Shareholder Primacy and Employee Health and Safety[*]

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Abstract

Shareholder primacy has been the doctrine for corporate decision making in U.S. firms in recent decades. However, there is growing concern that the shareholder focus under this doctrine imposes large negative externalities on other stakeholders and is a threat to sustainable growth. This paper examines the corporate governance reform in the early 2000s that increased corporate boards' focus on shareholder value, thus shareholder primacy, and identify its impact on an important workplace sustainability issue: employee health and safety. We find that the mandatory increases in board independence after the reform significantly reduced workplace injuries and illnesses. The reform especially benefited employees in low skill industries, non-unionized plants, and firms with low dedicated institutional ownership. Safety improvements occurred through at least two channels: an increase in safety inputs and the inclusion of safety metrics in CEO compensation. Overall, our findings suggest that greater shareholder control has a net positive effect on employee health and safety.

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1. Introduction

Shareholder primacy has been the dominant corporate governance doctrine in the U.S. for the past three decades. This doctrine dictates that the principal objective of a corporation is to maximize shareholder value, and that interests of other stakeholders, such as employees, suppliers, community, etc., may be taken into consideration only if doing so promotes shareholder value. In other words, the interests of other stakeholders are derivative of that of stockholders. While this shareholder primacy model was embraced by the Business Roundtables in its 1997 statement of corporate purpose, and the corporate governance reform in the early 2000s strengthened it through regulation; criticisms on the model has risen sharply in recent years. Critics of the model argue that the narrow focus on shareholder value imposes significant externalities on non-shareholder stakeholders, ranging from underinvestment in employees to the cheating of customers to the lack of incentive to take actions to address the climate change. Calls for replacing the shareholder primacy doctrine with a more stakeholder friendly approach have been made by prominent scholars and politicians alike. Most of the criticisms, however, are based on casual observations on several particular stakeholder concerns such as social equality and climate change. Yet, stakeholder interests are broad and the impacts of shareholder primacy on most of them, for example, employee health and safety, are unknown. Gaining a full understanding of these impacts is obviously an important step towards a proper assessment of the pros and cons of competing governance models.

In this paper, we examine the impact of shareholder primacy on employee health and safety at workplaces. Workplace safety is arguably the most important employee welfare, especially for workers in high injury risk industries. Although U.S. has safer workplaces than many developing countries, more than 5,000 workplace fatalities and 3.5 million serious injuries and illnesses still

occur each year. These injuries and illnesses generate 30 percent of permanent disability and 8 percent of subsequent earnings penalty among workers (Rennane et al., 2018). The Covid-19 pandemic serves as a reminder that new workplace safety and health hazards will continue to emerge in the future. Hence, protecting workers from workplace hazards remains an important sustainability issue. Understanding how shareholder primacy affects workplace safety thus is an important aspect of developing an optimal governance model that can promote sustainable growth.

From an empirical point of view, examining the impact of shareholder primacy requires the identification of variations in shareholder primacy across firms. In practice, we expect that firms show different degrees of shareholder primacy due to different preferences of directors and ownership structure. For example, family firms may treat employees better because they value a long-term relation with employees. However, cross-sectional variation in shareholder primacy likely correlates with other factors simultaneously affecting employee health and safety, making interpretation difficult. To overcome this challenge, we use the corporate governance reform around the passage of Sarbanes-Oxley Act (SOX) in 2002 as a quasi-natural experiment. The regulatory change around the SOX mandated most U.S. publicly-listed firms to have a majority of independent directors on the board and key committees consisting solely of independent directors.[1] The resulting increase in board independence significantly enhanced shareholder control over managers and thus the alignment of corporate decisions with shareholder interests. Our use of board independence as a proxy for shareholder primacy is well supported by the historical development of the shareholder primacy practice and the crucial role played by independent directors in enabling it. Gordon (2007) observes that "What the history reveals is that the rise of the independent board is associated with an increasing orientation of the corporate purpose toward

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[1] Exempted if the company has a 50% shareholder.

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shareholder wealth maximization." Particularly relevant to our study, Gordon (2007) argue that one of the most important problems independent directors solve is the enhancement of the fidelity of managers to shareholder objectives, as opposed to managerial interests or stakeholder interests. By relying more on stock performance to compensate and evaluate the CEO than inside and affiliated directors, independent directors instill the principle of shareholder primacy into the CEO's behavior.

The key criticism on shareholder primacy is that firms choose to maximize current stock price rather than long-term value. This preference is driven by the stock market's tendency to over-weigh near term earnings and under-weigh long-term earnings. At the same time, independent directors rely more on stock performance to compensate and evaluate the CEO than inside and affiliated directors, for example, Guo and Masulis (2015) find that the board independence mandate following SOX increased the sensitivity of forced CEO turnover to a firm's lagged stock returns in affected firms. As a result, managers have incentive to cut long-term investments, including safety investment, to increase current period earnings, which will lead to an increase in workplace incidence rate. Furthermore, the greater focus on shareholder interests following the transition to an independent board may also encourage managers to prioritize profits over workplace safety. When more managerial attention is paid to increasing profits, the enforcement of workplace safety protocols is neglected and workplace safety suffers. Therefore, according to the critics of the shareholder primacy doctrine, we expect that the increase in board independence will increase workplace incidence rate.

However, maximizing current stock price is merely an observation of what shareholder primacy appears to be implemented in practices. The doctrine itself does not define the horizon over which shareholder value should be maximized. It could well be that independent directors

consider their duty to be maximizing long-term shareholder value rather than current stock prices. In the long-run, failure to protect employees from workplace hazards can be costly to shareholders. Firms with unsafety workplaces will have to pay higher wages to workers, higher compensating premiums and more governmental fines, will experience more disruptions to production, more employee turnovers, and suffer reputation damages. Hence, if independent directors consider their duty to be maximizing long-term shareholder value, they would have strong incentives to uphold workplace safety. Therefore, we expect that the transition to an independent board would lead to a scrutiny of a firm's safety practices and, if the level of safety was suboptimal for maximizing long-term shareholder value, we expect to observe a change of the firm's safety level toward the optimal level. The direction of the change, nevertheless, can go in either direction and it depends on the level of safety at the firm before the regulatory shock. If less shareholder-focus allows managers to tip the balance of interests between shareholders and employees more toward employees either because of their own preferences and beliefs or because of a motive to entrench themselves through forming an alliance with employees against potential hostile takeovers (Pagano and Volpin, 2005), then the level of workplace safety was likely to be above the optimal level for maximizing long-term shareholder value and we expect to observe an increase in incidence rate. On the other hand, if weak corporate governance allows managers to shirk their safety duties, divert safety investments to other uses, increase short-term profits at the expenses of long-term value, then the level of workplace safety was likely to be below the level for maximizing long-term shareholder value and we expect to observe a decrease in incidence rate.

Overall, this theoretical analysis suggests that an increase in shareholder primacy created by the transition to an independent board can have either a positive or negative effect on workplace safety. Workplace incidence rate would increase if firms focus more on maximizing current stock

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price and reaching short-term profit goals or if firms focus more on maximizing long-term shareholder value but the pre-SOX level of workplace safety was above the optimal level. Alternatively, workplace incidence rate would decrease if firms focus more on maximizing long-term shareholder value and meanwhile the pre-SOX level of workplace safety was below the optimal level due to managerial agency problems.

We test these two competing hypotheses using administrative data from the U.S. Occupational Safety and Health Administration (OSHA)'s Data Initiative Program (ODI) which was active from 1996 through 2011. The data provides annual establishment-level counts of workplace injuries and illnesses and establishment-level employment information. To make the level of injuries and illnesses comparable across establishments of different sizes as well as within the same establishment over time, we scale the injury and illness count by total hours worked and define a variable called the incidence rate which equals the number of injuries and illnesses per 100 equivalents of full-time employees in a year. We then estimate a difference-in-differences regression at the establishment-year level where treatment establishments are those whose parent firms were non-compliant with the board independence mandate prior to 2002 and the control establishments are those whose parent firms were already in compliance with the requirement prior to 2002 and were thus not affected by the regulatory shock. We match treatment and control establishments at the parent firm level using coarsened exact matching before we estimate the difference-in-differences model to mitigate the concern that parent firms of the treatment and control establishments are systematically different, which can bias our estimate of the board independence effect.

Our main finding is that workplace incidence rate in treatment establishments drops significantly relative to that in control establishments after the regulatory shock, controlling for

establishment fixed effects, industry-year fixed effects to account for time varying differences in incidence rate across industries and state-year fixed effects to account for time varying difference in incidence rate across states. The average number of workplace injuries and illnesses per 100 full-time equivalent employees (FTE) falls by 1.6 in treatment establishments relative to control establishments or about 16% of the sample mean incidence rate. Examination of the dynamic effect of the regulatory shock by the year relative to the year of the regulatory shock shows that the injury rate was not significantly different between treatment and control establishments before 2003, which is consistent with the parallel trend assumption, and the injury rate only began to fall significantly in treatment establishments relative to control establishments after 2003.

This result supports the hypothesis that greater focus on shareholder value maximization as typically being implemented in practice through more independent director representation on the board improves employee health and safety. It contradicts the widely-held perception that greater shareholder focus means less attention to employee interests, instead, the evidence is consistent with economic theory which predicts that maximizing shareholder value leads to the maximization of other stakeholders' interests because shareholders hold the residual claim on a firm's cash flows.

We then examine the cross-sectional differences in the treatment effect of the board independence mandate conditional on the degree of managerial shirking and short-termism problems in the non-compliant firm that can compromise workplace safety. We find that the treatment effect is stronger for firms with fewer board meetings in a year, a larger proportion of independent directors who miss more than 25% of board meetings, and a busy board. We also find that the regulatory shock has a less pronounced effect on treatment establishments facing greater product market competition.

Consistent with independent directors on average view their duty as maximizing long-term shareholder value, we find that the regulatory shock has a less pronounced effect on treatment establishments belonging to firms with greater dedicated institutional ownership but has a more pronounced effect on treatment establishments belonging to firms with higher CEO pay-performance sensitivity, positive abnormal accruals and more analyst coverage.

Consistent with managers facing greater constraints in reducing workplace safety in the presence of unions and skilled labor, we find that the board independence effect is stronger in establishments in low union coverage or low labor skill industries.

We next explore specific channels through which independent boards improve workplace safety. First, we note that an overall increase in board monitoring would reduce various forms of managerial shirking, self-dealing, and earnings manipulation, including those related to workplace safety. Second, there are multiple safety-specific avenues and actions that the board can take to improve workplace safety. They include having more discussions of workplace safety matters in board meetings, requiring managers to establish an effective safety compliance program, exercising oversight of the program, taking regular steps to stay informed of the program's content and operation, approving key safety investments and policies, setting safety goals for the management, aligning incentives, and requiring substantive reporting on the organization's safety performance and risk. Due to data limitations, most of these potential avenues are unobservable, we examine only two dimensions that we can observe.

First, we find that non-compliant firms significantly increased their safety inputs after transition to an independent board as measured by OSHA violations and abnormal SGA expenditure. Compliance with government safety and health regulations is a salient example of safety inputs. We use SGA expenditure to proxy for safety spending because companies do not

separately report safety-related expenditures, instead, safety costs typically fall within selling, general and administrative expenses (SGA). Second, we find that noncompliant firms are more likely to include safety metrics in CEO compensation contracts after the regulatory shock. This suggests that independent boards also improve safety by incentivizing managers to improve workplace safety through compensation contracts.

1.1 Related Literature and Contribution

Our study contributes to current debate on the sustainability of the shareholder primacy model. Contrary to the general criticism that shareholder primacy imposes externalities on non-shareholder stakeholders, we find that an increase in shareholder focus actually improves one important workplace sustainability issue: employee health and safety. Our results suggest that while we criticize the inadequacy of shareholder primacy for addressing certain stakeholder issues, such as climate change, we should also be mindful of its benefits to other stakeholder welfare. In addition, our study illustrates the importance of taking into account the potential effect of managerial agency problems on stakeholders' interests when considering a change to a stakeholder governance model. Unless the proposed stakeholder governance model can adequately solve the accountability issue of managers, the potential rise in managerial agency problems can actually harm the exact stakeholders the proponents of the stakeholder governance model try to protect.

