Safety First! Overconfident CEOs and Reduced Workplace Accidents[1]

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First Version: January 2018

This version: September 2021

[1] Suman Banerjee gratefully acknowledges Summer Research Grant 2019 from Stevens Institute of Technology. We thank the conference participants at the Financial Management Association Annual Meeting (2020). We would also to like to thank the seminar participants at Stevens Institute Technology. We also thank Lingling Wang (FMA discussant). The usual disclaimer applies.

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Abstract

Prior literature posits that overconfident CEOs overinvest in R&D and capital expenditure. We hypothesize that this overinvestment might have a positive externality in form of improved workplace safety. The results are strongly supportive: firms with overconfident CEOs experience significantly fewer industrial accidents. This is most pronounced in cash and capital constrained firms, where overconfident CEOs are more likely to continue to invest than are other firms notwithstanding the constraints. Regulations that blunted overconfident CEOs' investments reduced the impact of overconfident CEOs on accidents. We ensure that our results are robust to alternative definitions of CEO overconfidence and different model specifications.

Keywords: Industrial Accidents; CEO Overconfidence; Corporate investment; Employees' Safety, OH&S

JEL classification: G14, G31, G32

Safety First! Overconfident CEOs and improved corporate workplace safety

1 Introduction

Workplace safety can provide a sustainable competitive advantage in the form of improved morale and reduced employee turnover. This might result in higher productivity leading to an increase in the firm value over the long run. Worker safety has also attracted increased regulatory scrutiny and attention from ESG-focused funds. However, some CEOs might under-invest in such long-term initiatives due to well-documented managerial myopia and a focus on the firm's short-term share price (Stein, 1988, 1989).[2] By contrast, overconfident CEOs tend to overinvest, often overestimating the returns, and underestimating the financial risks of those investments (Malmendier and Tate, 2005, 2008). One might wonder if overconfident CEOs' increased risk taking might put the firm at risk (Cheng et al., 2020). However, the mechanism of action through which overconfident CEOs increase financial risk is often through excess investment in emerging areas PP&E. Thus, overconfident CEOs' overinvestments might inadvertently modernize machinery and drive newer and safer production techniques. We test whether overconfident CEOs' overinvestments have the unintended benefit of reducing workplace accidents.

Workplace health and safety is economically important. In the United States, the National Safety Council (NSC) indicates that total economic cost of workplace injuries is at least USD 170 billion in 2018, with 103 million worker-days of lost productivity in total (National Safety Council,

[2] Goyal and Low (2019) show that investor myopia has resulted in a significant increase in the forced CEO turnover and the average CEO tenure has been declining over years. This has resulted in an increase in the CEO myopism.

2019). They also indicate that the average workers compensation cost is at least USD 40,000. This is not isolated to the United States. For example, the Australian Government indicates that workplace accidents could cost at least 4% of GDP (Safe Work Australia, 2015). These figures imply that workplace accidents are costly to both businesses and to society.

Underinvestment contributes to workplace accidents. The firm's organization climate is a key factor in a firm's accident frequency and severity (Hofmann et al., 2017). Firms can reduce accidents by incorporating new technologies and workplace practices, and by avoiding machinery failure (Hakkinen and Silvennoinen, 1998).[3] Underinvestment can involve investing too little in CAPEX, thereby allowing machinery to wear out and become unsafe. Further, accidents can increase when firms underinvest in research into developing better protocols, methods, and machinery. In part, this could be due to managers' perceived desire to cost cut and/or their feeling they would not achieve a return on such investments. For example, highly levered firms tend to invest less in workplace safety programs (Moussu and Ohana, 2016). In part, it could be due to a believe that such investments might improve staff quality, thereby providing staff with the skills and wherewithal to leave the firm (Greer and Fannion, 2014). By contrast, firms that invest more in workplace renewal tend to experience fewer accidents.

Overconfident CEOs often overinvest, but this could inadvertently result in workplace renewal and improved safety practices. Prior studies have indicated that overconfident CEOs tend to spend more on CAPEX (Malmendier and Tate, 2005) and R&D (Galasso and Simcoe, 2011; Hirshleifer et al., 2012) . This is associated with a growth in PP&E and assets (Banerjee et al., 2015). Such over-investment can sometimes reduce shareholder wealth. For example,

[3] There are myriad specific examples. For example, Kadlec et al (1998) show that investing in improved truck axles can reduce axle failure, which helps improve workplace safety.

overconfident CEOs' takeovers tend to create less value (Kolasinski and Li, 2013; Malmendier and Tate, 2008). While it is possible that overconfident CEOs might take more risk, the actual mechanism of action through which this occurs is through excess investment in nascent areas and in new production. Thus, investing in new property plant and equipment and R&D can help to replace old machinery and practices with new, thereby reducing the risk of accidents due to poor maintenance, and replacing machinery with new protocols with improved safety precautions.

