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Essays in Workplace Safety Issues in Finance

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ESSAYS IN WORKPLACE SAFETY ISSUES IN FINANCE

A Dissertation

by

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ABSTRACT

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I examine how firms address workplace safety issues considering their value implication. In my first essay, I investigate the relation between workplace safety and inside debt held by the CEO in form of pension benefits and deferred compensation. To mitigate the endogeneity of CEO inside debt design, I exploit variation generated by the implementation of the Internal Revenue Code Section 409A Final Regulations. Consistent with the long-term orientation hypothesis, I find strong evidence of lower establishment-level work-related injuries and illnesses in firms whose CEOs have higher relative inside debt. I also document that CEOs inside debt holdings are associated with both adopting employee-friendly corporate policy and reducing firms' risk-taking behavior. The effect of CEO inside debt on workplace safety is more pronounced in firms with high labor union coverage and cash flow volatility and low CEO ownership. The finding has a cost implication for bank financing in the sense that banks charge higher loan spreads to firms with higher workplace injuries and illnesses.

In the second essay, I investigate the effect of local religiosity on employee treatment, proxied by workplace safety incidents. Using the establishment-level data compiling on the

incidents of work-related injuries, I find that employees of the establishments in more religiouscounties get less injured than those in less religious counties. I further find that a reduction in occupational accidents is irrelevant for risk-based cross-sectional groups and more evident for establishments in counties dominated by one religious denomination. This analysis mitigates the concerns for a risk-based explanation of religiosity on employee treatment and strengthens my argument on community solidarity and homophiles stemmed from religious networks. Firms whose establishments are located in high religious counties are less likely to violate workplace conduct and more likely to take workplace safety measures. Moreover, firms with more work-related injuries exhibit poorer firm performance. Overall, my findings suggest that local religiosity has a value implication through human capital protection.

DEDICATION

I would like to dedicate my Ph.D. dissertation to my lovely wife, Ishrat Tarannum, and my dearest daughter, Ruwaida Tarannum, for their unconditional support. Without her support, I could not be what I am today. Thank you for your love and support throughout my doctoral studies.

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All errors are mine.

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CHAPTER I

INTRODUCTION

This dissertation consists of two essays on workplace safety issues in finance. In the first essay, I explore the role of CEO inside debt on workplace safety and its cost implication. In the second essay, I examine the effect of local religiosity on workplace safety and firm value.

The first easy examines CEO inside debt influence workplace safety outcomes with a cost implication of external financing. To solve the endogeneity problem, I use Internal Revenue Code Section 409A of Final Regulations as an exogenous shock to CEO inside debt holding. I collect workplace safety data from the Occupational Safety and Health Administration (OSHA) for the period from 2006 to 2011 and my final sample consists of 29,771 establishment-year observations with 622 unique firms and 2,834 unique establishments. Consistent with the hypothesis that inside debt induces CEOs' long-term orientation, I find evidence of lower work-related injuries and illnesses in firms whose CEOs have a higher level of relative inside debt. Finally, as a value implication, I show that workplace injury increases the conflict between the creditors and shareholders over the riskiness of the investment. As a result, banks tend to charge higher loan spreads, when they issue loans to firms with higher workplace injuries and illnesses.

In the second essay, I examine whether establishment county religiosity affects managerial attitude toward employee treatment, proxied by workplace injury and illness rates. I use the ordinary least square method to examine this relation. In the robustness check, I use difference-in-difference, instrumental variable, and changes in fixed effects model estimations. I show that a reduction in occupational accidents is irrelevant for risk-based cross-sectional groups and more evident for establishments in counties dominated by one religious denomination. This analysis mitigates the concerns for a risk-based explanation of religiosity on employee treatment and strengthens my argument on community solidarity and homophiles stemmed from religious networks. Firms whose establishments are located in high religious counties are less likely to violate workplace conduct and more likely to take workplace safety measures. Moreover, firms with more work-related injuries exhibit poorer firm performance. Overall, my findings suggest that local religiosity has a value implication through human capital protection.

The rest of the document proceeds as follows. Chapter II presents the first essay. Chapter III presents the second essay. Each chapter contains a brief literature review, data and summary statistics, empirical methodologies, results, and conclusion. Chapter IV summarizes the dissertation.

CHAPTER II

CEO INSIDE DEBT AND WORKPLACE SAFETY

2.1 Introduction

Inside debt[1] has been shown as an important instrument to align the incentives of the CEO with those of creditors since it mitigates the conflict of interest over investments in risky projects[2]. As a result, firms whose CEOs have higher inside debt holdings, have better access to external financing and lower cost of refinancing (Anantharaman et al., 2014 and Dang and Phan, 2016). Although a few studies (Shen and Zhang, 2020 and Borah et al., 2020) show that CEO inside debt also aligns interest between managers and shareholders, the recognition of its importance on other key stakeholders (e.g., employees) of the firm is largely ignored. In this paper, I aim to fill the void in the literature by examining the effect of CEO inside debt on workplace safety and further investigate its cost implication for banks financing.

[1] Inside debt, in form of pension benefits and deferred compensation is unsecured and unfunded (Sundaram and Yermack, 2007). The susceptibility of these plans to the financial distress or liquidation value of firms in the bankruptcy reduces CEOs' appetite for risky investment (Edmans and Liu, 2011). This is the key point to argue that inside debt aligns the incentives of CEOs with those of debt-holders. Throughout this paper (unless explained otherwise), inside debt indicates relative CEO inside-equity ratio with respect to firm debt-equity ratio.

[2] See Bebchuk and Jackson (2005); Sundaram and Yermack (2007); Wei and Yermack (2011); Edmans and Liu (2011); Anantharaman et al. (2014); Dang and Phan (2016); Cassell et al. (2012); and Phan (2014), among others.

On one hand, workplace safety could be improved in firms with higher CEO inside debt holdings for two reasons. First, inside debt, in form of pension benefits and deferred compensation is debt-like compensation, which is normally unsecured and unfunded obligations of firms (Sundaram and Yermack, 2007). This debt-like compensation exposes CEOs to the same susceptibility to the financial default or poor liquidation value of the firm as creditors are exposed for their debt payoffs, which reduces CEOs' appetite for risky investment (Jensen and Meckling, 1976; Edmans and Liu, 2011; and Cassell et al., 2012). Second, pension benefits and other deferred compensations are long-term contracts, which encourage managers to engage in long-term investments such as innovation (Lee, 2019). Lee (2019) argues that inside debt is a failure-tolerant and long-term success-rewarding component of compensation to encourage managers to work for the long-term interest of the firm. When inside debt induces managers' risk-averse and a long-term orientation, it can be argued that managers' discretionary investments such as workplace safety investment may not be vulnerable to cuts. This could lead to a better workplace environment and in turn, lower work-related injuries and illnesses in firms with higher CEO inside debt.

On the other hand, workplace safety could be worsened in firms with higher CEO inside debt holdings for other two important reasons. First, a higher level of inside debt holdings could tilt managers' interests toward debt holders (Liu et al., 2014) and result in lower firm value for their weak risk appetites (Caliskan and Doukas, 2015). This can create a conflict of interest between managers and shareholders. As a result, shareholders, particularly transient institutional investors who trade based on price fluctuations, may create short-term performance pressure for CEOs (Bushee, 2001). Second, inside debt encourages managerial conservatism (Wang et al., 2018). When CEOs are conservative, they are more likely to rely heavily on internal cash flows to

finance investment (Han and Pan, 2016). Mo et al. (2019) also show that CEO inside debt leads to a lower net hiring. So, the short-term performance pressure from managers' and shareholders' conflicting interests, and managers' conservatism in external financing and net hiring can make the investment in workplace safety more vulnerable to cuts. This could lead to a positive relation between CEO inside debt and workplace injuries and illnesses.

Testing these competing hypotheses faces a challenge that arises due to the endogenous determination of the components of CEO compensation. It is plausible to expect that components of a CEO compensation contract are influenced by the firm's investment opportunities that also influence workplace safety. For example, Palia (2001) shows that "compensation and firm value are simultaneously determined by many firm characteristics that are unobservable and difficult to measure" (such as differences in technology or intangibles). To mitigate the endogeneity of CEO inside debt design, I exploit variation generated by the implementation of the Internal Revenue Code Section 409A[3] Final Regulations. Section 409A is implemented to restrict the withdrawal of pension benefits and other deferred compensation prior to the timing initially designed for[4]. So, it brings an exogenous variation (positive shock) to CEO inside debt holdings. The advantage of Section 409A is that it allows for examining the changes in workplace safety outcomes (e.g., injuries and illnesses) when CEO inside debt holdings vary. This tax law change serves as a good empirical setting (difference-in-difference) for this study.

[3] See more details at https://www.irs.gov/newsroom/frequently-asked-questions-sec-409a-and-deferred-compensation

[4] Prior to the implementation of Section 409A, executives are allowed to withdraw all or part of their deferred compensation at any time for any reason, reducing their debt-like compensation less susceptible to default risk (Shen and Zhang, 2020). But the implementation of Section 409A restricts this flexibility in order to prevent executives from manipulating and abusing deferred compensation (O'Brien, 2008). Failure of compliance of the Section 409A, CEO's compensation is subject to extra taxation (20%) and penalty.

Using the establishment-level workplace injuries and illnesses data, a proxy variable of workplace safety, from the Occupational Safety and Health Administration (OSHA) for the period from 2006 to 2011, I find that CEO inside debt significantly mitigates workplace injuries and illnesses incidence. Specifically, the result provides evidence of lower work-related injuries and illnesses in firms with CEOs holding higher relative debt-like compensation as forms of pension benefits and deferred compensation. This finding is consistent with the long-term orientation hypothesis that to attenuate the sensitivity of debt-like compensation payoffs to the long-term value of the firm, inside debt helps align CEO interest in line with employees.

I, next, explore possible mechanisms through which CEO inside debt positively improves a firm's workplace safety. In line with the long-term orientation hypothesis, I first find that CEOs with higher inside debt positively influence workplace safety by adopting an employee-friendly corporate policy. A better employee-friendly corporate culture helps firms to hire a highly skilled labor force, resulting in lower workplace injuries and illnesses (Faleye and Trahan, 2011; Boubaker et al., 2019; and Orrenius and Zavodny, 2009). Second, I document that inside debt decreases CEOs' risk appetites. Edmans and Liu (2011) argue that the value of CEO inside debt is sensitive to the probability of bankruptcy and the reorganization of the firm, which suggests that CEOs with higher inside debt will make decisions that will reduce the overall risk of the firm. This is consistent with Lee's view (2019) presenting evidence that inside debt is "a long-term commitment contract and largely independent of short-term performance" pressure. When CEOs become risk-averse attitude due to holding a higher level of inside debt, they seem not to increase workload, extra working hours, and assign an inappropriate task for employees, which leads to decreasing employee stress-related workplace injury. Combined, I show that adopting the

employee-friendly corporate culture and reducing CEOs' risk appetite serve as important channels through which CEOs inside debt positively influences workplace safety.

In the cross-sectional analyses, I investigate to which extent the nature of the relation is affected by different sensitivities across firms and the outside market environment. Specifically, I examine the sensitivity of CEO inside debt effect on workplace injury with respect to union coverage, cash flow volatility, and CEO ownership. The results show that the relation significantly varies with respect to these sensitivities. For example, I document a complementary effect of inside debt in firms whose employees are highly unionized. This result suggests that CEOs acting in the debt holders' interest due to holding higher inside debt are more likely to settle workers' concerns such as workplace safety issues in firms that have high union coverage. CEOs with higher inside debt tend to hedge against cash flow sensitivity and act as insurance for workplace safety. As a result, the negative effect of inside debt on workplace injury is more pronounced in firms with high cash flow volatility. I document a similar role of CEO inside debt in firms with lower CEO stock ownership. Lower CEO stock ownership matters for workplace safety because a higher level of stock ownership aligns CEO interest in line with that of shareholders (Sundaram and Yermack, 2007 and Edmans and Liu, 2011). Under stock ownership, CEOs may stress short-term performance, resulting in higher workplace injuries.

As a financial consequence of workplace safety and motivation of CEOs with higher inside debt holdings to decrease work-related injuries and illnesses, I empirically show that workplace injury is positively associated with loan spreads. I argue that creditors consider workplace injury as the riskiness of managers and a reflection of asset substitutions from debt holders to shareholders. Since the riskiness and asset substitution increases the conflict of interest between

shareholders and creditors, banks charge higher loan spreads to firms with higher workplace injuries and illnesses to minimize the loan default risk. This result suggests that a cost implication of banking financing for firms with higher workplace injuries and illnesses.

This study contributes to the literature in several strands. First, I show that inside debt, in addition, to align the interest between managers and debtholders, also aligns managers' incentives with those of other non-financial stakeholders, e.g., employees. As a result, CEOs with higher inside debt tend to adopt a more employee-friendly corporate policy. Second, this study shows a cost-saving implication of workplace safety from bank financing. I show that workplace injury increases the conflict between shareholders and creditors over-investment in risky projects. Creditors price this conflicting interest by charging higher loan spreads. Finally, this study adds to those investigating the effect of CEO inside debt holdings on corporate investment policies and determinants of workplace safety.

The remainder of the chapter is organized as follows: Section 2.2 discusses related literature and develops hypotheses. Section 2.3 presents data and summary statistics. Section 2.4 discusses the empirical methodology and main results. Section 2.5 concludes this chapter.

2.2 Literature review and hypothesis development

2.2.1 Importance of workplace safety

The literature on the importance of workplace safety suggests several implications for both society and firms. For example, Konstantinidis et al. (2011) find that work-related injury is associated with a significant burden for society. Because, workplace injuries affect not only the injured workers but also their families, colleagues, and communities as a whole (Konstantinidis et

al., 2011; Newnam et al., 2014; and Schulte et al., 2017). Dong et al. (2016) and Boden (2005) suggest that workplace injuries not only lead to disability but also income loss. This income loss can not be compensated by their compensation benefits (Brown et al. 2007). Apart from these individual and social impacts, Galizzi and Zagorsky (2009) document a broader economic impact of workplace injuries and illnesses. They observe that injured workers significantly decrease their consumption for those days they are away from work due to injuries and illnesses.

On the other hand, from a firm perspective, survey evidence by Huang et al. (2007) shows that an effective safety program leads to increased productivity, reduced cost, retention, and increased satisfaction among employees, and vice-versa. McCaughey et al. (2013) find that workplace injuries and illnesses lead to employee stress, job dissatisfaction, and turnover intention. Li (2020) estimates that the monetary value of the productivity lost due to work-related injuries and illnesses is 1.3 times the costs saved from fewer injuries. Cohn and Wardlaw (2016) document a negative relation between workplace injuries and firm value. They compute the loss of firm value equal to an estimated cost per injury of $98,924. The actual cost (e.g., increased turnover, employee morale, insurance premia, reduced productivity) associated with individual injury is likely to be higher than the estimation (Danna and Griffin, 1999). These groups of studies show the importance of workplace safety considering both social and economic perspectives.

Some management literature implies that upper-level managers can affect workplace safety outcomes (e.g., injury or death). For example, Sawacha et al. (1999) find that senior-level managers' attitudes toward workplace safety can improve workplace safety outcomes[5]. Griffiths

[5] They also suggest several key factors that positively impact workplace safety performance, which are (1) management talk on safety; (2) provision of safety booklets; (3) provision of safety equipment; (4) providing safety environment and (5) appointing a trained safety representative on site.

(1985) documents a negative relation between senior-level managers' commitment and work-related injuries. However, empirical evidence on the determinants of workplace injuries and illnesses with respect to different aspects of firms that require top-level managers' involvement is rather limited. Recently, Caskey and Ozel (2017) show that firms that meet earnings expectations tend to have higher work-related injuries and illnesses. They argue that top managers of those firms can reasonably adjust their discretionary safety expenditure and increase workloads to achieve short-term earnings targets. Cohn and Wardlaw (2016) show empirical evidence that investment in workplace safety is at the managers' discretion. Top-level managers can adjust their investment needs by exploiting the internal fund initially set for improving workplace safety. When this safety fund is vulnerable to financing constraints, firms are likely to experience higher-level of workplace injuries and illnesses. But Filer and Golbe (2003) document a positive relation between firms' financial leverage and workplace safety. So, my understanding of the determinants of workplace injury is not only limited but also inconclusive based on the recent studies (such as Cohn and Wardlaw, 2016 versus Filer and Golbe, 2003), which warrants further empirical investigation on the determinants of workplace safety.

2.2.2 CEO inside debt and workplace safety

Following the seminal work by Jensen and Meckling (1976), empirical researchers focus on executive's compensation to relate its importance to corporate investment and financing policies (see, DeFusco et al., 1990; Fenn and Liang, 2001; Coles et al., 2006; and Gormley et al., 2013). Though compensation is initially set to motivate managers to work in the best interest of the shareholders (Brozobsky and Sopariwala, 1995), CEOs cannot neglect the relative interest of the other primary stakeholders, for example, employees (Arora and Alam, 2005). Because

managerial actions affect all other stakeholders of the company in addition to shareholders (Freeman, 1984 and Friedman, 1962). The stakeholder theory (Freeman, 1984) suggests that executives balance the interests and manage the responsibility of various stakeholders. Though the effect of executive compensation on other primary stakeholders is not well recognized, recently, a growing body of literature investigates the importance of managerial debt-like components of total compensation, in form of pension benefits and deferred compensation, on several aspects of corporate policies (see, Bebchuk and Jackson, 2005; Sundaram and Yermack, 2007; Wei and Yermack, 2011; and Edmans and Liu, 2011). Pension benefits and deferred components of CEO compensation are debt-like compensation in the sense that these portions are paid off to the executives at a fixed amount or after their retirement conditioning that firms are solvent at that time. The accrued benefits under these plans are unsecured and unfunded which resemble the debt holders' claimants (Sundaram and Yermack, 2007). The susceptibility of these plans to the financial distress or liquidation value of a firm in bankruptcy reduces CEOs' appetite for risky investment (Jensen and Meckling, 1976 and Edmans and Liu, 2011). This is the ground to argue that inside debt aligns the incentives of the CEO with those of debt-holders.

Empirical studies grounded on this interest alignment between managers and debt holders provide ample evidence. For example, Anantharaman et al. (2014) show that inside debt reduces the agency cost of debt. Dang and Phan (2016) show that firms whose CEOs hold a higher level of inside debt have better access to external debt financing and reduced refinancing risk. Cassell et al. (2012) show that CEOs with higher inside debt holding tend to exhibit a lower level of risk-taking behavior. They document a lower level of stock return volatility, R&D expenditure, and financial leverage in firms whose CEOs have higher inside debt holdings. Phan (2014) documents

that CEOs with higher inside debt holdings lead to positive (negative) M&A announcement abnormal bond (stock) returns. In addition to this risk-related interest alignment, inside debt also encourages CEOs toward long-term orientation for future performance (Lee, 2019).

Considering these risk-averse attitudes and long-term orientation induced by inside debt holdings, I assume that firms whose CEOs have higher inside debt are likely to experience lower work-related injuries and illnesses. The idea is that if CEOs are long-term oriented, investment in workplace safety may not be vulnerable to the cuts for risky and short-term performance generating investment projects. I formally formulate the first hypothesis of this study as follows:

H1: CEO inside debt positively affects workplace safety performance, resulting in lower work-related injuries and illnesses (Long-term orientation hypothesis**)**.

While I focus on the long-term orientation perspective of CEO inside debt, two other important considerations of CEO inside debt may explain the negative relation between CEO inside debt and workplace safety performance. First, short-term performance pressure due to increasing the conflict of interest between managers and shareholders. Extant literature (e.g., Liu et al., 2014) shows that CEOs with higher inside debt favor debtholders as oppose to shareholders. This risk-aversion can instigate a conflict of interest between managers and shareholders. Caliskan and Doukas (2015) suggest that firm value can be lower due to managers' weak risk appetite for inside debt holding. As a result, shareholders, particularly short-term institutional investors, may create short-term performance pressure for CEOs (Bushee, 2001). Second, inside debt induces managerial conservatism (Wang et al., 2018). When CEOs are conservative, they are more likely to rely heavily on internal cash flows to finance the investment (Han and Pan, 2016). CEO

conservatism due to higher inside debt holdings has an important impact on labor investment efficiency. For example, Mo et al. (2019) find that CEO inside debt is associated with a lower net employee hiring. The short-term performance pressure emanated from managers' and shareholders' conflict of interest, and managers' conservatism in heavily rely on the internal fund for financing investment and net hiring, may explain the negative relation between CEO inside debt and workplace safety performance. So, I entertain the possibility of a negative relation between CEO inside debt and workplace safety performance, resulting in higher work-related injuries and illnesses.

2.3 Data, Variables, and Summary Statistics

In this section, I outline how I combine different datasets from several data sources to make the complete sample and describe how I construct different variables to test the competing hypotheses. This section is concluded with summary statistics for the sample of firms.

2.3.1 Data Sources

The several data sources include The Occupational Safety and Health Administration (OSHA), ExecuComp, Compustat, CRSP, CRSP-Compustat merged, and MSCI(KLD) databases. Firstly, I obtain establishment-level workplace injuries and illnesses data from the OSHA. The OSHA ensures safe and healthy working conditions for working men and women through formulating and implementing standards for the workplace and providing necessary workers training, outreach, and related assistance, for example, health and safety programs[6]. The main goal of these programs is to prevent workplace injuries, illnesses, deaths, and financial hardship, since

[6] See the mission of the OSHA at https://www.osha.gov/aboutosha

these harm workers, their families, and employers[7]. To enforce the working standard and compliance assistance activities, OSHA establishes the annual OSHA Data Initiative (ODI) to collect data on workers' injuries and acute illnesses due to preventable hazardous working conditions. ODI surveys approximately 80,000 establishments in private sector industries from 1996 to 2011. Using these survey data, OSHA computes establishment-specific injuries and illnesses data to ensure America's safe working place[8]. This safety enforcement helps OSHA achieve its goal. For example, 19 percent drops of workers' injuries and illnesses are observed in California after five years of implementation of such a prevention program by OSHA[9]. Along with these injuries and illnesses records of each establishment, OSHA also records the searchable establishment name, address, industry, number of employees, number of hours worked, and several indicator variables including strikes, facility shutdown/lay-off, seasonality, and natural disasters that a particular establishment experiences in a given year or not. I exploit these data to compute the annual measures of establishment-level workers' injuries and illnesses incidence rates, which are the main outcome variables of this study.

Secondly, to compute the key variable of interest-relative CEO inside debt, I begin the sample selection process with Standard & Poor's (S&P) ExecuComp database. This database provides information on the stock and stock option ownership, and the present value of accumulative pension benefits and deferred compensation for top executives. I have been able to estimate relative CEO inside debt since 2006. Because prior to 2006, the detailed information on the values of executives' pension, deferred compensation, and exercisable/unexercisable options

[7] See at https://www.osha.gov/shpguidelines/
[8] See at https://www.osha.gov/recordkeeping/odi-background.html
[9] See at https://www.osha.gov/dsg/InjuryIllnessPreventionProgramsWhitePaper.html

is unavailable. Prior to 2006, firms used to disclose annual pension benefits payable at retirement but not their present value. In 2006, the Securities and Exchange Commission (SEC) requires public firms to disclose detailed information about the computation and value of executive pension benefits and deferred compensation. The beginning year of CEO inside debt calculation is in line with Wei and Yermack (2011) and Cassell et al. (2012) who restrict their sample to firms with positive CEO inside debt holdings from 2006.

Finally, accounting information on firms' financial performance is obtained from the Compustat database. To investigate the effect of CEO inside debt further on workplace injuries and illnesses with respect to different sensitivities, I use several other datasets. For example, to measure whether firms whose CEOs have higher relative inside debt adopt an employee-friendly corporate policy, I construct an employe friendly index using MSCI (KLD) database following Fisman et al. (2005). To get cross-sectional loan data, I use the LPC DealScan database.

Once I collect necessary data from all databases, following Caskey and Ozel (2017), I manually merge each establishment from OSHA with its parent firm in the Compustat database based on name and address. Since this study is at the establishment level, one firm may have multiple establish-year observations. After merging, I exclude firms operated in financial [6000<=SIC Code<=6999] and utility industries [4900<=SIC Code<=4999] following Cohn and Wardlaw (2016); Caskey and Ozel (2017); and Bradely et al. (2019). I drop firm-establishment-year observations with missing data. This process ends up my sample period from 2006 to 2011. My sample period begins in 2006 since prior to this year, I have been unable to compute the positive CEO inside debt variable and ends in 2011 because, after this year, OSHA stops collecting data due to its funding cuts. Finally, the complete sample consists of 29,771 establishment-year

observations with 622 unique firms and 2,834 unique establishments covering the period from 2006 to 2011.

