investors. Managers are willing to personally absorb limited downside risk and losses related to temporary bad performance by hiding firm-specific bad news. However, if a sufficiently long run of bad news accumulates to a critical threshold level, managers choose to give up, and all of the negative firm-specific shocks become public at once. This disclosure brings about a corresponding crash, a large negative outlier in the distribution of returns, generating long left tails in the distribution of stock returns. The empirical evidence supports the bad-news-hoarding theory. Jin and Myers's cross-country evidence indicates that firms in more opaque countries are more likely to experience stock crashes (i.e., large negative returns). Hutton et al. (2009) find a positive relation between firm-level financial reporting opacity and crash risk.[7] Kim et al. (2011a), (2011b) show that corporate tax avoidance and CFO's equity incentives are positively related to firm-specific stock price crash risk.[8]

In this article we argue that firms headquartered in areas with higher levels of religiosity will be associated with reduced future stock price crash risk. People's behavior is influenced by social norms, that is, people's perceptions of how other members of their social group should behave. Social norms in a locality induce conformity that allows people to become socialized to the environment in which they live (Perkins and Berkowitz (1986), Scott and Marshall (2005)). Failure to behave in conformity to a locality's social norms generates strong levels of cognitive dissonance and emotional discomfort, and brings about social sanctions imposed on deviants (Festinger (1957), Akerlof (1980)).[9] Thus, it is to be expected that managers will prefer to abide by local religious social norms to minimize the disutility incurred by deviating from them. Kennedy and Lawton (1998) provide evidence indicating that the extent to which managers are influenced by religious social norms increases with the level of religiosity in the area where the firm is located.

Because religion acknowledges the overall importance of ethical behavior and rejects manipulation, we expect that religious social norms will counter managers' incentives to hoard bad news from investors. Assuming managers maximize expected utility, each manager will weigh the expected pecuniary gain of

[7]The prior literature also documents that future stock price crash risk is associated with divergence of investor opinion (Chen, Hong, and Stein (2001)) and political incentives in state-controlled Chinese firms (Piotroski, Wong, and Zhang (2010)).

[8]Kothari et al. (2009) use stock market responses to voluntary disclosure of specific information to infer bad news hoarding. In contrast, the crash risk literature uses firm-specific return distributions to detect bad news hoarding. We argue that crash risk measures are better at capturing bad news hoarding because concealed bad news is revealed through a variety of information channels over time, not just firm-specific, voluntary disclosure at a specific point in time.

[9]Akerlof (1980) presents a utility-maximization model, incorporating social sanction imposed by loss of reputation from breaking the custom, to explain why social customs that are costly to the individual persist nevertheless.

hoarding bad news for personal wealth against expected litigation costs and the costs of breaking religious social norms (i.e., reputation loss, emotional dissonance, social stigma, and other social sanctions).[10] Ceteris paribus, managers of firms headquartered in areas with high levels of religiosity will assign a higher cost to activities deviating from religious norms, including bad news hoarding, than will managers in areas with low levels of religiosity. Furthermore, firms headquartered in localities with a higher level of religiosity are more likely to employ a larger percentage of religious people in their organizations. Therefore, deviations from religious norms are more likely to be "outed" by religious whistleblowers in firms headquartered in areas with high levels of religiosity.[11] This argument is in line with Javers's (2011) report that "religion, not money, often motivates corporate whistleblowers . . . whistleblowers can be deeply religious people, whose faith gives them an identity outside their corporate life."

Based on the above considerations, we predict that managers of firms headquartered in areas with high levels of religiosity will be more likely to follow religious norms compared to managers in areas with lows levels of religiosity, thereby reducing bad news hoarding. As a result, this will lead to a lower level of future stock price crash risk. This leads to our first hypothesis stated in the alternative:

Hypothesis 1. Firms headquartered in counties with higher levels of religiosity are associated with lower levels of future stock price crash risk.

Tittle and Welch (1983) examine the influence of contextual properties on the strength of the relation between individual religiosity and deviant behavior. Their research indicates that individual religiosity constrains deviant behavior most effectively in environments where secular controls are absent or weak. Tittle and Welch (p. 672) note that "when secular moral guidelines are unavailable, in flux, or have lost their authority and hence their power to compel, the salience of religious proscriptions is enhanced." Likewise, Weaver and Agle (2002) develop a social structural theory to assess religion's influence on an individual's behavior in organizations. They analyze how organizational context affects the relation between religion and ethical behavior. They emphasize that in an organization featuring weak organizational culture and norms, religion more frequently provides guidance. All other things being equal, the more salient religion is for a person in an organization, the more likely he or she will behave in accordance with religious social norms absent secular moral guidelines. Thus, both studies imply that religiosity can distinctly affect managerial behavior, especially when the corporation lacks effective mechanisms for curtailing deviant behavior.

[10] Akerlof (1980), Sunstein (1996), and Weaver and Agle (2002) indicate reputational loss and emotional distress are the major costs of breaking (religious) social norms.

[11] The degree to which religious managers will avoid bad-news-hoarding activities and the degree to which employees will act as whistleblowers are likely to be reflected in the firm's culture because "people determine organizational behavior" (e.g., Schneider (1987), p. 441). Nevertheless, the extent of whistleblowing by employees should not be underestimated. Evidence by Dyck, Morse, and Zingales (2010) indicates that employees are more likely to blow the whistle on corporate fraud, for example, than many other parties of interest.

Grullon et al. (2010) and McGuire et al. (2012) provide empirical evidence for the influence of corporate governance on the relation been religion and opportunistic managerial behavior. Grullon et al. find that the impact of religion on reducing option backdating weakened significantly after the passage of the Sarbanes-Oxley Act. McGuire et al. show that religious social norms have a larger effect on curbing accounting risk when dedicated institutional ownership in the firm is lower. These findings suggest that the impact of religiosity on investor welfare is contingent on the strength of the firm's governance environment and that religiosity and the monitoring role of governance are substitutes for each other. The weaker external governance mechanisms are in monitoring managerial activities, the stronger will be the impact of religious norms on managerial bad-news-hoarding activity and, hence, on future stock price crash risk. These considerations lead to our next hypothesis:

Hypothesis 2. The relation between religiosity and future stock price crash risk is stronger (more negative) when the firm's governance monitoring mechanisms are weaker.

Research studies and anecdotal evidence suggest that managers try to reduce investors' perception of high levels of risk-taking behavior by firms. For example, Lambert (1984), Dye (1988), and Trueman and Titman (1988) show that managers will rationally try to reduce investor's estimates of the volatility of the firm's underlying earnings process by income smoothing. Kim et al. (2011b) contend that managers of firms with high levels of risk taking are concerned about investor's perception of firm riskiness and will hide risk-taking information to support share price. Owens and Wu (2011) find a positive and significant relation between financial leverage and downward window dressing in short-term borrowings for publicly traded banks, suggesting that managers have an incentive to mask the true risk level of the firm to obtain a lower risk premium and higher equity values. The latter study is consistent with Kelly, McGinty, and Fitzpatrick's (2010) report that "major banks have masked their risk levels in the past five quarters by temporarily lowering their debt just before reporting it to the public. . . . [B]anks have become more sensitive about showing high levels of debt and risk, worried that their stocks and credit ratings could be punished."[12] In response to the concern that similar incentives to mask true risk levels exist in nonfinancial industries, the SEC voted unanimously in 2010 to propose measures requiring all public companies to provide additional disclosure to investors regarding their short-term borrowing arrangements.