Our study also contributes to a large literature on the board of directors. Board independence is arguable the board characteristic that has received the most attention from regulators, investors, and researchers. Increasing board independence has been the most popular type of corporate governance reform around the world. Although early studies are confounded by endogeneity concerns, studies using governance reforms as quasi-natural experiments find substantial evidence that board independence improves internal governance (Dahya, McConnell and Travlos, 2002;

Guo and Masulis, 2015). The relation between board independence and firm value, however, is more subtle. Duchin, Matsusaka and Ozbas (2010) find that board independence increases value only in firms with low information costs. Using corporate governance reforms in 41 countries, Fauver et al. (2017) find that reforms involving board and audit committee independence increase firm value, and the effects are similar across Civil-law and Common-law countries. Balsmeier, Fleming and Manso (2017) study the effect of board independence on firm innovation search strategies. They find that transition to independent boards after SOX increases a firm's total patenting and citations but the increase in innovation is mostly in known and previously successful areas. Overall, these studies focus on the impact of board independence on shareholders. We extend this literature by shifting the focus from shareholders to employees. In the extant corporate finance literature, employees are often depicted as having a conflict of interest with shareholders. Since increasing board independence benefits shareholders, many people would naturally think that increasing board independence would reduce employee welfare or at least not improve it. We, however, find that increasing board independence improves employee health and safety, in support of the enhanced shareholder value view.

Furthermore, when thinking about how corporate governance increases shareholder value, existing studies almost exclusively focus on the elimination of wasteful investments and self-dealing, more optimal executive compensation contracts, and increase in productivity, etc.. However, value can also be created by maintaining better stakeholder relations. Our paper shows that improving workplace safety is one channel through which independent boards increase firm value.

Our study also contributes to the nascent finance literature on workplace safety. Filer and Golbe (2003) and Cohn and Wardlaw (2016) relate workplace safety to the financial condition of

firms. In particular, Cohn and Wardlaw (2016) find that workplace safety investment is adversely affected by a firm's financial constrain. Cohn, Nestoriak and Wardlaw (2021) examine the impact of private equity buyout on worker welfare measured by workplace injury rates. They find that private-buyouts reduce injury rates and the reduction appears to be mainly driven by changes in investor horizon and operations. None of these papers examines workplace safety from an agency perspective. Caskey and Ozel's (2017) study is an exception but they are only interested in firm-years where managers manipulate earnings to meeting earnings expectations. They show that managerial attempts to meeting earnings expectations may compromise employee safety. In contrast, we examine the agency problems in workplace safety comprehensively and argue that the existence of agency problems results in underinvestment in workplace safety. Hence, our paper offers a new perspective to understand workplace safety.

2. Costs and Benefits of Workplace Safety

In this section, we provide more institutional details about the costs and benefits of workplace safety. Workplace injuries and illnesses can have a considerable impact on an employer's bottom line. It is estimated that U.S. employers paid $1 billion per week for direct worker compensation costs (medical plus indemnity) in 2010. This number does not include property losses that occur in some workplace safety accidents. The indirect costs of workplace injuries and illnesses can be substantially larger than the direct costs. In a survey of financial decision-makers, it was estimated that for every dollar spent on direct costs, about $2.12 would be spent on indirect costs. The indirect costs include workplace disruptions, downtime, and loss of productivity, training of new employees, regulatory penalties, increased insurance premiums, increased wages, and damage to reputation. In 2013, U.S. firms paid net workers' compensation insurance premiums of $41 billion. Since the premium is experience rated on past claims of an employer, more frequent workplace

injuries and illnesses increase the premium. It is well documented that workers require a wage premium for hazardous working conditions. The total wage premium for workplace fatalities, injuries, and illnesses paid by U.S. firms is estimated to be about $100 billion a year (Viscusi, 2016). More frequent workplace safety incidents can increase the wage premium. The negative publicity from a workplace mishap can damage a firm's reputation, which can result in a potential loss of business from customers, loss of confidence from investors, suppliers, and employees, all of which may impact a firm's ability to succeed in a competitive market. Hence, there are substantial savings that can be achieved from improving workplace safety. In addition, employers often find that changes made to improve workplace safety and health can result in significant improvements to their organization's productivity and financial performance. Consistent with this analysis of the benefits of improving workplace safety, Cohn and Wardlaw (2016) find a substantial negative relation between firm value and injury rates. They find that firm value decreases by 6.1% for a one-standard-deviation increase in injury rates.

However, the benefits of workplace safety do not come without a cost. Firms need to invest in a variety of activities to protect workers from safety and health hazards at workplaces. First, firms need to invest in physical assets. These include maintaining existing equipment, replacing worn parts or machines, purchasing equipment with better safety features, and purchasing personal protective gear. Secondly, firms need to expend on other less tangible activities that affect safety. These include changing workflows, modifying production processes, providing safety training, paying for hours employees spent on safety-related tasks. Thirdly and most importantly, managers need to exert significant effort to promote a safety climate and enforce safety policies and procedures. Safety research suggests that the tone at the top of an organization plays a vital role in the creation of safety climate in the organization and their message embodied by policies and

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actions from the top will permeate throughout the organization and improve the safety behavior at every level, and eventually reduce workplace injuries at the frontline (e.g., Barling et al., 2002; Flin and Yule, 2004). The National Safety Council lists leadership and engagement as the top pillars of safety excellence. Managers are expected to continuously emphasize safety, both in their communication and by acting as role models, provide timely feedbacks to subordinates' safe or unsafe conduct, and take initiatives to actions concerning safety improvements (Molnar et al., 2019).

Because improving workplace safety requires managers to spend financial resources on workers and exert effort, agency theory suggests that, without proper oversight, managers would not invest the optimal amount in workplace safety. The moral hazard problems are likely to be worse for safety decisions than other more visible decisions because of several features of safety investment. First, shareholders likely pay less attention to workers' injuries and illnesses than the financial performance of the firm unless some major safety accidents occur. Second, shareholders do not have access to accurate information about workplace safety. There is no mandatory disclosure requirement for workplace safety. Safety spending is usually lumped together with other items on a firm's financial reports so it is difficult for investors to assess the level of safety investment. Third, safety investment reduces current period earnings while the benefit accrues slowly over time. Hence, the immediate benefit of safety investment may not be obvious to shareholders who mainly focuses on the current stock price. When board oversight is weak, managers thus may believe that they can afford to neglect safety in the short run without much negative consequences to them. Specifically, the moral hazard problems can affect workplace safety in three ways. First, managers likely exert inadequate effort to promote safety and enforce safety policies and procedures because they bear the full cost of effort but only get a fraction of

the benefit when they are not the full owners of the firm. Second, managers may under invest in workplace safety because other uses of the financial resource may bring greater private benefits to them than safety investment. These other uses include their own "pet" projects, empire building, and their compensation and perks. Third, managers are often short-term oriented due to capital market pressure and their compensation contracts. As a result, they may cut safety investment to meet short-term earnings targets to boost stock prices or increase their compensation (Caskey and Ozel, 2017). Overall, the analysis suggests that agency problems result in underinvestment in workplace safety.

3. Empirical Methodology

We exploit the board independence mandate of major U.S. stock exchanges and the SOX to obtain an exogenous change in firm level shareholder primacy. Numerous studies show that independent directors better represent shareholders' interests than inside and affiliated outside directors do. Gordon (2007) argue that independent directors "enhance the fidelity of managers to shareholder objectives, as opposed to managerial interests or stakeholder interests." Hence, an increase in the fraction of independent directors represents an increase in shareholder primacy. In 2002, the Congress passed the SOX Act which requires all public firms to have an audit committee consisted solely of independent directors. The Act also stipulates a series other reforms aimed at strengthening the internal control systems and disclosure. NSYE and Nasdaq then issued new exchange listing rules which require all U.S. public firms to have more than 50% independent directors on the board and compensation and nominating committees consisting solely of independent directors in addition to the SOX requirement for audit committees comprised solely of independent directors. The exchanges also strengthened the definition of independent directors that enhanced the independence-in-fact of directors. We treat the increase in board independence

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in firms which were non-compliant with the new rules before SOX as exogenous. One attractive feature of this quasi-natural experiment is that a significant proportion of firms already have a majority of independent directors on the board before SOX and thus are not affected by the regulatory shock. Using these compliant firms as control firms, we then identify the effect of the change in shareholder primacy on workplace safety using the following difference-in-differences specification estimated at the establishment-year level:

$$Y_{i,j,l,s,t+1} = \alpha + \beta \ Independent \ Board_{j,t} + \gamma F_{j,t} + \delta E_{i,t} + \theta_i + \mu_{l,t+1} + \pi_{s,t+1} + \varepsilon_{i,j,l,s,t+1} \ (1)$$

where subscripts *i, j, l, s,* and *t* refer to an establishment, firm, establishment industry, establishment state of location, and year. $Y_{i,j,l,s,t+1}$ is the measure of incidence rate at an establishment in a year; $Independent \ Board_{j,t}$ is an indicator that equals one if a firm switches from having less than 50% independent board members to having a majority of independent board members in 2003 or later, and zero otherwise.[2] The coefficient β captures the treatment effect of the board independence requirement on establishment incidence rate. The vectors F_{jt} and $E_{i,t}$ contain firm and establishment characteristics that may be correlated with workplace incidence rates at the establishment level, respectively. θ_i denotes establishment fixed effects, $\mu_{l,t}$ denotes industry-year fixed effects that capture time-varying industry shocks to workplace incidence rates, and $\pi_{s,t}$ denotes establishment location state-year fixed effects that capture time-varying local factors at the establishment's location state level. $\varepsilon_{i,j,l,s,t}$ is the residual error term. We cluster heteroskedasticity-robust errors at the establishment level.

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[2] We choose the year 2003 as the first year of the post-treatment period because, although the deadlines of the listing rule on board independence are October 2004 for firms with non-classified boards and December 2005 for firms with classified boards, many firms started to make board structure changes as early as the year 2002. However, our results are qualitatively same if we use 2002, 2004, or 2005 as the threshold year.

A key assumption underlying the DiD approach is that the incidence rate in treatment and control firms follows parallel trends in the absence of the regulatory shock. To check for potential violation of this parallel trends assumption, we estimate the dynamic effects of regulatory changes in board independence on incidence rates in Section 5.2 and find no evidence that the changes in injury rates from the base year are significantly different between treatment and control firms in the pre-SOX period.

While we estimate the DiD specification with establishments from a matched sample of treatment and control firms, our estimation may still be biased due to distinct pre-event trend of incidence rate at different establishments. Thus, as a robustness check, we control for establishment-specific linear trends in incidence rate prior to 2002 as in the following specification:

$$Y_{i,j,l,s,t+1} = \alpha + \beta \, Independent \, Board_{j,t} + \gamma F_{j,t} + \delta E_{i,t} + \varphi * Establishment_i * pre2002_t$$

$$* t + \theta_i + \mu_{l,t+1} + \pi_{s,t+1} + \varepsilon_{i,j,l,s,t+1} \, (2)$$

where $pre2002_t$ equals one for the years 2001 or earlier.

4. Data and Sample

Our establishment-level injury and illness data is from the OSHA Data Initiative Program (ODI). The boards of directors data is from the Institutional Shareholder Services (ISS) database. Firm financial data is from the Compustat database. We start our sample in 1996 because it is the first year that the board of directors data and establishment injury and illness data are available. We end our sample in 2008 so that we have a symmetric time window around the passage of SOX in 2002. Keeping six years after SOX allows a long enough time for the change in board independence to exhibit its full effects while, at the same time, avoids potential confounding effects from the global financial crisis.