2.3.2 Variable measurement

2.3.2.1 Workplace safety measures: To estimate workplace safety, I use safety outcomes such as workers' physical harm, deaths, and injuries and illnesses since these events are tangible and easily visible rather than safety performance that includes individual safety-related behavior or organizational commitment (Neal and Griffin, 2004). Following Cohn and Wardlaw (2016); Caskey and Ozel (2017); and Bradley et al. (2019), I use several establishment-level workers' injuries and illnesses incidence rates, which are in line with OSHA's definitions. For the main analysis, I use two workplace safety outcome variables: Total Case Rate (TCR) and Days Away from work or with job Restriction or Transfer (DART). TCR is calculated by the total number of cases of employees' death, injuries, and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment divided by the number of hours worked by all employees in a given year and then, multiplied by 200,000. DART is calculated by the number of injuries and illnesses that result in days away from work or with job restriction or transfer divided by the number of hours worked by all employees in a given establishment year and then multiplied by 200,000[10]. The total number of cases of all injuries and illnesses for TCR is computed by adding up the columns (G, H, I, and J) of the OSHA Form 300 whereas the total number of all injuries and illnesses for DART is the sum of columns H and I of

[10] The reason for multiplying the ratio of total case rates and number of hours worked by 200,000 is for easy interpretation of yearly work-related injury rates. For example, a full-time worker can work 40 hours in a week for 50 working weeks in a given year. So, a full-time worker can work total 40*50=2,000 hours in a given year. And for easy interpretation, I again multiply by 100 (2,000*100=200,000) to make it as percentage of people who got injured while working the establishment for a given year.

the Form[11]. For robustness checks, I also use additional two measures of workplace injuries and illnesses: only Columns J of the OSHA Form 300, Injury/emp following Cohn and Wardlaw (2016), only injury rate, the natural logarithm of the total cases (summation of Columns G, H, I, and J of the OSHA Form 300) following Caskey and Ozel (2017), and the natural logarithm of the number of days employees stayed out the work for an injury. In addition to these outcome variables, I also measure some establishment-level control variables, which are establishment size proxied by the natural logarithm of employees and average hours worked by an employee in a given establishment year.

2.3.2.2 CEO inside debt measures: Following extant literature (Wei and Yermack, 2011 and Cassell et al., 2012) on CEO inside debt, I construct CEO inside debt as the natural logarithm of relative CEO inside debt, where relative CEO inside debt is measured as the ratio of CEO's debt to equity divided by the ratio of the firm's debt and equity. Relative CEO inside debt measure captures the incentive alignment of CEO with that of creditors (Jensen and Meckling, 1976 and Sundaram and Yermack, 2007). Then, I use a relative CEO inside debt dummy that indicates 1 if the relative CEO inside debt ratio exceeds 1, and 0, otherwise. Edmans and Liu (2011) suggest that this dummy variable captures better incentive alignment of CEO with that of creditors. Additionally, I also use the natural logarithm of the CEO inside debt to equity ratio. The detailed construction of the relative CEO inside debt is described in Appendix A.2.

2.3.2.3 Controls and other related variables: Control variables include related CEO characteristics, other forms of compensation, establishment-specific variables, and firm

[11] See for the detail injury and illness calculation at https://www.osha.gov/pls/odi/establishment_search.html

characteristics. Following Cassell et al. (2012), I control CEO Vega/Delta ratio because the ratio of the changes in CEO's wealth for a 1 % change in stock price and stock return volatility could lead to more risky investment choices (Rajgopal and Shevlin, 2002; Coles et al., 2006; and Anantharaman et al., 2014). CEO tenure and age are controlled because pension benefits and deferred compensation are accrued for CEOs who stay with the firm for a longer time (Sundaram and Yermack, 2007 and Erkan and Nguyen, 2021). As in Sundaram and Yermack (2007), CEO percentage ownership is controlled since ownership may have an important impact on the relative inside debt design. I control for two establishment-level control variables: establishment size and average hours worked by establishment employees (Cohn and Wardlaw, 2016 and Caskey and Ozel, 2017). Firm leverage is controlled because financing constraint has been shown to affect investment in workplace safety (Cohn and Wardlaw, 2016). Firm size is controlled because it has a potential impact on firms' engagement in corporate social responsibility that includes employee welfare (McWilliams and Siegel, 2000) as well as investment in intangibles assets such as R&D (Fishman and Robb, 1999). As in Cohn and Wardlaw (2016) and Caskey and Ozel (2017), turnover could be an important factor for safety investment and safety outcomes since the higher the turnover indicates the higher the sales generation that requires employees to work more. Cash flow could facilitate managers' discretion for investment in the safety program (Bradely et al., 2019). Finally, I control tangibility, capital expenditure, and market to growth opportunities following Cohn and Wardlaw (2016) and Caskey and Ozel (2017). Because these firm-level characteristics and growth opportunities have previously been shown to affect workplace safety outcomes. For further analysis on the effect of relative CEO inside debt on workplace safety, I consider several

firm-and-market characteristics that include corporate employee-friendly policy, cross-sectional loan spread, and industry level union coverage. All the variables are defined in Appendix A.2.

2.3.3 Summary statistics

Table 2.1 reports the summary statistics for all variables used in this study. The final sample consists of 29,771 establishment-year observations with 622 (2,834) unique firms (establishments) covering the period 2006-2011. To mitigate the potential influence of outliers, I winsorize all continuous variables at the 1 percent level in each tail. The results show that the mean and median values of TCR are 6.54 and 5.08, respectively. The mean and median values of DART are 4.51 and 3.14, respectively. These values are comparable to those reported in Caskey and Ozel (2017) and Bradely et al. (2019). These values are the annualized number of cases per 100 establishment-level employees suggesting that an employee has a 6.54% probability of experiencing total cases in a given establishment year. In terms of the key variables, the mean and median values of Ln (relative CEO inside debt) are 0.40 and 0.23, respectively. The key variables of interest have comparable summary statistics with those of empirical works by Phan (2014) and Erkan and Nguyen (2021). The summary statistics for firm-level control variables are qualitatively similar to those reported in Cohn and Wardlaw (2016) and Caskey and Ozel (2017).

2.4 Empirical results and discussion

2.4.1 The effect of CEO inside debt on workplace safety

I begin the analysis with the baseline empirical model in a multivariate setting. To examine the effect of CEO inside debt on workplace safety, I use the Ordinary Least Square (OLS) regression framework motivated by Cohn and Wardlaw (2016). I estimate the effect by employing the following baseline regression of workplace injuries and illnesses on CEO inside debt and

related CEO characteristics, establishment characteristics, and firm characteristics that have been shown to affect managers' decisions on safety investment. My baseline empirical model is as follows:

$$Injury_{i,j,t} = a_0 + \beta_1 * Ln(CEO\ Reldebt)_{j,t} + \sum_2^p \beta_{2\ to\ p} * E_{i,j,t} + \sum_{p+1}^q \beta_{p+1\ to\ q} * X_{j,t} + FEs + \varepsilon_{i,j,t} \qquad (1)$$

Where, p and q are numbers and i, j, and t index establishment, firm, and year, respectively. The key dependent variable is either the total case rate (TCR) or days away from work or with job restriction or transfer (DART). TCR is measured by the total number of cases of employees' death, and injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment, divided by the number of hours worked by all employees in a given year and then multiplied by 200,000. DART is measured by the number of injuries and illnesses that result in days away from work or with job restriction or transfer, divided by the number of hours worked by all employees in a given establishment year, and then multiplied by 200,000. The key independent variable is Ln (CEO Reldebt). Ln (CEO Reldebt) is measured as the natural logarithm of the CEO debt-to-equity ratio scaled by the firm debt-to-equity ratio (see Appendix A.1 for details). The higher (lower) value of the relative CEO inside debt represents, the more long-term orientation of the CEO. When CEOs are long-term oriented, investment in a workplace safety program is less likely to be vulnerable to cut. So, I expect β_1 to be negative in all of the model specifications. Control variables include several characteristics of CEO, establishment, and firm. Following Cassell et al. (2012) and Sundaram and Yermack (2007), I control CEO Vega/Delta ratio, CEO tenure, CEO age, and CEO percentage ownership. To control the establishment and firm-level characteristics, I follow Cohn and Wardlaw (2016); Caskey and

Ozel (2017); and Bradley et al. (2019), because they show that these characteristics as important determinants of a firm's ability to finance investment including intangibles. My establishment and firm-level control variables include the log of establishment-level employees, log of working hours per employee, leverage, firm size, turnover, free cash flow, tangibility, capex, and market to book (MB). The baseline model specifications include Fama and French 48 industry, firm, and establishment, and year fixed effects, respectively. All standard errors are robust to heteroskedasticity and corrected for the clustering of observations at the firm level. See Appendix A.1 for detailed descriptions of all the variables.

Table 2.2 reports the estimates from model (1). The results for TCR and DART on the Ln (Relative CEO inside debt) are reported in columns (1) to (6), whereas columns (1) and (2) report results with industry and year fixed effect, columns (3) and (4) report results with firm and year fixed effects, and columns (5) and (6) report results with establishment and year fixed effects. In all the cases, the coefficients on Ln (CEO Reldebt) are negative and statistically significant at the 1 percent level. These negative coefficients on Ln(CEO Reldebt) indicate that establishment-level employees of firms whose CEOs have higher relative inside debt holdings tend to experience lower work-related injuries and illnesses. This finding supports my long-term orientation hypothesis that higher debt-like components of CEO compensation reduce CEOs' risk appetite to boost short-term performance and induces long-term orientation to get their debt pay-off, resulting in a better workplace environment and lower work-related injuries and illnesses. Turning to the economic significance of the estimate, I calculate the effect of a one standard deviation increase in the Ln (CEO Reldebt) on TCR. A one standard deviation increases in the Ln (CEO Reldebt) leads to a decrease in TCR by 0.27%, which is 4.14% relative to the mean. I observe a similar economic

effect for all other columns with firm and establishment with year fixed effect separately. However, these findings support the view that higher relative CEO inside debt aligns the CEOs' incentive with that of debt holders by inducing long-term orientation (Cassell et al., 2012; Phan, 2014; and Wang et al., 2018).

When I add more robust fixed effects from industry to the firm to the establishment, I lose the significance of firm-level control variables. Since my estimations are at the establishment level, I later continue with only establishment and year fixed effects. When I turn attention toward different control variables, they are consistent with the prediction for firms' investment, though many of them lose statistical significance. For example, the coefficients on the CEO Vega/Delta ratio are positive and vary across robust fixed effects. This is consistent with the idea that a higher ratio of CEO Vega/Delta could lead to more risky investment choices of CEOs (Rajgopal and Shevlin, 2002 and Coles et al., 2006), which results in more workplace injuries and illnesses. CEO age and ownership induce long-term orientation and reduces risky investment by accruing inside debt-like compensation. The effects of these CEO characteristics are expected to be negative on workplace injury. The coefficient on working hours per employee is negative, which is consistent with Kaminski (2001); Cohn and Wardlaw (2016); Caskey and Ozel (2017); and Bradley et al. (2019). The result on establishment size is consistent with Cohn and Wardlaw (2016) and Bradley et al. (2019) but inconsistent with Caskey and Ozel (2017). The result on firm characteristics, leverage, is inconsistent with Cohn and Wardlaw (2016) and Caskey and Ozel (2017), but consistent with Bradley et al. (2019), though statistically insignificant for firm and establishment fixed-effect models. The result on firm size is consistent with Cohn and Wardlaw (2016).

Overall, the results from the baseline analysis suggest that CEO inside debt positively influences workplace safety by reducing work-related injuries and illnesses.

2.4.2 Potential mechanisms

In this section, I reinforce my hypotheses considering the potential mechanisms through which CEO inside debt holdings may affect workplace safety. I attempt to strengthen my main findings in the previous section which are consistent with the long-term orientation hypothesis. I consider two potential mechanisms through which CEO inside debt could affect workplace safety outcomes. Two potential mechanisms are firstly the adoption of employee-friendly corporate policy and secondly reducing CEOs' appetite for risk-taking behavior, which are in line with the long-term orientation hypothesis.

The long-term orientation hypothesis asserts that since inside debt aligns CEO interest with debt holders' interest, the CEO will be focused on long-term orientation. This long-term orientation induced by inside debt holding may exaggerate the conflict of interest between executives and shareholders over-investment in risky projects. Because inside debt tilts executives' incentives toward debt holders (Liu et al., 2014). Liu et al. (2014) also provide evidence of shareholders' value reduction of excess cash holdings by firms whose CEOs have a higher level of inside debt. Phan (2014) documents a higher abnormal M&A announcement abnormal bond return and a lower M&A announcement abnormal stock returns when the acquirer CEO has high inside debt holdings. Wei and Yarmack (2011) provide evidence of higher values of debt and lower values of equity when firms disclose their CEOs inside debt holdings. But, another stream of works argues that inside debt reconciles the conflicting interests between bondholders and shareholders. For example, He (2015) shows that firms' financial quality is better if their CEOs have higher inside

debt holdings. This might reduce the cost of acquiring information about the firms by shareholders and bondholders. Though Erkan and Nguyen (2020) show that inside holding reduces the conflict between managers and shareholders by paying more dividends only when firms previously overinvested, Borah et al. (2020) argue that using dividends as a channel, inside debt alleviates both the agency cost of debt and the agency cost of equity. However, I purely focus on how CEOs inside debt holdings mitigates the conflict of interest between managers and shareholders.

I hypothesis that CEOs with higher inside holdings will reduce this conflicting interest between them and shareholders by attaching shareholders' concerns for value creation toward long-term performance. So, these CEOs will adopt more employee-friendly corporate policies in order to firms' productivity and profitability, which in turn maximizes shareholders' wealth. Numerical empirical evidence supports this conjecture. For example, Faleye and Trahan (2011) show that labor-friendly firms outperform similar firms and are associated with positive abnormal stock returns. Based on international evidence, Fauver et al. (2018) show that firms with employee-friendly cultures are valued higher and perform better. Chen et al. (2016a) document a higher level and better quality of patents in employee-friendly firms because these firms develop a tolerance for failure and encourage engagement in innovation (Chen et al., 2016b). Finally, employee satisfaction is positively associated with stock returns even without managerial slack (Edmans, 2011).

The adoption of employee-friendly corporate policy induced by a higher level of CEO inside debt holdings has a direct implication for workplace safety. Faleye and Trahan (2011) provide evidence that firms with employee-friendly corporate cultures could be able to hire a highly skilled labor force. Once CEOs with higher inside debt holdings recruit a highly skilled

labor force, the likelihood of adjusting new job assignments, operating with new machines, and maintaining the desired workflow would be easily managed and less risky. If employees can adjust to their working environment efficiently, I could expect that workplace injury will be lower in those firms with a higher level of CEO inside debt. I empirically test this assumption by interacting the employee-friendly corporate culture index with the key independent variable-CEO inside debt. Following Fisman et al. (2005), I measure firms' employee-friendly corporate policy by using MSCI (KLD) data. The results are reported in Panel A of Table 2.3. The results show that employee-friendliness is positively associated with CEO inside debt. I conclude that employee-friendly corporate policy serves as a channel through which CEO inside debt decreases workplace injuries and illnesses.

Again, in line with the long-term orientation hypothesis, I consider lowering CEOs' risk-averse attitude as a second channel through which CEOs inside debt could affect workplace safety. I assume that CEOs with higher inside debt holdings would not be distracted from safety for risk-taking behavior, such as leverage. Work-load, extra working hours, and wrong assignments can stress employees much, which leads to workers' injuries and illnesses. Employees who are under pressure to excessive works and targets are more likely to be victims of workplace fatalities such as accidents, deaths, etc., (Caskey and Ozel, 2017). Lee (2019) argues that CEO inside debt is a long-term commitment agreement. When workplace injuries and illnesses reduce shareholders' future wealth, measured by firm value (Cohn and Wardlaw, 2016), I expect that long-term oriented CEOs due to inside debt holdings tend to reduce their firm leverage and market volatility. When firms have lower debts, they less financially constraint to fund their investment projects, leading to investment in workplace safety less vulnerable. Then, work-load, reduction in safety investment,

and new assignments will be lower in those firms, resulting in lower workplace injuries and illnesses.

I test this conjecture by examining the relation between CEO inside debt and risk-taking behavior, proxied by leverage and stock market volatility. If inside debt induces CEOs' long-term orientation, there will be less leverage and market volatility. Results are reported in Panel B of Table 2.3. The coefficient estimates on CEO inside debt are negative and statistically significant, suggesting that CEOs with higher inside debt holding exhibit lower risk-taking behavior. Finally, the results from this section indicate that adopting the employee-friendly corporate culture and reducing CEOs' risk appetite make the investment in workplace safety less vulnerable and serve as important channels through which CEO inside positively influences workplace safety.

2.4.3 Heterogeneity in CEO inside debt effects

The results shown in the previous sections suggest that CEO inside debt negatively affects workplace injuries and illnesses through two important mechanisms: adopting the employee-friendly corporate culture and being risk-averse. In this section, I investigate to what extent the nature of the relation is affected by different sensitivities within firms and outside the market environment. Specifically, I examine the impact of CEO inside debt on workplace injury with respect to union coverage, cash flow volatility, and CEO ownership. I re-run the baseline model (1) for the sub-samples of high and low groups of the respective category. High and low groups are defined based on the median values of each category. Table 2.4 reports the results of the sub-sample analysis based on these sensitivities.

Panel A provides results on the sub-samples based on union coverage. I check whether the negative effect of inside debt is influenced by workers' union coverage. I expect that CEOs with

higher inside debt will be less likely to distract from workplace safety issues for the high unionized group than for the low unionized group. Because labor protection (e.g., by unionization) can be a threat to creditors' contract enforcement, which may misalignments of interest between managers and creditors. Freeman and Medoff (1984) argue that the union serves as a collective voice. Because unionized employees may be more willing to express their preferences for workplace safety without fear of retaliation (Li and Singleton, 2020). So, CEOs act in the debt-holders interest due to holding higher inside debt are more likely to settle workers' concerns such as workplace safety issues, resulting in a lower level of work-related injuries in the firms with a higher level of workers' unionization. The coefficient estimates on CEO inside debt are negative and significant for the group in which employees are highly covered by union membership while they are not significant for the group with low union coverage. The results suggest a complementary effect of CEO inside debt with respect to union coverage on workplace safety.

Panel B provides results on the sub-samples based on firms' cash flow volatility. Cash flow volatility could affect the relation between CEO inside debt and workplace injuries and illnesses. Because investment in workplace safety could be susceptible to cash flow volatility. Minton and Schrand (1999) document that a lower level of managers' discretionary investment such as R&D, or advertising in firms with a higher level of cash flow volatility. They also argue that firms do not externally finance to fully cover cash flow shortfalls but permanently forgo such investment. Hirth and Viswanatha (2011) find that firms are more likely to reluctant to invest if their future cash flows are risky. On the other hand, firms can hedge against potential cash flow volatility, their investment may not be sensitive to their cash flow. I argue that inside debt acts as insurance for employees' safety funds because CEOs with higher inside debt can hedge the cash flow volatility

by securing the lower cost of external finance (Anantharaman et al., 2014). So, I should see the negative effect of inside debt on workplace injury more pronounced for subsample consists of high cash flow volatility than for subsample consists of low cash flow volatility. Consistent with this prediction, I document the negative effect of inside debt on workplace injury is more pronounced in firms even with high cash flow volatility, which suggests a substitutionary role.

Finally, I investigate the baseline results with respect to CEOs' incentive alignments. Agency theory by Jensen and Meckling (1976) predicts that the conflicting interest between managers and debt holders can be mitigated by designing inside debt to managers, while the conflicting interest between managers and shareholders can be attenuated by designing equity-based compensation for managers. Edmans and Liu (2011) suggest that if CEOs' inside debt-equity ratio mirrors firms' debt-equity ratio, CEOs' incentives will not tilt toward asset substitutions between debt holders and shareholders and vice-versa. More specifically, a higher level of inside debt aligns CEOs' interests in line with that of debt holders and a higher level of stock ownership aligns CEOs' interest in line with that of shareholders. When CEOs have a higher level of stock ownership, they may work for the best interest of shareholders. I should see a weaker negative effect of inside debt on workplace injuries and illnesses for subsample consists of firms with higher CEO stock ownership and vice-versa. Results reported in Panel C confirm this prediction. The coefficient estimates on inside debt are only significant for a group of firms with lower CEO stock ownership.

2.4.4 Endogenous determination of CEO inside debt

In this section, I attempt to address the endogenous determination of CEO inside debt design by difference-in-differences analysis. I begin by identifying a large exogenous variation in

CEO inside debt following the implementation of Section 409A to the Internal Revenue Code (IRC). Section 409A is implemented to regulate non-qualified deferred compensation[12]. Non-qualified deferred compensation includes pension benefits and deferred compensation that is to delay being taxed after the implementation of Section 409A (O'Brien, 2008). CEO inside debt holdings that include pension benefits and deferred compensation are generally unsecured and unfunded liability of the firm, which have a similar chance of being default like firm's debt (Cassell et al. 2012). Prior to the implementation of Section 409A, executives are allowed to withdraw all or part of their deferred compensation at any time for any reason, reducing their debt-like compensation less susceptible to default risk (Shen and Zhang, 2020). But the implementation of Section 409A restricts this flexibility in order to prevent executives from manipulating and abusing deferred compensation (O'Brien, 2008). With few exceptions such as executives' death, Section 409A lays out the rules for the timing for deferral election and distributions and restricts recipients to receive the distribution on a faster schedule than it is originally planned for[13]. The violation of this law is subject to severe penalties. For example, deferred compensation will be immediately taxed and subject to an additional 20% tax and excised tax, which is equal to the IRS underpayment rate plus 1%[14](O'Brien, 2008).

Considering the severity of the violation, Section 409A actually discourages executives from the withdrawal of their deferred compensation on a faster schedule than it is originally

[12] Non-qualified deferred compensation does not include 401(k) plan) or 403(b) plan or 457(b) plan. See more at https://www.irs.gov/newsroom/frequently-asked-questions-sec-409a-and-deferred-compensation

[13] See at https://www.thehartford.com/business-insurance/strategy/deferred-compensation-plans/irs-409a-impact

[14] See at https://www.irs.gov/newsroom/frequently-asked-questions-sec-409a-and-deferred-compensation

designed. This discouragement by the implementation of Section 409A of delaying the withdrawal of executives' deferred compensations puts their debt-like components of total compensation more susceptible to bankruptcy risk, which increases executives' tendency toward long-term orientation. So, the implementation of Section 409A appears to be a good candidate to generate exogenous variation in CEO inside debt holding and it is unlikely to affect workplace safety directly other than through inside debt. The justification of the exogenous shock by this tax law changes under Section 409A to CEO inside debt holdings is empirically shown by Shen and Zhang (2020). They show that this exogenous increase in CEO inside debt significantly decreases the cost of equity of treatment firms compare to control firms that do not experience such an exogenous increase in their CEOs inside debt holdings. Motivated by Shen and Zhang (2020), I attempt to estimate the effect of the exogenous changes in CEO inside debt holdings on workplace safety outcomes. They argue 2009 as a shock year for mainly two reasons[15]: 1) the complexity and lack of clear guidance of Section 409A make its implementation delay to 2009, 2) the Internal Revenue Service begins the auditing deferred compensation plans in 2009. So, in line with the enforcement of Section 409A and Shen and Zhang (2020), I also treat 2009 as a shock year.

I identify treatment and control firms within my sample period by following the steps of Fang et al. (2014)[16] and Shen and Zhang (2020). To do so, I firstly restrict my sample period to a

[15] See the reasons in more details at https://www.irs.gov/businesses/corporations/nonqualified-deferred-compensation-audit-techniques-guide

[16] Fang et al. (2014) construct a treatment group and a control group of firms using propensity score matching. Their key variable is stock market liquidity. The decimalization does not equally affect all firms in terms of changes in stock liquidity. That's why they construct treat and control firms based on changes in stock liquidity surrounding decimalization year. Firms are treated in the treatment group (control group) if they are in the top (bottom) tercile group based on changes in stock liquidity surrounding decimalization

two-years pre-and post-event period (2007-2011). Secondly, I keep only Compustat firms that appear to both pre-and post-event years, whereas 2009 is the event year. Specifically, for each firm, I estimate the change in the annual CEO inside debt from the pre-event year (Year-1) to the post-event year (Year+1), where the year (2009) zero represents the fiscal year during which the Section 409A of the American Jobs Protection of 2004 has been implemented. In the post-event year, I then sort the unique firms into terciles based on the changes in CEO inside debt. I retain only the top tercile representing the firms experiencing the largest increase in the CEO inside debt and the bottom tercile representing the firms experiencing the largest decrease in the relative CEO inside debt. I finally perform a propensity score matching to identify a matched firm from the control group (bottom tercile) for a treatment firm from the treatment group (top tercile). The dependent variable is the treatment dummy indicating 1 if a firm is in the top tercile changes in the CEO inside debt, and 0, for a firm if it is in the bottom tercile changes in the CEO inside debt. To find comparable control firm for each treatment firm during this period, I use the probit model that includes all firm-level control variables used in my baseline model (1), measured in the year prior to 2009. Using the predicted propensity score from the probit model, I have been able to identify comparable pairs of treatment-control firms. I then extract the corresponding firm as well as establishment year observations from the sample period of 2007 to 2011 and end up with 11,999 establishment-year observations.