Following this line of reasoning, we argue that managers of firms with high levels of risk taking are more likely to conceal and hoard bad news information

[12]In a similar vein, Lehman employed off-balance-sheet "Repo 105" transactions to temporarily remove securities inventory from its balance sheet and reduce its publicly reported net leverage, thereby creating a materially misleading picture of its financial condition (Valukas (2010)). Similarly, part of the Securities and Exchange Commission's (SEC) probe of JPMorgan Chase's trading scandal in 2012 was related to the latter's failure to disclose a major change to a risk metric in a timely fashion. By omitting any mention of the change from its earnings release in April, the bank disguised a spike in the riskiness of a particular trading portfolio by cutting in half its value-at-risk number (see Lynch and Henry (2012), Munoz (2012)).

from investors because bad news may be perceived by investors as the realization of excessive risk-taking behavior by managers.[13] If so, religion will play a larger role in preempting bad news hoarding in riskier firms and, hence, further reduce future stock price crash risk. This conjecture is consistent with the implication of Tittle and Welch (1983) and Weaver and Agle (2002) that where governance controls are weak, including presumably corporate risk controls, religiosity will constrain excessive risk-related bad-news-hoarding deviant behavior more effectively. These considerations yield the following hypothesis:

Hypothesis 3. The relation between religiosity and future stock price crash risk is stronger (more negative) when the firm is riskier.

III. Sample, Variable Measurement, and Descriptive Statistics

A. Data Sources and Sample

Following Hilary and Hui (2009), we obtain religiosity data from the Association of Religion Data Archives (ARDA). Once every decade, the Glenmary Research Center collects data from surveys on religious affiliation in the United States (1971, 1980, 1990, and 2000). Based on the survey results, the center reports county-level data on the number of churches and the number of total adherents by religious affiliation. These reports are available on ARDA's Web site (http://www.thearda.com/Archive/ChCounty.asp) under the title "Churches and Church Membership." Our main variable of interest is the degree of religiosity at time T (REL_T) of the county in which the firm's headquarter is located. We calculate REL_T as the number of religious adherents in the county to the total population in the county as reported by ARDA.[14] Following previous studies (e.g., Hilary and Hui (2009), Alesina and La Ferrara (2000)), we linearly interpolate the data to obtain the values for missing years (1972–1979, 1981–1989, and 1991–1999).

In addition, we collect stock return data from the Center for Research in Security Prices (CRSP) daily stock files and accounting data from Compustat annual files. Compustat also provides information on the location of firms' headquarters. Following prior research (e.g., Coval and Moskowitz (1999), Ivkovic and Weisbenner (2005), Loughran and Schultz (2004), Pirinsky and Wang (2006), and Hilary and Hui (2009)), we define a firm's location as the location of its headquarters "given that corporate headquarters are close to corporate core business activities" (Pirinsky and Wang, p. 1994). Our final sample consists of 80,404 firm-year observations from 1971 to 2000.

[13]Concealing bad news would be supported in equilibrium as long as investors cannot tell if the bad news is a result of normal risk or excessive risk taking and if the ability to take excessive risks varies exogenously among firms.

[14]ARDA (http://www.thearda.com/Archive/Files/Descriptions/RCMSST.asp) indicates that "for [the] purposes of this study, adherents were defined as 'all members,' including full members, their children and the estimated number of other regular participants who are not considered as communicant, confirmed or full members, for example, the 'baptized,' 'those not confirmed,' 'those not eligible for communion' and the like."

B. Measures of Firm-Specific Crash Risk

Following the prior literature (Chen et al. (2001), Jin and Myers (2006), and Hutton et al. (2009)), we employ three firm-specific measures of stock price crash risk for each firm-year observation: i) the negative coefficient of skewness of firm-specific daily returns (NCSKEW), ii) the down-to-up volatility of firm-specific daily returns (DUVOL), and iii) the difference between the number of days with negative extreme firm-specific daily returns and the number of days with positive extreme firm-specific daily returns (CRASH_COUNT).[15]

To calculate firm-specific measures of stock price crash risk, we first estimate firm-specific residual daily returns from the following expanded market and industry index model regression for each firm and year (Hutton et al. (2009)):

$$(1) \qquad r_{j,t} = \alpha_j + \beta_{1,j} r_{m,t-1} + \beta_{2,j} r_{i,t-1} + \beta_{3,j} r_{m,t} + \beta_{4,j} r_{i,t} + \beta_{5,j} r_{m,t+1} + \beta_{6,j} r_{i,t+1} + \varepsilon_{j,t},$$

where $r_{j,t}$ is the return on stock j on day t, $r_{m,t}$ is the return on the CRSP value-weighted market index on day t, and $r_{i,t}$ is the return on the value-weighted industry index based on 2-digit Standard Industrial Classification (SIC) codes. We correct for nonsynchronous trading by including lead and lag terms for value-weighted market and industry indices (Dimson (1979)).

We define the firm-specific daily return, $R_{j,t}$, as the natural log of (1 plus the residual return from equation (1)). We log transform the raw residual returns to reduce the positive skew in the return distribution and to help ensure symmetry (Chen et al. (2001)). We also estimate the measures of crash risk based on raw residual returns and obtain robust (untabulated) results.

Our first firm-specific measure of stock price crash risk is the negative coefficient of skewness of firm-specific daily returns (NCSKEW) computed as the negative of the third moment of each stock's firm-specific daily returns, divided by the cubed standard deviation. Thus, for any stock j over the fiscal year T,

$$(2) \qquad \text{NCSKEW}_{j,T} = \frac{-\left(n(n-1)^{\frac{3}{2}} \sum R_{j,t}^3\right)}{\left((n-1)(n-2)\left(\sum R_{j,t}^2\right)^{\frac{3}{2}}\right)},$$

where n is the number of observations of firm-specific daily returns during the fiscal year T. The denominator is a normalization factor (Greene (1993)). This study adopts the convention that an increase in NCSKEW corresponds to a stock being more "crash prone," that is, having a more left-skewed distribution, hence the minus sign on the right-hand side of equation (2).

[15]We also measure firm-specific crash risk by an indicator variable equal to 1 for a firm-year if the firm experiences one or more firm-specific daily returns falling 3.09 standard deviations below the mean value for that year, and 0 otherwise. Our results (available from the authors) remain robust. To conserve space, we do not report the results here.