We test the hypothesis that overconfident CEOs are associated with fewer workplace accidents than are other CEOs. We collect data on industry accidents and CEO characteristics from 1992-2015. In our sample, nearly 22% of firms have an industry accident each year, highlighting that workplace accidents are a key concern for a plurality of companies. We focus on an option-based measure of overconfidence, as has been widely used in the literature. However, we ensure that the results are robust to alternative measures of CEO overconfidence.

We start by exploring the relationship between CEO overconfidence and the number of accidents that firms experience. We find that overconfidence is negatively and statistically significantly associated with accidents, even after controlling for myriad firm and executive characteristics that might otherwise be associated with accidents. This effect is also economically significant; a one standard deviation increase in CEO confidence is associated with a 2.1 percentage point reduction in the number of accidents per year.

We next explore whether this is associated with overconfident CEOs' propensity to [over]invest. We do this by analyzing how CEOs behave under capital constraints. When there are capital constraints, CEOs might be less likely to continue CAPEX and R&D that might otherwise reduce workplace accidents. However, overconfident CEOs are more likely to continue to invest even when internal funds are constrained, or when borrowing is constrained. Thus, we hypothesize and show that overconfident CEOs' impact on accidents is mainly in the set of financially constrained firms. This is economically significant, with overconfident CEOs being associated with a 14 percentage point reduction in the number of accidents for firms with internal capital constraints, and a 19 percentage point reduction for those with borrowing constraints. This result also helps to explain the interesting finding in prior literature that overconfident CEOs can increase the value of cash holdings in capital constrained firms (Aktas et al., 2019).

We then explore the environments in which overconfident CEOs have the greatest impact. We find that overconfident CEOs' effect is most felt in accident prone industries, where their greater investment in CAPEX and R&D would logically have the greatest effect. Further, overconfident CEOs have a significantly greater impact in states with relatively lax labor laws as compared to those with relatively strict labor laws. This implies that in states with strict labor laws, all CEOs are forced to invest more in worker safety. However, in states with weaker labor laws, where CEOs might otherwise underinvest, overconfident CEOs' investment activities have the greatest impact.

We next examine the impact of the Sarbanes-Oxley Act of 2002, which involved a quasi-exogenous shock to corporate governance. SOX improved corporate governance and increased corporate oversight. Prior studies indicate that this reduced overconfident CEOs' investment activities (Banerjee et al, 2015). SOX also provides a natural experiment with which we can ensure that our results are causal and are well identified. We highlight that SOX muted the impact of overconfident CEOs on accident likelihood, consistent with SOX reducing overconfident CEOs' spending. Further, this effect concentrates in the set of firms that had not complied with SOX's regulatory requirements prior to its passage. However, we also find that for a sub-set of firms – those with borrowing constraints and in states with weak labor laws – overconfident CEOs are still associated with fewer accidents even after SOX. This is consistent with the idea that SOX reduced, but did not eliminate, overconfident CEOs' investment activities. Thus, the investment activities become most poignant in the industries and firms that were especially prone to underinvest.

Furthermore, using three different tests for mediation (Sobel, 1990; Aroian, 1968; and Goodman, 1960), our results document that the overconfident CEO's overinvestment in R&D and CAPEX serves as a channel through which CEO overconfidence reduces the number of industrial accidents. The increase in R&D and CAPEX increases a firm's investment in developing new business methods or new technologies and upkeep of existing of existing PP&E, which might result in a reduction in the number of accidents.

We take steps to ensure that the results are robust to model specification and causality issues. As indicated, we use SOX as a quasi-natural experiment to analyze how an exogenous change in behavior influences overconfident CEOs' behavior relative to other CEOs. Additionally, we highlight that the impact of overconfident CEOs varies with state-based labor laws, adding additional strength to the results' identification. We also find that replacing a non-overconfident CEO with an overconfident CEO is associated with a reduction in accidents. The results are also robust to propensity score matching approaches. Furthermore, we ensure that the results are robust to multiple different measures of CEO overconfidence.