For better visualization of the cross-sectional differences of workplace safety measures between treatment and control firms, I provide graphical representations of TCR and DART in

year. Similarly, I follow the approach to construct treatment and control firms based on tercile groups by the changes in relative CEO inside debt surrounding the implementation of Section 409A in 2009.

Appendix A.2. Figure 1 provides the mean difference of TCR across treatment and control groups of firms identified in my difference-in-difference analysis. Figure 2.1 shows a sudden drop in TCR of treatment firms after the event year (2009) while no such break is observed in TCR for control firms. I argue that this cross-sectional difference in mean TCR between control and treatment firms is attributed to the exogenous increase in CEO inside debt holding by the enforcement of Section 409A. In figure 2.2, I observe a similar pattern of workplace safety for both treatment and control firms when I use DART instead of TCR as a workplace injury measure. The post-event year shows a clear decrease in DART for treatment firms while there is no such drop observed in DART for control firms. The graphical representations of the effect of the exogenous changes in CEO inside debt holdings on workplace safety mitigate the concerns for endogenous determination of debt-like component of total compensation.

Table 2.5 provides the results from the difference-in-difference analysis. After propensity score matching (PSM) between the treatment and control firms, I check the validity of the parallel trend assumption. I firstly re-run the probit model after PSM matched sample and find all control variables are insignificant[17]. Fang et al. (2014) suggest that the insignificant coefficients on all independent variables after PSM matched sample alleviate the concerns for different parallel trend assumptions. Secondly, I compare the mean difference of firm-specific controls between treatment firms and control firms in the pre-event period. The results, reported in Panel A, show that treatment and control firms are not different in terms of firm characteristics in the pre-event period. This suggests that though control and treatment firms are similar to each other, they have been

[17] PSM results are not reported but available on request.

affected by the implementation of Section 409A differently, which confirms that the parallel trends assumption is not violated.

Panel B provides the results from difference-in-difference regression. The key variable of interest is the Treat*Post interaction because this interaction captures the difference in workplace safety between treatment and control firms. The coefficients on the Treat*Post interaction are negative and statistically significant, suggesting that exogenous increase in CEO inside debt holding in treatment firms significantly reduces workplace injuries and illnesses compared to firms in the control groups. This finding is consistent with the idea that the implementation of Section 409A increases executives' tendency toward long-term orientation. The finding finally alleviates the concerns for the endogenous determination of CEO inside debt design.

2.4.5 Robustness checks

To confirm the robustness of the baseline results, I perform several additional tests. I address the concerns for the measurement errors in the baseline estimation by considering alternative definitions of workplace safety and CEO inside debt measures. Further, Unlike the baseline model, I estimate the relation between CEO inside debt and workplace safety using other model specifications[18] that include different fixed effects. These alternative model specifications account for omitted variable bias with respect to firms, establishments, and states. Results are reported in Table 2.6.

[18] The models use the same set of control variables: related CEO, establishment, and firm characteristics that used in the baseline model (1).

Panel A reports the results on the alternative definitions of workplace injury. Concerns for the baseline results may arise due to the measurement errors of the key-dependent variables used in the baseline analysis. For example, in addition to injury rates for workplace safety measures, the number of injuries and illnesses cases is also an important variable to capture workplace safety outcomes (Caskey and Ozel, 2017). To address the measurement error concerns, I use other proxies for workplace safety. In addition to my main workplace injury variables-TCR and DART, I use other injury rates including DAWFII (Column J of OSHA Form 300), Injury scaled by the employee, the number of injuries and illness, and the number of days stays away from work. Injury/emp is measured as the number of all deaths, injuries, and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases divided by the number of employees working at the establishment in a given year. This variable represents work-related injuries and illnesses per establishment-level employee. The effects of CEO inside debt on workplace injury still there.

Panel B reports results on the alternative definitions of CEO inside debt. Instead of using the natural logarithm of CEO Reldebt, I use CEO inside debt dummy, indicating 1 if the *CEO reldebt* exceeds 1. and 0, otherwise. I include the relative CEO inside debt dummy because this variable captures better the alignment of CEO incentives with those debt holders (Edmans and Liu, 2011). Further, instead of comparing the CEO inside to equity ratio to the firm's debt and equity ratio, I use only the CEO debt to equity ratio to investigate its effect on workplace safety. The CEO inside debt is alternatively measured as the natural logarithm of CEO inside debt holdings to the value of equity holdings, where CEO inside debt is the sum of the present values of accumulated pension benefits and deferred compensation, and CEO equity holdings include the stocks and stock

options. My main results still hold and do not vary with respect to alternative key variables specifications.

Panels C and D report the results after controlling industry*year fixed effects, state*year, and establishment fixed effects, respectively. These fixed effects account for time-invariant industry-level and state-level omitted variable bias (e.g., state labor laws). After accounting for the time-invariant industry (and establishment)-specific attributes such as growth opportunities, innovation, or technical up-gradation that may correlate with omitted explanatory variables, the coefficients on CEO inside debt measure are still negative and statistically significant. These results suggest that the baseline results are not sensitive to omitted variable bias. Overall, results from this section show that the baseline results are robust to alternative variable measurements and different fixed effects that account for omitted variables bias.

2.4.6 Workplace safety and the cost of debt

In this section, I consider the cost implication of the relation between CEO inside debt and workplace safety. Though I present the robust effect of CEO inside debt on workplace safety in the previous sections, some might argue that if inside debt aligns CEO incentives with those of debt holders, why CEOs should care about other stakeholders (e.g., employees in this study) and positively influence workplace safety. I argue that CEOs with higher inside debt should care about workplace safety for two important reasons. Firstly, the CEO inside debt-like compensation is unsecured and unfunded liabilities of the firms (Cassell et al., 2012), which are paid off at the seniority level at the time of financial distress. So, it is reasonable to expect that CEO inside debt payoff is sensitive to the long-term performance of the firm. Since the long-term performance (e.g., firm value) deteriorates with the increase in workplace injuries and illnesses (Cohn and Wardlaw,

2016), CEOs with higher inside debt should pay attention to workplace safety issues for the payoff of their debt-like compensation.

Secondly, workplace safety issues could have a cost implication for the interest alignment between creditors and shareholders. I assume that creditors may consider workplace injury as managerial riskiness, which may reflect interest alignment between managers and shareholders, and interest misalignment between shareholders and creditors. Creditors may perceive workplace injury as a reflection of asset substitutions from them to shareholders. Because workplace injuries and illnesses could result from the attempt to meet the short-term performance target to satisfy shareholders. For example, Caskey and Ozel (2017) show that higher workplace injuries are associated with increasing workloads and lowering discretionary expenses related to workplace safety to meet the short-term performance goal. Chen et al. (2012) show that banks consider employee conditions as an important determinant for designing the cost of debt. Cohn and Wardlaw (2016) argue that if firms bear costs due to a higher level of workplace injury, they may experience financing constraints to the need for external financing. So, external credit suppliers may take workplace injury in their consideration of giving a new loan. When creditors perceive workplace injury as a reflection of asset substitutions (conflict of interest between creditors and shareholders), they will charge higher loan spreads to firms with higher workplace injuries and illnesses to minimize the riskiness of loan default. I test this second assumption by employing the following empirical model at the firm level.

$$Ln(Spreads)_{j,t} = a_0 + \beta_1 * Injury_{j,t} + \sum_2^p \beta_{2\ to\ p} * X_{j,t} + FEs + \varepsilon_{i,t} \qquad (2)$$

Where, p is a number and j and t index firm and year, respectively. The key dependent variable is the natural logarithm of loan spreads. Injury is either TCR or DART at the firm level.

X represents a set of firm and loan-specific control variables including profitability, leverage, firm size, MB, cash flow, Ln (Facility amount), Ln (Maturity), and dummies of Revolver, Merger, LBO, working cap, Debt-repay, and Corp-purp. Firm (loan)-level variables are defined in Appendix A.2 (Top of table 2.7). FEs include industry and year-fixed effects. The results are reported in Table 2.7.

Consistent with the hypothesis that workplace injury increases the divergence of managers' incentives from those of creditors and the conflict of interest between creditors and shareholders, Columns (1) and (2) show that on average, firms that have a higher level of workplace injuries and illnesses have higher loan spreads. This result suggests that banks do care about workplace safety in pricing their loans to firms with a higher workplace injury and a cost implication of banking financing for firms with higher workplace injuries and illnesses.

2.5 Conclusion

Using establishment-level workplace injuries and illnesses data from the Occupational Safety and Health Administration (OSHA), I examine whether the CEO inside debt affects workplace safety. Consistent with the hypothesis that inside debt induces CEOs' long-term orientation, I find evidence of lower work-related injuries and illnesses in firms whose CEOs have a higher level of relative inside debt. I also explore two mechanisms through which CEOs with higher inside debt affect workplace safety. Firstly, by adopting the employee-friendly corporate culture, these CEOs tend to hire highly skilled employees who can efficiently adapt to the necessary changes in working conditions. Secondly, by decreasing CEOs' risk appetite, due to higher inside debt holdings, an investment fund in workplace safety is less likely to vulnerable to cut and more likely to relax the file-rank employees' stress-related to extra assignments and enough recovery time, which leads to lower work-related injuries and illnesses. I argue that CEOs with

higher inside debt do not necessarily tilt their incentives toward debt holders in all cases. They also contribute to increasing shareholders' future wealth and satisfy the key stakeholders-employees-of the company by improving workplace safety. In my further analysis, I also show cross-sectional heterogeneity in the CEO inside debt effect on workplace safety. For example, the CEO inside debt acts as insurance for workplace safety in firms with a higher level of cash flow volatility and lower CEO ownership, suggesting a substitutionary effect. I also find an augmenting effect of CEO inside debt for firms whose employees are unionized. My findings are robust to endogeneity concerns and several empirical settings. Finally, as a value implication, I show that workplace injury increases the conflict between the creditors and shareholders over the riskiness of the investment. As a result, banks tend to charge higher loan spreads, when they issue loans to firms with higher workplace injuries and illnesses.

Table 2.1: Descriptive statistics

This table reports summary statistics for measures of establishment-level employees' deaths, and all injuries and illnesses, working hours, employees, firm-level CEO inside debt, related CEO characteristics, and other firm-specific control variables. The sample consists of 29,771 establishment-year observations with 622 (2,834) unique firms (establishments) covering the period 2006-2011. The key dependent variables are the total case rate (TCR) and days away from work or with job restriction or transfer (DART). The natural logarithm of the relative CEO inside debt (Ln(CEO Reldebt)) is the key independent variable, which is measured by the CEO debt-to-equity ratio scaled by the firm debt-to-equity ratio (see Appendix A.1 for details). The natural logarithm of employees and working hours per employee are establishment-level control variables. In all estimations, I use a standard set of firm-specific controls along with related CEO characteristics. All continuous variables are winsorized at the top and bottom 1% levels. Appendix A.2 provides more details of all variables.

Variable	N	Mean	STD	P25	Median	P75
TCR	29771	6.541	5.812	2.137	5.082	9.399
DART	29771	4.507	4.644	0.937	3.143	6.658
Ln(CEO Reldebt)	29771	0.399	0.471	0.024	0.229	0.592
CEO Reldebt>1	29771	0.221	0.415	0.000	0.000	0.000
Ln (CEO D/E)	29771	0.278	0.476	0.011	0.133	0.325
Leverage	29771	0.266	0.128	0.185	0.246	0.323
Cashflow	29771	0.105	0.063	0.078	0.108	0.136
Ln(Assets)	29771	9.286	1.432	8.070	9.773	10.572
Turnover	29771	1.368	0.491	1.017	1.350	1.608
Tangibility	29771	0.395	0.189	0.230	0.381	0.573
Capex	29771	0.052	0.032	0.027	0.042	0.068
MB	29771	1.348	0.684	0.857	1.149	1.746
EstbEmp	29771	259.58	695.85	79.00	121.000	200.00
Ln(EstbEmp)	29771	4.901	0.923	4.369	4.796	5.298
WorkHours	29771	1967.17	298.87	1844.42	1996.63	2087.33
Ln(WorkHour)	29771	7.573	0.153	7.520	7.599	7.644
Vega/Delta	29771	0.515	0.402	0.134	0.507	0.824
CEO age	29771	4.023	0.102	3.951	4.043	4.094
CEO own	29771	0.355	0.730	0.000	0.008	0.283
Tenure	29771	4.907	4.560	2.000	4.000	6.000
DAWFII	29771	2.002	2.916	0.000	0.991	2.620
Injry/emp	29771	6.198	5.361	2.128	5.000	8.889
Injuryonly	29771	6.252	5.839	1.932	4.802	8.934
Num of cases	29771	12.418	21.315	3.000	6.000	13.000
Ln(Num of cases)	29771	1.964	1.088	1.386	1.946	2.639
Dtransfer	29771	231.59	847.38	2.00	72.00	224.00
Ln (Dtransfer)	29771	3.579	2.379	1.099	4.290	5.416

Table 2.2: Baseline results: CEO Inside Debt and Workplace Injury

This table presents the results from the OLS regression model (1), where the key dependent variable is either the total case rate (TCR) or days away from work or with job restriction or transfer (DART). TCR is measured by the total number of cases of employees' death, and injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment, divided by the number of hours worked by all employees in a given year and then multiplied by 200,000. DART is measured by the number of injuries and illnesses that result in days away from work or with job restriction or transfer, divided by the number of hours worked by all employees in a given establishment year, and then multiplied by 200,000. The key independent variable (Ln(CEO Reldebt)) is the natural logarithm of the CEO debt-to-equity ratio scaled by the firm debt-to-equity ratio (see Appendix A.1 for details). All other independent variables are defined in Appendix A.2. The sample period is from 2006 to 2011. Columns (1) and (2) include Fama and French 48 industry and year fixed effects. Columns (3) and (4) include firm and year fixed effects. Columns (5) and (6) include establishment and year fixed effects. *T*-statistics are robust to heteroskedasticity, computed using standard errors corrected for clustering at the firm level, and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	*TCR*	*DART*	*TCR*	*DART*	*TCR*	*DART*
Ln(CEO Reldebt)	-0.576***	-0.576***	-0.832***	-0.697***	-0.886***	-0.725***
	(-7.48)	(-9.73)	(-5.89)	(-6.45)	(-2.84)	(-2.93)
Vega/Delta	0.093	0.309***	-0.422***	-0.407***	-0.287	-0.273
	(0.98)	(4.07)	(-2.70)	(-3.28)	(-1.09)	(-1.52)
CEO age	-4.888***	-3.268***	-2.082*	-1.400*	1.108	0.924
	(-13.90)	(-12.09)	(-1.93)	(-1.71)	(1.33)	(1.24)
CEO own	-0.319***	-0.287***	-0.625***	-0.579***	-0.143	-0.145
	(-4.13)	(-4.70)	(-3.60)	(-4.06)	(-0.85)	(-1.48)
Tenure	0.010	0.024***	0.061**	0.055***	0.011	0.019
	(0.97)	(3.09)	(2.49)	(2.92)	(0.24)	(0.46)
Ln(WorkHour)	-6.423***	-3.702***	-4.893***	-2.868***	-4.673***	-2.799***
	(-23.97)	(-17.66)	(-16.50)	(-12.41)	(-4.02)	(-3.82)
Ln(EstbEmp)	0.169***	0.179***	0.105***	0.122***	0.055	0.078
	(4.84)	(6.48)	(2.89)	(4.30)	(0.70)	(1.06)
Leverage	-1.781***	-1.881***	-0.725	-0.714	-2.000	-1.832
	(-5.82)	(-7.97)	(-0.97)	(-1.23)	(-1.15)	(-1.25)
Cashflow	0.649	0.449	1.080	0.411	-1.060	-1.129
	(0.84)	(0.75)	(1.00)	(0.49)	(-0.69)	(-0.89)
Ln(Assets)	-0.257***	-0.102***	-0.206	-0.158	-0.021	-0.018
	(-7.85)	(-4.10)	(-0.77)	(-0.80)	(-0.22)	(-0.26)
Turnover	0.377***	0.207**	0.126	-0.192	0.089	-0.266
	(3.49)	(2.49)	(0.57)	(-1.11)	(0.32)	(-0.90)
Tangibility	0.961**	1.822***	0.903	0.266	-0.501	-0.593
	(2.39)	(5.74)	(0.80)	(0.30)	(-0.47)	(-0.59)
Capex	-7.883***	-5.307***	-6.223***	-5.456***	-3.102	-3.644
	(-5.14)	(-4.44)	(-2.88)	(-3.19)	(-1.32)	(-1.25)
MB	-0.192***	-0.284***	-0.091	-0.181	0.137	0.083
	(-2.68)	(-5.02)	(-0.55)	(-1.35)	(1.14)	(1.06)

Constant	77.566***	46.329***	54.632***	34.432***	39.405***	23.915***
	(33.14)	(25.66)	(9.57)	(8.12)	(3.72)	(3.24)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	No	No	No
Firm FE	No	No	Yes	Yes	No	No
Estab. FE	No	No	No	No	Yes	Yes
N	29771	29771	29771	29771	29771	29771
Adj. R2	0.333	0.337	0.408	0.404	0.476	0.469

Table 2.3: Potential channels

This table presents the effect of CEO inside debt on the potential channels for which firms may experience fewer workplace injuries. The key independent variable is Ln (CEO inside debt), measured as the natural logarithm of the CEO debt-to-equity ratio scaled by the firm debt-to-equity ratio (see Appendix A.1 for details). Panel A reports the results of the CEO inside debt and employee friendliness corporate policy. The dependent variables are the firm's employee friendliness and workplace safety index. Employee friendliness is measured by the total number of strengths of the employee relation index reported in the KLD database. The total number of strengths include union relations, no-layoff policy, cash profit sharing, employee involvement, retirement benefits, health and safety, and other strengths. The workplace safety index is a dummy variable that indicates 1 if the firm has strong employee health and safety programs, and 0, otherwise. Panel B reports the results of the CEO inside debt and firm riskiness, proxied by leverage and total risk. A firm's total risk/RetVol is the standard deviation of daily stock return over a given year. ROA is the return on assets, measured as the net income before extra-ordinary items scaled by total assets. D/E is the firm's debt to equity ratio. SalesGR is the changes in sales scaled by lagged sales. R&D is the research & development expense scaled by total assets. Return is the continuously compounded firm's yearly stock returns using the daily CRSP return. All other independent variables are defined in Appendix A.2. The sample period is from 2006 to 2011. These are firm-level analyses. All model specifications include Fama and French 48 industry and year fixed effects. *T*-statistics are computed using standard errors corrected for clustering at the firm level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: CEO inside debt and employee-friendly corporate policy

	(1)	(2)
Variable	*Emp friendliness*	*Prob(Safety Index=1)*
Ln(CEO Reldebt)	0.114**	0.068***
	(2.10)	(2.97)
Vega/delta	0.045	-0.001
	(0.65)	(-0.03)
CEO age	0.038	0.090
	(0.17)	(1.24)
CEO own	0.063	0.026*
	(1.51)	(1.80)
Tenure	-0.012*	-0.006**
	(-1.72)	(-2.44)
ROA	-1.477***	0.097
	(-2.75)	(0.50)
Cashflow	1.732***	-0.049
	(2.71)	(-0.23)
Ln(Assets)	0.321***	0.095***
	(10.96)	(9.83)
D/E	-0.057*	-0.008
	(-1.96)	(-0.68)
SalesGR	-0.279***	-0.119***
	(-3.19)	(-4.14)
R&D	2.121***	0.317*
	(3.83)	(1.69)
RetVol	7.276***	1.966**
	(3.32)	(2.23)

MB	0.041	0.000
	(1.42)	(0.01)
Capex	-0.575	0.144
	(-0.88)	(0.63)
Constant	-2.483**	-1.007***
	(-2.53)	(-3.39)
Year and Industry FE	Yes	Yes
N	2770	2764
Adj. R2	0.315	0.255

Panel B: CEO inside debt and firm riskiness

	(1)	(2)
Variable	*Leverage*	*Total Risk*
Ln(CEO Reldebt)	-0.029***	-0.121***
	(-3.32)	(-2.76)
Vega/delta	0.006	-0.215***
	(0.48)	(-3.27)
CEO age	0.007	0.008
	(0.17)	(0.04)
CEO own	-0.018**	-0.063*
	(-2.35)	(-1.73)
Tenure	0.001	-0.013**
	(0.64)	(-2.53)
ROA	-0.076	-4.229***
	(-0.80)	(-6.29)
Cashflow	-0.034	2.670***
	(-0.33)	(4.06)
Ln(Assets)	0.022***	-0.278***
	(7.15)	(-17.24)
D/E	0.075***	0.514***
	(10.29)	(14.74)
SalesGR	0.027*	0.098
	(1.80)	(1.14)
R&D	-0.285***	2.094***
	(-2.76)	(4.57)
Return	0.016***	0.453***
	(2.68)	(8.23)
MB	0.007	-0.200***
	(0.77)	(-6.81)
Capex	-0.096	1.464**
	(-0.94)	(2.34)
Constant	0.006	4.241***
	(0.03)	(5.58)
Year and Industry FE	Yes	Yes
N	3170	3170
Adj. R2	0.429	0.693

Table 2.4: Subsample Analysis

This table reports the relation between CEO inside debt and workplace injury with different sensitivities. The dependent variable is either the total case rate (TCR) or days away from work or with job restriction or transfer (DART). TCR is measured by the total number of cases of employees' death, and injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment, divided by the number of hours worked by all employees in a given year and then multiplied by 200,000. DART is measured by the number of injuries and illnesses that result in days away from work or with job restriction or transfer, divided by the number of hours worked by all employees in a given establishment year, and then multiplied by 200,000. Ln (CEO Reldebt) is measured as the natural logarithm of the CEO debt-to-equity ratio scaled by the firm debt-to-equity ratio (see Appendix A.1 for details). Panel A reports the results for the subsamples based on establishments of firms operating under industry with high vs low levels of labor union membership. Panel B reports the results of the Ln (CEO Reldebt) on workplace safety with respect to cash flow volatility. Cash flow volatility is measured by the standard deviation of the previous 4-years of cash flows (measured as sum(*ib,dp)/lagged total assets*) including contemporary cash flow. Panel C reports the results of the Ln (CEO Reldebt) on workplace safety with respect to CEO stock ownership. CEO ownership is measured as CEO stock ownership, SHROWN excluding options, scaled by total share outstanding (SHROUT) of a given firm-year in percentage. All specifications include the same set of controls used in Model (1) and defined in Appendix A.2. The sample period is from 2006 to 2011. All model specifications include establishment and year fixed effects. T-statistics are computed using standard errors corrected for clustering at the firm level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Labor union

Variable	High		Low	
	(1)	(2)	(3)	(4)
	TCR	*DART*	*TCR*	*DART*
Ln(CEO Reldebt)	-0.492***	-0.479***	-0.098	0.149
	(-2.78)	(-3.37)	(-0.19)	(0.43)
Control	Yes	Yes	Yes	Yes
Constant	52.883***	34.384***	20.137**	11.879
	(3.41)	(3.24)	(2.13)	(1.47)
Year and Estab. FE	Yes	Yes	Yes	Yes
N	14730	14730	14901	14901
Adj. R2	0.507	0.499	0.424	0.421

Panel B: Cash flow volatility

Variable	High		Low	
	(1)	(2)	(3)	(4)
	TCR	*DART*	*TCR*	*DART*
Ln(CEO Reldebt))	-1.076***	-0.905***	-0.125	0.006
	(-3.82)	(-4.15)	(-0.48)	(0.04)
Control	Yes	Yes	Yes	Yes
Constant	41.143**	25.379**	24.591**	13.081*
	(2.38)	(2.18)	(2.41)	(1.73)
Year and Estab. FE	Yes	Yes	Yes	Yes
N	13887	13887	15248	15248
Adj. R2	0.475	0.451	0.475	0.476