The second measure of firm-specific crash risk is called "down-to-up volatility" (DUVOL), calculated as follows:

$$\text{DUVOL}_{j,T} = \log\left\{\frac{(n_u - 1)\sum_{\text{DOWN}} R_{j,t}^2}{(n_d - 1)\sum_{\text{UP}} R_{j,t}^2}\right\}, \tag{3}$$

where n_u and n_d are the number of up and down days over the fiscal year T, respectively. For any stock j over a 1-year period, we separate all of the days with firm-specific daily returns above (below) the mean of the period and call this the "up" ("down") sample. We further calculate the standard deviation for the up and down samples separately. We then compute the log ratio of the standard deviation of the down sample to the standard deviation of the up sample. Similar to NCSKEW, a higher value of DUVOL corresponds to a stock being more "crash prone." This alternative measure does not involve the third moment and, hence, is less likely to be excessively affected by a small number of extreme returns.

The last measure, CRASH_COUNT, is based on the number of firm-specific daily returns exceeding 3.09 standard deviations above and below the mean firm-specific daily return over the fiscal year, with 3.09 chosen to generate frequencies of 0.1% in the normal distribution (Hutton et al. (2009)). CRASH_COUNT is the downside frequencies minus the upside frequencies. A higher value of CRASH_COUNT corresponds to a higher frequency of crashes. Like Hutton et al. (2009) and Kim et al. (2011a), we use the 0.1% cutoff of the normal distribution as a convenient way of obtaining reasonable benchmarks for extreme firm-specific daily returns to calculate the stock price crash risk measure CRASH_COUNT.[16]

We employ 1-year-ahead NCSKEW (NCSKEW_{T+1}), DUVOL (DUVOL_{T+1}), and CRASH_COUNT (CRASH_COUNT_{T+1}) as the dependent variables in our empirical tests below.

C. Control Variables

Following the prior literature (Chen et al. (2001), Jin and Myers (2006)), we control for the following set of variables: NCSKEW_T, defined as the negative coefficient of skewness for firm-specific daily returns in fiscal year T; KUR_T, defined as the kurtosis of firm-specific daily returns in fiscal year T; SIGMA_T, defined as the standard deviation of firm-specific daily returns in fiscal year T; RET_T, defined as the cumulative firm-specific daily returns in fiscal year T; MB_T, defined as the market-to-book ratio at the end of fiscal year T; LEV_T, defined as the book value of all liabilities divided by the total assets at the end of fiscal year T; ROE_T, defined as income before extraordinary items divided by the book value of equity at the end of fiscal year T; LNSIZE_T, defined as the log of market value of equity at the end of fiscal year T; and DTURNOVER_T, defined as the average monthly share turnover over fiscal year T minus the average monthly share turnover over the previous year, $T - 1$, where monthly share turnover is

[16]We also estimate all of our regressions with measures of stock price crash risk based on market-adjusted returns and beta-adjusted returns, and our results remain qualitatively similar.

calculated as the monthly share trading volume divided by the number of shares outstanding over the month.

Following Hutton et al. (2009), we include the regressor of accrual manipulation, AM_T, computed as the 3-year moving sum of the absolute value of annual performance-adjusted discretionary accruals (Kothari, Leone, and Wasley (2005)) from fiscal year $T-2$ to T, to proxy for financial reporting opacity.[17] Following Fang, Liu, and Xin (2009), we control for the impact of industry-level litigation risk ($LITIG\_RISK_T$) on stock price crash risk. $LITIG\_RISK_T$ is equal to 1 when the firm is in the biotechnology (4-digit SIC codes 2833–2836 and 8731–8734), computer (4-digit SIC codes 3570–3577 and 7370–7374), electronics (4-digit SIC codes 3600–3674), or retail (4-digit SIC codes 5200–5961) industries, and 0 otherwise (Francis, Philbrick, and Schipper (1994)). The Appendix summarizes the variable definitions used in this study.

D. Descriptive Statistics

Panel A of Table 1 presents descriptive statistics for key variables used in our regression models from 1971 to 2000 for our sample firms. The mean values of future stock price crash risk measures $NCSKEW_{T+1}$, $DUVOL_{T+1}$, and $CRASH\_COUNT_{T+1}$ are −0.226, −0.211, and −0.659, respectively. The mean value and standard deviation of $NCSKEW_{T+1}$ and $DUVOL_{T+1}$ are very similar

TABLE 1

Descriptive Statistics and Correlation Matrix

Table 1 presents descriptive statistics and correlation matrix of key variables of interest for the sample of firms included in our study. The sample covers firm-year observations with nonmissing values for all control variables from 1971 to 2000. Panel A presents descriptive statistics of key variables of interest. Panel B presents a Pearson correlation matrix. The *p*-values are below the correlation coefficients in Panel B. All variables are defined in the Appendix.

Panel A. Descriptive Statistics

Variables	*N*	Mean	Std. Dev.	5th Pctl.	25th Pctl.	Median	75th Pctl.	95th Pctl.
$NCSKEW_{T+1}$	80,391	−0.226	1.145	−1.604	−0.603	−0.226	0.098	1.204
$DUVOL_{T+1}$	80,387	−0.211	0.592	−1.050	−0.518	−0.215	0.069	0.653
$CRASH\_COUNT_{T+1}$	80,404	−0.659	1.702	−3.000	−2.000	−1.000	0.000	2.000
REL_T	80,404	0.534	0.124	0.345	0.433	0.539	0.619	0.739
$NCSKEW_T$	80,404	−0.234	0.942	−1.580	−0.605	−0.232	0.086	1.147
KUR_T	80,404	5.080	8.282	0.322	1.239	2.408	5.027	19.388
$SIGMA_T$	80,404	0.033	0.021	0.011	0.018	0.028	0.042	0.076
RET_T	80,404	−0.194	0.275	−0.726	−0.222	−0.096	−0.042	−0.015
MB_T	80,404	2.289	3.483	0.311	0.849	1.441	2.548	7.411
LEV_T	80,404	0.503	0.219	0.146	0.351	0.511	0.642	0.848
ROE_T	80,404	−0.006	0.559	−0.677	0.008	0.097	0.152	0.276
$LNSIZE_T$	80,404	18.275	2.109	15.007	16.703	18.149	19.768	21.914
$DTURNOVER_T$	80,404	0.004	0.051	−0.059	−0.010	0.001	0.013	0.081
AM_T	80,404	0.202	0.158	0.038	0.092	0.157	0.261	0.530
$LITIG\_RISK_T$	80,404	0.048	0.214	0.000	0.000	0.000	0.000	0.000
$GINDEX_T$	11,772	9.068	2.825	5.000	7.000	9.000	11.000	14.000
$STATUTES_T$	51,597	2.507	1.820	0.000	0.000	3.000	4.000	5.000
DED_T	41,787	0.069	0.078	0.001	0.015	0.046	0.097	0.211
$EARNINGS\_VOL_T$	80,391	0.381	1.428	0.012	0.038	0.084	0.205	1.252

(continued on next page)

[17]We also use the modified Dechow and Dichev (2002) accrual quality measure in Francis, LaFond, Olsson, and Schipper (2005) to measure firm-level reporting quality, and the results (untabulated) remain robust.