The results make a significant contribution to the literature. We contribute to the literature on workplace health and safety. Workplace accidents are costly to employees, business, and the economy. Therefore, it is important to understand which CEO characteristics are associated with lower accident propensity, and the circumstances in which that manifests. We illustrate one such characteristic: CEO overconfidence. While overconfident CEOs can have some downsides, the results imply they could be beneficial with respect to corporate accidents. This indicates that firms might seek to leverage the benefits of overconfident CEOs, while potentially mitigating the downsides (such as overinvestment) through improved corporate governance.

We add to the research on CEO overconfidence. Most prior studies focus on the disbenefits of overconfident CEOs. For example, prior studies indicate that overconfident CEOs might overinvest in CAPEX (Malmendier and Tate, 2005) and takeovers (Malmendier and Tate, 2008, Kolasinski and Li, 2013). In turn, this might encourage overconfident CEOs to indulge in poor reporting practices (Ahmed and Duellman, 2013; Schrand and Zechman, 2012), which can also increase litigation risk (Banerjee et al., 2018a). However, outside the area of R&D and innovation (see e.g., Galasso and Simcoe, 2011; Hirshleifer et al, 2012), relatively few studies have analyzed whether overconfident CEOs might generate positive externalities. By contrast, we analyze whether overconfident CEOs' investment propensity could have positive side-effects. We highlight that such investment can indirectly lead to property renewal and replacement, thereby improving workplace safety and reducing accidents.

2 Hypotheses

Overconfident CEOs overestimate payoffs and underestimate risks. At first glance, this suggests that overconfident CEOs might under-invest in safety due to an erroneous perception that accidents are unlikely to occur. However, on the other hand, overconfident CEOs tend to overinvest. This is because overconfident CEOs overestimate investments' payoffs and underestimate their economic risks. Thus, they overestimate projects' NPVs. Therefore, firms with overconfident CEOs often exhibit higher CAPEX (Malmendier and Tate, 2005), R&D (Galasso and Simcoe, 2011; Hirshleifer et al., 2012), and takeover activity (Malmendier and Tate, 2008).

This also skews overconfident CEOs' payout policies (Banerjee et al., 2018b; Deshmukh et al., 2013). However, this implies that overconfident CEOs are more likely to invest in renewing, replacing, and expanding property, plant, and equipment, and in relevant R&D.

Overinvestment could have some positives when it comes to accidents. Machinery obsolescence can increase accident risk. This is because older machinery tends to fail more, putting workers at risk. Further, newer machinery tends to incorporate more modern safety protocols, which themselves are associated with lower accident risk (see e.g., Barlas and Izci, 2018). Relatedly, research can help to reduce accidents by, for example, using more technology to reduce employee risks (see e.g., Nedel et al., 2016). For example, a combination of research and PP&E expenditure can help reduce accident risk by improving plant layouts (Alves et al., 2016), and replacing ageing machinery with new equipment, which is generally safer. Further, avoiding cost-cutting helps to ensure there are adequate resources to upgrade and maintain equipment. Firms can also reduce accidents through internal R&D expenditure, which can help the firm to modernize procedures. Given that overconfident CEOs are more likely to overinvest, and to maintain high levels of CAPEX and R&D, we would therefore expect overconfident CEOs' firms to have fewer accidents. We also anticipate that this effect would be stronger in 'accident prone' industries, in which the relative benefits of such investment would be greater.

Hypothesis 1a*: Overconfident CEOs' firms have fewer accidents*

Hypothesis 1b*: The impact of overconfident CEOs on accidents is stronger in accident prone industries.*

We further expect that overconfidence will have a greater impact in areas with relatively weaker accident oversight. Accident oversight can come from several sources. Strict labor laws can force firms to reduce accidents. Labor laws differ across states in the US. Thus, we would expect that states with relatively more strict labor laws would have fewer accidents. However, this would also reduce the relative impact of overconfidence. This is because in strict law states, all firms would need to raise labor standards, potentially drawing them closer in effect to firms run by overconfident CEOs.

Unionization could also moderate the impact of overconfidence on accidents. Unions could arguably push for higher safety standards. This could reduce accident risk. Indeed, prior literature finds that firms with a higher degree of unionization have fewer accidents (Donado and Wa''Ide, 2012; Weil, 1992). We expect that unionization would push non-overconfident CEOs closer towards overconfident CEOs. However, because overconfident CEOs would already have inadvertently improved safety standards, we would expect unions to impact them relatively less. Thus, we make the following predictions.