4.1 Sample Construction

To construct our sample, we first obtain establishment injury and illness data from the ODI dataset. In1996, OSHA initiated the ODI annual surveys to collect injury and illness data on private-sector employers. The program was ended in 2011 due to budget cuts. Each establishment in the data set is matched to a unique physical location with detailed demographic information. Broadly speaking, OSHA covers all the manufacturing plus non-construction industries that are considered high-hazard ones.[3] Table 1 presents the distribution of workplace injuries and illnesses in the U.S. private sector in 2011 by cause (Panel A) and nature (Panel B). Since the ODI dataset does not contain a unique parent firm identifier for establishments, we manually match each establishment from the ODI database to a parent firm in the Compustat databases by comparing their names. Like Caskey and Ozel (2017), we begin with direct searches of parent firm names in the Compustat database for establishments in the ODI dataset. If the searches do not produce successful matches, we conduct internet searches for establishments via Google, Hoovers, and company websites to identify parent firm names and match establishments to corresponding Compustat firms. In the case that an establishment is matched to a hierarchy of Compustat parent firms, we match the establishment to the nearest parent firm in the hierarchy. In the case that an establishment changed its parent firm due to a merger, we match the establishment to its historical parent firm before the merger and to its current parent firm after the merger. We then add the board of directors' information from the ISS database. To make sure that we have information to classify firms into compliant and non-compliant firms before the regulatory shock and all firms in our sample are subject to the regulatory shock, we require that firms have director independence data

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[3] The high-hazard industries refer to those which have a DART rate of 5.0 or greater. The Days Away, Restricted, or Transferred (DART) Rate is explained with details in Section 3.2. See https://www.industrysafe.com /blog/osha-recordkeeping/what-is-a-dart-rate.

available from the ISS in 2001 and that firms' common stocks are listed on the NYSE or NASDAQ from 2001 to at least 2005. We further exclude financial (SIC codes 6000-6999) and utility (SIC codes 4900-4999) firms. A firm can have multiple establishments. When a firm is excluded from the sample, all its establishments are also excluded. These filters yield an initial sample of 54,950 establishment-year observations from 553 firms for the period 1996–2008.

4.2 Coarsened Exact Matching

We classify our sample firms into treatment and control firms based on their board structure in 2001. Firms that do not have 50% or more independent directors on the board are defined as treatment firms, while firms that already have more than 50% of independent directors on the board are defined as control firms. Our identification strategy requires that firms are randomly assigned to the treatment and control groups. However, a typical concern with this type of observational study is that the assignment of treatment and control firms is not random (Morgan and Winship, 2014). For instance, some firm characteristics that endogenously determine the assignment (whether the board is independent before the regulatory change) can be correlated to changes in injury rates. To minimize this concern arising from cross-sectional heterogeneity between treatment and control firms, we construct a balanced sample of treatment and control firms by matching them on core observable characteristics before 2002. Similar to Balsmeier et al. (2017), we use Coarsened Exact Matching (CEM) since it has several advantages over conventional matching methods in reducing the imbalance, model dependence, and estimation bias (for details, see Iacus, King and Porro, 2011, 2012; King and Nielsen, 2019).[4] In particular, we match each treatment firm with multiple control firms which are in the same two-digit SIC industry and have similar average firm sizes (measured by the natural logarithm of total assets), Tobin's Qs, and

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[4] In Table B2 of the robustness checks, we form a balanced sample based on nearest-neighbor propensity score matching and find the same qualitative results.

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board sizes over years 2000 and 2001. [5] Following Balsmeier et al. (2017), we run CEM by cutting (coarsening) the average values of the natural logarithm of total assets, Tobin's Q, and board size into three bins and drop all firms that do not satisfy these criteria (for applications, see Blackwell et al., 2009). The matched sample contains 43,307 establishment-year observations of 9,254 establishments for 477 unique firms from 1996 to 2008. While 115 firms with 2519 establishments are in the treatment group, 362 firms with 6735 establishments are in the control group. Panel A of Table 2 reports the comparison of the means of key characteristics of treatment and control firms before 2001 from two-sample t-tests. We find no significant differences in the means of these characteristics between the treatment and control groups, indicating that the samples of treatment and control firms are similar along these observable characteristics. However, unobservable differences may still exist between treatment and control firms. If these differences are correlated with workplace safety, then the estimates can still be biased. We thus include establishment fixed effects in all our DiD specifications to control for unobservable time-invariant differences across firms and establishments.

4.3. The ODI Data and Workplace Safety Measures

We measure workplace safety using the annual incidence rate of injuries and illnesses at the establishment level. The ODI program collects data on three incidence rates which differ in their inclusion of less serious incidents: (1) The Total Case Rate (*TCR*) is the primary metric for incidence rates. It includes all recordable cases of nonfatal injuries and illnesses multiplied by 200,000 over the number of hours worked by all employees in an establishment-year. (2) The Case Rate of Days Away, Restricted, or Transferred (*DART*) is the number of injuries and illnesses with days away from work or job restriction or transfer multiplied by 200,000 over the number of hours

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[5] Our results are unchanged if we take the average values of these variables over the period 1996 to 2001.

worked by all employees. Unlike *TCR*, *DART* represents only those injuries and illnesses that have had an impact on workplace activities. It includes anyone who has had to cease working, restricted their work activities, or transferred to a different department or job due to workplace injuries or work-related illnesses. (3) The Case Rate of Days Away from Work (*DAFWII*) is the number of injuries and illnesses with days away from work multiplied by 200,000 over total employees' hours. *DAFWII* is a slightly narrower metric since it does not account for those workers transferred to a different department or restricted their work activities. We use the *TCR* as our primary measure of workplace safety and the latter two injury rates along with the number of total cases as alternative measures in our robustness checks.

Along with injury and illness data, the ODI program also collects information on basic establishment characteristics such as the number of employees, total hours worked in a year, employment of seasonal workers, and unusual events such as strikes, shutdowns, and disasters. We include these establishment characteristics into our analysis because they may be correlated with injury rates at the establishment. Moreover, since board independence mandate affects various aspects of firm financial conditions that may influence establishment level injury rates, our analysis includes a battery of firm financial variables: *Ln(Assets)* (the natural logarithm of total assets), *Cash/Assets* (cash balances over total assets), *Leverage* (short-term and long-term debt over total assets), *PPE/Assets* (net property, plant, and equipment over total assets), *Sales/Assets* (sales over total assets), *CapEx/Assets* (capital expenditure over total assets), *Market-to-Book* (market value of assets over total assets). For brevity, we list the detailed definitions of workplace safety variables and other variables of interest in Table A1 of the Appendix.

4.4. Summary Statistics

Panel B of Table 2 presents summary statistics for the establishment-level and firm-level variables in our analysis. Continuous variables are winsorized at the 1st and 99th percentiles to reduce outliers' influence. *TCR* has a typical skewness with a mean of 10.92 and 8.93, respectively, indicating that an establishment with 100 full-time equivalent (FTE) employees who work for 2,000 hours per year has 10.92 incidents on average in a year, and about one-half of the establishments have more than 8.93 injuries in a year. On average, the sample establishments have 307 employees, and each employee works for 1,913 hours per year. The median logarithm of total firm assets is 7.48, indicating that the median firm has total assets of 1.78 billion and is relatively large. The average firms have a cash over assets ratio of 5.3%, a book leverage ratio is 23.9%, net property, plant, and equipment over assets of 29.3%, an asset turnover ratio of 1.16, a capital expenditure ratio of 5.9 %, and a market-to-book ratio of 1.81. These establishment-level and firm-level values are comparable to those reported in Caskey and Ozel (2017) and Cohn and Wardlaw (2016). Besides, the average firms have an independent director ratio of 67 % with a board size of 9.64.

Figure 1 Panel A shows the histogram of our focal dependent variable, *TCR,* at the establishment-year level. Figure 1 Panel B reports the average TCR industry where the industry is defined using the Fama and French 48 industry classification. As shown, the three industries with the highest workplace incident rates are: Healthcare, Transportation and Food products. Figure 2 shows the distribution of establishments in our sample by number of employees (Panel A) and by industry (Panel B). Most establishments in our sample have between 101-250 employees; Healthcare, Transportation, and Retail are the top three industries by number of establishments.

5. Results

In this section, we present our baseline results on the effect of the board independence mandate on workplace injury rates, the timing of the change in injury rates, and the cross-sectional variations in the effect of the board independence mandate.

5.1. Baseline Results

Table 3 reports estimates of the treatment effect of the board independence mandate on workplace safety based on Equation (1). The dependent variable is the establishment level total case rate (TCR) for a given year. Column (1) is our simplest specification and only includes the key independent variable, *Independent Board*, besides all the fixed effects in Equation (1). The inclusion of these fixed effects ensures that the treatment effect is identified from within-establishment changes in *TCR* for treatment establishments relative to control establishments around the board structure change after filtering out changes in *TCR* due to industry and location state shocks. The coefficient estimate, -1.64, indicates that transition to a majority independent board on average decreases *TCR* by about 16% of the sample mean *TCR* (10.92). The effect is statistically significant at the 1% level. This result strongly supports the hypothesis that board independence improves workplace safety.

In column 2, we control for establishment characteristics which are likely to be correlated with injury rates, including the number of employees, the annual hours worked per employee, and whether there is a strike, a shutdown, hiring seasonal workers, or a natural disaster and other adverse weather conditions. We find that the coefficient estimate of the term *Independent Board* remains negative and statistically significant at the 1% level. The economic magnitude of the coefficient is little changed.

In column 3, we further control for parent firm characteristics the financial conditions and policies of the parent firm can affect establishment level incidence rate. For financial conditions of the parent firm, we include *Ln(Assets)*, *Cash/Assets*, and *Debt/Assets*. Filer and Golbe (2003) and Cohn and Wardlaw (2016) find that workplace safety investment is constrained by a firm's financial conditions. Workplace injuries may also be related to production technology and asset utilization efficiency. We control for asset tangibility ratio (*PPE/Assets*) and asset turnover ratio (*Sales/Assets*). A firm's investment policy can affect the scale and nature of operations and, thus, workplace safety, so we include *CapEx/Assets* in our regression. To control the effect of a firm's growth opportunities on workplace injuries, we include the parent firm's *Market-to-Book ratio*. Several recent studies find that raising board independence influences firm operating performance (Chhaochharia et al., 2017), innovation activities (Balsmeier et al., 2017), acquisition spending and capital expenditures (Lie and Yang, 2020), and CEO total compensation (Guthrie et al., 2012). Since these firm policy changes may affect the availability of financial resources available for safety investments, we control for these simultaneous policy changes by adding *ROA*, *R&D/Assets*, *Acquisition/Assets*, *Dividends/Assets, and Ln(CEO Compensation)* in our specification. Column (3) shows that the coefficient estimate of *Independent Board* remains negative and statistically significant at the 1% level. The economic magnitude of the coefficient is little changed.

In column 4, we allow for establishment-specific linear trends in incidence rate prior to the regulatory shock as specified in Equation (2) with all the control variables and fixed effects. As shown, the coefficient of *Independent Board* is little changed in both statistical and economic significance. Overall, we find that the transition to an independent board reduces incidence rate and the effect is both statistically significant and economically large.

5.2. Dynamics of the Treatment Effect

The validity of our difference-in-difference approach hinges on the parallel trend assumption, which requires that incidence rates in treatment and control establishments follow parallel trends in the absence of the treatment. This assumption cannot be directly tested because we do not observe the counterfactual in the post-treatment period. However, one necessary condition for the assumption to hold is that the time trends of injury rates in treatment and control establishments are similar before the treatment. To verify this, we estimate a modified version of Equation (1) where the dependent variable is TCR, and the single *Independent Board* indicator is replaced with a set of indicator variables, *Independent Board*$_{j,k}$ for k = -5, -4, -2, -1, 0, +1, +2, +3, +4, +5+, where k indicates the year relative to 2002, the year some non-compliant firms begin to comply with the board independence mandate. For example, *Independent Board*$_{j,+5+}$ equals one for the years that are 5 or more years after 2002. The coefficients of these *Independent Board*$_{j,k}$ terms capture the change in incidence rate from the base year (-3). Figure 3 plots the coefficient estimates with their 95% confidence interval. As we can see, the coefficients for *Independent Board*$_{j,k}$ is statistically insignificant for k from -5 to 1 but becomes statistically significant from +2. The pattern of the coefficients suggests that there are no differential time trends before the regulatory shock. After the regulatory shock, injury rates significantly decrease in treatment establishments relative to control establishments. For brevity, we report the coefficient estimates in Table A2 in the Appendix.