TABLE 1 (continued)

Descriptive Statistics and Correlation Matrix

Panel B. Correlation Matrix

	$NCSKEW_{T+1}$	$DUVOL_{T+1}$	$CRASH\_COUNT_{T+1}$	REL_T	$NCSKEW_T$	KUR_T	$SIGMA_T$	RET_T	MB_T	LEV_T	ROE_T	$LNSIZE_T$	$DTURNOVER_T$	AM_T	$LITIG\_RISK_T$	$GINDEX_T$	$STATUTES_T$	DED_T
$DUVOL_{T+1}$	0.90																	
	0.00																	
$CRASH\_COUNT_{T+1}$	0.49	0.69																
	0.00	0.00																
REL_T	–0.02	–0.02	–0.01															
	0.01	0.02	0.18															
$NCSKEW_T$	0.02	0.03	0.02	–0.03														
	0.03	0.00	0.03	0.01														
KUR_T	0.00	–0.02	–0.02	–0.04	0.51													
	0.66	0.02	0.01	0.00	0.00													
$SIGMA_T$	0.01	–0.02	–0.04	–0.14	0.12	0.28												
	0.40	0.02	0.00	0.00	0.00	0.00												
RET_T	0.02	0.04	0.05	0.11	–0.09	–0.25	–0.94											
	0.11	0.00	0.00	0.00	0.00	0.00	0.00											
MB_T	0.10	0.11	0.10	–0.01	–0.02	–0.04	0.01	0.00										
	0.00	0.00	0.00	0.24	0.02	0.00	0.13	0.75										
LEV_T	–0.04	–0.04	–0.02	0.06	–0.02	0.01	–0.05	0.00	–0.07									
	0.00	0.00	0.04	0.00	0.03	0.20	0.00	0.73	0.00									
ROE_T	0.02	0.05	0.05	0.02	–0.01	–0.05	–0.19	0.19	0.14	–0.05								
	0.04	0.00	0.00	0.01	0.13	0.00	0.00	0.00	0.00	0.00								
$LNSIZE_T$	0.12	0.15	0.15	0.02	0.02	–0.08	–0.37	0.34	0.36	0.00	0.17							
	0.00	0.00	0.00	0.07	0.04	0.00	0.00	0.00	0.00	0.73	0.00							
$DTURNOVER_T$	0.03	0.04	0.03	–0.02	0.12	0.12	0.14	–0.13	0.05	–0.01	0.00	0.05						
	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.19	0.78	0.00						
AM_T	0.02	–0.01	–0.01	–0.07	0.02	0.09	0.38	–0.32	0.10	–0.07	–0.04	–0.17	0.02					
	0.02	0.37	0.22	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09					
$LITIG\_RISK_T$	0.03	0.01	–0.01	–0.08	0.04	0.07	0.21	–0.18	0.13	–0.13	–0.02	0.01	0.01	0.15				
	0.00	0.18	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.26	0.20	0.00				
$GINDEX_T$	–0.01	0.00	0.00	0.06	–0.01	–0.02	–0.17	0.15	–0.03	0.15	0.02	0.10	0.00	–0.10	–0.09			
	0.34	0.73	0.78	0.00	0.47	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.92	0.00	0.00			
$STATUTES_T$	0.01	0.03	0.02	0.25	0.01	0.00	–0.15	0.12	0.01	0.07	0.04	0.04	–0.01	–0.11	–0.09	0.14		
	0.24	0.01	0.06	0.00	0.42	0.98	0.00	0.00	0.42	0.00	0.00	0.00	0.42	0.00	0.00	0.00		
DED_T	–0.02	–0.02	–0.02	0.01	–0.01	0.01	0.02	0.02	0.03	0.05	0.00	0.09	–0.01	0.00	–0.01	0.05	0.00	
	0.07	0.04	0.06	0.13	0.14	0.22	0.05	0.04	0.00	0.00	0.79	0.00	0.38	0.68	0.12	0.00	0.99	
$EARNINGS\_VOL_T$	–0.01	–0.02	–0.03	0.00	–0.01	0.03	0.18	–0.18	0.07	0.17	0.03	–0.07	0.01	0.12	0.05	–0.04	–0.03	0.04
	0.22	0.01	0.01	0.95	0.16	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.29	0.00	0.00	0.00	0.00	0.00

to those reported by Chen et al. (2001) using daily market-adjusted returns. The mean value and standard deviation of REL_T are 0.534 and 0.124, respectively, comparable to the statistics reported in Hilary and Hui (2009). Untabulated results show that the largest religious group in our sample firms is the Catholic Church, followed by the Southern Baptist Convention and the United Methodist Church.

Panel B of Table 1 presents a Pearson correlation matrix for the key variables used in our study. Our future stock price crash risk measures, NCSKEW_{T+1}, DUVOL_{T+1}, and CRASH_COUNT_{T+1}, are all significantly and positively correlated with each other. Although these measures are constructed differently from firm-specific daily returns, they seem to be picking up much the same information. The correlation coefficient between NCSKEW_{T+1} and DUVOL_{T+1}, 0.90, is comparable to that reported by Chen et al. (2001). In addition, consistent with the prior literature, all future crash risk measures are significantly and positively correlated with NCSKEW_T, LNSIZE_T, and DTURNOVER_T. REL_T is significantly and negatively correlated with NCSKEW_{T+1} and DUVOL_{T+1} at the 1% and 2% significance levels (two-tailed), respectively, and negatively correlated with CRASH_COUNT_{T+1} at the 10% level (one-tailed). The univariate results are consistent with our expectation that firms located in more religious counties display lower levels of future stock price crash risk.

IV. Multivariate Empirical Tests

A. Main Results

We examine the effect of religion on future firm-specific stock price crash risk (Hypothesis 1) with reference to the regression equation:

$$\text{CRASH\_RISK}_{j,T+1} = \alpha_0 + \alpha_1 \text{REL}_{j,T} + \sum_k \alpha_k \text{CONTROLS}^k_{j,T} + \text{YEAR\_DUMMIES} + \text{INDUSTRY\_DUMMIES} + \varepsilon_{j,T}, \tag{4}$$

where CRASH_RISK_{T+1} is measured by NCSKEW_{T+1}, DUVOL_{T+1}, or CRASH_COUNT_{T+1}. All regressions control for year and industry (2-digit SIC) fixed effects. Regression equations are estimated using pooled ordinary least squares (OLS) with White (1980) standard errors corrected for firm clustering.[18] Our focus is on the effect of REL_T on future stock price crash risk, that is, on the coefficient α_1.[19]

Table 2 shows the results of our regression analysis of equation (4), where we measure future firm-specific crash risk by NCSKEW_{T+1}, DUVOL_{T+1}, and CRASH_COUNT_{T+1} in columns 1 to 3, respectively. Across all three models,

[18]Standard errors corrected for clustering by both firm and year, by both industry and year, or by both county and year yield very similar results.

[19]To control for potential outliers, we winsorize top and bottom 1% regressor outliers, but not the dependent variables following Jin and Myers (2006) and Hutton et al. (2009). The regression results are qualitatively similar (untabulated) without winsorization.

TABLE 2

The Impact of Religion on Crash Risk

Table 2 estimates the cross-sectional relation between religiosity and future stock price crash risk. The sample covers firm-year observations with nonmissing values for all variables from 1971 to 2000. The *t*-statistics reported in parentheses are based on White (1980) standard errors corrected for firm clustering. Year- and industry-fixed effects are included. ** and *** indicate significance at the 5% and 1% levels, respectively. All variables are defined in the Appendix.