Hypothesis 2a*: Strict labor laws reduce the relative impact of overconfidence on accident likelihood.*

Hypothesis 2b*: Unionization reduces the relative impact of overconfidence on accident likelihood.*

We expect the relative impact of overconfidence to be greater in cash constrained firms as compared with relatively unconstrained firms. On average, expenditure is lower at firms with lower free cash flows (cf. Jensen, 1986), or cash holdings (cf. Harford, 1999). Thus, overconfident

CEOs unsurprisingly maintain higher levels of cash, likely in order to facilitate investment (Chen et al., 2020), and have a lower speed of adjustment of cash holdings (El Kalak et al., 2020). However, not all firms run by overconfident CEOs can maintain excess cash holdings. However, whereas capital constraints might reduce expenditure for non-overconfident CEOs, we expect that overconfident CEOs would maintain high levels of expenditure even at lower levels of cash holdings. This is because overconfident CEOs invest more than other CEOs, they have a more positive believe about the value of future investments, and perceive those investments to be less risky. Therefore, we expect the difference between overconfident and non-overconfident CEOs to be more pronounced in cash constrained firms (i.e., non-overconfident CEOs reduce investment at a greater rate than do overconfident CEOs). Therefore, we expect the impact of overconfident CEOs (relative to non-overconfident CEOs) on workplace accidents to be greater in cash constrained firms.

Hypothesis 3*: Overconfidence has a greater impact in cash constrained firms*

We further expect that the impact of overconfident CEOs will be higher in firms with borrowing constraints. Firms that face borrowing constraints are less able to borrow to invest. However, as indicated above, overconfident CEOs have a more positive view about the payoffs to future investments. They also view those investments as less risky. This would encourage additional investment notwithstanding borrowing constraints. Consistent with this, overconfident CEOs appear more willing to use short term debt (Huang et al., 2016), and to accept restrictive covenants (Lin et al., Forthcoming). This can manifest in overconfident CEOs eschewing public bonds in favor of bank debt, which is often short term and covenant laden (Ge et al., 2020). Additionally, overconfident CEOs' . This implies that overconfident CEOs are more willing to continue to borrow to invest notwithstanding barriers to obtaining debt. Rather, overconfident CEOs will be more likely to accept covenants and shorter term debt in such circumstances in order to maintain investment. Therefore, we expect that overconfident CEOs' relative impact on workplace accidents is higher in firms with borrowing constraints.

Hypothesis 4*: Overconfidence has a greater impact in firms with borrowing constraints.*

The Sarbanes-Oxley Act of 2002, and the contemporaneous NYSE/NASDAQ listing rules (collectively, "SOX"), provide an exogenous shock that enables us to ensure that the results are well identified. The NYSE/NASDAQ listing rules required firms to have a majority independent board of directors. The Sarbanes-Oxley Act of 2002 required firms to (inter alia) have a fully independent audit committee and nominating committee (Coates, 2007; Guo and Masulis, 2015). Banerjee et al (2015) show that the increased oversight forces overconfident CEOs to reduce their CAPEX, asset growth, and PP&E growth. This effect concentrates in the firms that did not already exhibit the requisite board independence prior to SOX's passage. Therefore, we expect that SOX will reduce the impact of overconfident CEOs on firms' accident propensity.

Hypothesis 5*: The passage of SOX reduced the impact of overconfident CEO on industrial accidents.*

A natural outcome of reduction in industrial accidents or improved workplace safety is the increase in labor productivity and efficiency which should translate in higher firm value. Regulators provide estimates of the cost of workplace accidents. For example, the Queensland government indicates that costs can vary significantly between industries, with even minor injuries potentially costing over AUD 100,000 in the manufacturing industry in lost productivity; workplace accidents effectively cost businesses between 1 and 2 days of profit (WorkCover Queensland, 2019). Injury cost estimates vary by industry, and reporting organization, and can depend on whether they include both direct and indirect costs; however, the costs are generally significant.[4] Therefore, we expect that reducing workplace accidents will improve firm value, and that workplace accidents are negatively associated with firm value.