Panel C: CEO ownership

Variable	High		Low	
	(1)	(2)	(3)	(4)
	TCR	*DART*	*TCR*	*DART*
Ln(CEO Reldebt)	-0.061	-0.144	-1.236**	-1.155**
	(-0.18)	(-0.52)	(-2.10)	(-2.24)
Control	Yes	Yes	Yes	Yes
Constant	31.707***	16.544***	57.199***	37.406***
	(5.28)	(3.14)	(3.07)	(2.66)
Year and Estab. FE	Yes	Yes	Yes	Yes
N	14925	14925	14846	14846
Adj. R2	0.478	0.472	0.465	0.455

Table 2.5: Results from Difference-in-difference test

This table presents the results of difference-in-difference analyses. I define the years prior to 2009 (e.g., 2007-2008) as the pre-event period and the years after 2009 (e.g., 2010-2011) as the post-event period. In my difference-in-difference analysis, I begin with Compustat firms that have observations available in both pre-and post-event periods. I construct a treatment group and a control group of firms using propensity score matching. Specifically, for each firm, I estimate the change in the annual relative CEO inside debt from the pre-event year (Year-1) to the post-event year (Year+1), where year (2009) zero represents the fiscal year during which section 409A of the American Jobs Protection of 2004 has been implemented. I then sort these unique firms into terciles. I retain only the top tercile representing the firms experiencing the largest increase in the relative CEO inside debt and the bottom tercile representing the firms experiencing the largest decrease in the relative CEO inside debt. I finally performed a propensity score matching to identify a matched firm from the control group (bottom tercile) for a treatment firm from the treatment group (top tercile). The dependent variable is the treatment dummy indicating 1 if a firm is in the top tercile changes in the relative CEO inside debt, and 0, for a firm if it is in the bottom tercile changes in the relative CEO inside debt. The probit model includes all firm-level control variables used in my baseline model (1), measured in the year prior to 2009. Using the predicted propensity score from the probit model, I have been able to identify a matched pairs of treatment-control firms. Panel A provides the mean comparison of firm-specific controls between treatment firms and control firms in the pre-event period. Panel B provides the results from difference-in-difference regression. The key independent variables are post dummy, treatment dummy, and interaction-Treat*Post. The sample period is from 2007 to 2011. All model specifications include establishments and year-fixed effects. T-statistics are computed using standard errors corrected for clustering at the firm level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Comparing treatment firms and control firms pre-event period

Variable	Control	Treatment	Difference	t-statistic
Vega/Delta	0.579	0.584	-0.005	-0.127
CEO age	4.003	4.002	0.002	0.182
CEO own	1.447	1.420	0.026	0.428
Tenure	0.910	0.914	-0.005	-0.020
Leverage	0.242	0.237	0.005	0.348
Ln(Assets)	7.831	7.828	0.003	0.025
Turnover	1.300	1.261	0.039	0.654
Cashflow	0.098	0.089	0.008	0.950
Tangibility	0.282	0.290	-0.008	-0.445
Capex	0.060	0.060	0.000	0.072
MB	1.175	1.139	0.036	0.591

Panel B: Difference-in-difference results

	(1)	(2)
Variable	*TCR*	*DART*
*Treat*Post*	-0.524*	-0.617***
	(-1.81)	(-2.57)
Controls	Yes	Yes
Constant	47.995***	26.977**
	(3.14)	(2.48)
Year and Estab. FE	Yes	Yes
N	11999	11999
Adj. R2	0.500	0.493

Table 2.6: Robustness checks

This table presents the results from additional robustness check analyses. Panel A (B) provides the results on the alternative definitions of workplace injuries (CEO inside debt). DAWFII (column H of OSHA FORM 300) is the case rate, which includes the number of cases that involve days away from work per 100 full-time equivalent employees. Injury/Emp is the number of injuries and illnesses scaled by the total number of establishment employees. Injryonly is the total case rate excluding illness. Ln (Number of cases) is the natural logarithm of the sum of deaths and all injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year (Column G + Column H + Column I + Column J). Ln(Dtransfer) is the natural logarithm of the number of days away from work due to work-related injury and illness. Ln (CEO D/E) is the natural logarithm of CEO inside debt holdings to the value of equity holdings, where CEO inside debt is the sum of the present values of accumulated pension benefits and deferred compensation, and CEO equity holdings include the stocks and stock options held by the CEO. In Panels C and D, I replicate my baseline analysis with respect to different fixed effects. All specifications include the same set of control variables used in the baseline model. The sample period is from 2006 to 2011. All model specifications include Fama and French industry*year and establishment fixed effects. T-statistics are computed using standard errors corrected for clustering at the firm level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Alternative definition of injury variables

	(2)	(3)	(4)	(5)	(6)
Variable	*DAWFII*	*Iinjry/emp*	*Injuryonly*	*Ln(Num of cases)*	*Ln(Dtransfer)*
Ln(CEO Reldebt)	-0.161*	-0.756***	-0.871***	-0.101***	-0.242***
	(-1.81)	(-3.38)	(-2.83)	(-3.49)	(-3.25)
Controls	Yes	Yes	Yes	Yes	Yes
Constant	16.073***	-13.802	38.716***	-3.655***	-5.116
	(4.94)	(-1.62)	(3.59)	-2.59	(-1.29)
Year and Estab. FE	Yes	Yes	Yes	Yes	Yes
N	29771	29771	29771	29771	29771
Adj. R2	0.441	0.450	0.464	0.693	0.474

Panel B: Alternative definitions of CEO inside debt

	(1)	(2)	(3)	(4)
Variable	*TCR*	*DART*	*TCR*	*DART*
CEO Reldebt>1	-0.734***	-0.607***		
	(-2.62)	(-2.69)		
Ln (CEO D/E)			-0.373**	-0.352**
			(-2.07)	(-2.42)
Controls	Yes	Yes	Yes	Yes
Constant	39.455***	23.911***	43.392***	27.088***
	(3.72)	(3.22)	(3.49)	(3.02)
Year and Estab. FE	Yes	Yes	Yes	Yes
N	29771	29771	29771	29771
Adj. R2	0.476	0.469	0.475	0.468

Panel C: Establishment and Industry*year Fixed Effects

	(1)	(2)	(3)	(4)
Variable	*TCR*	*DART*	*TCR*	*DART*
Ln(CEO Reldebt)	-0.901***	-0.766***		
	(-3.03)	(-3.23)		
CEO Reldebt>1			-0.915***	-0.763***
			(-2.81)	(-3.03)
Controls	Yes	Yes	Yes	Yes
Constant	39.626***	24.110***	37.726***	22.989***
	(3.53)	(3.12)	(3.30)	(2.94)
Estab. FE	Yes	Yes	Yes	Yes
Industry* Year FE	Yes	Yes	Yes	Yes
N	29771	29771	29771	29771
Adj. R2	0.478	0.471	0.478	0.471

Panel D: Establishment and State* year Fixed Effects

	(1)	(2)	(3)	(4)
Variable	*TCR*	*DART*	*TCR*	*DART*
Ln(CEO Reldebt)	-0.712**	-0.624**		
	(-2.12)	(-2.27)		
CEO Reldebt>1			-0.621**	-0.544**
			(-2.10)	(-2.24)
Controls	Yes	Yes	Yes	Yes
Constant	42.750***	25.785***	42.557***	25.620***
	(3.76)	(3.25)	(3.77)	(3.26)
Estab. FE	Yes	Yes	Yes	Yes
State* Year FE	Yes	Yes	Yes	Yes
N	29771	29771	29771	29771
Adj. R2	0.474	0.469	0.474	0.469

Table 2.7: Workplace safety and cost of bank loan

This table provides the firm-level evidence of the implication of workplace safety issues on its loan pricing in the debt contract from the model (2). The key dependent variable is the natural logarithm of loan spread retrieved from the DealScan database. The main variable of interest is either firm-level TCR or firm-level DART. ROA is the income before extraordinary items scaled by total assets. Ln (Facility amount) is the natural logarithm of the total deal amount. Ln (Maturity) is the natural logarithm of the duration of the loan in months. Revolver, LBO, working cap, Debt-repay, and Corp_purp are dummies that indicate 1 if the loan is in the respective category. All other independent variables are defined in Appendix A.2. The sample period is from 2006 to 2011. All model specifications include Fama and French 48 industry and year fixed effects. T-statistics are computed using standard errors corrected for clustering at the firm level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Variable	*Ln (Spreads)*	
TCR	0.021**	
	(2.28)	
DART		0.031**
		(2.54)
ROA	-0.025	-0.035
	(-0.09)	(-0.13)
Leverage	0.936***	0.932***
	(4.94)	(4.91)
Ln(Assets)	-0.082***	-0.084***
	(-3.69)	(-3.79)
MB	-0.238***	-0.235***
	(-4.47)	(-4.50)
Ln (Facility amount)	-0.175***	-0.173***
	(-7.22)	(-7.13)
Ln (Maturity)	0.283***	0.281***
	(4.62)	(4.58)
Revolver	-0.214***	-0.213***
	(-5.53)	(-5.49)
LBO	0.344***	0.347***
	(2.62)	(2.66)
Capex	0.534	0.499
	(0.58)	(0.54)
Workcap	-0.369***	-0.371***
	(-5.36)	(-5.36)
Debtrepay	-0.434***	-0.433***
	(-2.83)	(-2.83)
Corppurp	-0.454***	-0.457***
	(-7.88)	(-7.88)
Cashflow	-0.810	-0.802
	(-1.35)	(-1.35)
Constant	5.464***	5.492***

	(17.35)	(17.46)
Year & Industry FE	Yes	Yes
N	1001	1001
Adj. R2	0.631	0.632

Figures for mean comparison of workplace injuries measures across treatment and control firms.

I define the years prior to 2009 (e.g., 2007-2008) as the pre-event period and the years after 2009 (e.g., 2010-2011) as the post-event period. In my difference-in-difference analysis, I begin with firms that have observations available in both pre-and post-event periods. I construct a treatment group and a control group of firms using propensity score matching. Specifically, for each firm, I estimate the change in the annual relative CEO inside debt from the pre-event year (Year-1) to the post-event year (Year+1), where year (2009) zero represents the fiscal year during which section 409A of the American Jobs Protection of 2004 has been implemented. I then sort the 261 unique firms into terciles. I retain only the top tercile representing the firms experiencing the largest increase in the relative CEO inside debt and the bottom tercile representing the firms experiencing the largest decrease in the relative CEO inside debt. I finally performed a propensity score matching to identify a matched firm from the control group (bottom tercile) for a treatment firm from the treatment group (top tercile). The dependent variable is the treatment dummy indicating 1 if a firm is in the top tercile changes in the relative CEO inside debt, and 0, for a firm if it is in the bottom tercile changes in the relative CEO inside debt. The probit model includes all firm-level control variables used in my baseline model (1), measured in the year prior to 2009. Using the predicted propensity score from the probit model, I have been able to identify a matched pairs of treatment-match firms. Figure 1 shows the Mean difference of TCR across treatment and control groups. Figure 2 shows the Mean difference of DART across treatment and control groups.

Figure 2.1: Mean difference of TCR across treatment and control groups

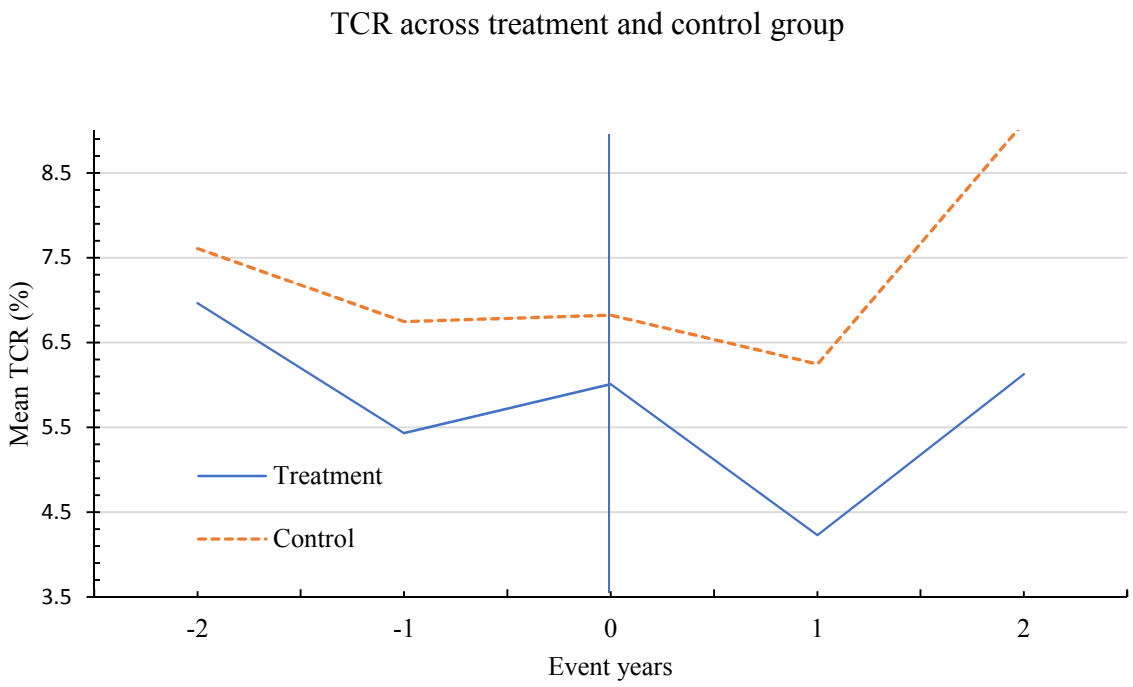
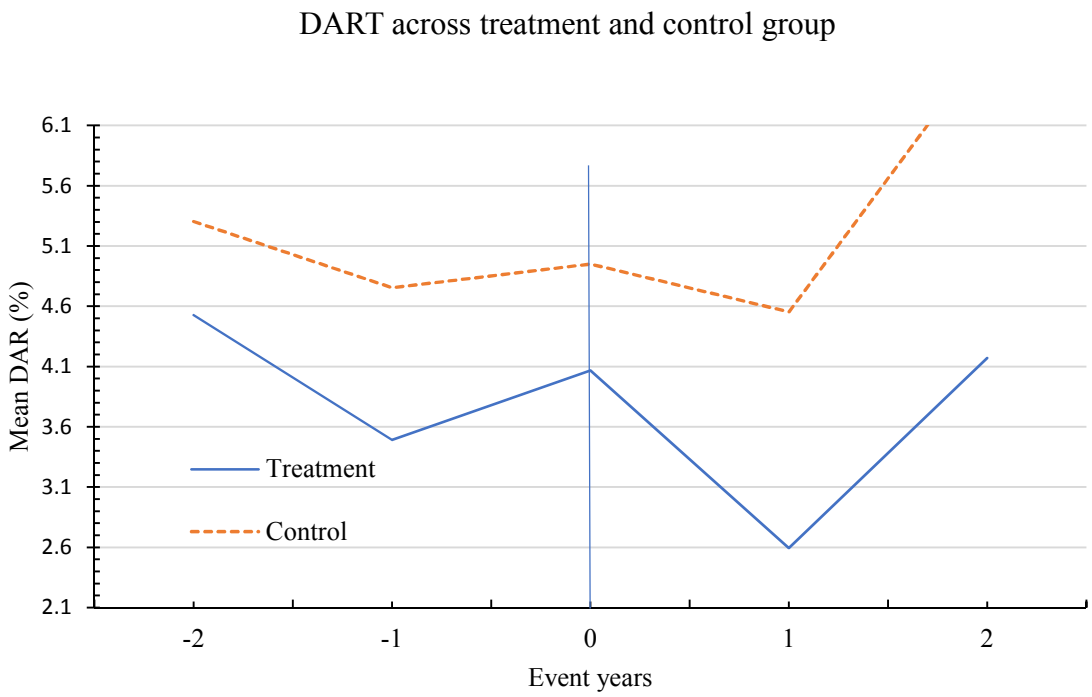


Figure 2.2: Mean difference of DART across treatment and control groups



CHAPTER III

LOCAL RELIGIOSITY, WORKPLACE SAFETY, AND FIRM VALUE

3.1 Introduction

Employee treatment, given the importance of human capital, encompasses employees' knowledge, skills, and other features that can be converted into productivity. Especially, Zingales (2000) highlights the greater importance of human capital in "new" firms[19] which are distinct from capital-centered "traditional" firms. Although numerous papers have documented the effects of employee treatment (e.g., Edmans (2011), Chen et al. (2011), and Au et al. (2019)), the determinant of employee treatment has not been clearly uncovered yet. Hence, the purpose of this study is to address this knowledge breach. Particularly, by focusing on the cultural trait of an establishment's local area, I empirically explore if local religiosity is associated with employee treatment measured by cross-regional variations in degrees of workplace safety in the U.S.

Departing from prior research on employee treatment using intangible measures such as employee satisfaction (e.g., Edmans (2011)), I choose to exploit more tangible events, occupational accidents, which present an advantage over other measures such as employee

[19] He further argues that employee skills become less specialized fitting to specific firms, and employees have better outside opportunities than before as the global market becomes integrated.

satisfaction because easily traceable records allow us to gauge employee treatment objectively and unambiguously. According to the U.S. Bureau of Labor Statistics, 5,250 American workers die from work-related injuries in 2018[20]. The National Safety Council also estimates that income loss due to preventable work-related injuries is close to $161.5 billion in 2017[21]. Moreover, in addition to substantial economic and societal loss, workplace safety issues have a nontrivial negative impact on firm value (see Cohn and Wardlaw (2016)) through a reduction in productivity, an increase in compensation claims (e.g., medical expense), and workplace morale. Therefore, understanding key factors in occupational safety is one of the uppermost issues for typical business owners.

I posit that religiosity could be an essential factor for workplace safety. Numerous studies present the basis for my reasoning, reporting the impact of social interaction and trust on diverse aspects of a firm such as product innovation and workplace performance (e.g., Guiso et al. (2015); Lins et al. (2017)). Concurrently, several studies have also documented that religiosity significantly affects how people behave and interact in society. In particular, studies (e.g., McPherson et al. (2001)) have shown religion as one of the most outstanding personal traits to form homophily, the tendency for similar people to be connected at a higher rate than dissimilar ones, with robust implications for how people form their societal attitudes and experience interactions. Also, religious people are more trusting of other people and more authentic (e.g., Guiso et al. (2003)). Focusing on these aspects of religiosity, I rely on the varying levels of local religiosity to identify the community members' propensity for social networking, interaction, trust, and solidarity.

[20] See at https://www.bls.gov/news.release/pdf/cfoi.pdf
[21] See at https://injuryfacts.nsc.org/work/costs/work-injury-costs/

To carry out my empirical tests, I obtain work-related injury and illness data from the Occupational Safety Health Administration (OSHA) and construct (unbalanced) panel data of occupational injuries and illnesses at the establishment level. More specifically, throughout the paper, my primary measure of workplace safety is the sum of deaths and all injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year. In this study, I find strong evidence that employees of the establishments in more religious counties get less injured than those in less religious counties. Moreover, the size of the relation between religiosity and workplace safety is economically substantial as well. In my regression analysis, one standard deviation increase in the level of local religiosity corresponds to a 1.5% drop in the number of work-related injury cases, even after controlling for corporate and demographic characteristics.

The common weakness of studies examining the effect of local religiosity on an economic outcome is the confounding effect, which refers to local religiosity being highly correlated with observable (e.g., age, gender, and education) and/or unobservable characteristics (e.g., personal mentality and family tradition) of local communities. To address this endogeneity issue, I present that my evidence is robust to a battery of sensitivity tests, including the alternative definition of religiosity, a two-stage model with an instrumental variable, a difference-in-differences approach exploiting migration shock, and other various approaches to deal with endogeneity.

I further show that the positive effect of religiosity on workplace safety[22] is irrelevant for risk-based cross-sectional groups and mainly pronounced in areas dominated by one religious denomination, regardless of Protestant or Catholic[23]. Hence, the correlation between workplace safety and local religiosity is not driven by a manner of risk-taking behavior documented in prior studies (e.g, Chen et al. (2014)), but rather, it is likely determined by the degree of unity among community members sharing the same religious identity. The effect of this unity among community members sharing the same religious identity survives even after controlling other social networks, such as social capital (network through non-religious social institutions), risk-related controls, local ethnicity, and other minority groups within the local religiosity. This finding is consistent with the empirical evidence that employee behaviors and performance in the workplace are positively affected by the cooperative relationships and mutual trust within the organizations (e.g., Kim et al. (2018)). Mencl and May (2009) also show that employees refrain from workplace misbehavior when they are socially and psychologically close to colleagues at work. Such tendencies could be more evident when community solidarity is built-in secure social networks and trust formed through sharing the same religious belief.

I provide two additional tests that explain the relation I present in this study, within the context of the mechanisms through which local religiosity affects workplace safety. I find that

[22] The negative relation between religiosity and work-related injuires and illnesses symbolizes the positive relation between local religiosity and workplace safety.

[23] In the U.S., Protestant and Catholic are two major religions: about 43% and 20% of Americans identify themselves as protestants and catholics in 2019, respectively. About 26% of Americans are not affiliated with any religion. Other religions such as Mormons account for no more than 2% of total populations independently (https://www.pewforum.org/2019/10/17/in-u-s-decline-of-christianity-continues-at-rapid-pace/). Therefore, a high local religiosity is likely driven by either Protestant or Catholic.

establishments in more religious counties are remarkably linked with better workplace safety when the parent firm has a lower discretionary expense and higher work pressure. This suggests that local religiosity affects managers' attitudes toward workplace safety even when they have lower discretionary resources for safety and higher performance pressure to increase firms' productivity. I claim that such managers' positive attitudes toward workplace safety could result from religiosity-induced informal interpersonal interactions within the community and workplace. In other words, a more robust regional community and workplace solidarity aroused by local religiosity may secure efficient allocation of limited resources (such as, proper rewards, training, management commitment, effective communication, and employee participation) for safety and align the work assignment with the employees' ability and skills in a better way, which eventually drives the positive relationship between local religiosity and workplace safety.

Furthermore, focusing on the different aspects of heterogeneity in the effect of religiosity, I provide several tests to unveil cross-sectional differences in the relation between religiosity and workplace safety issues. I find that the positive linkage between local religiosity and workplace safety is more pronounced in establishments of industries with lower union membership, establishments of firms with higher analysts coverage, and establishments located in counties with lower republic political orientation and higher social capital. Based on these findings, I argue that religiosity has a complementary effect concerning industry union membership or analyst coverage of a firm on advancing workplace safety.

In the firm-level analysis, I find that firms with higher establishment-level employee weighted religiosity are less likely to violate workplace conduct and pay workplace violation

penalties to different federal regulatory agencies. These firms are also more likely to undertake workplace safety measures and reduce employment uncertainty.

Lastly, I examine the influence of workplace safety on firm performance measured as firm-level market-to-book ratio and Tobin's Q. I find that workplace accidents are negatively associated with firm performance, suggesting a value implication of local religiosity through human capital protection. This finding corresponds with the human relations theories arguing that employee satisfaction and responsible employee treatment may ultimately benefit shareholders (see Akerlof (1982) and Lee and Mas (2012), among many others).

My study contributes to the growing literature on employee relations and finance by presenting compelling evidence that there is a substantial improvement in employee treatment and workplace safety, which affects employee welfare to a great extent and potentially firm value as well, in areas with high religiosity. Extant finance literature shows that better employee treatment or satisfaction increases employee morale at the workplace, resulting in higher productivity and lower turnover (Harter et al. (2002)), better innovation productivities (Chen et al. (2016b); Chen et al. (2016)) and higher stock returns (Edmans (2011); Edmans et al. (2014)), which all could eventually lead to stockholder wealth maximization. Building on this line of literature, my study provides a value implication of local religiosity through human capital protection, demonstrating that corporate culture highlighted as managerial integrity could increase the firm value significantly through better employee relations.

My study also sheds light on how local religiosity is an influential factor shaping a relation between corporate culture and employee welfare. Since Hilary and Hui's seminal work (2009), a voluminous amount of research has focused on the linkage between religiosity and

risk-taking behavior and shown that local religiosity is negatively associated with the level of corporate risk-taking behavior: cost of debt, earnings management, voluntary disclosure, corporate misbehavior, corporate financial reporting, innovation, venture capital investment decision, debt financing, and so on (e.g., Kanagaretnam et al. (2015); Dyreng et al. (2012); El Ghoul et al. (2012); Cai and Shi (2017); Chircop et al. (2020a); among many others). Instead, I turn my attention to another critical aspect of religiosity, as a gauge for the community members' propensity for social networking, homophilous interactions, and trust, and then I demonstrate its positive association with workplace safety. Hence, my findings add to a growing body of literature about the impact of social interaction and employee trust on different aspects of firms (e.g., Shi and Tang (2015); Lins et al. (2017)).