Dependent Variable	$NCSKEW_{T+1}$	$DUVOL_{T+1}$	$CRASH\_COUNT_{T+1}$
Test Variables			
REL_T	−0.077**	−0.055***	−0.134**
	(−2.06)	(−2.62)	(−2.34)
Control Variables			
$NCSKEW_T$	0.071***	0.045***	0.104***
	(9.06)	(10.34)	(13.53)
KUR_T	−0.003***	−0.001	−0.000
	(−2.83)	(−1.26)	(−0.40)
$SIGMA_T$	6.141***	−0.148	−4.657***
	(5.40)	(−0.24)	(−3.37)
RET_T	0.353***	−0.007	−0.365***
	(5.49)	(−0.19)	(−4.22)
MB_T	0.010***	0.006***	0.014***
	(6.69)	(8.23)	(6.14)
LEV_T	−0.044**	−0.044***	−0.133***
	(−1.99)	(−3.52)	(−4.03)
ROE_T	0.040***	0.021***	0.071***
	(4.19)	(4.14)	(5.46)
$LNSIZE_T$	0.080***	0.023***	0.093***
	(18.42)	(9.68)	(17.72)
$DTURNOVER_T$	0.357***	0.132***	0.430***
	(4.42)	(3.42)	(3.62)
AM_T	0.187***	0.106***	0.211***
	(5.89)	(6.16)	(4.42)
$LITIG\_RISK_T$	0.006	−0.010	−0.076
	(0.18)	(−0.53)	(−1.45)
Intercept	−1.585***	−0.453***	−1.862***
	(−16.05)	(−8.51)	(−15.22)
Year-fixed effects	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes
No. of obs.	80,391	80,387	80,404
Adj. R^2	4.03%	5.03%	4.79%

the estimated coefficients for REL_T are negative and significant at less than the 5% level (*t*-statistics = −2.06, −2.62, and −2.34). The results indicate that religiosity is negatively associated with future stock price crash risk, consistent with Hypothesis 1. These findings are consistent with the view that religion effectively curbs managerial incentive to hide bad news, thus reducing future stock price crash risk.

To further examine the economic significance of the results, we follow Hutton et al. (2009) by setting REL_T to their 25th and 75th percentile values, respectively, and comparing crash risk at the two percentile values while holding all other variables at their mean values. On average, the drop in stock price crash risk in any year corresponding to a shift from the 25th to the 75th percentiles of the distribution of religiosity is 4.99% of the sample mean (across alternative measures of crash risk). The specific percentages for $NCSKEW_{T+1}$, $DUVOL_{T+1}$, and $CRASH\_COUNT_{T+1}$ are 6.34%, 4.85%, and 3.78%, respectively. Comparing these results with evidence provided below indicates that the estimated impact of religiosity on firm-specific crash risk is similar in economic significance to the

impact of leverage on crash risk and to about half of the impact of accrual manipulation on crash risk.

Hilary and Hui (2009) find a negative relation between religiosity and corporate risk exposure measured by variance in equity return, and Chen et al. (2001) argue that more volatile stock is more likely to crash in the future. Thus, we explicitly control for SIGMA_T to make sure that the relation between religiosity and future crash risk is not simply driven by stock return volatility. Unreported robustness results show that the regression results on REL_T are very similar, even when we exclude SIGMA_T from the regression equation. In a similar vein, we also explicitly control for AM_T to make sure the relation between religiosity and future crash risk is not driven by accounting accrual manipulation (Hutton et al. (2009), McGuire et al. (2012)). Untabulated reports show that after we exclude AM_T from the regression equation, the regression results on REL_T become even stronger, suggesting that accounting accrual manipulation is only one of multiple ways to hide bad news.[20]

We now turn to our other control variables. Consistent with the findings of Chen et al. (2001), the coefficients on LNSIZE_T, NCSKEW_T, MB_T, and DTURNOVER_T are positive and significant across all three models. In addition, we observe negative coefficients on LEV_T and positive coefficients on AM_T, both of which are significant, consistent with the findings of Hutton et al. (2009). We calculate the change in NCSKEW_{T+1} (DUVOL_{T+1}, CRASH_COUNT_{T+1}) corresponding to a shift from the 25th to the 75th percentiles of AM_T, while holding all other variables at their mean values. The economic impact of AM_T on NCSKEW_{T+1} (DUVOL_{T+1}, CRASH_COUNT_{T+1}) is 13.98% (8.49%, 5.41%) of the sample mean.[21] Similarly, the economic impact of LEV_T on NCSKEW_{T+1} (DUVOL_{T+1}, CRASH_COUNT_{T+1}) is 5.67% (6.06%, 5.87%) of the sample mean.

B. Robustness Checks

We perform several robustness checks (untabulated) of our main results. We first reestimate regression equation (4) including dummy variables for each 4-digit SIC industry rather than for each 2-digit SIC industry, and the results hold. We also include firm-fixed effects to address the concern that omitted time-invariant firm characteristics may be driving the results. When analyzing the effect of religion on future stock price crash risk, endogeneity concerns arise because of omitted unobservable firm characteristics. Omitted variables affecting people's faith in religion and future stock price crash risk could lead to spurious correlations between religion and future stock price crash risk. We find that our results still hold when we include dummies for each firm. Similarly, we include county- or state-fixed effects to control for county- or state-level macroeconomic conditions (e.g., differences in the legal and cultural environments or in

[20]Untabulated results show that the estimated coefficients (t-statistics) on REL_T are -0.111 (-3.40), -0.073 (-3.99), and -0.184 (-3.74) at the 0.001 significance level (two-tailed) for the three models of NCSKEW_{T+1}, DUVOL_{T+1}, and CRASH_COUNT_{T+1}, respectively.

[21]Here, accrual manipulation has a larger economic impact on crash risk than does religion. However, the results in Sections IV.B and IV.C indicate that the economic impacts of religion on crash risk are sometimes much greater than those of accrual manipulation.

employee costs). We find that our results remain robust. The t-statistics for REL_T range between -1.93 and -2.83 for the series of tests.

Following Iannaccone (1998) and Hilary and Hui (2009), we also control for different county-level demographic variables, including the size of the population in the county; the percentage of people aged 25 years and older who have a bachelor's, graduate, or professional degree; the percentage of married people in the county; the male-to-female ratio in the county; the average income in the county; and the percentage of minorities in the county. We obtain the latter data from the 1990 and 2000 Surveys of the U.S. Census Bureau.[22] We linearly interpolate the data to obtain the values in the missing years from 1991 to 1999. Unreported results indicate that the negative coefficients for REL_T are robust to including these demographic variables in regression equation (4) (t-statistics $= -1.73$, -2.62, and -2.61).