5.3. Cross-Sectional Variations of the Treatment Effect

5.3.1. Internal and External Governance

We argue that the board independence effect arises from the correction of mainly three types of agency problems: managerial shirking, self-dealing, and short-termism. In this section, we

examine the cross-sectional differences in the treatment effect across firms with different degrees of these agency problems. If stricter board monitoring is responsible for the reduction in incidence rates in treatment establishments, we expect the decrease to be more pronounced for treatment establishments belonging to firms with greater degrees of these agency problems. To test this prediction, we expand the difference-in-differences specification in Equation (1) to a triple differences (DDD) regression by including proxies for the degree of the agency problems in the firm and all the double and triple interaction terms. The coefficients of the interaction with *Independent Board* capture the differences in the treatment effect across establishments with different degree of the agency problems at the parent firm level.

First, we measure board monitoring by three proxies, board meeting frequency, the fraction of independent directors missing more than 25% of annual board meetings and an indicator for busy board which equals one if more than 50% of the director serve on three or more boards.

Safety research finds that workplace safety depends on the concerted efforts of all employees in an organization. The tone at the top of an organization, thus, plays a key role. When the top leaders in an organization emphasize safety and reinforce it through their actions, the message will permeate throughout the entire organization and results in a safety improvement at the front lines. Hence, the most important way for the board to improve workplace safety is likely through directors' effort to convey the message by actions and monitor its implementation by managers. Since director safety efforts cannot be completely observed, we use the board meeting frequency, absence of board meeting by independent directors and busy board to proxy for the intensity of such efforts. Board meeting frequency has been used to measure the board's general "effort" in other papers. Directors' safety effort is likely positively correlated with their overall effort. Hence, we expect that board meeting frequency is positively related to the board's safety effort. In addition

to being a proxy for directors' level of safety effort, board meetings are a formal place for safety policies to be made and safety matters to be discussed. The more board meetings a firm has in a year, the more chances independent directors get to discuss safety matters and the more likely they can take timely actions to correct any deficiencies. We expect that transition to an independent board will have a stronger effect on workplace safety for treatment establishments belonging to firms with fewer board meetings a year, more board meeting absence by independent directors and a busy board.

The triple differences regression results are reported in columns 1 through 3 of Table 4. We demean variables *Meeting Frequency* and *Meeting Absence* so that the coefficient of *Independent Board* estimates the effect of transition to an independent board on incidence rate in a treatment establishment with the average meeting frequency or meeting absence. We find that, in all three columns, the coefficient of *Independent Board* is negative and statistically significant at the 1% level. Our interest is in the interaction between *Independent Board* and these proxies. We find that they are all significant at conventional levels and have the expected signs.

Second, a large literature shows that product competition can reduce managerial slack and improve operating efficiency (Hart, 1983; Nickell, 1996; Schmidt, 1997; Aghion et al., 1999; Dasgupta et al., 2018). We expect that firms competing in competitive product markets are more likely to make the optimal amount of safety investment.[6] In addition, managers of these firms likely exert greater efforts to enforce safety procedures to avoid disruptions and absenteeism caused by workplace injuries and illnesses. To measure the intensity of product market competition, we use the product similarity constructed by Hoberg and Phillips (2016), where high pairwise product

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[6] The optimal level of safety investment can be lower for firms in more competitive industries because of their lower profit-margins than firms in more concentrated industries. However, we are not interested in the level of safety investment but the change in the level of safety investment with a firm from before to after transition to an independent board.

similarity is associated with more intense product market competition.[7] Consistent with our expectation, we find that the coefficient of the interaction of *Independent Board* and *Product Similarity* is positive and statistically significant in Column 4 of Table 4.

5.3.2. Investment Horizon

The main criticism on shareholder primacy is that it induces managerial short-termism. In this section, we examine whether independent directors focus on maximizing long-term or short-term value with regard to investing in workplace safety. The shareholder primacy doctrine itself does not explicitly say over what horizon shareholder value should be maximized. Hence, this is an empirical question. If independent directors on average maximize long-term value, then we expect that the effect of transition to an independent board will be stronger (weaker) for firms with shorter (longer) investment horizons.

To proxy for a firm's investment horizon, we use four proxies, ownership by dedicated institutional investors, CEO pay-performance sensitivity (PPS), positive abnormal accruals, and analyst coverage. Large ownership by institutional investors provides another alternative mechanism to the board of directors that can reduce managerial agency costs (Shleifer and Vishny, 1997; Hartzell and Starks, 2003; Chen, Harford and Li, 2007). Because of the large size of their stakes, institutional investors have the incentive to collect information and monitor the management. Their large stakes also give them enough voting control to put pressure on the management to maximize shareholder value. However, not all institutional investors are alike. Although the above description fits the behavior of dedicated institutional investors, i.e. those having concentrated holdings in portfolio firms and long investment horizon, it does not fit the behavior of transient institutional investors who have short investment horizon and employ

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[7] We also use industry concentration as an alternative measure for product market competition and find the qualitatively same results.

earnings momentum trading strategies (Bushee, 1998). Transient institutional investors typically do not monitor the management because of their short holding periods. Instead, their trading strategies even put pressure on managers to forgo long-term investment in order to maintain short-term earnings growth (Bushee, 1998). Since return to safety investment is recouped over the long-run not the short-run, only ownership by dedicated institutional investors likely alleviates short-termism and is likely to be associated with lower incidence rate before the regulatory shock. As a result, we expect that transition to an independent board has a weaker effect on firms with greater dedicated institutional ownership.

We follow Bushee (2001) and classify institutional investors into two categories based on their portfolio turnover and concentration: transient institutional investors (short horizon, diversified portfolio) and dedicated institutional investors (long horizon, concentrated portfolio). We use the percentage of outstanding shares held by dedicated institutional investors to measure dedicated institutional ownership.

Although greater CEO pay-performance sensitivity (PPS) can reduce CEO shirking in terms of increasing profits, it can worsen the short-termism problem because it incentivize the CEOs to focus on the short-term over which their stock option grants will be vested. Such CEOs may also cut safety investment to boost short-term earnings when their option grants are vesting (Caskey and Ozel, 2017). We define an indicator for *High CEO PPS* which equals one if the PPS of the CEO is in the top quartile of the sample in a given year and zero otherwise. We expect that the regulatory shock will have a more prominent effect on treatment establishments belonging to firms with *High CEO PPS*.

Many studies find that financial analysts put short-term earnings pressure on managers. For example, firms followed by intensive analysts tend to forgo investment projects that benefit long-

term shareholder interest (e.g., He and Tian, 2013). Managers often manipulate earnings in order to meet analyst forecasts. We use the number of analysts and an indicator for positive abnormal accruals to measure the intensity of short-term earning pressure from the capital market. Since safety investment is a long-term investment, we expect that managers are more likely to compromise workplace safety when facing greater earning pressure from analysts.

In Table 5, we estimate the triple differences regression to examine the variation of the board independence effect with the degree of short-termism in treatment firms. In column 1, we find that the interaction of *Independent Board* and *Dedicated Ownership* is positive and statistically significant at the 5% level, suggesting that establishments belonging to non-compliant firms with greater ownership by dedicated institutional investors experience a smaller decrease in incidence rate after the regulatory shock. In column 2, we find that the interaction of *Independent Board* and *High CEO PPS* is negative and statistically significant at the 5% level, suggesting that establishments belonging to non-compliant firms with higher CEO pay-performance sensitivity experience a greater decrease in incidence rate after the regulatory shock. In columns 3 and 4, we find that the interaction of *Independent Board* and *High CEO PPS* and *Positive Abnormal Accruals* is negative and statistically significant at better than the 5% level, suggesting that establishments belonging to non-compliant firms under greater analyst pressure experience a greater decrease in incidence rate after the regulatory shock.

5.3.3. Labor Constraints

The degree of the agency problems associated with workplace safety can also vary with non-governance-related constraints on managers' ability to alter the level of workplace safety. One such factor is the presence of labor unions. Workplace safety is a top bargaining issue for labor unions. Union workers are also more aware of workplace safety and health hazards than non-union

workers thanks to the education programs run by labor unions. As a result, unionized firms usually have better workplace safety and are subject to greater scrutiny from OSHA (Weil, 1991; Morantz, 2013). Hence, we expect that the transition to an independent board will lead to a smaller decrease in injury rates for unionized non-compliant firms. Since firm or establishment level unionization data is rarely available, we use industry level union membership to proxy for bargaining power that each establishment faces. The industry-level data comes from the Union Membership and Coverage Database[8]. We define an indicator variable, *Union Membership,* for establishments that operate in an industry with union membership above the median of a year. Consistent with our expectation, we find the coefficient of the interaction of *Independent Board* and *Union Membership* is positive and statistically significant in Table 5 Column (1).

Another factor we examine is the proportion of high skilled labor in an establishment's industry. Low-skilled positions typically involve a high degree of physical work, mechanical equipment, and something being physically built or maintained. Due to the physical nature of work, employees in low-skilled positions often face an increased risk of workplace incidents. In addition, Workplace injuries and illnesses increase employee turnovers (Viscus, 1979; Danna and Griffin, 1999; Cottini et al., 2011). A high turnover rate is harmful because firms must spend resources to search, hire, and train new employees and bear knowledge spillover risks to rivals. Since these turnover costs and risks are particularly higher for skilled employees, we expect that managers in firms which employ more skilled employees are less likely to underinvest in workplace safety (Freeman, 1978; Akerlof et al., 1988).

Following (Belo *et al.*, 2017), we measure the fraction of high-skilled employees at an establishment using the establishment's industry-level data, since data on employee skill are not

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[8] See https://www.unionstats.com/.

available at the firm- or establishment-level.[9] The Department of Labor classifies all occupations into one of nine skill levels based on the amount of preparation (e.g., training and formal education) required for a typical worker to perform the occupation's focal task. Level 1 corresponds to the lowest preparation, while level 9 corresponds to the highest preparation. We define high-skilled occupations as those with a skill level of 7 (which corresponds to an occupation requiring 2–4 years of preparation) or above. We then calculate the fraction of employees in high-skilled occupations in a given industry and denote it by *Labor Skill*. According to this measure, industries with the highest labor skill include software publishers (NAICS 5112) and computer systems design and related services (NAICS 5415); industries with the lowest labor skill include clothing stores (NAICS 4481) and restaurant and other eating places (NAICS 7225).

In Column 2, we report the estimate of the triple differences model with the establishment's industry-level fraction of high skilled employees as the main cross-sectional difference. Consistent with our expectation, Column (2) shows that the coefficient estimate of the interaction of *Independent Board* and *Labor Skill* is positive and statistically significant.

6. Channels

6.1. Safety Inputs

One salient example of employer inputs into safety is their compliance with government safety and health regulations (Johnson, Schwab and Koval, 2020). The regulatory approach of OSHA to safety and health risks is to seek technological solutions through capital investments in the workplace (Viscusi and Gayer, 2005). Hence, OSHA standards primarily relate to firms' capital investments in safety and health, and most violations are related to inadequate capital investment (Viscusi, 1979). If transition to an independent board increases a firm's safety input, we expect to

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[9] The labor skill dataset was downloaded from Professor Belo's website. We also use an alternative labor skill dataset compiled from O*Net, and find similar results to those reported here.

observe a fall in the likelihood of a treatment establishment being found violating OSHA safety and health standards after the regulatory shock.

We test this by collecting data on OSHA inspections from the Department of Labor. We match the inspected establishments to their parent firms in our sample and define two new dependent variables: *Violation* is an indicator variable that equals one if the inspection finds any violation by the establishment and zero otherwise; and *Serious violation* is an indicator variable that equals one if the inspection finds a violation resulting in the establishment being fined and zero otherwise. We then estimate a linear probability model similar to Equation (1) using these two indicators as the dependent variables. Since OSHA rarely inspects the same establishment in our sample repeatedly, we replace the establishment fixed effects with parent firm fixed effects. The sample consists of all establishment-years belonging to any of the firms in our earlier matched sample in which OSHA conducted an inspection of the given establishment.