My findings have practical implications specifically for business owners, as running a business in a more religious area than a less religious area would increase firm value, if all other things are equal. They invest in their employees upon contract signing and bear a significant amount of risk since those investments often take a long time to see what comes up as a return. If workers get injured on the job before the talent of the workforce creates value, the business owners will assume the entire costs arisen from the human capital loss. While governments may share the costs by implementing relevant regulations or by offering a government subsidy if workplace accidents and injuries happen, my findings suggest a significant role of religiosity in workplace safety. That is, business owners in highly religious areas can internalize the costs related to workplace safety and would likely make additional investments in employee welfare. Rendering safe working practices to the employee is initially costly but could ultimately enhance shareholder wealth.

This chapter is organized as follows. Section 2 discusses the related literature and prior findings. Section 3 describes the data and sample selection procedure. Section 4 describes the empirical results. Finally, this chapter is concluded in section 5.

3.2 Literature Review

3.2.1 The importance of employee treatment

The World Bank Council for Sustainable Development (1999) asserts that making good business includes both behaving ethically and contributing to "economic development and improving the quality of life of the workforce and their families as well as of the local community and society at large." As this definition implies, the workforce represents one of the key stakeholders of a firm. At the same time, the importance of human capital has been increasingly emphasized in the literature. Pfeffer (1996) mentioned human capital as one of the main driving forces for a firm's competitive success. Furthermore, human capital, as a crucial asset and the source of value creation, can be lost easily when employees leave a firm (Hall and Lerner (2010)). Thus, the importance of employee treatment has received burgeoning attention.

Markedly, a large body of literature has demonstrated that a firm's treatment of its employees can yield a significant impact on the firm in numerous ways. For instance, Bae et al. (2011) find that firms treating their employees fairly maintain low debt ratios, implying that such firms have strong incentives to reduce the probability of financial distress. In addition, employee conditions are important determinants of firms' cost of debt (Chen et al. (2012a)) and the cost of equity (Chen et al. (2011)). Numerous papers also find that a firm's investment in employee welfare can yield a favorable impact such as more innovation success (e.g., Liu et al. (2020);

Mao and Weathers (2019)). Moreover, Edmans et al. (2014) and Lee and Mas (2012) find that good employee treatment is positively associated with stock returns and market value increasing shareholders' wealth. Then, while the consequences of corporate irresponsibility toward employees are well understood, studies on underlying internal or external mechanisms improving employee treatment are relatively scant. Hence, my focus is to extend this area of study by examining a relatively underexplored part, the determinant of employee treatment, measured as workplace safety events.

3.2.2 Determinants of workplace safety

Prior literature has discussed numerous elements affecting workplace safety. For example, Gillen et al. (2002) find that union workers are less likely to perceive risk-taking as a part of their job, and Morantz (2013) claims that unionization leads to fewer workplace injuries. Using a unique dataset based on factory audits of working conditions in Nike's suppliers, Locke et al. (2007) find that monitoring efforts combined with interventions focused on halting the root causes of poor working conditions enhance working environments effectively, although monitoring alone does not produce substantial improvement in the suppliers' working conditions. Additionally, Caskey and Ozel (2017) argue that firms that meet or just beat analyst forecasts are associated with decreases in discretionary expenses related to worker welfare, which is also related to an increase in workplace injury or illness.

At the same time, extant literature finds that workplace injuries occur when a workplace lacks proper rewards, training, management commitment, effective communication, and employee participation (e.g, Ali et al. (2009)). The relational coordination theory, developed in

operational management literature, states that workplace coordination can increase through a shared goal, shared knowledge, mutual respect, and enhanced relationship among colleagues that facilitate effective communication, resulting in a safe working environment (Gittell (2002) and Pagell et al. (2015)). In this context, to what extent workplace culture plays a role in mitigating occupational injuries and illnesses would be a well-grounded topic to discuss.

3.2.3 Religiosity, homophily, and economic behavior

In this study, I focus on religiosity, which is a type of cultural factor that has been documented from different dimensions. For instance, Rupasingha (2009) shows that more religious U.S. counties exhibit better economic growth. Notably, several papers have shown that religiosity, as a part of corporate culture, affects different aspects of corporate behavior and has economic implications. While much of finance papers (e.g., Hilary and Hui (2009)) have focused on one particular aspect of religiosity and coupled it with corporate risk-taking behaviors, my emphasis is more on another side of religiosity, concerning societal attitude, homophily, and social connection. There are specific attributes found to be associated with more religious people. For instance, Guiso et al. (2003) claim that religious people are more trusting of other people, public institutions, and market outcomes. At the same time, such people are also more trustworthy as they are less willing to break the law or cheat. Hence, there could be an enhanced level of mutual trust and stronger bonding among religious people.

Moreover, another critical feature linked with religiosity is homophily, which refers to people's well-known tendency to connect more with others sharing similar traits such as race, ethnicity, and education. Homophily has been shown to affect many different areas to a

substantial degree. As an instance, Kleinbaum et al. (2013) show that there is a higher proportion of homophilous interactions among members within business units, job functions, offices, and quasi-formal structures than across their boundaries. Furthermore, among numerous social distinctions that can divide people's social worlds, McPherson et al. (2001) find religion as one of the strong traits for inbreeding homophily. Therefore, focusing on this aspect of religiosity with regards to homophily, social network, and trust, I examine its relation with workplace safety.

However, one may argue that the exclusiveness of religion could cause dispute across religions and thereby deteriorating workplace interactions and safety. When an area, for instance, is highly religious but comprised of diverse religious denominations, establishments located in that area may not necessarily exhibit better workplace safety due to conflicts and unfavorable interactions among different religious adherents within the workplace. Thus, I later examine not only how local religiosity is related to workplace safety but also extend it to if the dominance of one religion in an area matters for workplace safety.

3.3 Data and Sampling

In this section, I describe the sample selection process, variables construction, and summary statistics. My data mainly come from three different sources: the Occupational Safety and Health Administration (OSHA), the Association of Religion Data Archive (ARDA), and the Compustat database.

My data on workplace injuries are collected from the OSHA. The Bureau of Labor Statistics (BLS) compiles the OSHA data initiative (ODI) that shows work-related injuries and

illnesses from 2002 to 2011[24] through surveys with employers in manufacturing industries selected by a stratified sampling method under the Occupational Safety and Health Act, which involves approximately 80,000 establishments each year[25]. For each establishment, OSHA records injuries and illnesses data, along with searchable establishment name, address, industry identification, the average number of employees, mean number of working hours, and indicator variables that indicate whether an establishment experiences unusual events such as strikes or lockout, facility shutdown or layoff, seasonal work, or natural disasters or adverse weather conditions. Several studies (e.g., Cohn and Wardlaw (2016), McManus and Schaur (2016), Caskey and Ozel (2017), Bradley et al. (2019), Cohn et al. (2020)) have used the OSHA data as a primary source of workplace safety research.

I use this data to construct annual measures of injuries and illnesses, and injury rates at the establishment level. My primary measure of injury is the natural logarithm of the sum of deaths and all injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year (Column G + Column H + Column I + Column J of OSHA Form 300). In my robustness tests, I use an alternative

[24] While the OSHA compiled data since 1996, our sample period begins in 2002 because the OSHA changed its recording criteria for injuries and illnesses and the coverage of industries from 2002. The pre-2002 years' injuries and illnesses data are not comparable to those after the change made in 2002. Although OSHA discontinued the ODI collection initiative in 2011 due to funding cuts, I end up our sample year in 2010 because our religion data from ARDA decennial survey data are available up to the year of 2010.

[25] With a broad mandate to reduce injuries and illnesses in America's workplaces, OSHA requires all establishments with 11 or more employees to maintain log recording injuries and illnesses. Using this log record, OSHA can spot establishments with serious workplace safety issues and take initiatives to ensure that "an America whose workplaces, as far as possible, are free from hazards that are causing or likely to cause death or physical harm." See OSHA's justification at https://www.osha.gov/Reduction_Act/SS2091999.html

measure of establishment-level injury: Total Case Rate (TCR) and DART. TCR and DART represent the establishment-level incident rate per 100 full-time employees in a given year. I also use a different measure of establishment-level injury which is the natural logarithm of the number of days away from work (Column K) due to work-related injuries and illnesses[26].

My data on county-level religiosity come from the Churches and Church Membership files of the Association of Religion Data Archive (ARDA). The Glenmary Research Center collects data from decennial surveys on religious affiliation in the U.S. (1971, 1980, 1990, 2000, and 2010). In the 2010 decennial survey year, it compiles data on the number of congregations and adherents for 236 religious' groups. As per the ARDA[27] definition, total adherents include "all members, including full members, their children, and the estimated number of other participants who are not considered members; for example, the "baptized," "those not confirmed," "those not eligible for Communion," "those regularly attending services," and the like." The decennial survey data on religious adherents are available at the ARDA website[28] under the title "Religious Congregations and Membership File."

For my analyses, I use the datasets for 1990, 2000, and 2010 to construct my measure of county-level religiosity. The main variable of interest is the degree of religiosity in the counties in which a firm's establishments are located. I compute county-level religiosity as the number of religious adherents in the establishment county divided by the total population in the county

[26] Our first measure has a clear distinction from the third one. The first measure deals with total injury cases that cause days away from work (e.g., one incidence may cause 5 days of absence from work). The third measure captures the number of days in total that are unproductive due to injury incidence.

[27] See the ARDA website at http://www.thearda.com/Archive/Files/Descriptions/RCMSCY10.asp

[28] Religious data available at http://www.thearda.com/Archive/ChCounty.asp

reported by ARDA. The higher value of religiosity represents more religious adherents in the county. Following previous literature (Alesina and La Ferrara (2000); Hillary and Hui (2009); and Adhikari and Agrawal (2016)) on religiosity, I linearly interpolate the data to estimate the values for missing years (e.g., 1991-1999 and 2001-2009).

In addition, I collect establishment-county level demographic variables from the U.S. Census Bureau. I use the establishment county population's median age, level of education, population, percentage of married people, and social capital as county-level control variables that might affect workplace safety issues. As in the estimation of missing years' county-level religiosity, I linearly interpolate missing years' county-level demographic variables.

My accounting data come from Compustat annual files. I calculate several firm-level control variables following the work of Cohn and Wardlaw (2016). Firm-specific control variables include leverage, cash flow, dividends, firm size *(Ln(Assets))*, asset turnover *(Turnover)*, tangibility, capital expenditure *(Capex)*, and market to book ratio *(MB)*. The detailed variable constructions are available in Appendix A.2. I also control for establishment-level variables such as establishment size *(Ln(EstbEmp))* measured as the natural logarithm of the number of employees and working hours per employee *(Ln(WorkHour))*. To address the effect of the possible influence of outliers, I winsorize all of these variables at the top and bottom 1% level. Following Cohn and Wardlaw (2016) and Caskey and Ozel (2017), I delete financial institutions [Standard Industrial Classification (SIC) Codes 6000-6999] and utility suppliers [Standard Industrial Classification (SIC) Codes 4900-4999]. I also exclude the observation with missing values.

I use the Compustat-OSHA injury and illness link table[29] of Caskey and Ozel (2017)[30] to match each establishment with its Compustat firm. To merge OSHA data with ARDA data, I match them by Federal Information Processing Standards (FIPS) code and calendar year. After merging OSHA establishment-level injuries and illnesses and ARDA county-level religion data with Compustat data, my final sample consists of 72,287 establishment-year observations with 5,268 unique establishments and 1,615 unique firms.

Table 3.1 provides summary statistics for establishment-level, county-level, and firm-level variables. The average establishment in my sample has 250 employees, and employees work for an average of 1,941 hours per year. In terms of my measures of workplace safety, the mean and median values of the number of cases that result in days away from work or in transfers and other recordable cases are 16.30 and 7 per establishment, respectively, in a given year. My alternative measures of workplace safety issues are TCR and DART, the establishment-level incident rate per 100 full-time employees in a given year. The mean and median values of TCR are 7.76 and 6.14, while the mean and median values of DART are 5.09 and 3.63, respectively. The mean DART implies that, in an average establishment year, an employee has a 5.1% probability of sustaining work-related injury and illness.

The county-level religiosity measured as the percentage of people who belong to a church in each county exhibits the mean and median values of 50.70% and 50.50%, respectively. The

[29] See the the Compustat-OSHA injury and illness link table at https://sites.google.com/view/bugraozel/data

[30] Caskey and Ozel (2017) manually match establishments form the ODI to firms in Compustat based on names. If any search does not produce any match, they conduct additional searches through Hoovers, company/establishment websites, and other online resources to identify whether the establishment matches with a subsidiary of a Compustat firm.

standard deviation of religiosity is 11.20%, indicating a fair amount of variation in my religiosity variable[31]. The establishment-county population age has a mean and median of 36.69 and 36.60 years, respectively. The mean and median percentages of the establishment county age 25+ population with at least one year of high education are 83.01% and 84.16%, respectively. On average, 19.20% of establishment-county people are married. Each establishment county has a population of 890,552 (308,760) in terms of its mean (median) value.

The mean and median values of the total assets are $31.58 billion and $10.50 billion, respectively, which indicates that on average, the firms used in my sample are relatively large. On average, a firm has 27.30% total debt in its capital structure. The average cash flow is about 9.80% of total assets. The average dividend paid to common stock is 1.80% of total assets. Asset turnover averages $1.45 of sales per dollar of beginning assets, and capital expenditure averages 5.60% of beginning assets. On average property, plant, and equipment (PP&E) or tangible assets is about 38.00% of my sample firm's total assets. The mean firm in my sample has an asset market-to-book ratio of 1.35.

Sampling distribution and cross-tabulation of injuries and illnesses analysis over the years are depicted in Figures 1 and 2. Figure 1 shows the distribution of the sample over the years. Observations in my sample are almost evenly distributed over the sample period with few exceptions. In the years 2009 and 2010, the number of observations is relatively lower than in previous years. Figure 2 shows the distribution of the average number of cases, Total Case Rate (TCR), and days away from work or with job restriction or transfer (DART) over the sample years. Both the number and rate of cases are decreasing over the years.

[31] The statistics of county-level religiosity are comparable to those of Hilary and Hui (2009).

3.4 Empirical Results

3.4.1 The effect of religiosity on establishment-level work-related injury and illness

I examine the relation between local religiosity and establishment-level workplace injury in an Ordinary Least Square (OLS) regression framework. I employ the following baseline empirical model that links the measures of establishment-level workplace injury of firm *j* in year *t* to the county-level religiosity and a vector of the firm and establishment-specific control variables in year t.

$$Ln(Num\_Cases)_{i,j,t} = a_0 + \beta_1 * Religisotiy_{i,j,t} + \sum_2^p \beta_{2\ to\ p} * E_{q,i,j,t} + \sum_{p+1}^q \beta_{p+1\ to\ q} * X_{p,j,t} + FEs + \varepsilon_{i,j,t} \qquad (1),$$

where *p* and *q* are numbers, and *i*, *j*, and *t* index establishments, firms, and years respectively. $Ln(Num\_Cases)_{i,j,t}$ is the key dependent variable, computed as the natural logarithm of the sum of deaths and all injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year. The main variable of interest is *Religiosity*, computed as the percentage of religious adherents of the total county population in a given establishment-county year. The higher values of the coefficient estimate on *Religiosity* in a negative direction indicate that the employees of the establishments resided in more religious counties get less injured than those in less religious counties, and vice-versa. *E* captures the establishment-level controls that include county-level demographic variables, establishment size *(Ln(EstbEmp)),* and working hours per employee *(Ln(WorkHour))*. Following Hilary and Hui (2009) and Adhikari and Agrawal (2016), I consider the county population

(Ln(Pop)), median age *(Ln(MedAge))*, percentage of people having at least one year of high school education *(Educ)*, and percentage of married people *(Married)* as my county-level demographic variables. These county-level demographic variables are correlated with county-level religious participation; I want to disentangle the pure religious participation effect per se from simply being correlated with the other demographic characteristics. *X* represents a set of firm-specific variables that have been shown to affect changes in workplace safety investment; they are leverage, cash flow, dividends, firm size *(Ln(Assets))*, asset turnover *(Turnover)*, tangibility, capital expenditure *(Capex)*, and market to book ratio *(MB)*. My regression model includes firm or establishment and year fixed effects to capture the time-invariant and firm-level unobservable shock. All standard errors are robust to heteroskedasticity and corrected for the clustering of observations by establishment county.

Table 3.2 reports the estimates from the empirical model (1). The first column reports the univariate results, while Columns (2) and (3) include controls and the firm/establishment and year fixed effects, respectively. The coefficient on *Religiosity* in Column (1) is negative and statistically significant, which shows that employees of establishments located in counties with a higher level of religiosity experience better workplace safety performance. When I add firm and year fixed effects in Column (2), the coefficient on *Religiosity* remains negative and statistically significant at the 5 percent level. In this column, speaking of economic magnitude, an increase by a standard deviation of local religiosity leads to a decrease in cases of work-related injuries by 1.50% ($=\exp^{(-0.130*0.112)}-1$). With establishment fixed effects used in the place of firm fixed effects, the same relation remains qualitatively. The magnitude of the coefficient estimates on *Religiosity* varies from -0.130 to -0.257.

When I turn my attention to the firm and establishment-specific control variables that literature has shown to affect changes in workplace safety investment, I find the expected coefficients. For example, Cohn and Wardlaw (2016) show that firm-level leverage, tangibility, and log of employees are positively related to injury rate, while capital expenditure and firm size are negatively associated with establishment injury. The coefficients of my control variables are in line with those results in the workplace safety literature.

This table shows that, in all my specifications, workplace injury is negatively related to establishment-county level religiosity. In other words, the results from my baseline regression indicate that county-level religiosity positively affects employee welfare, and these results are consistent with my conjecture that local religious culture has a positive association with employee treatment, enhancing the working environment and employee welfare. However, one may be concerned with my finding as establishment-level safety-related activities could be driven by the firm-level budgetary and policy initiative decisions. Regardless of the establishments' location, the parent firm equally sets the safety budget and policy initiative for all of its establishments. Then, how could establishments of the same firm exhibit different levels of workplace safety? I respond to this concern by arguing that, while safety-related budgetary and policy initiative decisions are made at the firm level, safety-related activities are implemented at the establishment level. For instance, Cohn and Wardlaw (2016) contend that establishment managers may cut safety expenditure in order to meet short-run budgeted cost targets. When the implementation of safety programs is at the divisional managers' discretion, the local community members' homophilous social networks and mutual trust solidified through

religious belief could significantly influence the local establishments' responsible treatment of their employees.

3.4.2 Types of religious adherents and workplace safety

In this section, to further investigate the nature of the relation between local religiosity and workplace safety, I examine whether my baseline results are sensitive to a risk-based explanation of religious effect on employee treatment and depend on religious denominations considering differences between religious groups. My argument is based on community solidarity and information interaction induced by the religious network. Studies (e.g., Kumar et al. (2011); Gao et al. (2017); and Chircop et al. (2020a)) investigate the effect of local religiosity on several corporate policies based on a manner of organizational risk-taking behavior. In this line of research, many may be skeptical about my findings by arguing that workplace injuries are simply a proxy for risk-taking. To address this concern, I re-estimate my main analysis controlling riskiness and homophily attributes induced by one religious group rather than their cross-sectional differences.

We, in addition to my main control variables, include several risk-based control variables in my baseline model and re-estimate the results. In this re-estimation, risk-based control variables include state-level revenue from selling lottery, standard deviation of firms stock return, standard deviation of operating performance, and research & development expense. Then I also create a subsample based on counties dominated by catholic adherents. Several studies (such as Hilary and Hui (2009)) have highlighted how religious groups are different from one another. For instance, Protestant denominations are more likely to involve in religious activities

(e.g., higher church attendance and financial contributions to churches) and interact with one another frequently. Numerous studies on local religiosity show that Catholics are more prone to risk-taking compared to Protestants in diverse areas of decision making such as gambling, innovation, stock investment, and corporate investment (e.g., Kumar (2009); Kumar et al. (2011); Schneider and Spalt (2016); among many others). There are also studies on the differences and similarities between Protestants and Catholics, focusing on their workplace and social ethics (e.g., Arrunada (2010)).

Considering the differences between religious denominations, I examine if my baseline results change for different religious orientations. Since Protestant and Catholic are the two most popular religions in the U.S., I first measure local religious ideology *Rel_Ideo* as the ratio of Protestant adherents minus the ratio of Catholic adherents divided by their sum. *Rel_Ideo* has a value ranges from -1 to 1. A value of 1 (-1) for *Rel_Ideo* value indicates that the local community's religious identity is dominated by Protestant (Catholic) ideology. To capture a dominance by one religion in a given county, in my estimation, I use the absolute value of *Rel_Ideo* (i.e., *Abs(Rel_Ideo))*. As such, the *Abs(Rel_Ideo)* represents whether the county is religiously dominated by one religious group (either Protestant or Catholic). As a second measure, I construct the Herfindahl index (i.e., *Rel_HHI*) based on religious adherents by incorporating all minor religions although other minority religious groups only account for less than 2% in any county. Results are reported in Table 3.3.

Panel A provides results after controlling additional risk-based controls in my baseline model. If my main findings are explained by risk-based explanation or my key dependent variable- workplace injury is a proxy for organizational risk-taking, I should not see the

significant coefficient on religiosity in Columns (1) and (2). The coefficient estimates on religiosity reported in Columns (1) and (2) are negative and statistically significant even after controlling state-level lottery, return volatility, ROA volatility, and R&D. I then divide my sample into two groups based on counties dominated by Catholic adherents since Catholics are more prone to risk-taking compared to Protestants in diverse areas of decision making (e.g., Kumar (2009); Kumar et al. (2011); and Schneider and Spalt (2016)). If risk-based explanation dominates my key findings, I should observe any significant religious effect in the low Catholic group and the statistically significant cross-sectional difference between high and low Catholic groups (Columns 3 to 6). The coefficient estimates on both groups are negative and statistically significant and their cross-sectional differences are also statistically insignificant. This analysis bolsters my community solidarity and homophily-based explanation of my main findings.

I also alleviate the risk-based explanation of my finding in another way. Panel B reports the results. In Columns (1) and (2), the results show a negative relation between *Abs(Rel_Ideo)* and the number of workplace accidents, indicating that dominance by Protestant or Catholic religious groups in a given county results in lower workplace injury of that county's establishment. In Columns (3) and (4), I also find that *Rel_HHI* is negatively associated with the number of workplace accidents. It confirms that workplace safety is affected by whether local community members are solidified through sharing identical religious ideology. When one particular religious denomination is more prevalent in an area, the community would be more likely to get solidified and closer through shared common beliefs, ideologies, and homophily. Hence, this finding is consistent with the relational coordination theory (e.g., Gittell (2002)),

which claims that workplace safety environment could be enhanced by the relationship among workers and the resulting workplace coordination.

Recall from my postulation that the local community members' homophilous social networks and mutual trust solidified through religious belief significantly influences firms' responsible treatment of their local employees. I acknowledge that the effect of local religiosity on an economic outcome could be jointly influenced by social ties of local communities other than religion. For example, local community members' homophilous social networks and mutual trust could be solidified through informal networking (e.g., bowling clubs) which can be captured by social capital. Or, local community members' homophilous social networks and mutual trust could be overlapped with those nested in an ethnic group. To address this concern, we, in addition to my standard establishment county controls, include (e.g., social capital[32] in all my models) *Ethnicity-HHI* based on the ethnic origin of people (e.g., White, Black, Asian, or Hispanic[33]) in a given county as additional control variables in my estimations. Results are reported in Columns (5) and (6). Overall, the results show that the effect of local religiosity is not subsumed by ethnicity homophilous interactions in the county.

3.4.3 Potential mechanisms through which religiosity affects workplace safety

To test my hypothesis considering the plausible mechanisms through which local religiosity affects workplace safety, I rely on current research on workplace safety (e.g., Caskey and Ozel (2017); Bradley et al. (20219); and Bai et al (2020)). These studies suggest that

[32] I collect social capital data from https://aese.psu.edu/nercrd/community/social-capital-resources

[33] I collect data on county-level demography and ethnicity from https://www.census.gov/library/publications/2011/compendia/usa-counties-2011.html

workplace injuries result from reducing investment in workplace safety and increasing managerial pressure for short-term performance. In this study, I investigate how local religiosity affects workplace safety by influencing these two mechanisms. I expect that managers, due to community solidarity and trust through religious networks in the establishment county, will efficiently use safety investment funds even they are limited and align the job assignment even under productivity pressure.