As shown above, our robustness checks are focused on the issue of omitted correlated variables. Reverse causality, that is, the change in the religiosity of the headquarter county due to firm-specific crash risk, seems unlikely. We are also unaware of any theory suggesting a reverse relation. Therefore, we treat the religiosity of the county in which the headquarters of a firm is located as exogenous to the firm (e.g., Guiso, Sapienza, and Zingales (2006)). In addition, using current REL_T to predict future crash risk in the main regression analyses helps to alleviate any concern of reverse causality. Finally, our focus on interaction effects for Hypotheses 2 and 3 makes it much harder to argue for reverse causality.[23]

C. Testing the Other Hypotheses

1. Governance Monitoring Mechanisms and Religiosity

We use the number of state-level antitakeover statutes (STATUTES_T), the governance index of Gompers, Ishii, and Metrick (2003) (GINDEX_T), and the percentage of shares outstanding held by dedicated institutions (DED_T) to proxy for governance monitoring mechanisms. Prior studies indicate that state antitakeover laws can impede the threat of a hostile takeover and shield managers from shareholder pressure (e.g., Hackl and Testani (1988), Schwert (2000)), reducing the effectiveness of shareholder governance and monitoring. STATUTES_T is computed from the data provided by Bebchuk and Cohen (2003) on the number of state-level antitakeover statutes from 1986 to 2001. GINDEX_T measures the number of antitakeover provisions at the firm level. Gompers et al. establish that more antitakeover provisions are associated with poorer corporate governance and fewer shareholder rights.[24] DED_T is the percentage of shares outstanding

[22]The U.S. Census Bureau Web site (http://www.census.gov/main/www/cen1990.html and http://www.census.gov/main/www/cen2000.html) provides survey data of county-level demographic variables only for 1990 and 2000.

[23]Following Hilary and Hui (2009), we employed an instrumental variable two-stage least squares (2SLS) approach to control for the possible reverse causality (untabulated). We reestimated regression equation (4) using the fitted values of REL_T estimated from the first-stage regression of REL_T on instrumental variables, REL_T lagged by 3 years and the county population lagged by 3 years. Consistent with our main findings, the results remain robust.

[24]The Investor Responsibility Research Center (IRRC) collects and reports data about every 2 years (1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006). Similar to Gompers et al. (2003), we assume

held by dedicated institutions at the year-end. A larger percentage suggests better investor oversight and better corporate governance. Bushee (1998), (2001) provides evidence suggesting that dedicated institutional investors serve a monitoring role in effectively curtailing short-term myopic investment behavior by management. In a similar vein, Chen, Harford, and Li (2007) find that monitoring of acquisitions is facilitated by independent long-term institutions with concentrated holdings.

To allow for a more nuanced interpretation of the coefficients and to mitigate measurement problems, Panel A of Table 3 splits the sample into two subsamples based on the median number of state antitakeover laws and estimates each subsample separately.[25] This panel shows that the coefficients on REL_T are negative for both subsamples, but significant only for firms in states with an above-median (high) number of antitakeover statutes (t-statistics $= -3.84$, -4.30, and -3.51). Furthermore, the coefficients on REL_T are much larger in absolute value for the subsample with the above-median number of state antitakeover statutes than for the subsample with the below-median number of state antitakeover statutes.

In a similar fashion, Panel B of Table 3 splits the sample by above- and below-median GINDEX, and estimates each subsample separately. The coefficients on

TABLE 3

Differential Impact of Religion on Crash Risk: Governance Monitoring Mechanisms

Table 3 estimates the cross-sectional relation between religion, governance monitoring mechanisms, and future stock price crash risk. The sample covers firm-year observations with nonmissing values for all variables from 1971 to 2000. To conserve space, all control variables (as in Table 2) are suppressed. The t-statistics reported in parentheses are based on White (1980) standard errors corrected for firm clustering. Year- and industry-fixed effects are included. ** and *** indicate significance at the 5% and 1% levels, respectively. All variables are defined in the Appendix.

	Dependent Variable					
	NCSKEW_{T+1}		DUVOL_{T+1}		CRASH_COUNT_{T+1}	
Test Variables	High	Low	High	Low	High	Low
Panel A. State Antitakeover Statutes						
REL_T	−0.266***	−0.030	−0.159***	−0.035	−0.368***	−0.103
	(−3.84)	(−0.45)	(−4.30)	(−1.02)	(−3.51)	(−1.07)
No. of obs.	23,046	28,542	23,045	28,539	23,047	28,550
Adj. R^2	3.41%	3.16%	4.34%	3.15%	3.67%	2.82%
Panel B. Gompers, Ishii, and Metrick's Antitakeover Index (GINDEX)						
REL_T	−0.392***	0.088	−0.177***	0.031	−0.433**	0.070
	(−2.68)	(0.72)	(−2.70)	(0.53)	(−2.23)	(0.39)
No. of obs.	5,226	6,545	5,226	6,545	5,226	6,546
Adj. R^2	4.28%	5.08%	9.30%	8.91%	7.85%	6.58%
Panel C. Dedicated Institutional Ownership						
REL_T	−0.065	−0.148**	−0.036	−0.084**	−0.128	−0.113
	(−1.00)	(−2.18)	(−1.04)	(−2.46)	(−1.22)	(−1.13)
No. of obs.	20,892	20,893	20,892	20,892	20,892	20,895
Adj. R^2	4.32%	3.55%	6.00%	4.54%	4.87%	3.85%

that the index remains constant in the year(s) following the most recent report for years in which IRRC does not report GINDEX.

[25]Another advantage is to avoid having to discuss whether 3 state antitakeover statutes is "very different" from 4, or whether a GINDEX of 12 is "very different" from 13, or whether 6% dedicated institutional ownership yields much better investor monitoring than 5% dedicated ownership.

REL_T are negative and significant only for the above-median GINDEX group (t-statistics $= -2.68$, -2.70, and -2.23). Furthermore, the coefficients on REL_T are much larger in absolute value for the above-median GINDEX group than for the below-median GINDEX groups. Panel C of Table 3 examines the role of dedicated institutions in mediating the relation between religion and future price crash risk. It shows that the coefficients on REL_T are negative for both above- and below-median holdings by dedicated institutional investors, but significant only for below-median holdings in two of the three stock price crash risk specifications (t-statistics $= -2.18$ and -2.46).

To compare the differences in the estimated coefficients of REL_T across the subsamples, we interact REL_T with a binary dummy, HISTATUTES, that equals 1 for above-median number of state antitakeover laws, and 0 otherwise. The results (untabulated) show that the estimated coefficients on the interaction term $REL_T \times HISTATUTES_T$, which captures the differential impact of REL_T on future stock price crash risk from the above-median number of state antitakeover statutes, are negative and significant for $NCSKEW_{T+1}$ and $DUVOL_{T+1}$ (t-statistics $= -2.21$ and -2.03) and negative and marginally significant for $CRASH\_COUNT_{T+1}$ at the 10.5% level (t-statistic $= -1.62$). We obtain the similar results when we interact REL_T with the binary variables of $GINDEX_T$ and dedicated institutional holdings.

Overall, the findings in Table 3 are consistent with Hypothesis 2, namely, that religiosity functions as a substitute mechanism for (external) monitoring in curbing managerial bad-news-hoarding behavior. These results are consistent with those of Grullon et al. (2010) and McGuire et al. (2012), who find that the impact of religion on investor welfare is contingent on the strength of the firm's governance environment.