The results are reported in Table 7. We find that the coefficient of *Independent Board* is negative and statistically significant in both columns, indicating that switching to a majority independent board reduces workplace safety violations and fines. The economic effect is large. The coefficient of -0.187 on *Independent Board* in Column (1) implies a 35% decline in the probability of being found to have any safety violation relative to the mean level of 0.527, while the coefficient of -0.167 on *Independent Board* in Column (2) implies a 44% decline in the probability of being found to have a fine-carrying serious safety violations relative to the mean level of 0.373. There results suggest that an important channel through which board independence improves workplace safety is an increase in employer's safety inputs, mostly capital based. The results also mitigate the concern that a change in injury reporting by firms after the regulatory shock drives our main results. Lastly, since serious violations are associated with fines paid by

employers, our evidence shows a concrete dimension on which board independence increases firm value.

As an alternative way to measure a firm's safety expenditures, we calculate a firm's abnormal SGA spending as the residual from regressions of the SG&A expenses divided by the beginning number of employees [$xsga_t/emp_{t-1}$] on the beginning sales divided by the beginning number of employees [$sale_{t-1}/emp_{t-1}$] and inverse beginning number of employees [$1/emp_{t-1}$] for each year and 2-digit sic industry (Caskey and Ozel, 2017). Firms do not separately report their safety investments and expenditures. However, most of the expenditures, such as the costs of maintenance, safety training, and oversight programs, fall in selling, general and administrative expenses (SGA). We test the prediction that non-compliant firms increase safety expenditures after the regulator shock relative to compliant firms. The regression model is similar to Equation (1) except that the dependent variable is the SGA expenses per employee and the model is estimated at the firm-year level. In Table 8 Column (1), we find that the coefficient of *Independent Board* is positive and statistically significant at the 5% level. Supporting our prediction, this result suggests that non-compliant firms increase abnormal SGA expenses per employee by about 30% of the sample mean abnormal SGA expenses per employee of 18.57 after transition to an independent board relative to compliant firms.

6.2. Safety Incentive in CEO Compensation

CEO compensation contract is another important device that corporate boards use to address agency problems. The most common practice is to make a large proportion of a CEO's pay to be equity-based so that the CEO's pay increases when she delivers positive stock returns to shareholders. Besides stock prices, the board often sets short-term or strategic goals for the firm to achieve that are based on accounting or other performance measures, for example, EBIT, customer

satisfaction, employee safety, etc. To incentivize the CEO to attain these goals, the board often makes the vesting of equity-based awards or the payout of annual cash bonuses contingent on the attainment of the goals.[10] Thus, we next examine whether the transition to an independent board changes the inclusion of workplace safety-related metrics in CEO compensation contracts. We manually search for a list of key safety-related words, such as "incident", "injury", "injure", "safe", "safety", "health", "OSHA" and so on, in the CEO compensation section of company proxy statements on EDGAR. We then read the details of the discussions and confirm that safety metrics are used in the determination of CEO compensation. Most of the safety metrics are used in setting CEO cash bonuses. We define an indicator variable, *Safety Metrics,* which equals one if a safety metric is included in the CEO's compensation contract in a year and zero otherwise. We then estimate a difference-in-difference regression similar to Equation (1) at the firm level, where the dependent variable is the indicator variable, *Safety Metrics*. The model includes firm and year fixed effects and controls for firm size and performance, which are found to affect CEO compensation (Bettis et al., 2010). The regression result is reported in Table 8 Column (2). We find that the coefficient of *Independent Board* is positive and statistically significant at the 5% level. The estimate indicates that the transition to an independent board increases the likelihood of non-compliant firms including safety metrics in CEO compensation contracts by about 7.7% relative to compliant firms. The increase is 1.58 times more than the sample's unconditional likelihood of having a safety metric in CEO compensation contracts of 4.86%. This result shows

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[10] According to a recent survey of boards of directors by Willis Towers Watson, "nearly four in five respondents (78%) are planning to change how they use ESG with their executive incentive plans over the next three years. More than four in 10 (41%) plan to introduce ESG measures into their long-term incentive plans over the next three years, while 37% plan to introduce ESG measures into their annual incentive plans. Additionally, about a third plan to raise the prominence of environmental and social/employee measures in their incentive plans." See https://www.globenewswire.com/news-release/2020/12/09/2142357/0/en/4-in-5-companies-planning-to-change-ESG-measures-in-executive-pay-plans-over-next-3-years-Willis-Towers-Watson-survey-finds.html.

another specific channel through which the transition to an independent board improves workplace safety.

The explicit inclusion of safety metrics in the CEO compensation contract signals a strong desire of the board to improve workplace safety. However, it is not the only way that the board uses to incentivize the CEO to improve workplace safety. Since workplace safety increase shareholder value in the long-run, compensation policy changes that increase the CEO's incentive to maximize long-term shareholder value will also improve the CEO's safety incentive. Although we do not study these compensation policy changes because they do not contain direct safety metrics, to the extent that the regulatory shock causes the boards in non-compliant firms to offer greater incentives to the CEO to increase long-term shareholder value, those compensation policy changes also contribute to the average board independence effect on safety that we document.

7. Robustness Checks

In Table A3 in the Appendix, we report results from four robustness tests.

7.1. Nearest Propensity Score Matching

First, many prior studies use the nearest neighbor propensity score matching method to construct matched samples. We hence check the robustness of our results to the use of this propensity score matching method. We match each treatment firm with a control firm that is in the same two-digit SIC industry as the treatment firm and has the closest propensity score to the treatment firm. We then re-estimate Equation (1) with *TCR* as the dependent variable using establishments belonging to these matched treatment and control firms. In Column (1), the coefficient estimate of *Independent Board* is negative and statistically significant at the 1% level and has similar magnitude to that in Column (2) of Table 2.

7.2. Alternative Injury Rate Measures and Models

In our baseline regression, we use the *TCR* as the dependent variable. As a robustness check, in Columns (2) and (3), we replace *TCR* with two alternative workplace injury measures: *DART* (The Case Rate of Days Away, Restricted, or Transferred) and *DAFWII* (The Case Rate of Days Away from Work). Compared with *TCR*, these two measures only include relatively more severe injuries. We find that the transition to an independent board also significantly reduces *DART* and *DAFWII*. Lastly, we use *TC* (Total Cases) as the dependent variable in Column (4). Since *TC* is a count variable, we estimate a Poisson regression at the establishment level. In Column (4), we find that the coefficient of *Independent Board* is negative and statistically significant in this model as well.

8. Conclusion

Although the corporate governance reform in the early 2000s was hailed as a success in promoting shareholder interests, there is growing concern in recent years over the adverse externalities imposed on corporate stakeholders and the society by the promotion of shareholder primacy. Reforms which would expand the duty of directors to non-shareholder stakeholders are being intensely debated among academics and seriously considered by legislators. Given the profound consequences that such reforms can have on the survival of capitalism, it is important to understand the relation between shareholder primacy and its impacts on corporate stakeholders item by item before any change in corporate law is implemented. Otherwise, a hasty change in the law without a careful analysis of its unintended consequences may not only fail to enhance stakeholders' interests but also impair the interests of shareholders. In this paper, we contribute to such an understanding by carefully examining how an increase in the board's focus on increasing shareholder value affects an important employee sustainability issue: employee health and safety

at workplaces, whose importance to employees, companies, societies and the economy is made clear by the Covid-19 pandemic if not earlier.

Exploiting the exogenous increase in board independence in some U.S. public firms due to the passage of SOX and new exchange listing rules, we find that the transition to a majority independent board improves workplace safety. Consistent with the improvement in safety being driven by a reduction of managerial agency problems which we argue lead to under-supply of workplace safety in the first place, we find that the effect is stronger for firms with weaker board monitoring, facing less product market competition, and firms that are subject to more short-termism pressure. The effect is also more pronounced for firms with low union coverage and higher proportion of low skilled workers. We further find that independent boards achieve these improvements through at least three channels. They include stricter monitoring, an increase in safety inputs, and linking CEO compensation to safety metrics.

During the current Covid-19 pandemic, Covid-19 safety becomes a key workplace safety issue. Understanding the incentives of the board of directors to protect workers from the virus has important policy implications. Our results suggest that independent boards mandated by SOX and exchange listing rules have the desired incentives in place to protect workers from Covid-19 health risk. However, ensuring independence in fact rather than in appearance remains an important issue for regulators. For boards that are truly independent, regulators should pay more attention to issues related to information access rather than incentive alignment in protecting workers from the Covid-19 and future pandemics.

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Figure 1. Distribution of Establishment-Level Total Case Rate (TCR)

Panel A presents the distribution of total case rate (TCR) for each establishment-year observation in our sample for the period 1996–2008. TCR equals the equivalent number of workplace incidents in a year for an establishment with 100 full-time workers working 40 hours per week for 50 weeks in a year.
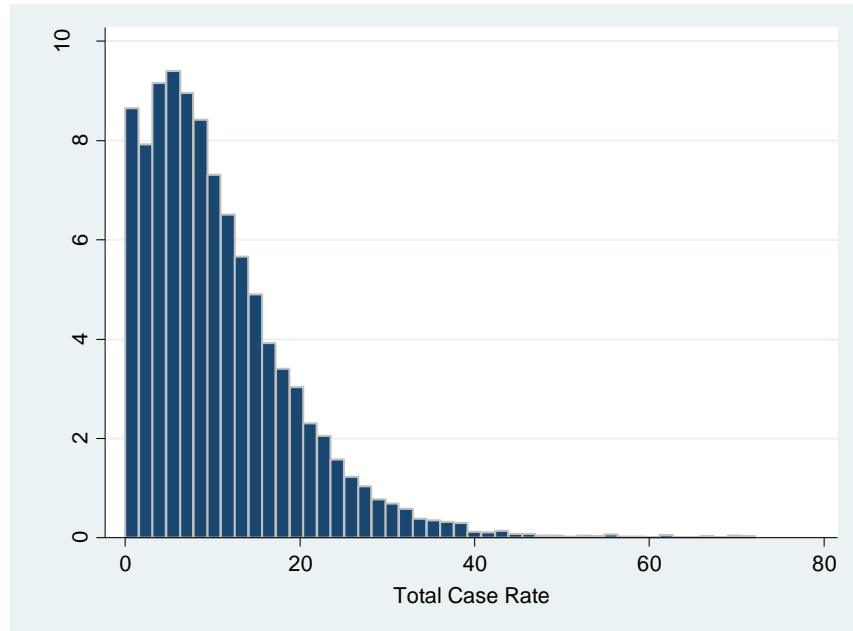
Panel B presents the distribution of average total case rate by Fama-French 48 industry codes for each establishment observation in our sample for the period 1996–2008.
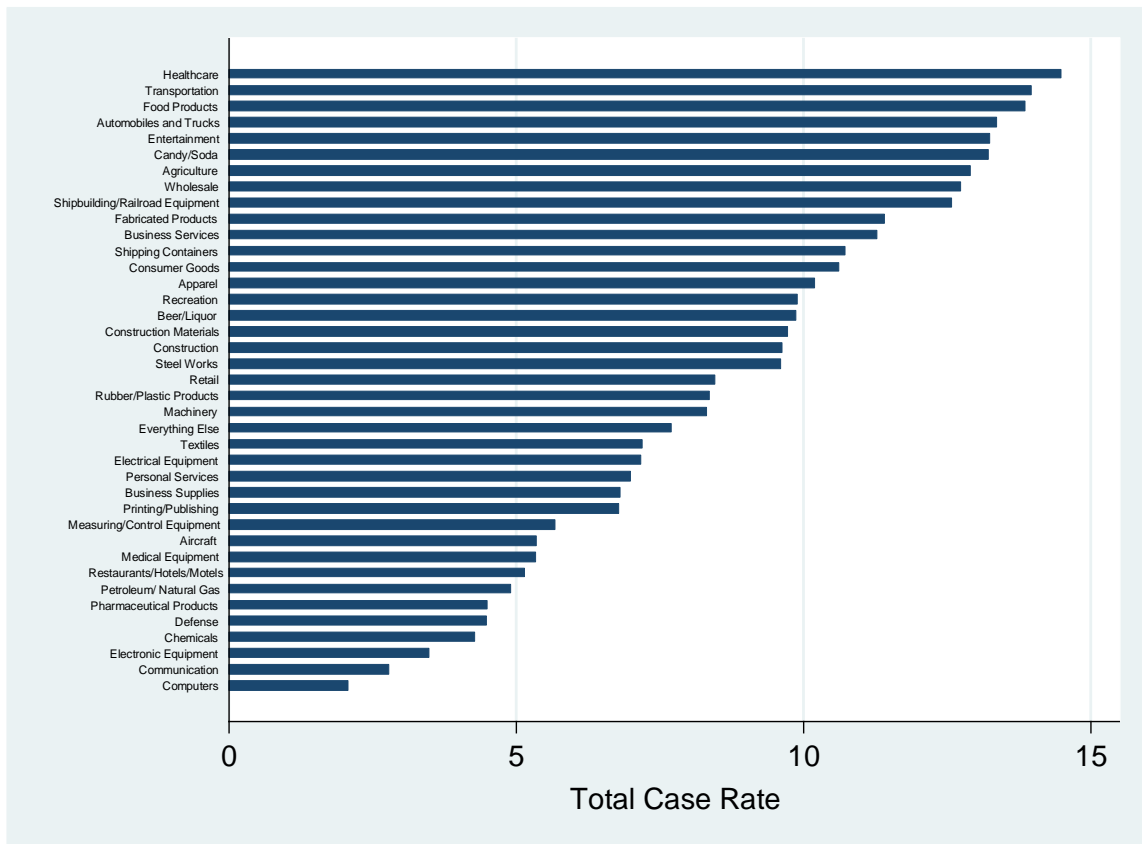
Figure 2. Distribution of Sample Establishments by Size and Industry