Safety investments include costs of maintenance, plant improvements, setting up and enforcing safety policies, training, and oversight programs. But the limitation is that there are no traceable track records of these items and no company reports them separately in the Compustat database. Since I do not have the luxury to extract employee safety expenses from the Compustat database, in order to test whether managers' attitude toward workplace safety is influenced by community solidarity and homophile induced by local religiosity, I first estimate discretionary safety expenditure following Caskey and Ozel (2017). Sales, general, and administrative (SG&A) expenses include some product promotional and managerial costs. So, any abnormal discretionary expense per employee, measured by the residual from the model can be particularly set for employee safety expense. In particular, I adopt the following model to measure the residual as a proxy for discretionary employee safety expense.

$$\frac{SG\&A_{i,t}}{EMP_{i,t-1}} = a_0 + \beta_1 * \frac{1}{EMP_{i,t-1}} + \beta_2 * \frac{Sales_{i,t-1}}{EMP_{i,t-1}} + \varepsilon_{i,t} \qquad (2)$$

Where SG&A is selling, general, and administrative expenses. EMP indicates the number of employees reported in the Compustat database. Following Caskey and Ozel (2017), I scaled SG&A and EMP by beginning employees rather than beginning assets. I then take the residual from the model (2) within each two-digit SIC coded industry-year to measure my discretionary

safety expenditure. I then create a subsample based on the median value of the absolute discretionary safety expense. Panel A of Table 3.4 reports the results. The coefficient estimates on religiosity are negative and statistically significant when discretionary safety expense is lower (below median value), while they are insignificant for the group with higher discretionary safety expense. The cross-sectional differences are statistically significant at the 1 percent level. This result suggests that when managers have limited discretionary safety funds, they become much more efficient to allocate those resources for workplace safety due to community solidarity and homophily induced by the local religious network.

Considering another channel, I investigate whether local religiosity encourages managers to pay attention to workplace safety when they are under productivity pressure. They can create work pressure to boost earnings targets. When religiosity solidifies the mutual trust and homophilous interaction within the local community, the local community members may not abuse one another by dint of their power and authority. For example, establishment managers may not assign extra work for their file and rank employees or force them to work beyond their capacity or in an unsafe working condition. So, I expect that, due to community solidarity, managers will properly align the job assignment with employees' skills and abilities, even after they are under pressure to increase productivity by increasing working hours, new job assignments, and so on. I again divide my sample into two parts based on work pressure. Following Caskey and Ozel (2017), I define work pressure as the sum of the cost of goods sold and changes in inventory divided by the total number of employees. A firm is defined as in the high (low) work pressure group if its productivity is higher (lower) than or equal to its median during my sample period.

The results are presented in Panel B of Table 3.4. The coefficient estimates on religiosity are negative and statistically significant when managers face performance pressure that results in work pressure for the file-and-rank employees while they are not significant for groups with lower work pressure. In Columns (1) and (2), the coefficients on *Religiosity* are -0.206 and -0.218 with substantial statistical significance (*t*-statistics of -2.97 and -3.35), respectively. Caskey and Ozel (2017) suggest that in order to meet or beat the analysts' earning targets, they create work pressure, which results in workers' injury and illness. But my results show the effect of religiosity only for the high working pressure group. The results support my conjecture that, due to community solidarity, mutual trust, and homophilous interaction induced by local religiosity, managers do not exploit their file and rank employees by assigning extra work, wrong work order, or poor working conditions. In sum, establishment county-level religiosity has a significant influence on employees' safety investment and work pressure, and I argue that such effects could be potential channels through which local religiosity affects workplace safety.

3.4.4 Subsample analyses: Heterogeneity in the effect of religiosity on workplace safety

In this section, I examine the cross-sectional differences in the effect of religiosity on workplace safety issues. I focus on fmy aspects of heterogeneity in the influence of religiosity: industry-level union membership, analyst coverage, and county-level political orientation and social capital.

I first investigate whether industry-level union membership has an impact on the relation between religiosity and workplace safety. Using data from the U.S. Bureau of Labor Statistics, I treat an establishment as high labor union coverage if its firm operates in an industry with above-

median union membership. Panel A of Table 3.5 reports the estimates from the baseline regression Model (1) with the union membership as a control variable and for subsamples of high and low industry union membership. The results reported in both Columns (1) and (2) suggest that *Religiosity* is negatively related to workplace safety outcomes. Hence, my baseline results survive even after controlling for union membership, and the results also show that union membership is positively related to work-related injury and illness. However, the relation could merely represent correlation, rather than a causal relation, between union membership and workplace safety because jobs with higher risks related to injury and illness are more likely to be unionized (Hirsch and Berger (1984)). Also, in the literature, the influence of union membership on workplace safety is inconclusive[34].

Then, when I divide the sample into groups based on industry membership, I find that the coefficients on *Religiosity* are statistically significant only for the low union group of establishments. In Columns (5) and (6), the coefficients on *Religiosity* for firms operating in the industry having low union membership are -0.264 and -0.297 and statistically significant at the 1 percent level (*t*-statistics -3.71 and -4.06), respectively. Overall, the results from Panel A provide evidence that the negative effect of religiosity on workplace safety is more pronounced for firms whose industry has low union membership. Although the results initially may seem at odds with my explanation, I argue that local religiosity has a complementary effect on workplace safety with respect to industry union membership.

[34] When union serves as a collective voice (Freeman and Medoff, 1984), unionized workers may be more willing to express their preferences for workplace safety without fear of retaliation (Li and Singleton, 2020). Then, firms with unionized employees may experience lower workplace injury and illness than those of their peers that have no unionized employees. On the other hand, Li et al. (2020) show that at the mean level, the union has no detectable effect but in downward injury distribution.

I then assess whether workplace injury is relatively lower in religious county establishments whose firm has a higher level of analyst coverage. Bradley et al. (2019) show that analysts investigate firms' safety policies due to cash flow implications of workplace safety issues on shareholder wealth. For example, Cohn and Wardlaw (2016) provide empirical evidence of firm value deterioration for workplace injury and illness. It interesting to investigate whether local religiosity affects analysts' effort to firms' safety policies and investment. Because local analysts can have frequent on-site visits and better access to management via information connections (e.g., social gathering, religious network, or another way) (O'Brien and Tan (2015)). As a result, I expect that local religiosity will enhance analysts' personal connection (through informal meetings) with establishment employees, managers, and so on to get first-hand information about workplace safety. I should see a cross-sectional difference of religious effect on workplace safety with respect to analyst coverage. I create a subsample based on the median value of analysts' coverage. Results are reported in Panel B of Table 3.5.

I find that the coefficients on *Religiosity* are statistically significant only for the group of high analyst coverage. This finding supports my conjecture that the religious network solidifies community relation, mutual trust, and easy access to soft information, which complement the investigation of analysts for workplace safety issues. The coefficients on *Religiosity* are -0.263 and -0.276 (whose t-statistics are -4.04 and -4.58) in Columns (1) and (2), respectively. These coefficient estimates are significantly different from their counter-part.

Next, I investigate whether local religiosity influences community solidarity and mutual trust induced by other social networks (e.g., social capital). Social capital also enhances mutual cooperation, facilitates transactions, and helps firms get a corporate contract or access to external

capital (Hasan et al. (2020)). People can interact with one another through non-religious networks such as attending labor organizations, business associations, golf courses, physical fitness programs, or sports clubs, which are the components of social capital. I expect that this mutual cooperation and community solidarity will be augmented by the religious network. I again create a subsample based on the median value of county-level social capital and report the results in Panel D of Table 3.4. I see the coefficient estimates on religiosity are statistically significant only for the group with high social capital, suggesting that religiosity enhances the effect of social capital on workplace safety.

My subsample analyses imply that religiosity has a complementary effect with respect to union coverage, a firm's analyst coverages, and establishment county's social capital on advancing workplace safety.

3.4.5 Sensitivity analyses

3.4.5.1 Endogeneity issues: In this section, I perform a battery of robustness tests to show that my baseline findings are not driven by the endogeneity issue. A major concern for my estimated effect could be a confounding effect since local religiosity is highly correlated with observable (e.g., age, gender, education, etc.) and/or unobservable characteristics (e.g., personal mentality, family tradition, etc.) of local communities. I address this endogeneity issue in several ways.

First, I estimate residual local religiosity orthogonalized to known relevant characteristics (e.g., age, education, etc.) since these relevant characteristics could drive a person's religious participation. Particularly, I regress establishment county religiosity on income, population, education, married (%), the median age of the county population, political orientation, social

capital, Chinese population, Mexican population, and the risky attitudes of the county population, proxied by state revenue from lottery sales as a percentage of Gross Domestic Product(GDP). Then, I take the residual from the estimation[35] as an exogenous definition of my religiosity measure. Panel A of Table 3.6 reports the results from my baseline Model (1) re-run on this alternative measure of my key independent variable, *Religiosity*. The results reported in Columns (1) and (2) show that my baseline results are not sensitive to the confounding effect due to *Religiosity* being highly correlated with observable and unobservable county characteristics or religiosity measurement errors. The magnitude of the coefficients is similar to that reported in Table 3.2.

Second, another primary concern regarding my baseline regression results is that they might be driven by unspecified omitted variables that affect both a person's religious participation and workplace injury in a county. To overcome the endogeneity problem, I employ the instrumental variable approach in which religious organization is used as an instrument. I employ the following two-stage model with an instrument variable (IV) of the lagged county-level religiosity and population. Religiosity a decade earlier and 3 years lagged county population will surely not affect workplace safety other than through the contemporary religiosity. Studies on the effect of local religiosity (e.g., Hilary and Hui (2009) and Adhikari and Agrawal (2016)) use a decade earlier religiosity as an instrument for IV their estimations. I also select previous decade religiosity and 3 years lagged population as IV since they are highly correlated with the contemporary local religiosity but less likely related to unobservable factors that influence workplace safety.

[35] Results are reported in Appendix B.3.

First-stage:

$$Religiosity_{i,j,t} = a_0 + \beta_1 * Religiosity_{i,j,1990} + \beta_2 * Ln(Pop)_{i,j,t-3} + \sum_3^p \beta_{3\ to\ p} * E_{i,j,t} + \sum_{p+1}^q \beta_{p+1\ to\ q} * X_{j,t} + FEs + \varepsilon_{i,j,t} \quad (3),$$

Second-stage:

$$Ln(Num\_Cases)_{i,j,t} = a_0 + \beta_1 * Pred\ Religisotiy_{i,j,t} + \sum_2^p \beta_{2\ to\ p} * E_{i,j,t} + \sum_{p+1}^q \beta_{p+1\ to\ q} * X_{j,t} + FEs + \varepsilon_{i,j,t} \quad (4),$$

where p and q are numbers and *i, j,* and *t* index establishments-county, firm, and year, respectively. In the first stage, the key-dependent variable is contemporary religiosity, whereas, in the second stage, the key-dependent variable is $Ln(Num\_Cases)_{i,j,t}$, computed as the natural logarithm of the sum of deaths and all injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year. The first-stage F-statistic is 380.47, which satisfies the minimum criteria of 10. The main variable of interest is *Religiosity*, predicted from the first-stage Model (3). In all the specifications, I use the same control variables used in Model (1). And, as in the baseline regression, standard errors are robust to heteroskedasticity and corrected for the clustering of observations by establishment county. Panel B of Table 3.6 reports the estimates from my IV regression Models (3) and (4). The results are consistent with those reported in Table 3.2 as the coefficient on the predicted *Religiosity* is negative with statistical significance.

Third, I further attempt to address the endogeneity issue using a difference-in-difference (DID) empirical approach. Since cultural value changes slowly, it is difficult to find a truly exogenous shock that changes local religiosity. However, it is still valuable to see how workplace safety is affected by a certain event that drives changes in local religiosity. As such an event, I

choose a migration shock, the inflow of people into a county. For this set of tests involving migration flows, I utilize "Statistics of Income (SOI) Tax Stats – County-to-County Migration Data"[36]. The data are based on year-to-year address changes reported on individual income tax returns filed with the IRS. Using this information, I identify county-level migration flows connecting the population's county of current residence and where the residents migrate from.

To form the treatment group, I first define high migration-in as the percentage of migration that comes from counties whose religiosity is greater than the yearly median of all migration sending counties. Then, I consider firm-establishment as treatment if its county's migration receiving is in the top decile of my sample migration-in, and control group otherwise. Treatment and control groups are one-to-one matched based on firm characteristics. I take the highest migration-in year for the treatment group as the event year and the following year as the post year, and the key variable of interest is the interaction between treatment and post dummy. Figure 3 first shows the parallel trend of workplace injury between treatment and benchmark group for the pre-event years. After the migration shock, however, there is a greater decrease in workplace injury for the treatment group than the benchmark group (i.e., the slope of the line for the treatment group is steeper than that for the benchmark group after the intervention). When a county receives migration from other highly religious counties, establishments of this county experience a noticeable drop in workplace injury and illness. I interpret the difference between the blue dashed line and the blue dotted line of workplace injury for the treatment group as a result of migration shock to the county because the migration shock increases the religious adherents in the receiving county.

[36] Data are provided by the United States Internal Revenue Service (IRS) (http://www.irs.gov).

The results from my DID regressions are presented in Panel C of Table 3.6. The marginal effect of the positive shock to the establishment-level religiosity is negative and highly statistically significant, implying that local religiosity does matter in establishment-level work-related safety issues. The coefficient on the interaction between treatment and post in Column (1) is -0.074, which is statistically significant at the 1 percent level. The result is qualitatively similar when I use establishment fixed effects instead of firm fixed effects in Column (2).

3.4.5.2 Additional robustness analysis: A potential concern could be that my results may be driven by sample selection bias since my tests are based on the locations of establishments and firms rarely locate their establishments in a random fashion. Thus, in order to alleviate the concern over the sample selection bias issue, I conduct a propensity score matching (PSM) analysis and report the results in Table 3.7.

I divide the sample into five groups based on religiosity (quintile by firm and year). I then create a dummy variable equal to 1 if the establishment county religiosity is in the top quintile by firm and year, and zero otherwise. In the first stage, I test whether firm, establishment, and county characteristics affect a firm's decision to locate one or more of its establishments in a highly religious county, and the results are reported in Panel A. Using the probit model, in Column (1), I see only three characteristics (establishment county-specific characteristics) have a small contribution to firm's choice to locate its establishment in a highly religious county. In Column (2) re re-run the probit model using the matched sample only. I find those two characteristics are not significantly different between the test group and the matched group. In Panel B, when I re-estimate my baseline regressions using both test and matched groups only, I

find the negative effect of establishment county-level religiosity remains statistically significant on the work-related injury. Hence, this result, at least partially, alleviates concerns about potential sample selection bias in the presentation of the relation between local religiosity and workplace safety.

I further conduct a set of other additional robustness tests and include the results in Appendix A.2. The first test in Panel A is using a restricted sample of firms with multiple establishments. Panel B shows results based on alternative measures of work-related injury. I exclude illness from my comprehensive injury and illness measure, keeping only the injury portion and use the natural logarithm of the number of days away from work. Alternative injury measures also include injury rates (TCR and DART). TCR is the total number of cases in a given establishment year divided by the number of hours worked by all employees at the establishment in a given year and then multiplied by 200,000. DART is the number of injuries and illnesses that result in days away from work or with job restriction or transfer, divided by the number of hours worked by all employees in a given establishment year, and then multiplied by 200,000. Panel C reports the results from my baseline Model (1) with different fixed effects and firm clustering. In Panel D, I address the concern about whether the results are driven by a few establishments in exceptionally high or low religious counties since my key variable of interest is the religiosity level of the counties where the establishments are located. Following Adhikari and Agrawal (2016) to find the most and/or least religious states, I address this concern by excluding establishment-year observations that are located in any counties within the five most religious states (MS, UT, AL, LA, and AR) and/or the five least religious ones (VT, NH, ME, MA, and RI). In all these tests, my main results continue to hold. Since my key independent

variable is linearly interpolated in the missing survey years, it could bias my results. To address this concern, in Panel E, I restrict my analysis to ARDA decennial survey years (2010 and 2002 for 2000 survey year) only. In Panel F(G), I control family firm (short interest). Finally, in Panel H, I test whether the effect of religiosity exists in the financial crisis period (2007-2009). Overall, the results survive from different sets of robustness checks.

3.4.6 Firm-level evidence of religiosity and employee treatment

In this section, I check the validity of my main findings. If religiosity influences managers' attitudes toward workplace safety that leads to lower workers' injury and illness, there would have some firm-level evidence of employee treatment with respect to religiosity. I provide several firm-level evidence with respect to religiosity, including firm-level employee-related violations[37], health and safety measures, and employment uncertainty. Firstly, I examine whether establishment-level employee-weighted religiosity affects employee-related violations, which include non-compliance with labor laws, health and safety violations, and other violations related to labor exploitation. I also examine how religiosity affects a firm's likelihood of receiving federal penalties for violating labor laws. Following Chircop et al. (2020b) and Li and Raghunandan (2020), I define violation as the total number of employee-related violations per year and penalty as the natural logarithm of the total penalty amount per year. I then regress this

[37] I collect labor-related violation data from Violation Tracker. I also thank Phil Mattera of Good Jobs First for providing us the access to workplace inspection data from the Violation Tracker database. This database contains workplace inspection by eight Federal Agencies: the Employee Benefits Security Administration (EBSA), Equal Employment Opportunity Commission (EEOC), Federal Motor Carrier Safety Administration (FMCSA), Federal Railroad Administration (FRA), Department of Health & Human Services Office of Inspector General (HHSOIG), Mine Safety & Health Administration (MSHA), Occupational Safety & Health Administration (OSHA), and Department of Labor Wage & Hour Division (WHD).

employee-related violation and penalty on my establishment-level employee weighted religiosity and other related control variables. I include three-digit SIC coded industry fixed-effect in this estimation. Results are reported in Panel A of Table 3.8. The coefficient estimates on employee weighted religiosity are negative and statistically significant for both violation and penalty amount, respectively. This result suggests that firms are less likely to violate employee-related laws and more likely to reduce the incidence and severity of this violation (such as penalty).

Secondly, I also investigate whether firms show ethically responsible behavior for their employees using KLD data. Since my argument relies on the religiosity-induced community solidarity and trust in the establishment county, managers and their rank-and-file employees may get to know each other more than what their formal relationship would imply, which may not (if not improve) aggravate their rank-and-file employee's employment uncertainty. I expect that managers will take workers' health and safety measures more often and reduce their employment uncertainty. I collect workers' health and safety strength and workforce reduction indicator data from KLD and test my hypothesis on employee weighted religiosity. Panel B of Table 3.8 reports the results. The coefficient on employee weighted religiosity in Column (1) is positive and statistically significant, suggesting that firms do take measures for workers' health and safety in the workplace. The coefficient in Column (2) is negative and statistically significant, which implies that employees are more likely to be secured in their employment and there is a proper alignment of job responsibility for employees.

3.4.7 Workplace accidents and firm performance

In this paper, I have shown that local religiosity has an effect of improving workplace safety signified by a reduced number of injuries in local workplaces. This finding leads us to question whether that relation between religiosity and workplace safety has any implication on firm value and performance. Hence, lastly, I examine to what extent workplace safety influences firm performance. Since the establishment-level performance measure is not publicly available, I carry out this test at the firm level and therefore utilize the aggregate number of workplace injuries and deaths at the firm level as my variable of primary interest. To measure firm performance, I use a ratio of market to book ratio (MB) and Tobin's Q. I first show that aggregated workplace injury is negatively related to these firm performance measures using the System GMM model. Table 3.9 reports the results.

As expected, I find that workplace accidents are negatively associated with firm performance regardless of its measurement as *MTB* or Tobin's Q. Economically speaking, a one percent increase in *Ln(Num of Cases)* leads to a decrease in *MTB* (Q) by 0.025 (0.166). This finding suggests that the effect of local religiosity is not limited to employee safety and welfare, but it goes beyond and influences firm performance and ultimately shareholder wealth as well. This view broadly corroborates with prior studies on employee treatment highlighting the importance of human capital protection. Like numerous studies, including Edmans (2011), documenting a positive effect of employee satisfaction on firm value, I show that workplace injuries as tangible events symbolizing employee welfare lead to a noteworthy consequence regarding firm performance. While I are not able to show a direct effect of local religiosity on firm value, my findings suggest a strong value implication of local religiosity through human capital protection.

3.5 Conclusion

In this paper, I examine the effect of local religiosity on workplace safety. Using the establishment-level data compiling on the incidents of work-related injuries from the Occupational Safety and Health Administration, I provide evidence that employees of the establishments resided in more religious counties get less injured compared to those in less religious counties. My multivariate empirical tests support my hypotheses, and my main results survive through a set of robustness tests. I explain, firstly, that religiosity significantly influences employee treatment by enhancing community solidarity and trust through informal social networks among residents. The religiosity-induced community solidarity influences managers' attitude toward workplace safety, acting as a complement of workplace safety investment. Secondly, due to religious homophilous interaction between community members, establishment-level managers properly align the job responsibility and allocation of other necessary resources efficiently. Overall, my study shows that local religiosity is a key element of determining employee treatment and workplace safety which is linked with firm performance.

Table 3.1: Descriptive statistics

This table reports summary statistics for measures of establishment-level employees' deaths, and all injuries and illnesses, establishment-country level religiosity and demographics, and other firm-specific control variables. My sample consists of 72,287 establishment-year observations with 1,615 (5,268) unique firms (establishments) covering the period 2002-2010. The key dependent variables are the natural logarithm of the number of cases, TCR, DART, and the natural logarithm of the number of days away from work due to work-related injury and illness. County-level religiosity is the key independent variable. The natural logarithm of employees and working hours per employee are establishment-level control variables. Median age, Education, Married, and Population are county-level control variables. In all my estimations, I use a standard set of firm-specific controls. All continuous variables are winsorized at the top and bottom 1% levels. Appendix B.1 provides more details of all variables.