2. Firm Risk and Religiosity

Next we investigate whether the riskiness of the firm has an impact on the relation between religiosity and future stock price crash risk. Empirically, we use leverage, LEV_T, and earnings volatility, $EARNINGS\_VOL_T$, to proxy for the riskiness of the firm.[26] To the extent that bankruptcy costs are significant, levered firms are going to be more risky on average than unlevered firms. $EARNINGS\_VOL_T$ is measured by the standard deviation of earnings excluding extraordinary items and discontinued operations, deflated by the lagged total equity over the current and prior 4 years.

Panel A of Table 4 estimates regression equation (4) separately for subsamples with above- and below-median leverage. We find that although the coefficients on REL_T are negative for both subsamples, the coefficients are significant only for firms with above-median leverage (t-statistics $= -2.30$, -2.65, and -2.52). Furthermore, the coefficients on REL_T are much larger in absolute value for the subsample with above-median leverage than for the subsample with below-median leverage. Similarly, Panel B of Table 4 estimates regression equation (4)

[26]Given that our dependent variables are defined in terms of returns, we do not measure firm risk using a return metric.

separately for subsamples with above- and below-median earnings volatility. We find that although the coefficients on REL_T are negative for both subsamples, the coefficients are significant only for firms with above-median volatility (t-statistics $= -2.05$, -3.03, and -2.52). Furthermore, the coefficients on REL_T are much larger in absolute value for the subsample with above-median volatility than for the subsample with below-median volatility.

TABLE 4

Differential Impact of Religion on Crash Risk: Risk Taking

Table 4 estimates the cross-sectional relation between religion, risk taking, and future stock price crash risk. The sample covers firm-year observations with nonmissing values for all variables from 1971 to 2000. To conserve space, all control variables (as in Table 2) are suppressed. The t-statistics reported in parentheses are based on White (1980) standard errors corrected for firm clustering. Year- and industry-fixed effects are included. ** and *** indicate significance at the 5% and 1% levels, respectively. All variables are defined in the Appendix.

	Dependent Variable					
	$NCSKEW_{T+1}$		$DUVOL_{T+1}$		$CRASH\_COUNT_{T+1}$	
Test Variables	High	Low	High	Low	High	Low
Panel A. Financial Leverage						
REL_T	−0.119**	−0.034	−0.075***	−0.036	−0.197**	−0.070
	(−2.30)	(−0.67)	(−2.65)	(−1.26)	(−2.52)	(−0.90)
No. of obs.	40,195	40,196	40,191	40,196	40,204	40,200
Adj. R^2	3.29%	5.15%	4.84%	5.81%	4.65%	5.42%
Panel B. Earnings Volatility						
REL_T	−0.110**	−0.037	−0.090***	−0.019	−0.194**	−0.065
	(−2.05)	(−0.77)	(−3.03)	(−0.73)	(−2.52)	(−0.82)
No. of obs.	40,189	40,189	40,185	40,189	40,201	40,190
Adj. R^2	3.16%	5.75%	4.18%	8.16%	3.72%	6.89%

We also run regression equation (4) incorporating the interaction of REL_T with the binary dummy, $HILEV_T$, that equals 1 for above-median leverage, and 0 otherwise. The estimated coefficients (untabulated) on the interaction term $REL_T \times HILEV_T$ are negative and significant for $DUVOL_{T+1}$ (t-statistic $= -2.28$) and negative and marginally significant for $NCSKEW_{T+1}$ and $CRASH\_COUNT_{T+1}$ at the 17.6% and 10.3% levels (t-statistics $= -1.35$ and -1.63). The results remain similar when we incorporate the interaction of REL_T with the binary variable of earnings volatility.

Taken together, the results in Table 4 are by and large consistent with Hypothesis 3, namely, that the influence of religiosity on future crash risk is more concentrated (negative) in riskier firms.

D. Verification of Bad News Hoarding in Stock Price Crash

The literature on crash risk is based on the maintained hypothesis that idiosyncratic crashes are caused by bad news hoarding. By and large, the literature tests the implications of this maintained hypothesis but refrains from testing the maintained hypothesis per se because of empirical difficulties. How is the researcher to know if bad news is being hoarded ex ante if the market does not know? But even ex post, it is impossible to determine in all but the most infamous cases that bad news hoarding was the cause of the crash based on public

information such as firm press releases or from the press itself. But then how are we to know whether the crash is the result of bad news hoarding or simply the result of "unexpected events," that is, idiosyncratic risk?[27]

To try to ensure that the subsequent crash is a consequence of bad news hoarding, we focus on firms that restated accounting data and suffered a stock price crash as a result. The restatement firms in our sample are those involved in accounting irregularities that resulted in material misstatements of financial results. Generally, these irregularities are discovered at least 1 year, and often many years, after the event and involve hiding poor revenues or increased expenses (or both) by management.[28] In other words, these are firms that we are fairly certain suffered a crash because management hid negative information.

We initially collect data for a sample of restatement firms identified by the U.S. General Accounting Office (2002) available from Jan. 1997. These restatements "involved accounting irregularities resulting in material misstatements of financial results." To complement this sample, we include nonoverlapping restatements from the SEC's Accounting and Auditing Enforcement Releases (AAERs) available from Sept. 1995.[29] We also hand-collect data on the impact of the restatement on net income from the restatement announcements. We further impose the restriction that restating firms must have the necessary financial and equity data on Compustat and CRSP. We restrict the restatement sample to the period that overlaps our primary results, yielding a total of 458 distinct restatements from 1995 to 2000.

Based on equation (1), we calculate firm-specific daily returns for the restatement sample on the day of and the day after the restatement announcement. Following Hutton et al. (2009), we define a stock price crash if the firm-specific daily return on either of the 2 days is 3.09 standard deviations below the annual mean. Table 5 shows that of the 458 firms in the restatement sample, 140 restatements result in stock price crash over the 2-day window. The mean firm-specific daily return for the 140 crash events is -35.33% (t-statistic $= -17.43$, p-value < 0.0001). These restatements also show a nontrivial adverse impact on net income, a mean reduction of -16.91% of shareholders' equity (t-statistic $= -2.47$, p-value $= 0.016$). Thus, restatements followed by crashes are consistent with the bad-news-hoarding interpretation of firm-specific stock price crashes. Specifically, managers withhold firm-specific income-decreasing news from investors by overstating financial results, and accumulate the adverse information until the restatement announcement date when the revelation of bad news results in a corresponding crash, an extreme negative return.

For each of 140 firms in the sample, we further identify firms in the same industry from the group of restatements firms that did not suffer a crash. From the latter, we choose a control firm whose total assets are closest to those of the treatment firm (in the same industry). We compare the mean of the firm-specific daily

[27]Note that we control for idiosyncratic risk in our regression analysis.

[28]Irregularities discovered within the year are corrected in that year and do not result in restatements.

[29]The SEC Web site (http://www.sec.gov/divisions/enforce/friactions/friactions1999.shtml) is the source of the AAER data.