Panel A presents the distribution of establishments by the number of employees for each establishment observation in our sample for the period 1996–2008. Establishments are grouped into five bins by the number of employees: 1-50, 51-100, 101-250, 251-1000, and 1001+ employees, respectively.
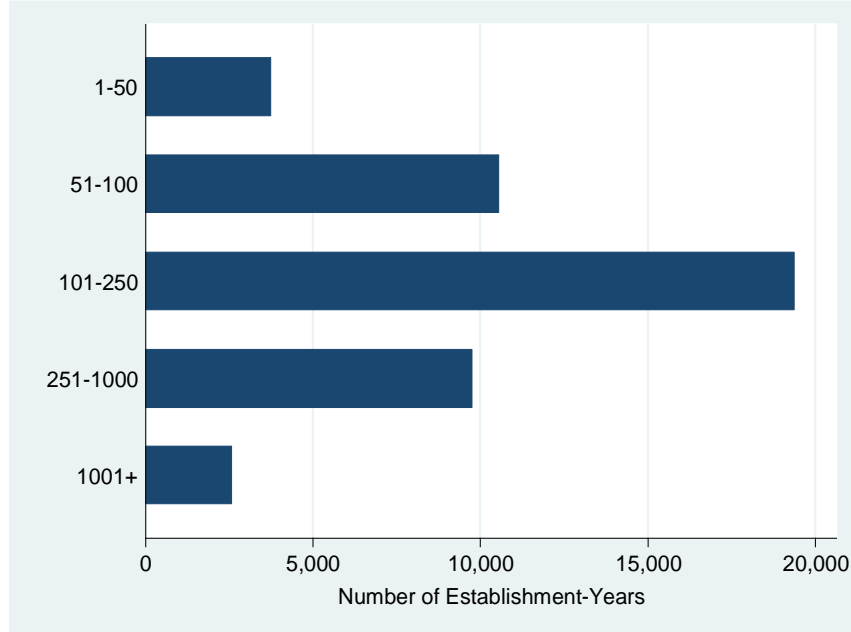
Panel B presents the distribution of establishments by Fama-French 48 industry codes for each establishment observation in our sample for the period 1996–2008.
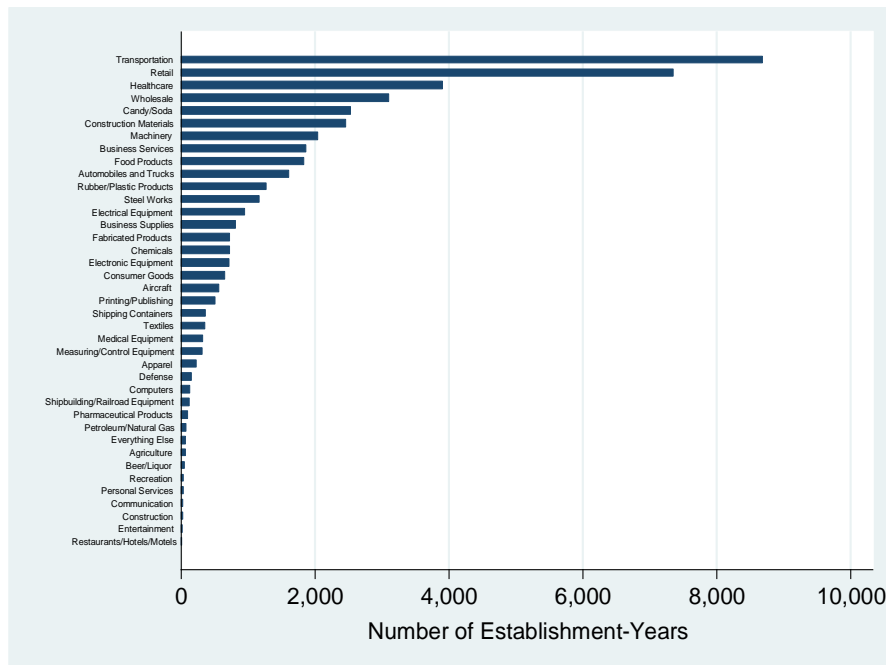
Figure 3. Dynamic Effects of Independent Board

This figure plots the dynamic effects of the 2003 NYSE and NASDAQ listing mandate on board independence on establishment incident rate around the exchange listing mandate from 1996 to 2008. The dashed line segments mark the 95% confidence intervals of estimated coefficients. Specifically, we estimate the following model:

$$TCR_{i,j,l,s,t} = \beta_0 + \sum_{n \in (-5-,-4) \cup (-2,+5+)} \beta_n * Independent\ Board_{j,2002+n} + \gamma F_{j,t} + \delta E_{i,t} + \theta_i + \mu_{lt} + \pi_{st} + \epsilon_{i,j,l,s,t}$$

Independent Board$_{j,2002+n}$ is an indicator variable that equals one for the n-th years relative to the earliest adoption of independent board in 2002 for noncompliant firm j. *Independent Board*$_{j,2002-3}$ is excluded so that all estimates are relative to three years before the treatment. $TCR_{i,j,l,s,t}$ is the total injury case rate for an establishment year; $F_{j,t}$ is a vector of firm control variables; $E_{i,t}$ is a vector of establishment control variables; θ_i is establishment fixed effects; μ_{lt} is the industry by year fixed effects; π_{st} is the establishment state by year fixed effects; and $\epsilon_{i,j,l,s,t}$ is the error term. Heteroscedasticity-robust standard errors are clustered at the establishment level.

Estimated Coefficients of Independent Board Dummies

Years to 2003 Board Independence Listing Mandate
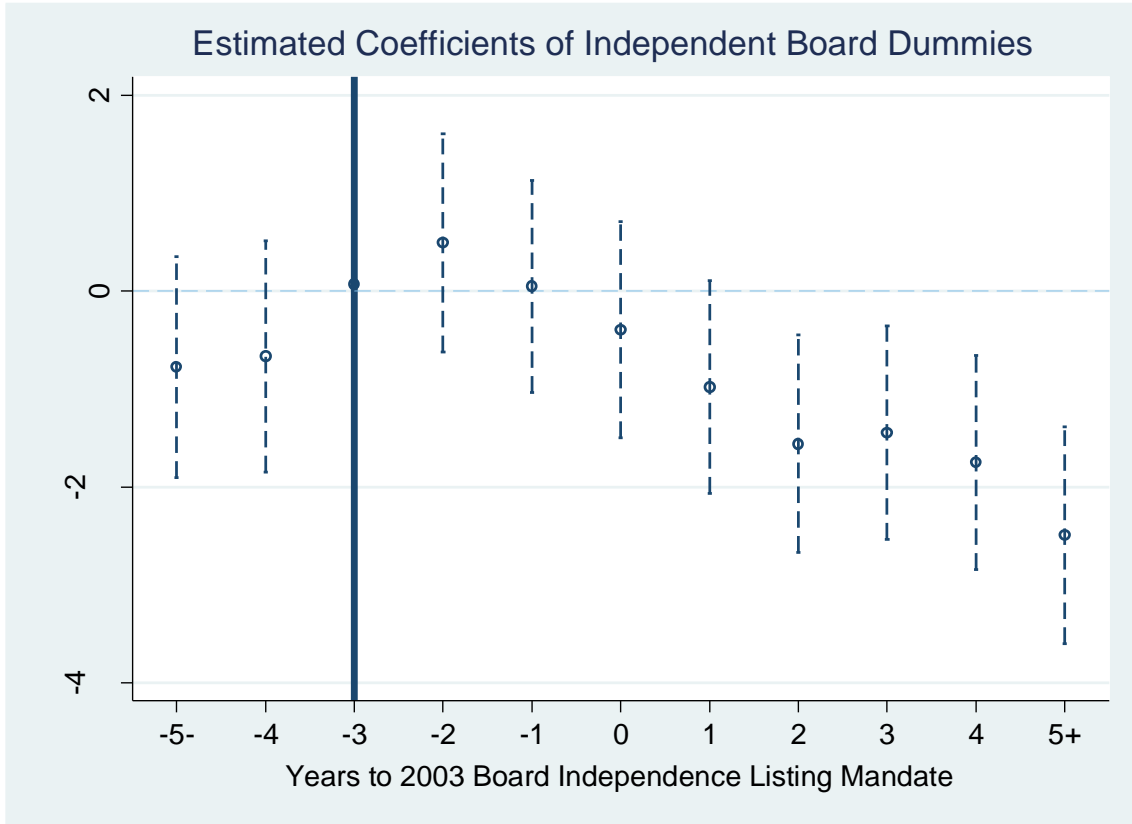
Table 1. Injuries and Illnesses by Cause and Nature

This table presents the distribution of injuries and illnesses in the U.S. private sector in 2011 by cause (Panel A) and nature (Panel B). The percentages are based on the workplace incident rate from the BLS at https://www.bls.gov/news.release/archives/osh2_11082012.pdf.

Panel A: Injuries and Illnesses by Cause	
Cause of Injury and Illness	Percent
Contact with objects	29.30
Fall on same level	19.83
Overexertion in lifting/lowering	14.81
Violence and other injuries by persons or animal	7.95
Transportation incidents	6.32
Fall to lower level	6.10
Exposure to harmful substances or environments	5.23
Slips or trips without fall	5.23
Repetitive motion	3.70
Fires and explosions	0.22
All other events	1.31

Panel B: Injuries and Illnesses by Nature	
Nature of Injury and Illness	Percent
Sprains, strains, tears	38.44
Soreness, pain, including back	12.55
Bruises, contusions	8.83
Fractures	7.88
Cuts, lacerations	6.84
Multiple traumatic injuries and disorders	3.72
Heat (thermal) burns	1.30
Carpal tunnel syndrome	0.87
Amputations	0.43
Chemical burns	0.35
Tendonitis (other or unspecified)	0.26
All other natures	18.53

Table 2. Summary Statistics

This table summarizes matched sample firms and variables used in the analysis for the period 1996–2008. Panel A compares the means of key characteristics for treatment and control firms, averaged over the years 2000 and 2001 after coarsened exact matching (CEM) based on two-digit SIC industry codes, the natural logarithm of total assets, Tobin's Q, and board size. Panel B reports the summary statistics of all establishments and their parent firms in our sample. All variables are defined in Table A1. All continuous variables are winsorized at 1% and 99%.