***Hypothesis 6** : The reduction in the industrial accidents increases firm value.*

3 Data and CEO overconfidence measures

We collect and compile data from several different databases. We download all of the CEO compensation data from January 1, 1992 through December 31, 2015 from Execucomp database. Excluding observations with missing data on essential components of CEO compensation reduces the sample size to approximately 23,000 firm-year observations. We compute the "CEO confidence" measure for this reduced sample, excluding cases where there is insufficient data to

[4] Myriad organizations indicate that workplace accidents are costly to employers (Centers for Disease Control and Prevention, 2016; Liberty Mutual, 2018; National Safety Council, 2017; O'Neill, 2014; Safe Work Australia, 2015; U.S. Chemical Safety and Hazard Investigation Board, 2017; WorkCover Queensland, 2019)

construct our option-based measure of overconfidence. We also use the Execucomp database to obtain the governance variables including CEO tenure, CEO age, the ratio of bonus-compensation to fixed-salary, and the CEO's percentage ownership. Next we download the annual firm-level variables required for our analysis from Compustat and firm and market returns from CRSP databases. The annual firm level accidents data is provided by the right to knowledge act.[5] Finally, we merge all the data to derive the final sample for analysis.

CEO confidence measures:

Following Malmendier and Tate (2005) and Banaerjee, Humphery-Jenner, and Nanda (2015), we construct a continuous "CEO confidence" variable, based on the CEO's option holdings. Since CEOs have a large part of their wealth tied to the company and their human capital is undiversified, a rational CEO would exercise options as soon as they vest. Hence, holding vested in-the-money options should represent CEO overconfidence. Using vested options data from Execucomp we construct the continuous confidence measure as follows:

$$Confidence_i = \frac{\text{unexercised exercisable options}_i}{\text{number of options}_i * Price_i}$$

where *unexercised exercisable options* is the total value of all unexercised exercisable options, *number of options* is the total number of unexercised exercisable options, and *Price* is the stock price at the end of the fiscal year as reported in Compustat database. The subscript *i* represents the fiscal year.

[5] The last year we could access the data was in 2015.

Confidence measures the extent to which the CEO retains in-the-money options that are vested. *Confidence* measure varies over time, consistent with the prior evidence that depending on the past experience and performance, overconfidence can vary over time (see e.g., Billett and Qian, 2008; Hilary and Menzly, 2006). Following Banaerjee, Humphery-Jenner, and Nanda (2015), we further ensure that the results are robust to using the indicator variable, *ConfidenceTop25* , that equals one if the CEO's confidence measure is in the top quartile of all firms in a given year.

We further compute the Holder67 measure from Malmendier et al (2011). This Holder67 measure is an indicator that equals one if the *Confidence* measure is at least 67% on at least two occasions, in which case Holder67 equals one from the first time on which *Confidence* is at least 67% and equals zero otherwise. Once a CEO is coded as 1 for this measures, (s)he remains in that group for the remaining sample period.

For robustness tests, we use CEO confidence measures based on newspaper reports (Hirshleifer et al., 2012, Banerjee et al., 2015). This measure analyzes whether the media perceives the CEO to be overconfident. This measure is provided by Banerjee et al. (2015) and is constructed by conducting a Factiva-search for news articles in the New York Times, Wall Street Journal, US Today, and Business Week that relate to the CEO of a given firm. The authors search for 'Confident' words ("confident", "optimistic", "positive", and the derivations thereof) and the 'NonConfident' words ("cautious", "pessimistic", and the converses of the 'Confident') words. Using the number of confident and non-confident words found, the authors construct a ConfidenceNews measure by subtracting the number of 'NonConfident' articles from the number of 'Confident' articles.

We report the sample composition by year in Table 1 and provide summary statistics in Table 2. The statistics in Table 1 indicate that while CEO overconfidence (as measured by

Confidence) varies across years, within year variation is relatively stable over time. This is consistent with the idea that CEO overconfidence is a behavioral trait (rather than a transient reflection of the corporation's position). The summary statistics in Table 2 provide some description of our sample and show that our sample, in general, is consistent with existing literature. Specifically, we find that the mean *Confidence* is 0.28. This is slightly lower than Banerjee et al. (2015) due to a declining trend in *Confidence* . We also find that on average there are 0.22 accidents per firm per year. The following sections use these data to conduct a multivariate analysis of effect of managerial overconfidence on industrial accidents.

4 Results

4.1 The impact of overconfident CEOs on workplace accidents

We begin by testing the hypothesis that overconfident CEOs' firms are more likely to have fewer industrial accidents. We do this by regressing the two core overconfidence measures onto measures for the number of accidents that a firm experiences in a given year. We control for additional factors that could influence the firm's accident likelihood. We also include industry x year effects in order to address the concern that some years, or industries, might be more accident prone. The OLS regression has the following form.

$$\text{Accidents}_{i,t} = \alpha + \beta \text{Overconfidence}_{i,t} + \sum_{j=1}^{N} x_{i,t}^{(j)} \theta^{(j)} + \varepsilon_{i,t} \tag{1}$$

Where, $\text{Accidents}_{i,t}$ denotes either the natural log of one plus the number of accidents the firm experiences in year t or the natural log of one plus the number of accidents scaled by the number of employees. $\text{Overconfidence}_{i,t}$ denotes either Holder67 or our continuous measure of CEO confidence, and $x_{i,t}^{(j)}$ denotes a set of control variables, including SIC two digit industry x year fixed effects. Standard errors are clustered by firm and year. We use three different definitions of CEO overconfidence, which are described in Appendix A.