TABLE 5

Bad News Hoarding, Restatements, and Crash Risk

Table 5 describes the mean firm-specific daily returns for the day of and the day after the restatement announcement, the impact of the restatement on net income, and the mean and median REL for the group of restatements with crashes versus a matched control group of restatements without crashes (matched by industry and size). ** and *** indicate significance at the 5% and 1% levels, respectively.

	No. of Obs.	Mean Firm-Specific Daily Returns	Mean Impact of Restatement on Net Income (% of Shareholders' Equity)	Mean REL	Median REL
Treatment Group					
Restatements with crash	140	−35.33%	−16.91%	51.55%	50.76%
t-statistic for $H_0 = 0$		−17.43***	−2.47**		
Matched Control Group (Matched by Industry and Size)					
Restatements without crash	140	−1.58%	−4.80%	55.05%	57.63%
t-statistic for $H_0 = 0$		−2.74***	−1.56		
t-statistic for difference between groups		10.54***	2.25**	2.40**	3.92***

returns and the mean impact on net income for both groups. As shown in Table 5, the mean firm-specific daily return for the control group is −1.58%, which is much less negative than for the treatment group. The difference in returns for the two groups is statistically significant (t-statistic = 10.54, p-value < 0.0001). The mean impact of restatements on net income for the control group is −4.80% of shareholder's equity, which is significantly smaller than the group of restatements with crashes (t-statistic = 2.25, p-value = 0.026). The comparison suggests that relative to the control group, the group of restatement firms that suffered a crash were much more likely to have hoarded material bad news from investors.

We further calculate mean and median values of REL for the restatement group with crashes and the control group.[30] The differences in mean and median values of REL between the two groups are −6.40% (= (0.5155 − 0.5505)/0.5505) and −11.92% (= (0.5076 − 0.5763)/0.5763), respectively. The restatement group with crashes demonstrates significantly lower levels of religiosity as compared to the control group (t-statistic = 2.40, p-value = 0.017 for the difference in means). These results are broadly consistent with the idea that firms headquartered in areas with higher levels of religiosity are less likely to hoard bad news and, thus, are less prone to crashes.

V. Conclusion

This study investigates whether religiosity is negatively associated with future stock price crash risk. We find robust evidence that firms located in U.S. counties with high levels of religiosity exhibit low levels of future stock price crash risk. This negative association is incrementally significant even after controlling for accruals manipulation (Hutton et al. (2009)), trading volumes and past returns (Chen et al. (2001)), and other factors known to affect stock price crash risk. These results are consistent with our conjecture that religious social norms

[30]The inference remains similar when we use nonrestatement Compustat firms (matched by industry and size) as an alternative control group.

can effectively curb managerial bad-news-hoarding activities within firms, thus decreasing future stock price crash risk.

Our evidence further shows that the negative relation between religiosity and future stock price crash risk is more salient for firms with weak governance monitoring mechanisms as measured by shareholder takeover rights and dedicated institutional ownership. These findings enrich our understanding of the influence of religion on future stock price crash risk and shed light on how social norms interact with corporate monitoring mechanisms to reduce agency costs. We also find a more pronounced negative relation between the degree of county-level religiosity and future crash risk for riskier firms.

This study complements the existing literature on religion and corporate behavior. Our study supports extant evidence that religiosity brings significant benefits to firms and their shareholders. In addition, our results are consistent with the view that sociological factors matter for influencing corporate culture and behavior (Hilary and Hui (2009)). We expect that numerous noneconomic cultural factors besides religious norms also affect corporate behavior and have similar economic implications. These factors are worth researching further, especially if they help to mitigate the kinds of corporate crises we are currently experiencing and reduce the incidences of extreme outcomes in the capital markets that have a material impact on the welfare of investors.

Appendix. Variable Definitions

Crash Risk Measures

NCSKEW is the negative coefficient of skewness of firm-specific daily returns over the fiscal year.

DUVOL is the log of the ratio of the standard deviation of firm-specific daily returns for the "down-day" sample to standard deviation of firm-specific daily returns for the "up-day" sample over the fiscal year.

CRASH_COUNT is the number of firm-specific daily returns exceeding 3.09 standard deviations below the mean firm-specific daily return over the fiscal year, minus the number of firm-specific daily returns exceeding 3.09 standard deviations above the mean firm-specific daily return over the fiscal year, with 3.09 chosen to generate frequencies of 0.1% in the normal distribution.

We estimate firm-specific daily returns from an expanded market and industry index model regression for each firm and year (Hutton et al. (2009)):

$$\text{(A-1)} \qquad r_{j,t} = \alpha_j + \beta_{1,j} r_{m,t-1} + \beta_{2,j} r_{i,t-1} + \beta_{3,j} r_{m,t} + \beta_{4,j} r_{i,t} + \beta_{5,j} r_{m,t+1} + \beta_{6,j} r_{i,t+1} + \varepsilon_{j,t},$$

where $r_{j,t}$ is the return on stock j on day t, $r_{m,t}$ is the return on the CRSP value-weighted market index on day t, and $r_{i,t}$ is the return on the value-weighted industry index based on the 2-digit SIC code. The firm-specific daily return is the natural log of (1 plus the residual return from the regression model).

Religious Measure

REL is the number of religious adherents in the county compared to the total population in the county (as reported by ARDA).

Other Variables

KUR is the kurtosis of firm-specific daily returns over the fiscal year.

SIGMA is the standard deviation of firm-specific daily returns over the fiscal year.

RET is the cumulative firm-specific daily returns over the fiscal year.
MB is the ratio of the market value of equity to the book value of equity measured at the end of the fiscal year.
LEV is the book value of all liabilities divided by total assets at the end of the fiscal year.
ROE is the income before extraordinary items divided by the book value of equity at the end of the fiscal year.
LNSIZE is the log value of market capitalization at the end of the fiscal year.
DTURNOVER is the average monthly share turnover over the fiscal year minus the average monthly share turnover over the previous year, where monthly share turnover is calculated as the monthly share trading volume divided by the number of shares outstanding over the month.
AM is accrual manipulation, computed as the 3-year moving sum of the absolute value of annual performance-adjusted discretionary accruals developed by Kothari et al. (2005).
LITIG_RISK is equal to 1 for all firms in the biotechnology (4-digit SIC codes 2833–2836 and 8731–8734), computer (4-digit SIC codes 3570–3577 and 7370–7374), electronics (4-digit SIC codes 3600–3674), and retail (4-digit SIC codes 5200–5961) industries, and 0 otherwise (Francis et al. (1994)).
STATUTES is the number of state-level antitakeover statutes.
HISTATUTES is an indicator variable that equals 1 if the number of the state antitakeover statutes is greater than the sample median, and 0 otherwise.
GINDEX is the governance index of Gompers et al. (2003).
DED is the percentage of shares outstanding held by dedicated institutions at the end of the year.
HILEV is an indicator variable that equals 1 if LEV is greater than the sample median, and 0 otherwise.
EARNINGS_VOL is the standard deviations of earnings excluding extraordinary items and discontinued operations, deflated by the lagged total equity over the current and prior 4 years.

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