Panel A: CEM Matched Sample Firms: Treatment vs Control						
	Treatment Firms		Control Firms			
	N	Mean	N	Mean	Difference	Pr(|T| > |t|)
Ln(Assets)	114	7.261	350	7.514	0.253	0.106
Tobin's Q	114	1.951	350	1.966	0.016	0.913
Board Size	114	8.930	350	9.211	0.282	0.257
Cash/Assets	114	0.095	350	0.095	-0.001	0.950
Leverage	114	0.267	350	0.253	-0.013	0.445
ROA	114	0.177	350	0.169	-0.008	0.406
Panel B: Summary Statistics						
	N	Mean	S.D.	25%	Median	75%
Establishment Characteristics						
TCR	46005	10.924	8.897	4.583	8.929	15.043
DART	46005	6.820	6.167	2.131	5.262	9.831
DAFWII	46005	3.382	4.070	0.596	2.011	4.641
Number of Employees (000s)	46005	0.307	0.564	0.088	0.145	0.268
Ln(Number of Employee)	46005	2.220	0.424	1.944	2.161	2.428
Hours Per Employee (000s)	46005	1.913	0.329	1.710	1.970	2.096
Strike	46005	0.004	0.061	0.000	0.000	0.000
Shutdown	46005	0.061	0.240	0.000	0.000	0.000
Seasonal	46005	0.039	0.193	0.000	0.000	0.000
Disaster	46005	0.005	0.072	0.000	0.000	0.000
Firm Characteristics						
Ln(Assets)	3396	7.637	1.480	6.554	7.479	8.516
Cash/Assets	3396	0.053	0.040	0.017	0.045	0.087
Leverage	3396	0.239	0.153	0.132	0.234	0.338
PPE/Assets	3396	0.293	0.164	0.165	0.260	0.386
Sales/Assets	3396	1.163	0.463	0.828	1.082	1.533
CapEx/Assets	3396	0.059	0.046	0.027	0.045	0.075
Market-to-Book	3396	1.808	0.958	1.219	1.524	2.090
ROA	3396	0.166	0.085	0.109	0.157	0.213
R&D/Assets	3396	0.021	0.031	0.000	0.009	0.030
Dividends/Assets	3396	0.014	0.021	0.000	0.009	0.020
Acquisition/Assets	3396	0.043	0.106	0.000	0.001	0.033
Ln(CEO Compensation)	3396	7.956	1.033	7.212	7.928	8.636
Board Size	3064	9.643	2.266	8.000	9.000	11.000
Board Independence	3064	0.670	0.177	0.556	0.700	0.800

Table 3. Main Result: Board Independence and Workplace Safety

This table presents results from difference-in-difference regressions of establishment incident rate on the 2003 NYSE and NASDAQ listing mandate on board independence. The sample consists of all establishments of the matched treatment and control firms for the period 1996-2008. *Independent Board* is an indicator variable that equals one if a firm switches from a minority of independent board members to a majority of independent board members in 2003 or later, and zero otherwise. *TCR* is the number of injuries and illnesses over the number of hours worked by all employees at an establishment in a year and multiplied by 200,000. All variables are defined in Table A1. Heteroscedasticity-robust standard errors are clustered at the establishment level and are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	TCR			
	(1)	(2)	(3)	(4)
Independent Board	-1.640***	-1.654***	-1.643***	-1.627***
	(0.233)	(0.233)	(0.235)	(0.236)
Ln(Number of Employee)		-0.374	-0.305	-0.302
		(0.377)	(0.377)	(0.377)
Hours Per Employee		-0.003***	-0.003***	-0.003***
		(0.000)	(0.000)	(0.000)
Strike		2.990***	2.904***	2.901***
		(0.956)	(0.958)	(0.958)
Shutdown		0.052	0.002	0.001
		(0.159)	(0.160)	(0.160)
Seasonal		0.238	0.189	0.182
		(0.235)	(0.237)	(0.237)
Disaster		1.212**	1.174**	1.173**
		(0.588)	(0.592)	(0.592)
Ln(Assets)			-0.054	0.043
			(0.222)	(0.222)
Cash/Assets			2.984	2.632
			(1.919)	(1.902)
Leverage			1.984***	1.894**
			(0.751)	(0.749)
PPE/Assets			-1.986	-2.163*
			(1.246)	(1.240)
Sales/Assets			-0.542	-0.393
			(0.402)	(0.401)
CapEx/Assets			-2.151	-1.779
			(2.004)	(2.008)
Market-to-Book			-0.421***	-0.405***
			(0.106)	(0.107)
ROA			-3.392***	-3.756***
			(1.273)	(1.269)
R&D/Assets			-7.635	-7.405
			(6.219)	(6.216)
Dividends/Assets			1.497	1.867
			(2.065)	(2.071)
Acquisition/Assets			-0.900	-0.853
			(0.592)	(0.592)
Ln(CEO Compensation)			0.017	0.017
			(0.082)	(0.082)
Establishment FE	Y	Y	Y	Y
Industry × Year FE	Y	Y	Y	Y
State × Year FE	Y	Y	Y	Y
Pre-trend Control	N	N	N	Y
Adjusted R^2	0.558	0.565	0.567	0.567
Observations	46,005	46,005	46,005	46,005

Table 4. Monitoring and Workplace Safety

This table presents results from difference-in-difference regressions of establishment incident rate on the 2003 NYSE and NASDAQ listing mandate on board independence conditional on board monitoring intensity based on Equation (3). The sample consists of all establishments in the matched treatment and control firms for the period 1996-2008. *Independent Board* is an indicator that equals one if a firm switches from a minority of independent board members to a majority of independent board members in 2003 or later, and zero otherwise. *TCR* is the number of injuries and illnesses over the number of hours worked by all employees at an establishment in a year and multiplied by 200,000. *Meeting Frequency* is the number of board meetings. *Meeting Absence* is the percentage of independent board members missing more than 25% of annual board meetings. *Busy Board* is an indicator variable that equals one if at least half the directors serve on three or more boards. *Product Similarity* is a firm's products similarity index to those of the competitors (Hoberg and Phillips, 2016). All columns include the same control variables as Column (3) of Table 2. All variables are defined in Table A1. Heteroscedasticity-robust standard errors are clustered at the establishment level and are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	TCR			
Monitoring Variable	Meeting Frequency	Meeting Absence	Busy Board	Product Similarity
	(1)	(2)	(3)	(4)
Independent Board * Monitoring	0.193**	-5.660*	-3.418***	0.884***
	(0.096)	(2.956)	(1.022)	(0.207)
Independent Board	-0.963***	-1.375***	-0.830***	-0.909***
	(0.241)	(0.270)	(0.261)	(0.244)
Monitoring	-0.014	3.396***	-0.422	-0.115
	(0.035)	(1.159)	(0.325)	(0.090)
Controls	Y	Y	Y	Y
Establishment FE	Y	Y	Y	Y
Industry × Year FE	Y	Y	Y	Y
State × Year FE	Y	Y	Y	Y
Adjusted R^2	0.573	0.600	0.596	0.582
Observations	33,912	36,061	41,466	45,771

Table 5. Managerial Horizon and Workplace Safety

This table presents results from difference-in-difference regressions of establishment incident rate on the 2003 NYSE and NASDAQ exchange listing mandate on board independence conditional on managerial horizon based on Equation (3). The sample consists of all establishments belonging to firms in the matched sample of treatment and control firms over the period from 1996 to 2008. *Independent Board* is an indicator that equals one if a firm switches from a minority of independent board members to a majority of independent board members in 2003 or later, and zero otherwise. *TCR* is the number of injuries and illnesses over the number of hours worked by all employees at an establishment in a year and multiplied by 200,000. *Dedicated Ownership* is the number of shares held by dedicated institutional investors divided by the total number of shares outstanding. *High CEO PPS* is an indicator variable that equals one if CEO pay-performance sensitivity (delta) is above the top quartile of a year, and zero otherwise (Coles et al., 2006). *Positive Abnormal Accruals* is an indicator variable that equals one if a firm has positive abnormal accruals in a year, where abnormal accruals is computed based on the Modified-Jones Model. *Analyst Coverage* is the number of analyst earnings forecasts. *E Index* is an indicator variable that equals one if the number of six shareholder right provisions is above the top quartile of a year, and zero otherwise (Bebchuk et al., 2009). All columns include the same control variables as Column (3) of Table 1. All variables are defined in Table A2. Heteroscedasticity-robust standard errors are clustered at the establishment level and are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	TCR			
Horizon Variable	Dedicated Ownership	High CEO PPS	Analyst Coverage	Positive Abnormal Accruals
	(1)	(2)	(3)	(4)
Independent Board * Horizon	10.241**	-1.105**	-0.072**	-1.875***
	(4.175)	(0.500)	(0.036)	(0.469)
Independent Board	-1.712***	-0.549**	-1.117***	0.064
	(0.297)	(0.275)	(0.235)	(0.413)
Horizon	-0.275	0.244	0.031	0.375**
	(1.415)	(0.256)	(0.029)	(0.188)
Controls	Y	Y	Y	Y
Establishment FE	Y	Y	Y	Y
Industry × Year FE	Y	Y	Y	Y
State × Year FE	Y	Y	Y	Y
Adjusted R^2	0.601	0.579	0.592	0.583
Observations	34,778	39,955	40,860	45,958

Table 6. Union and Skilled Labor

This table presents results from difference-in-difference regressions of establishment incident rate on the 2003 NYSE and NASDAQ exchange listing mandate on board independence conditional on employee orientation, unionization, and skill. The sample consists of all establishments belonging to firms in the matched sample of treatment and control firms over the period from 1996 to 2008. *Independent Board* is an indicator that equals one if a firm switches from a minority of independent board members to a majority of independent board members in 2003 or later, and zero otherwise. *TCR* is the number of injuries and illnesses over the number of hours worked by all employees at an establishment in a year and multiplied by 200,000. *Constituency Statute* is an indicator variable that equals one if a firm is incorporated in a state with Constituency Statute. *Union Membership* is an indicator variable that equals one if an establishment is in an industry with union membership above the top quartile of a year, and zero otherwise. *Labor Skill* is the industry-level occupation-weighted average of required skills for an establishment *(Belo et al., 2019)*. All columns include the same control variables as Column (3) of Table 2. All variables are defined in Table A1. Heteroscedasticity-robust standard errors are clustered at the establishment level and are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	TCR	
Employee Variable	Union Membership	Labor Skill
	(1)	(2)
Independent Board * Employee	1.377**	9.100***
	(0.549)	(1.613)
Independent Board	-1.569***	-1.112***
	(0.260)	(0.239)
Employee	-0.387	2.804
	(0.291)	(1.820)
Controls	Y	Y
Establishment FE	Y	Y
Industry × Year FE	Y	Y
State × Year FE	Y	Y
Adjusted R^2	0.591	0.604
Observations	44,329	41,786

Table 7. Board Independence and Compliance with Safety Regulations

This table presents results from difference-in-difference regressions of OSHA safety inspection and violation fines on the 2003 NYSE and NASDAQ listing mandate on board independence. The sample consists of all establishments in the matched treatment and control firms for the period 1996-2008. *Independent Board* is an indicator that equals one if a firm switches from a minority of independent board members to a majority of independent board members in 2003 or later, and zero otherwise. *Violation* is an indicator variable that equals one if an establishment has any safety violations under OSHA inspection during the year, zero otherwise. *Serious Violation* is an indicator variable that equals one if an establishment has any fines-associated safety violations under OSHA inspection during the year, zero otherwise. All variables are defined in Table A1. Heteroscedasticity-robust standard errors are clustered at the establishment level and are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Violation (0/1)	Serious Violation (0/1)
	(1)	(2)
Independent Board	-0.187**	-0.167**
	(0.094)	(0.085)
Ln(Number of Employee)	0.009	0.012
	(0.012)	(0.011)
Unionized Establishment	-0.016	-0.012
	(0.063)	(0.059)
Ln(Assets)	0.199*	0.124
	(0.120)	(0.118)
Cash/Assets	-0.011	-0.213
	(0.475)	(0.523)
Leverage	0.875***	0.537*
	(0.288)	(0.315)
PPE/Assets	0.393	0.368
	(0.498)	(0.496)
Sales/Assets	0.358***	0.347***
	(0.128)	(0.123)
CapEx/Assets	0.320	-0.070
	(0.723)	(0.681)
Market-to-Book	0.013	0.028
	(0.075)	(0.072)
ROA	-0.258	-0.104
	(0.657)	(0.649)
R&D/Assets	-2.805	-0.640
	(3.561)	(3.171)
Dividends/Assets	3.785**	3.566**
	(1.745)	(1.705)
Acquisition/Assets	0.227	0.440
	(0.355)	(0.340)
Ln(CEO Compensation)	-0.012	-0.023
	(0.034)	(0.036)
Establishment FE	Y	Y
Industry × Year FE	Y	Y
State × Year FE	Y	Y
Adjusted R^2	0.156	0.146
Observations	3,111	3,111