Variable	N	Mean	SD	P25	Median	P75
Num of Cases	72287	16.284	29.137	3.000	7.000	16.000
Ln(Num of Cases)	72287	2.129	1.170	1.386	2.079	2.833
EstbEmp	72287	249.661	432.418	75.000	127.000	226.000
Ln(WorkHour)	72287	1940.90	324.89	1760.00	1994.45	2103.95
Religiosity	72287	0.507	0.112	0.419	0.505	0.582
Leverage	72287	0.273	0.162	0.150	0.252	0.373
Cashflow	72287	0.098	0.079	0.065	0.102	0.146
Dividends	72287	0.018	0.021	0.000	0.012	0.029
Assets (bln)	72287	31.584	81.967	1.900	10.504	33.005
Ln(Assets)	72287	8.959	1.837	7.550	9.260	10.404
Turnover	72287	1.451	0.720	0.963	1.319	1.771
MB	72287	1.352	0.767	0.796	1.135	1.746
Tangibility	72287	0.380	0.186	0.228	0.363	0.550
Capex	72287	0.056	0.038	0.027	0.044	0.074
SocialCap	72287	-0.494	0.876	-1.113	-0.468	0.084
MedAge	72287	36.692	3.634	34.110	36.600	38.940
Married	72287	0.192	0.025	0.173	0.193	0.211
Pop	72287	890552.6	1695717.7	92067.2	308760.0	886217.4
Educ	72287	83.066	6.345	79.640	84.160	87.480
Injuryonly	72287	16.898	51.539	3.000	7.000	15.000
Daysawork	72287	276.66	1057.56	1.000	66.000	233.00
TCR	72287	7.761	6.790	2.627	6.139	11.063
DART	72287	5.094	5.162	1.137	3.630	7.461

Table 3.2: Baseline Results

This table presents the results from the OLS regression Model (1), where the key dependent variable is the natural logarithm of the total number of cases of employees' death, and injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year. The key independent variable is Religiosity, measured as the number of religious adherents in a county divided by the county population in a year. Religiosity in the non-census year is determined by linear interpolation. All other independent variables are defined in Appendix B.1. Columns (2) and (3) include firm and year, and the establishment and year fixed effects, respectively. *T*-statistics are computed using standard errors corrected for clustering at the establishment-county level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Variable	*Ln(Num of Cases)*		
Religiosity	-0.247**	-0.130**	-0.151***
	(-2.21)	(-2.45)	(-2.95)
Ln(WorkHour)		0.004***	0.004***
		(11.70)	(10.63)
Ln(EstbEmp)		0.836***	0.832***
		(117.73)	(108.78)
Leverage		0.156***	0.110***
		(3.99)	(3.03)
Cashflow		0.378***	0.262***
		(6.52)	(4.70)
Dividends		-0.426	-0.204
		(-1.39)	(-0.86)
Ln(Assets)		-0.007	0.009
		(-0.50)	(1.45)
Turnover		-0.013	-0.006
		(-1.00)	(-0.48)
Tangibility		0.321***	0.240***
		(5.02)	(4.43)
Capex		-0.636***	-0.700***
		(-4.54)	(-5.24)
MB		-0.021*	-0.001
		(-1.93)	(-0.16)
Ln(MedAge)		0.026	-0.037
		(0.27)	(-0.43)
Educ		-0.368	-0.399*
		(-1.49)	(-1.69)
Ln(Pop)		-0.000	0.010
		(-0.02)	(0.97)

Married		0.343	0.454
		(0.68)	(0.97)
SocialCap		0.010	0.012
		(0.81)	(1.02)
Constant	2.254***	-4.412***	-4.513***
	(42.22)	(-10.49)	(-10.87)
Year FE	Yes	Yes	Yes
Firm FE	No	Yes	No
Estab. FE	No	No	Yes
N	72287	72287	72287
Adj. R2	0.001	0.664	0.711

Table 3.3: Riskiness perspective of religiosity and workplace safety

This table presents the results from the OLS regression Model (1), where the key dependent variable is the natural logarithm of the total number of cases of employees' death, and injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year. In columns (1) and (2) of Panel A, I add different risk-based control variables in my baseline model, including state-level revenue generated from lottery selling as a percentage of states Gross Domestic Product (GDP), return volatility, ROA volatility, and R&D expenditure. Panel B provides results controlling different religious denominations. The key independent variable considers two different types of Religious adherent groups: Protestant orientation and Catholic orientation. *Abs(Rel_Ideo)* is the absolute value of *Rel_Ideo,* which is measured as the ratio of protestant adherents minus the ratio of catholic adherents divided by their sum. *Rel_HHI* is the Herfindahl index of different religious groups' participation (Protestant, Catholic, Orthodox, and other) in churches, which is calculated as the sum of the squares of different religious adherents by county and year. In columns (5) and (6), I add ethnicity as an additional control variable: *Ethnicity_HHI* is the Herfindahl index of different ethnicity origins (e.g., White, Black, Asian, and Hispanic) in the county. All other independent variables are defined in Appendix B.1. *T*-statistics are computed using standard errors corrected for clustering at the establishment-county level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: With additional risk-based controls

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Number of Cases)					
	Controlling riskiness		Catholic Group			
			High	Low	High	Low
Religiosity	-0.127**	-0.150***	-0.220***	-0.173***	-0.286***	-0.134**
	(-2.37)	(-2.94)	(-2.91)	(-2.66)	(-3.75)	(-2.10)
			B(3)=B(4) p-value= 0.631		B(5)=B(6) p-value= 0.108	
Lottery	-0.000	-0.002*	0.004	-0.002	0.001	-0.004***
	(-0.31)	(-1.81)	(1.53)	(-1.25)	(0.66)	(-2.70)
RETVOL	-2.741***	-2.989***	-0.712*	-1.908***	-0.748	-2.072***
	(-5.78)	(-6.40)	(-1.68)	(-3.92)	(-1.56)	(-4.12)
STD(ROA)	-0.086	-0.065	-0.041	-0.104	-0.019	-0.123
	(-1.11)	(-0.87)	(-0.48)	(-1.41)	(-0.22)	(-1.63)
R&D	0.761	-0.389	-0.481*	-0.154	-0.485*	-0.274
	(0.99)	(-0.58)	(-1.82)	(-0.32)	(-1.70)	(-0.58)
Ln(WorkHour)	0.004***	0.004***	0.004***	0.003***	0.004***	0.004***
	(11.05)	(10.10)	(8.12)	(8.24)	(7.36)	(7.07)

Ln(EstbEmp)	0.837***	0.833***	0.822***	0.842***	0.814***	0.842***
	(117.58)	(109.09)	(73.71)	(91.17)	(71.55)	(85.78)
Leverage	0.232***	0.176***	0.419***	0.097*	0.321***	0.082
	(5.34)	(4.30)	(5.97)	(1.77)	(5.05)	(1.54)
Cashflow	0.230***	0.154**	0.382***	0.060	0.294***	0.047
	(3.46)	(2.40)	(3.97)	(0.67)	(3.10)	(0.55)
Dividends	-0.672**	-0.319	-0.479	-0.550	-0.029	-0.550*
	(-2.21)	(-1.36)	(-0.88)	(-1.50)	(-0.07)	(-1.88)
Ln(Assets)	-0.004	0.004	-0.009	0.009	0.002	0.011
	(-0.26)	(0.67)	(-0.39)	(0.43)	(0.24)	(1.26)
Turnover	-0.014	-0.008	-0.027	0.002	-0.030	0.006
	(-0.95)	(-0.62)	(-1.24)	(0.10)	(-1.42)	(0.37)
Tangibility	0.387***	0.253***	0.292***	0.396***	0.116	0.302***
	(5.44)	(4.27)	(2.69)	(4.14)	(1.28)	(3.84)
Capex	-0.553***	-0.658***	-0.527**	-0.467***	-0.629***	-0.613***
	(-3.83)	(-4.83)	(-2.09)	(-2.64)	(-2.81)	(-3.57)
MB	-0.007	0.017*	-0.016	0.012	0.013	0.025**
	(-0.61)	(1.90)	(-1.01)	(0.75)	(0.91)	(2.05)
Ln(MedAge)	0.023	-0.043	-0.061	-0.091	-0.169	-0.102
	(0.24)	(-0.50)	(-0.44)	(-0.91)	(-1.30)	(-1.00)
Educ	-0.357	-0.398*	-0.534	-0.258	-0.621*	-0.178
	(-1.46)	(-1.70)	(-1.51)	(-1.29)	(-1.68)	(-0.91)
Ln(Pop)	0.000	0.010	-0.007	-0.019***	0.005	-0.009
	(0.00)	(1.03)	(-0.53)	(-2.69)	(0.35)	(-1.26)
Married	0.338	0.464	0.747	0.332	1.093	0.304
	(0.67)	(1.00)	(0.93)	(0.71)	(1.38)	(0.65)
SocialCap	0.008	0.011	-0.016	0.035***	-0.007	0.030**
	(0.64)	(0.97)	(-0.77)	(2.71)	(-0.35)	(2.24)
Constant	-4.332***	-4.319***	-3.950***	-3.759***	-3.619***	-4.048***
	(-10.10)	(-10.23)	(-6.18)	(-6.49)	(-5.79)	(-6.60)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	No	Yes	Yes	No	No
Estab. FE	No	Yes	No	No	Yes	Yes
N	68844	68844	28344	40500	28344	40500
Adj. R2	0.665	0.713	0.674	0.678	0.729	0.721

Panel B: Controlling religious types

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	*Ln(Num of Cases)*					
Abs(Rel_Ideo)	-0.088***	-0.098***				
	(-3.24)	(-3.83)				
Rel_HHI			-0.253***	-0.270***	-0.236***	-0.258***
			(-4.96)	(-5.43)	(-4.80)	(-5.31)
Ethnicity_HHI					0.430***	0.326***
					(6.61)	(5.21)
Lottery	-0.000	-0.002*	-0.001	-0.002*	-0.000	-0.002*
	(-0.36)	(-1.93)	(-0.38)	(-1.95)	(-0.35)	(-1.89)
RETVOL	-1.254***	-1.361***	-1.258***	-1.357***	-1.280***	-1.363***
	(-3.18)	(-3.07)	(-3.20)	(-3.07)	(-3.21)	(-3.07)
STD(ROA)	-0.108**	-0.077	-0.109**	-0.077	-0.107**	-0.076
	(-1.98)	(-1.34)	(-1.99)	(-1.34)	(-1.97)	(-1.32)
R&D	-0.390	-0.505**	-0.392	-0.508**	-0.403	-0.509**
	(-1.52)	(-2.02)	(-1.53)	(-2.04)	(-1.59)	(-2.04)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-4.406***	-4.396***	-4.047***	-4.006***	-4.266***	-4.169***
	(-10.38)	(-10.61)	(-9.28)	(-9.45)	(-9.81)	(-9.79)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	No	Yes	No	Yes	No
Estab. FE	No	Yes	No	Yes	No	Yes
N	68844	68844	68844	68844	68844	68844
Adj. R2	0.665	0.713	0.665	0.713	0.667	0.714

Table 3.4: Potential mechanism through which Religiosity affect workplace safety

This table reports the relation between establishment-county religiosity and establishment-level employee treatment, proxied by the discretionary safety investment and work pressure. Panel A reports the results from the relation between Religiosity and workplace injury with respect to discretionary safety investment (see model 2). Panel B reports the relation between establishment-county religiosity and establishment-level employee work-pressure, proxied by the firm-level productivity. The key dependent variable is the work pressure, measured as the sum of the cost of goods sold and inventory changes divided by the total number of employees. The key independent variable is Religiosity, measured as the number of religious adherents in a county divided by the county population in a year. Religiosity in the non-census year is determined by linear interpolation. All other independent variables are defined in Appendix B.1. *T*-statistics are computed using standard errors corrected for clustering at the establishment-county level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Religiosity and Absolute discretionary expense

	(1)	(2)	(3)	(4)
Variable	*Ln(Num of Cases)*			
Abs Disc. Expense	High		Low	
Religiosity	-0.012	0.032	-0.247***	-0.305***
	(-0.17)	(0.43)	(-4.30)	(-5.52)
	β_1=β_2 p-value= 0.0005		β_3=β_4 p-value= 0.0098	
Controls	Yes	Yes	Yes	Yes
Constant	-4.205***	-4.357***	-4.190***	-4.254***
	(-7.78)	(-8.50)	(-7.47)	(-7.39)
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	No	Yes	No
Estab. FE	No	Yes	No	Yes
N	35654	35654	35981	35981
Adj. R2	0.672	0.725	0.658	0.694

Panel B: Religiosity and Work Pressure

	(1)	(2)	(3)	(4)
Variable	*Ln(Num of Cases)*			
Work pressure	High	Low	High	Low
Religiosity	-0.206***	-0.052	-0.218***	-0.080
	(-2.97)	(-0.83)	(-3.35)	(-1.28)
	β_1=β_2 p-value= 0.099		β_3=β_4 p-value= 0.126	
Controls	Yes	Yes	Yes	Yes
Constant	-3.590***	-4.924***	-4.607***	-4.346***
	(-6.58)	(-8.58)	(-9.63)	(-7.73)
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	No	No
Estab. FE	No	No	Yes	Yes
N	36198	35927	36198	35927
Adj. R2	0.679	0.643	0.728	0.687

Table 3.5: Subsample Analysis: Heterogeneity in Religious effect on Workplace Safety

This table reports the relation between establishment-county religiosity and workplace safety from the context of different subsamples, where the key dependent variable is the natural logarithm of the total number of cases of employees' death, and injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year. The key independent variable is Religiosity, measured as the number of religious adherents in a county divided by the county population in a year. Religiosity in the non-census year is determined by linear interpolation. Panel A represents a subsample based on establishments of firms operating under industry with high vs low levels of labor union membership. Panel B represents a subsample based on whether the parent company of establishments has a higher number of analysts following. Panel C provides a subsample based on the establishment-county social capital. The high group indicates firms above the median values of their respective categories. All other independent variables are defined in Appendix B.1. *T*-statistics are computed using standard errors corrected for clustering at the establishment-county level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Religious effect under Industry Labor Union influence

Variable	*Ln (Number of Cases)*					
			High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Religiosity	-0.168***	-0.196***	-0.055	-0.264***	-0.051	-0.297***
	(-2.77)	(-3.18)	(-0.61)	(-3.71)	(-0.56)	(-4.06)
			β_3=β_4 p-value= 0.069		β_5=β_6 p-value= 0.035	
Union	0.612***	0.448***	--	--		
	(5.14)	(3.82)	--	--	--	--
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	No	Yes	Yes	No	No
Estab. FE	No	Yes	No	No	Yes	Yes
N	47768	47768	23524	24244	23524	24244
Adj. R2	0.668	0.707	0.698	0.620	0.737	0.654

Panel B: Religious effect under analyst coverage

	Ln (Number of Cases)			
	High	Low	High	Low
Variable	(1)	(2)	(3)	(4)
Religiosity	-0.263***	-0.066	-0.276***	-0.048
	(-4.04)	(-0.89)	(-4.58)	(-0.64)
	β_1=β_2 p-value= 0.059		β_3=β_4 p-value= 0.018	
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	No	No
Estab. FE	No	No	Yes	Yes
N	25036	25953	25036	25953
Adj. R2	0.668	0.682	0.707	0.729

Panel C: Religious effect under high vs low Social Capital of the county

	Ln (Number of Cases)			
	High	Low	High	Low
Variable	(1)	(2)	(3)	(4)
Religiosity	-0.155**	-0.115	-0.204***	-0.104
	(-2.33)	(-1.39)	(-3.06)	(-1.40)
	β_1=β_2 p-value= 0.706		β_3=β_4 p-value= 0.287	
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	No	No
Estab. FE	No	No	Yes	Yes
N	36145	36142	36145	36142
Adj. R2	0.670	0.673	0.720	0.720

Table 3.6: Robustness checks

Panel A uses a residual of *Religiosity* regressed on age, income, education, total population, married people, political orientation, social capital, Chinese and Mexican population, and risky attitudes of a county population, proxied by state lottery revenue as a percentage of states Gross Domestic Product (GDP). Panel B reports the results from the Two-stage least squares (2SLS) regression analysis. The instruments are religiosity in 1990 and three years lagged county population. Panel C reports the result of estimates from difference-in-differences regressions exploiting migration shocks in a given county. The key independent variable is the interaction between treatment and post dummy. To form the treatment group, I first define high migration-in as the percentage of migration that comes from counties whose religiosity is greater than the yearly median of all migration sending counties. Then, I consider firm-establishment as treatment if its county's migration receiving is in the top decile of my sample migration-in, and control group otherwise. Treatment and control groups are one-to-one matched based on firm characteristics. I take the highest migration-in year for the treatment group as the event year and the following year as the post year. All other independent variables are defined in Appendix B.2. *T*-statistics are computed using standard errors corrected for clustering at the establishment-county level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Alternative definition of religiosity/residual

	Ln (Num of cases)	
Variable	(1)	(2)
Residual Religiosity	-0.128**	-0.141***
	(-2.49)	(-2.81)
Controls	Yes	Yes
Year FE	Yes	Yes
Firm FE	Yes	No
Estab. FE	No	Yes
N	72287	72287
Adj. R2	0.664	0.711

Panel B: IV regression results

	(1)	(2)
	First stage	Second stage
Variables	*Religiosity*	*Ln(Num of Cases)*
Religiosity		-0.326***
		(-4.73)
$Religiosity_{1990}$	0.601***	
	(80.42)	
$Ln(Pop)_{t-3}$	0.019***	
	(34.99)	
Ln(WorkHour)	-0.000*	0.004***
	(-1.95)	(11.84)
Ln(EstbEmp)	-0.000	0.837***
	(-0.11)	(114.03)
Leverage	-0.008**	0.150***
	(-2.49)	(3.88)
Cashflow	-0.007	0.373***
	(-1.46)	(6.49)
Dividends	-0.032	-0.449
	(-1.11)	(-1.47)
Ln(Assets)	-0.002	-0.008
	(-1.26)	(-0.54)
Turnover	0.001	-0.012
	(1.48)	(-0.89)
Tangibility	-0.002	0.311***
	(-0.45)	(4.95)
Capex	-0.011	-0.644***
	(-0.92)	(-4.64)
MB	0.001	-0.022**
	(1.58)	(-2.02)
Ln(MedAge)	-0.187***	-0.004
	(-21.82)	(-0.04)
Educ	-0.247***	-0.454***
	(-15.83)	(-2.78)
Married	1.166***	0.432
	(28.18)	(1.01)
SocialCap	0.023***	0.018*
	(21.49)	(1.75)
Constant	0.660***	-3.694***
	(14.25)	(-7.47)
Year FE	Yes	Yes
Firm FE	Yes	Yes
N	71,911	71,911

Adj R2	0.665	0.664

Panel C. Migration Shock

	(1)	(2)
Variable	*Ln (Num of Cases)*	
*Treat*Post*	-0.074***	-0.070***
	(-3.16)	(-2.87)
Ln(WorkHour)	0.000***	0.000**
	(3.65)	(2.51)
Ln (EstbEmp)	0.840***	0.832***
	(56.27)	(47.96)
Leverage	-0.248**	-0.229*
	(-2.15)	(-1.93)
Cashflow	0.129	0.013
	(0.77)	(0.07)
Dividends	-1.026	-1.013
	(-1.13)	(-1.27)
Ln(Assets)	0.028	-0.001
	(0.69)	(-0.08)
Turnover	0.046	0.038
	(1.14)	(0.98)
Tangibility	0.538***	0.248
	(3.03)	(1.63)
Capex	-0.737	-0.396
	(-1.60)	(-0.80)
MB	0.037	0.029
	(1.10)	(1.07)
Ln (MedAge)	-0.130	-0.149
	(-0.81)	(-0.95)
Educ	-0.335	-0.459
	(-0.88)	(-1.31)
Married	0.065	0.556
	(0.07)	(0.66)
Ln (Pop)	-0.012	0.010
	(-0.88)	(0.77)
Socialcap	0.037*	0.040*
	(1.82)	(1.83)
Constant	-1.688**	-1.421**
	(-2.35)	(-2.19)
Firm FE	Yes	No
Year FE	Yes	Yes
Estab. FE	No	Yes
N	11558	11558
Adj. R2	0.655	0.714

Table 3.7: Propensity score matching analysis

This table presents the results from the propensity score matching analysis. Panel A reports results from the probit model, where the dependent variable is high Religiosity, measured as a dummy variable equal to one if the establishment county Religiosity is in the top quintile by firm and year. Religiosity is the number of religious adherents in a county divided by the county population in a year. Column (1) uses my full sample of establishments. Column (2) uses only a matched sample of establishments, establishments located in high Religious counties, and their equivalent peers located in lower Religious counties. Control variables include the same set of variables used in the previous analysis. Panel B reports result from the baseline model (1) on the propensity score-matched sample of establishments, where the key dependent variable is the natural logarithm of the total number of cases of employees' death, and injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year. All other independent variables are defined in Appendix B.1. *T*-statistics are computed using standard errors corrected for clustering at the establishment-county level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: PSM Matching (Quintile)

	Before Match	After Match
Variable	(1)	(2)
	Pr(High_Religiosity=1)	
Ln(WorkHour)	-0.001	-0.001
	(-1.10)	(-0.87)
Ln(EstbEmp)	0.012	0.001
	(0.80)	(0.05)
Leverage	-0.017	0.133
	(-0.20)	(1.05)
Cashflow	0.029	0.256
	(0.24)	(1.32)
Dividends	0.153	-0.781
	(0.22)	(-0.77)
Ln(Assets)	-0.006	0.006
	(-0.17)	(0.13)
Turnover	0.007	0.008
	(0.25)	(0.18)
Tangibility	-0.052	0.171
	(-0.31)	(0.71)
Capex	0.088	-0.358
	(0.25)	(-0.72)
MB	-0.011	0.022
	(-0.49)	(0.60)

Ln(MedAge)	-0.817	0.175
	(-1.08)	(0.21)
Educ	-4.419***	-0.188
	(-3.45)	(-0.14)
Married	0.066	-0.004
	(1.26)	(-0.06)
Ln(Pop)	8.863***	-0.518
	(2.89)	(-0.15)
SocalCap	0.380***	-0.016
	(5.06)	(-0.20)
Constant	3.357	0.004
	(1.13)	(0.00)
Year FE	Yes	Yes
Firm FE38	Yes	Yes
N	66385	23166
Pseudo R2	0.022	0.006

38 Stata does not permit us to estimate psm model with establishment fixed effects.

B: The second stage regression

	(1)	(2)
Variable	*Ln(Num of Cases)*	
Religiosity	-0.105*	-0.128**
	(-1.75)	(-2.10)
Ln(WorkHour)	0.003***	0.003***
	(7.15)	(6.20)
Ln(EstbEmp)	0.851***	0.847***
	(91.51)	(85.31)
Leverage	0.176**	0.178***
	(2.43)	(2.81)
Cashflow	0.393***	0.178
	(3.32)	(1.55)
Dividends	-0.352	-0.701
	(-0.64)	(-1.43)
Ln(Assets)	0.018	0.027**
	(0.70)	(2.19)
Turnover	-0.021	-0.023
	(-0.81)	(-0.99)
Tangibility	0.288***	0.176*
	(2.67)	(1.81)
Capex	-0.886***	-0.996***
	(-3.31)	(-3.70)
MB	-0.005	0.017
	(-0.24)	(1.10)
Ln(MedAge)	-0.007	-0.086
	(-0.05)	(-0.78)
Educ	-0.081	-0.168
	(-0.31)	(-0.73)
Ln(Pop)	0.004	0.015
	(0.31)	(1.41)
Married	0.576	0.559
	(0.97)	(1.05)
SocialCap	-0.005	0.007
	(-0.32)	(0.44)
Constant	-4.625***	-4.452***
	(-7.63)	(-7.16)
Year FE	Yes	Yes
Firm FE	Yes	No
Estab. FE	No	Yes
N	23186	23186
Adj. R2	0.661	0.707

Table 3.8: Firm-level evidence on religiosity and employee treatment

This table reports the relation between establishment employee weighted religiosity and employee treatment at the firm level. Panel A provides results on the employee weighted religiosity and employee-related misconduct. Employee-related misconduct includes labor laws violations and penalties. Violation is measured as the total number of employee-related violations per year and penalty is measured as the natural logarithm of the total penalty amount due to labor laws violations per year. Panel B provides results on the effect of employee weighted religiosity on the health and safety index and workforce reduction. These are indicator variables obtained from the KLD database. The key independent variable is Religiosity, measured as the number of religious adherents in a county divided by the county population in a year. Religiosity in the non-census year is determined by linear interpolation. All other independent variables are defined in Appendix B.1. These firm-level analyses include three digits SIC coded industry fixed-effects. *T*-statistics are computed using standard errors corrected for clustering at the establishment-county level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Employee weighted religiosity and employee-related misconduct

Variable	(1) Violation	(2) Ln(penalty)
EmpWtRel	-0.984**	-2.052**
	(-2.35)	(-2.37)
Leverage	-0.139	-0.407
	(-0.51)	(-1.02)
Cashflow	0.398	-0.432
	(0.96)	(-0.39)
Dividends	-1.048	-5.481
	(-0.60)	(-1.35)
Ln(Assets)	-0.180	0.488**
	(-1.55)	(2.24)
Turnover	0.065	0.070
	(0.65)	(0.46)
Tangibility	-0.057	1.172*
	(-0.11)	(1.74)
Capex	-1.751	-5.919***
	(-1.14)	(-2.71)
MB	0.041	0.045
	(0.41)	(0.33)
Ln(Emp)	0.516***	0.229
	(3.53)	(0.98)
LabIntensity	-0.018	0.049

	(-0.78)	(1.19)
Constant	1.112	7.398***
	(1.34)	(4.76)
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	1942	1942
Adj. R2	0.396	0.435

Panel B: Employee weighted religiosity and Safety Index and Workforce reduction

	(1)	(2)
Variable	*Health and Safety Strength*	*WorkforceReduction*
EmpWtRel	0.099**	-0.199***
	(1.97)	(-3.46)
ROA	0.057	-0.286***
	(1.61)	(-4.99)
R&D	0.189**	-0.070
	(2.14)	(-0.82)
Adv	0.129	0.088
	(0.66)	(0.54)
Ln(Emp)	0.030**	-0.031***
	(2.08)	(-2.75)
SalesGrowth	-0.004	-0.008**
	(-0.93)	(-2.07)
Debt/Equity	-0.030***	-0.001
	(-2.77)	(-0.05)
Ln(Assets)	-0.193***	0.078**
	(-4.90)	(2.49)
Ln(Assets)^2	0.016***	-0.002
	(6.69)	(-1.24)
Turnover	0.000	-0.001
	(0.02)	(-0.11)
RetVol	0.926*	2.061***
	(1.88)	(3.14)
Capex	-0.410***	-0.329**
	(-2.85)	(-2.39)
MB	0.012	0.008
	(1.26)	(1.04)
Tangibility	0.122*	-0.105**
	(1.79)	(-2.28)
Constant	0.484***	-0.176
	(2.83)	(-1.33)
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	4488	4252
Adj. R2	0.321	0.157

Table 3.9: SGMM results: Workplace injuries and firm performance

This table presents the results from the System GMM analysis for the effect of workplace injuries has on firm performance at the firm level, where the key independent variable is the natural logarithm of the total number of cases of employees' death, and injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the firm in a given year. The dependent variable in Column (1) is MTB measured as the market value of equities divided by the book value of equities. The dependent variable in Column (2) is Tobin's Q. All other independent variables are defined in Appendix B.1. *T*-statistics are computed using standard errors corrected for clustering at the firm level and reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Variable	*MB*	*Tobin's Q*
Ln (Num Cases)	-0.025***	-0.166***
	(-3.62)	(-3.15)
Leverage	-0.104	-0.157
	(-1.19)	(-0.97)
Cashflow	1.475***	0.486*
	(9.04)	(1.78)
Ln(Assets)	-0.025**	0.059**
	(-2.42)	(2.33)
Sale_grwth	0.039***	0.172***
	(7.87)	(7.65)
Dividends	7.807***	8.341***
	(7.66)	(6.70)
Tangibility	-0.940***	-0.700***
	(-10.64)	(-4.46)
Capex	3.489***	2.803***
	(9.06)	(5.46)
Turnover	-0.119***	0.028
	(-5.53)	(0.55)
Ln (Firm_age)	-0.098***	-0.050*
	(-4.89)	(-1.67)
Constant	1.802***	-0.166***
	(20.60)	(-3.15)
Year FE	Yes	Yes
N	7148	7148
No of Instruments	34	37
AB(1)	-8.13	-3.87
p-value	0.000	0.000
AB(2)	-1.36	-0.05
p-value	0.175	0.962

Hansen	5.63	7.53
p-value	0.344	0.274

Figure 3.1: Observations by year

This figure shows the number of observations over the sample year. My sample period begins in 2002 and ends in 2010.

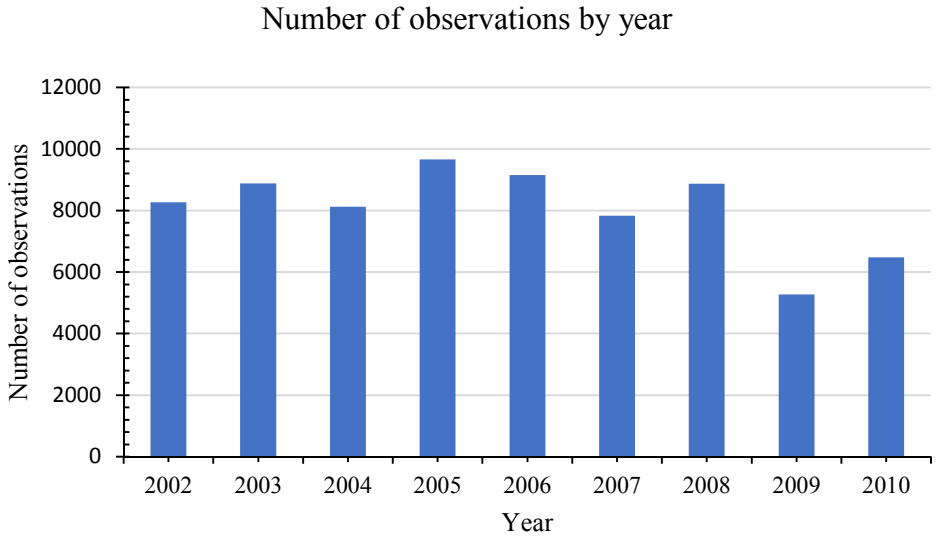


Figure 3.2: Injury by year

This figure shows the average number of cases and days away from work, TCR, or with job restriction or transfer (DART) over the sample year. My sample period begins in 2002 and ends in 2010.

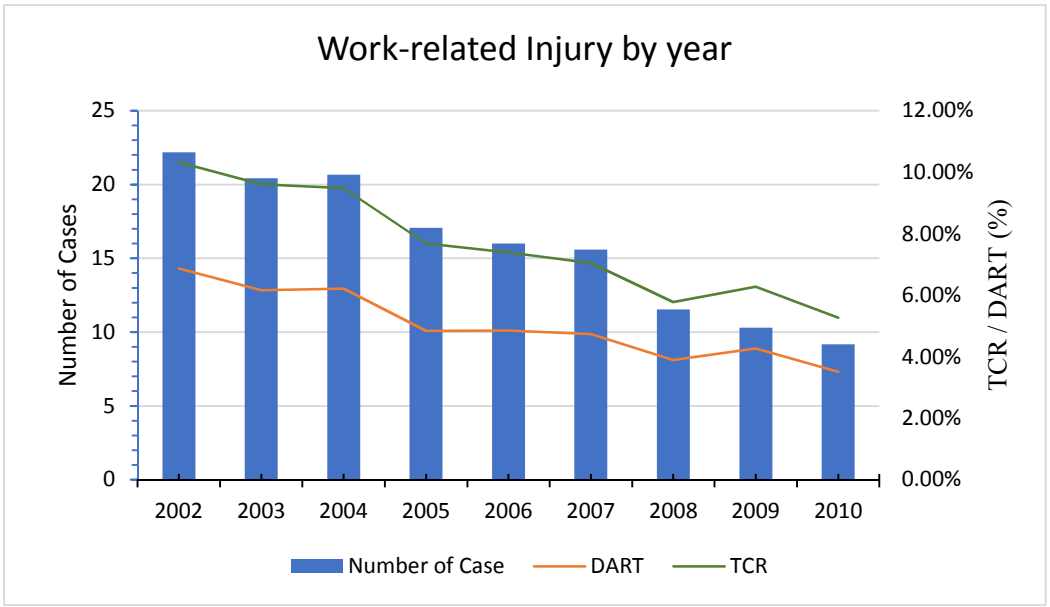
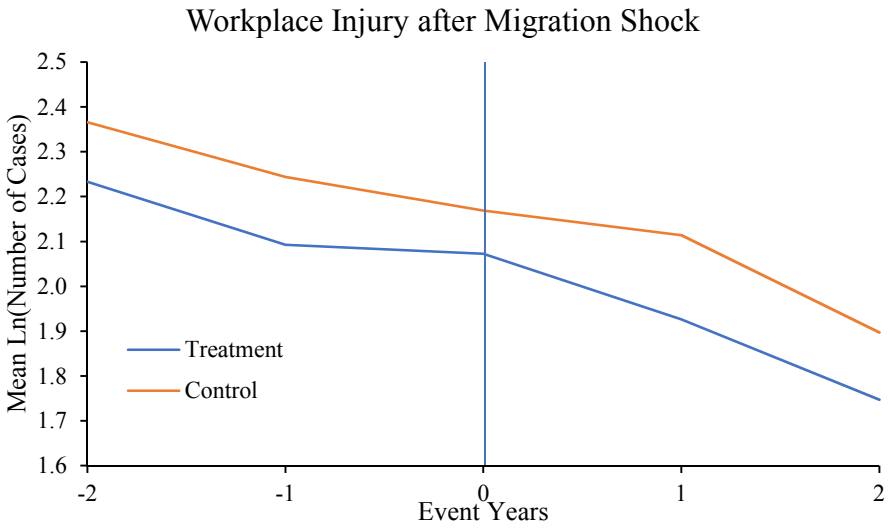


Figure 3.3: Injury after Migration Shock

This figure shows the average workplace injury and illness for both treatment and control firms during the pre and post-migration shock years.



CHAPTER IV

SUMMARY AND CONCLUSION

In this dissertation, I examine how firms respond to workplace safety issues. In the first essay, I explore the role of CEO inside debt on workplace injury and illness, and in the second essay, I examine the effect of local religiosity on employee treatment, proxied by establishment-level workers injury and illness data from the Occupational Safety and Health Administration (OSHA). My results in the first essay show that lower establishment-level work-related injuries and illnesses appear in firms whose CEOs have higher relative inside debt. I also document that CEOs' inside debt holdings are associated with both adopting employee-friendly corporate policy and reducing firms' risk-taking behavior. The effect of CEO inside debt on workplace safety is more pronounced in firms with high labor union coverage and cash flow volatility and low CEO ownership. The finding has a cost implication for bank financing in the sense that banks charge higher loan spreads to firms with higher workplace injuries and illnesses. The results from my second essay suggest that employees of the establishments in more religious counties get less injured than those in less religious counties. Firms whose establishments are located in high

religious counties are less likely to violate workplace conduct and more likely to take workplace safety measures. Moreover, firms with more work-related injuries exhibit poorer firm performance. Overall, my findings suggest that local religiosity has a value implication through human capital protection.

Overall, my two essays provide novel pieces of evidence and contribute to the various strands of literature. For example, my first essay contributes that inside debt, in addition, to align the interest between managers and debtholders, also aligns managers' incentives with those of other non financial stakeholders, e.g., employees. As a result, CEOs with higher inside debt tend to adopt a more employee-friendly corporate policy. Second, this study shows a cost-saving implication of workplace safety from bank financing. I show that workplace injury increases the conflict between shareholders and creditors over-investment in risky projects. Creditors price this conflicting interest by charging higher loan spreads. Similarly, my second essay contributes to the literature by presenting compelling evidence that there is a substantial improvement in employee treatment and workplace safety, which affects employee welfare to a great extent and potentially firm value as well, in areas with high religiosity.

Thus, the findings of this dissertation can be used by the researchers, policymakers, employees, federal regulators, and various market participants to understand and expand future studies on firms' attitudes toward workplace safety and its economic consequences.

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APPENDIX

APPENDIX

Appendix A.1: Relative CEO inside debt measure

To construct Relative CEO inside debt, I, as a first step, estimate a stock option's value or sensitivity to stock price or stock-return volatility based on the Black-Scholes (1973) model, modified by Merton (1973) to account for dividend payout, which as follows:

$$Option\ Value = C = [Se^{-dT}\ N(Z) - \ Xe^{-rT}N(Z - \sigma\ T^{\left(\frac{1}{2}\right)})],$$

where:

$$Z = \left[ln\left(\frac{S}{X}\right) + \ T\left(r - d - \frac{\sigma^2}{2}\right)\right]/\sigma T^{\left(\frac{1}{2}\right)}$$

N = cumulative probability function for the normal distribution

S = price of the underlying stock.

X = exercise price of the option.

σ = expected stock-return volatility over the life of the option.

r = natural logarithm of the risk-free interest rate.

T = time to maturity of the option in years.

d = natural logarithm of the expected dividend yield over the life of the option.

As the options portfolio exists of newly granted options and previously granted options, I follow Core and Guay (2002) and Frank and Goyal (2007) to estimate the value of unexercised options held by CEOs (e.g., options granted in the previous year whose value is not reported). The inputs are obtained as follows:

1. In order to estimate the exercise price of previously granted unexercised options, I consider the unexercised options as two separate grants: unexercised exercisable options and unexercised unexercisable options. To estimate the exercise price of these two options, I follow a two-step process separately. For the estimation of the average price for unexercised exercisable options (X). Firstly, I calculate the ratio of the realizable value of in-the-money exercisable options and the number of unexercised exercisable options. Secondly, I subtract the ratio from the fiscal year-end stock price. The resulting number is an estimate of the average exercise price for unexercised exercisable options held by CEOs. For the estimation of the average price for unexercised unexercisable options (UX), I obtain an estimate of the average exercise price of unexercised unexercisable options by

subtracting the ratio of in-the-money unexercisable options to the number of unexercised unexercisable options from the fiscal year-end stock price. The formulas are as follows:

X=PRCC_F-(OPT_UNEX_EXER_EST_VAL/OPT_UNEX_EXER_NUM)

UX= *PRCC_F-(OPT_UNEX_UNEXER_EST_VAL/OPT_UNEX_UNEXER_NUM)*

2. Option maturity for unexercised exercisable options: I assume that the maturity of unexercised exercisable options is 4 years less than the average maturity of the new grants. In case no grants are made this year, the maturity is set at 6 years. The maturity of unexercisable options is set at 1 less than the average maturity of the new grants. In case no grants are made, the maturity is set at 9 years.

3. Stock price, risk-free rate, dividend yield, and volatility remain the same as for the newly granted options and obtained from Compustat, CRSP, and ExecuComp databases.

Once I get the value of all options, as a second step, I follow Wei and Yermack (2011) and Cassell et al. (2012) to construct relative CEO inside debt, which is modeled below:

Relative CEO inside debt = $\frac{CEO\ inside\ debt\ holding}{CEO\ \ equiy\ holding} \div \frac{Firm's\ debt}{Firm's\ equity}$

Where,

- CEO inside debt holding is the sum of the present values of accumulated pension benefits and deferred compensation. Consistent with previous literature, I restricted my sample to those firms with positive CEO inside debt holding.
- CEO equity holdings include the stocks (SHROWN_ECL_OPTS*PRCC_F) and all other stock options (Newly granted, unexercised exercises, and unexercised unexercised) held by the CEO.
- Firm's debt is the sum of short-term and long-term debt scaled by the total asset. Compustat items: (dlc+ltt)/at.
- Firm's equity is the total number of common shares outstanding multiplied by the stock price.

Appendix A.2: Variable definitions

Variables	Definitions
Number of cases	Sum of deaths and all injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year (Column G + Column H + Column I + Column J).
Total case rate (TCR)	The total number of cases in a given establishment year divided by the number of hours worked by all employees at the establishment in a given year and then multiplied by 200,000.
DART	The number of injuries and illnesses that result in days away from work or with job restriction or transfer, divided by the number of hours worked by all employees in a given establishment year, and then multiplied by 200,000.
Injury/Emp	The number of injuries and illnesses scaled by the total number of establishment employees.
Ln (CEO Reldebt)	The natural logarithm of the relative CEO inside the debt-to-equity ratio scaled by the firm debt-to-equity ratio. (See appendix A.1 for more details).
CEO Reldebt>1	A dummy variable that indicates 1 if Relative CEO debt exceeds 1 and 0, otherwise
Ln (CEO D/E)	The natural logarithm of CEO inside debt holdings to the value of equity holdings, where CEO inside debt is the sum of the present values of accumulated pension benefits and deferred compensation, and CEO equity holdings include the stocks and stock options held by the CEO.
Vega	Dollar (thousands) denotes the sensitivity of the CEO's wealth to a 1 percent change in the stock price volatility, computed per the methodology of Coles et al. (2006)
Delta	Dollar (thousands) denotes the sensitivity of the CEO's wealth to a 1 percent change in the stock price, computed per the methodology of Coles et al. (2006)
Ln (Tenure)	The natural logarithm of 1+ the CEO's tenure at a firm.
CEO ownership	CEO stock ownership, SHROWN, scaled by total share outstanding (SHROUT) of a given firm year.
Ln (EstbEmp)	The average number of employees working in a given establishment during the year
Ln (HoursEmp)	The natural logarithm of the total number of annual hours worked in a given establishment dividend the number of employees
Leverage	The sum of short-term and long-term debt scaled by the total asset. Compustat items: (dlc+ltt)/at
Firm size	The natural logarithm of total assets. Compustat items: Ln(at)
Turnover	Total sales scaled by the total asset. Compustat items: sale/ lagged at
FCF	Free cash flow is measured as a firm's total free cash flows divided by total assets. Compustat items: sum (oibdp, xintmm, txtmm, capxmm)/at;
Tangibility	Net property, plant, and equipment scaled by the total asset. Compustat items: ppent/at
Capex	Capital expenditure scaled by lagged assets. Compustat items: Capx/lagged at
MB	The market value of equities divided by the book value of equities.

Appendix B.1 Variable Definition

Variables	Definitions
Number of cases	Sum of deaths and all injuries and illnesses that result in days away from work or with job restriction or transfers, and other recordable cases at the establishment in a given year (Column G + Column H + Column I + Column J of OSHA Form 300).
Total case rate (TCR)	The total number of cases in a given establishment year divided by the number of hours worked by all employees at the establishment in a given year and then multiplied by 200,000.
DART	The number of injuries and illnesses that result in days away from work or with job restriction or transfer, divided by the number of hours worked by all employees in a given establishment-year, and then multiplied by 200,000.
Daysawork	Number of days away from work (Column K).
EstbEmp	The average number of employees working in a given establishment during the year
Ln(HoursEmp)	The natural logarithm of the total number of annual hours worked in a given establishment dividend the number of employees
Religiosity	The number of religious adherents in a county divided by the county population in a year. Religiosity in the non-census year is determined by linear interpolation. Protestant, Catholic, and Orthodox are particular religious followers.
MedAge	The median age of the establishment county population. Age in non-census year determined by linear interpolation.
Educ	The fraction of the age 25+ establishment county population with at least one year of high school education. Education in non-census year determined by linear interpolation.
Pop	The total population in an establishment county.
Married	The fraction of county people who are currently married. Married in non-census year determined by linear interpolation.
Chinese_Pop	A fraction of the county population consists of merely Chinese people.
Mexican_Pop	A fraction of the county population consists of merely Mexican people.
Pol_Orient	The ratio of votes for the Republic presidential candidate in a county to the sum of votes for both Republican and Democrat candidates.
Leverage	The sum of short-term and long-term debt scaled by the total asset. Compustat items: (dlc+ltt)/at
Cashflow	The sum of income before extraordinary items and depreciation and amortization scaled by the lagged asset. Compustat items: (ib+dp)/lagged at
Dividends	Common dividend scaled by the asset. Compustat items: dvc/at
Ln (Assets)	The natural logarithm of total assets. Compustat items: Ln(at)
Turnover	Total sales scaled by the total asset. Compustat items: sale/ lagged at

Tangibility	Net property, plant, and equipment scaled by the total asset. Compustat items: ppent/at
Capex	Capital expenditure scaled by lagged assets. Compustat items: Capx/lagged at
MTB	The market value of equities divided by the book value of equities.
Tobin's Q	Tobin's Q is measured using Compustat variables:(AT + ME - BE) / AT
Sales growth	Changes in sales scaled by lagged sales
Social capital	Social capital is the first principal component based on a principal component analysis (PCA) using Pvote, Respn, Ncss, and Assn from NRCRD data.

Appendix B.2: The first stage model regressing religiosity on county characteristics

The table presents the results of estimates from an OLS regression to obtain a residual *Religiosity*. Definitions of variables are available in Appendix B.1.

Variable	*Religiosity*
Ln (MedAge)	-0.205***
	(-17.52)
Ln (Income)	0.014**
	(2.22)
Educ	-0.006***
	(-32.58)
Ln (Pop)	0.015***
	(15.18)
Married	0.192***
	(3.13)
Pol_Orient	0.230***
	(25.85)
Social Cap	0.074***
	(75.77)
Chinese_pop	0.157***
	(16.54)
Mexican_pop	-0.295*
	(-1.92)
Lottery	-0.012***
	(-31.01)
Constant	1.354***
	(19.00)
Year FE	Yes
N	26,290
Adj. R2	0.258

Appendix B.3: Additional robustness

This table presents the results from additional robustness check analyses. The key dependent variable is the natural logarithm of the total number of cases that caused employees' death, and injuries and illnesses that result in days away from work or with job restrictions or transfers, and other recordable cases at the establishment in a given year. In Panel A, I replicate my baseline analysis restricted to firms with multiple establishments only. The results reported in Columns (1) and (2) are from a restricted sample of firms having at least 3 establishments (which is equal to the median number of establishments). The results reported in Columns (3) and (4) are from a restricted sample of firms having at least 7 establishments (which is equal to the third quartile number of establishments). The results on alternative definitions of work-related injury and illness are reported in Panel B. Panel C reports results with respect to different fixed effects and clustering. Panel D represents the results from my baseline model after excluding the top five most and/or least religious states: MS, UT, AL, LA, and AR. Panels E, F, and G provide results on controlling only decennial survey years by ARDA for religiosity, family firm, and short-interest (as Bai et al. (2020). ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Restricted to multiple establishments

	Ln (Num of cases)			
Variable	(1)	(2)	(3)	(4)
Religiosity	-0.133**	-0.157***	-0.140**	-0.154***
	(-2.49)	(-3.06)	(-2.57)	(-3.01)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	No	Yes	No
Estab. FE	No	Yes	No	Yes
N	67536	67536	60498	60498
Adj R2	0.657	0.705	0.655	0.702

Panel B: Alternative definition of injury

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	*Injury only*		*Ln (Daysawork)*		*TCR*		*DART*	
Religiosity	-0.124**	-0.144***	-0.808***	-0.800***	-0.769*	-0.776*	-0.944***	-0.770**
	(-2.39)	(-2.86)	(-4.89)	(-4.88)	(-1.77)	(-1.90)	(-2.86)	(-2.43)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-4.513***	-4.547***	-4.225***	-3.993***	42.404***	42.269***	19.602***	19.434***
	(-10.65)	(-10.79)	(-3.36)	(-3.10)	(11.82)	(12.30)	(6.76)	(7.44)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	No	Yes	No	Yes	No	Yes	No
Estab. FE	No	Yes	No	Yes	No	Yes	No	Yes
N	72287	72287	72287	72287	72287	72287	72287	72287
Adj. R2	0.657	0.706	0.423	0.478	0.354	0.440	0.341	0.421

Panel C: Different Fixed Effects

	Ln (Num of cases)					
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Religiosity	-0.134**	-0.155***	-0.123**	-0.147***	-0.130**	-0.151**
	(-2.44)	(-2.90)	(-2.35)	(-2.88)	(-2.34)	(-2.58)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	Yes	Yes
State*Year FE	Yes	Yes	No	No	No	No
Industry*Year FE	No	No	Yes	Yes	No	No
Firm FE	Yes	No	Yes	No	Yes	No
Establishment FE	No	Yes	No	Yes	No	Yes
Firm clustering	No	No	No	No	Yes	Yes
N	72287	72287	72287	72287	72287	72287
Adj. R2	0.662	0.710	0.670	0.716	0.664	0.711

Panel D: Drop the top most/least 5 Religious states

	Ln (Num of cases)					
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Religiosity	-0.117**	-0.137***	-0.119**	-0.142***	-0.105*	-0.127**
	(-2.15)	(-2.61)	(-2.22)	(-2.77)	(-1.91)	(-2.43)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	No	Yes	No	Yes	No
Establishment FE	No	Yes	No	Yes	No	Yes
Exclude Rel States	Top 5 Most		Top 5 Least		Both	
N	68663	68663	69630	69630	66006	66006
Adj. R2	0.654	0.703	0.667	0.713	0.657	0.704

Panel E: Restricted to ARDA survey year (2010 and 2002 for 2000 survey year)

	(1)	(2)
Variable	*Ln(Num of Cases)*	
Religiosity	-0.379***	-0.163*
	(-3.81)	(-1.89)
Controls	Yes	Yes
Year 2010=1		-0.567***
		(-23.81)
Constant	1.096*	-4.408***
	(1.73)	(-7.04)
Year FE	Yes	Yes
Firm FE	Yes	No
Estab. FE	No	Yes
N	14688	14688
Adj. R2	0.521	0.547

Panel F: Controlling family firm

	(1)	(2)
Variable	*Ln(Num of Cases)*	
Religiosity	-0.169**	-0.160**
	(-2.12)	(-2.21)
Controls	Yes	Yes
Family Firm	0.00039	0.174
		(1.46)
Constant	-6.641***	-7.040***
	(-8.07)	(-9.72)
Year FE	Yes	Yes
Firm FE	Yes	No
Estab. FE	No	Yes
N	17552	17552
Adj. R2	0.644	0.696

39 Family firm coefficient drops because it correlates with firm fixed effects.

Panel G: Controlling short interest

	(1)	(2)
Variable	*Ln(Num of Cases)*	
Religiosity	-0.137***	-0.161***
	(-2.60)	(-3.17)
Controls	Yes	Yes
Ln(menshortint)	-0.005	-0.002
	(-1.06)	(-0.52)
Constant	-4.239***	-4.425***
	(-9.97)	(-10.65)
Year FE	Yes	Yes
Firm FE	Yes	No
Estab. FE	No	Yes
N	69608	69608
Adj. R2	0.665	0.713

Panel H: Only Financial crisis period (2007-2009)

	(1)	(2)
Variable	*Ln(Num of Cases)*	
Religiosity	-0.125*	-0.203***
	(-1.92)	(-3.05)
Controls	Yes	Yes
Constant	-4.078***	-4.383***
	(-5.25)	(-7.30)
Year FE	Yes	Yes
Firm FE	Yes	No
Estab. FE	No	Yes
N	21947	21947
Adj. R2	0.662	0.713

BIOGRAPHICAL SKETCH

Md Ruhul Amin was born in Bangladesh in 1986. He received a Bachelor of Business Administration and Master of Business Administration from the University of Dhaka, Bangladesh in 2009 and 2011, respectively. After that, he started his career as a correspondent banker. During his banking career, he presented the overall performance of the bank to different external correspondents, such as central banks, letters of credit advising banks, foreign banks. During this process, analyzing financial statements, interpreting numbers, and reporting them to corresponds made him interested in teaching. As such plan, he pursued his higher studies here at the University of Texas-Rio Grande Valley (UTRGV). He also received his second Master's in Business Administration in 2016 from the University of Texas-Rio Grande Valley. In August 2017, he entered the doctoral program in finance at the Robert C. Vackar College of Business & Entrepreneurship at the University of Texas Rio Grande Valley. He received the Outstanding Finance Ph.D. student teaching award from UTRGV in 2021. He is interested in empirical corporate finance research. He earned a Doctor of Philosophy in Business Administration with a Finance concentration in August 2021.

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