Table 8. Channels: Safety Expenditure and CEO Compensation Contracting

This table presents results from difference-in-difference regressions of three channels through which the 2003 NYSE and NASDAQ exchange listing mandate on board independence affects workplace safety. The sample consists of all firms in the matched sample of treatment and control firms over the period from 1996 to 2008. *Independent Board* is an indicator that equals one if a firm switches from a minority of independent board members to a majority of independent board members in 2003 or later, and zero otherwise. *Abnormal SGA/Employee* is the residual from regressions of the SG&A expenses divided by the beginning number of employees [$xsga_t/emp_{t-1}$] on the beginning sales divided by the beginning number of employees [$sale_{t-1}/emp_{t-1}$] and inverse beginning number of employees [$1/emp_{t-1}$] for each year and 2-digit sic industry. *CEO Safety Metrics* is an indicator variable that equals one if a firm has at least one safety performance-based compensation award in its CEO compensation contract in a year and zero otherwise. All columns include the same firm-level control variables as Column (3) of Table 2. All variables are defined in Table A2. Heteroscedasticity-robust standard errors are clustered at the firm level and are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Abnormal SGA/Employee	CEO Safety Compensation
	(1)	(2)
Independent Board	5.695**	0.077**
	(2.880)	(0.037)
Controls	Y	Y
Firm FE	Y	Y
Year FE	Y	Y
Adjusted R^2	0.839	0.466
Observations	3,198	1,008

Table A1. Variable Definitions

Board Independence Mandate	
Independent Board	An indicator that equals one if a firm switches from a minority of independent board members to a majority of independent board members in 2003 or later, and zero otherwise.
Independent Audit (Nominating or Compensation) Committee	An indicator variable that equals one if a firm has switched to a majority of independent audit (nominating or compensation) committee members, and zero otherwise.

Establishment Characteristics	
TCR	The number of injuries and illnesses over the number of hours worked by all employees at an establishment in a year and multiplied by 200,000.
DART	The number of injuries and illnesses resulting in days away from work and with job restriction or transfer over the number of hours worked by all employees at an establishment in a year and multiplied by 200,000.
DAFWII	The number of injuries and illnesses resulting in days away from work over the number of hours worked by all employees at an establishment in a year and multiplied by 200,000.
Total Case	The number of injuries and illnesses at an establishment in a year.
Ln(Number of Employee)	The natural logarithm of total number of employees at an establishment.
Hours Per Employee	The number of total annual hours worked at an establishment divided by the number of employees
Ln(Hours/Employee)	The natural logarithm of total number of annual hours worked at an establishment divided by the number of employees.
Strike	An indicator variable that equals one if there was a strike/lockout in the establishment during the year and zero otherwise.
Shutdown	An indicator variable that equals one if there was a shutdown/layoff in the establishment during the year and zero otherwise.
Seasonal	An indicator variable that equals one if the establishment employs seasonal workers during the year and zero otherwise.
Disaster	An indicator variable that equals one if the establishment is affected by adverse weather conditions/natural disasters during the year and zero otherwise.
Union membership	The percentage of union membership in an establishment's industry.
Labor skill	The level of industry-level occupation-weighted average of required skills of an establishment.
Violation	An indicator variable that equals one if the establishment has any safety violations under OSHA inspection during the year and zero otherwise.
Serious Violation	An indicator variable that equals one if the establishment has any fines-associated safety violations under OSHA inspection during the year and zero otherwise.

Firm characteristics	
Ln(Assets)	The natural logarithm of book value of total assets.
Cash/Assets	The ratio of cash and short-term investment over total assets.
Leverage	The ratio of long-term and short-term debt over total assets.
PPE/Assets	The ratio of net property, plant, and equipment over total assets.
Sales/Assets	The ratio of total sales over total assets.
CapEx/Assets	The ratio of capital expenditures over total assets.
Market-to-Book	The ratio of market value of assets (the sum of market value of equity, book value of total liabilities, and liquidation value of preferred stock minus deferred tax liabilities) over book value of total assets.

Tobin's Q	The ratio of market value of assets (book value of total assets minus book value of equity minus deferred taxes plus market value of equity) over book value of total assets.
ROA	The ratio of a firm's operating income over lagged total assets.
R&D/Assets	The ratio of research and development spending over lagged total assets.
Dividends/Assets	The ratio of common dividends paid over lagged total assets.
Acquisition /Assets	The ratio of acquisition spending over lagged total assets.
Ln(CEO Compensation)	The natural logarithm of total CEO compensation.
Board Size	The number of directors in a board.
Busy Board	An indicator variable that equals one if at least half the directors serve on three or more boards.
Board Independence	The percentage of independent directors in a board.
CEO Tenure	The number of years in which CEOs stay in their current positions.
CEO Voting	The percentage of CEO voting rights in a firm.
Institutional Ownership	The percentage of institutional holding in a firm.
KLD Governance Index	The normalized net governance score (normalized governance strength score minus normalized governance concern score) under the category of "Corporate Governance" of MCSI KLD CSR data.
E Index	The number of six shareholder rights provisions: classified board, poison pill, golden parachute, supermajority requirements for mergers, limits to bylaw amendments, limits to charter amendments (Bebchuk, Cohen, and Ferrell, 2009).
Meeting Frequency	The number of board meeting in a firm.
Meeting Absence	The percentage of board members missing more than 25% of annual board meetings.
Product Similarity	The level of product similarity index of a firm to those of the competitors, defined in Hoberg and Phillips (2016).
Dedicated Ownership	The number of shares held by dedicated institutional investors divided by the total number of shares outstanding.
CEO Pay-Performance Sensitivity	The change in the dollar value of the CEO's wealth for a one percentage point change in stock price. The data is from Lalitha Naveen's website.
Positive Abnormal Accruals	An indicator variable that equals one if a firm has positive abnormal accruals in a year. Abnormal accruals is computed based on Compustat data and the Modified-Jones Model: Total annual accruals [$ta=(oancf-ibc)/at_{t-1}$, are regressed on the change in cash sales [$((sale-sale_{t-1})-(rect-rect_{t-1}))/at_{t-1}$], tangible assets [$ppent/at_{t-1}$], and inverse assets [$1/at_{t-1}$] for each year and 2-digit sic industry. The residual is the abnormal accrual.
Analyst Coverage	The number of analyst earnings forecasts for a firm.
Abnormal SGA/Employee	The residual from regressions of the SG&A expenses divided by the beginning number of employees [$xsga_t/emp_{t-1}$] on the beginning sales divided by the beginning number of employees [$sale_{t-1}/emp_{t-1}$] and inverse beginning number of employees [$1/emp_{t-1}$] for each year and 2-digit sic industry, based on Roychowdhury (2006).
KLD Employee Index	The normalized net employee treatment score (normalized employee strength score minus normalized employee concern score) under the category of "Employee Relation" of MCSI KLD CSR data.
CEO Safety Compensation	An indicator variable that equals one if a firm has at least one safety performance-based compensation award in its CEO compensation contract in a year and zero otherwise.

Table A2. Dynamic Effects of Independent Board

This table presents results from dynamic difference-in-difference regressions of establishment incident rate on the 2003 NYSE and NASDAQ listing mandate on board independence controlling for other governance characteristics. The sample consists of all establishments in the matched treatment and control firms for the period 1996-2008. *Independent Board$_n$* is an indicator variable that equals one for the *n*-th years relative to noncompliant firms switch from a minority of independent board members to a majority of independent board members in 2002, and zero otherwise. For instance, *Independent Board$_{-4}$* equals one for the year that is four years before noncompliant firms start to switch from a minority of independent board members to a majority of independent board members in 2002, and zero otherwise. *Independent Board$_{+5+}$* equals one for the years that are five years and later after noncompliant firms start to switch from a minority of independent board members to a majority of independent board members in 2002, and zero otherwise. *Independent Board$_{-3}$* is excluded so that all estimates are relative to three years before the treatment. *TCR* is the number of injuries and illnesses over the number of hours worked by all employees at an establishment in a year and multiplied by 200,000. Column (2) includes the same control variables as Column (3) of Table 2. All variables are defined in Table A2. Heteroscedasticity-robust standard errors are clustered at the establishment level and are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	TCR	
	(1)	(2)
Independent Board -5-	-0.855	-0.776
	(0.588)	(0.576)
Independent Board -4	-0.614	-0.666
	(0.618)	(0.603)
Independent Board -2	0.236	0.489
	(0.577)	(0.568)
Independent Board -1	-0.205	0.047
	(0.560)	(0.552)
Independent Board 0	-0.676	-0.397
	(0.571)	(0.563)
Independent Board +1	-1.297**	-0.978*
	(0.559)	(0.553)
Independent Board +2	-1.727***	-1.559***
	(0.572)	(0.567)
Independent Board +3	-1.597***	-1.446***
	(0.559)	(0.556)
Independent Board +4	-2.019***	-1.753***
	(0.562)	(0.558)
Independent Board +5+	-2.760***	-2.492***
	(0.573)	(0.566)
Controls	N	Y
Establishment FE	Y	Y
Industry × Year FE	Y	Y
State × Year FE	Y	Y
Adjusted R^2	0.574	0.582
Observations	46,005	46,005

Table A3. Alternative Matching Method, Injury Measure, and Model

This table presents robustness checks from difference-in-difference regressions of establishment injury rate on the 2003 NYSE and NASDAQ listing mandate on board independence using alternative matching method, injury measure, and estimation model. The sample consists of all establishments in the matched treatment and control firms for the period 1996-2008. *Independent Board* is an indicator variable that equals one if a firm switches from a minority of independent board members to a majority of independent board members in 2003 or later, and zero otherwise. *TCR* is the number of injuries and illnesses over the number of hours worked by all employees at an establishment in a year and multiplied by 200,000. *DART* is the number of injuries and illnesses with days away from work and with job restriction or transfer divided by the number of hours worked by all employees at an establishment in a year and multiplied by 200,000. *DAFWII* is the number of injuries and illnesses with days away from work divided by the number of hours worked by all employees at an establishment in a year and multiplied by 200,000. *Total Case* is the number of total injuries and illnesses at an establishment in a year. Column (1) uses the nearest neighbor propensity score matched sample. Columns (2)-(3) use DART and DAFWII as injury measures. Columns (4) estimates a Poisson model with high-dimensional fixed effects. All columns include the same control variables as Column (3) of Table 2. All variables are defined in the Table A2. Heteroscedasticity-robust standard errors are clustered at the establishment level and are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Alternative Matching	Alternative Measure		Alternative Model
Dependent Variable	TCR	DART	DAFWII	Total Case
	(1)	(2)	(3)	(4)
Independent Board	-2.377***	-1.087***	-1.214***	-0.059***
	(0.368)	(0.160)	(0.114)	(0.023)
Model	OLS	OLS	OLS	Poisson
Controls	Y	Y	Y	Y
Establishment FE	Y	Y	Y	Y
Industry × Year FE	Y	Y	Y	Y
State × Year FE	Y	Y	Y	Y
Adjusted (Pseudo) R^2	0.427	0.551	0.523	0.891
Observations	18,453	46,005	46,005	45,682