The results are in Table 3 and are consistent with our hypotheses. Overconfidence is negatively and significantly related to industrial accidents. This is economically meaningful. Overconfident CEOs experience around 2.4% fewer industrial accidents and around 1.3% fewer accidents per employee. The results for the control variables are also consistent with expectations. For example, larger firms have more accidents in absolute terms , albeit not as a percentage of employees. R&D intensive firms have fewer accidents, consistent with them having less PP&E that would ordinarily attract an accident. Interestingly, longer tenured CEOs experience fewer accidents, potentially due to such CEOs becoming more familiar with their companies; and thus, becoming more cognizant of the impact of accidents and how to prevent them.

4.2 CEO overconfidence in accident prone vs non-accident prone industries

We next cross-validate our findings by exploring the types of firm in which overconfidence might influence accident likelihood. We hypothesize that overconfidence will be most impactful in accident prone industries, but will have relatively less impact on non-accident prone industries. This is because we anticipate that overconfident CEOs' over-spending might create PP&E renewal. But, this is only relevant if the firm is in an industry that might be susceptible to accidents. We anticipate this would have little impact in "safe" industries in which there are relatively few accidents.

The results are in Table 4 and are consistent with our hypotheses. Here, we split the sample into two sub-samples: firms in accident prone industries (Panel A) and those in non-accident prone industries (Panel B).[6] We find that overconfidence is negatively and significantly related to accident occurrence in the accident prone industries but not in the relatively save industries. Indeed, the impact of overconfidence is larger when focusing on the accident prone industries than when looking at the whole sample. In accident prone industries, overconfident CEOs have 4.4% fewer accidents overall and 2.17% fewer accidents as a percentage of employees.

4.3 CEO overconfidence, capital constraints and accidents

We expect that overconfidence will have the greatest impact on accidents in capital constrained firms. Without capital constraints, all CEOs can invest significant amounts in CAPEX and PP&E. Indeed, agency conflicts of excess free cash flow (Jensen, 1986) and excess cash holdings (Harford, 1999) are well documented. Thus, for firms without capital constraints, we would expect overconfidence to have a relatively lower impact on expenditure; and thus, a relatively smaller impact on accident incidence. By contrast, when there are capital constraints, we would expect overconfident CEOs to spend significantly more than their non-overconfident peers due to their tendency to overinvest. But, PP&E renewal is a key avenue through which firms might reduce accidents. Therefore, we would expect overconfident CEOs to reduce accidents more (relative to firms with non-overconfident CEOs) in capital constrained firms.

[6] Accident prone industries are those in Agriculture, Forestry, fishing, mining, construction, wholesale, business services and repairs, Manufacturing, Transportation, Communications, Electric, Gas, And Sanitary Services are accident prone industries.

We examine capital constraints in two ways. First, we look at cash constraints. This focuses on the idea that firms might finance some CAPEX and PP&E from cash holdings. We define a firm as having a high level of cash flow if its Free Cash Flow / Assets is in the top quartile, with other firms being relatively more cash constrained. Second, we look at credit constraints. This is because firms usually finance at least part of their activities with debt. We define a firm as having a "high" credit rating if its credit rating is *above* BBB and as having a low credit rating if it is below BBB (inclusive).

Table 5 explores how *cash* constraints influence the relative impact of CEO overconfidence. We split the sample into sub-samples of firms that are cash constrained (Panel A) and firms that are not cash constrained (Panel B). We find that overconfidence only reduces accidents in the cash constrained sub-sample. In the cash constrained sub-sample, overconfident CEOs reduce accidents by 2.89% and accidents as a percentage of employees by 1.69%. By contrast, overconfident CEOs do have statistically significantly different accident rates in non-constrained firms. This is unsurprising given that all CEOs can engage in significant CAPEX in the non-constrained firms.

In Table 5, we test the impact of cash constraint on the impact of CEO overconfidence on the number of accidents. We find that the negative relationship between CEO overconfidence and the number of accidents exists only for the cash constraint firms. With cash constraints, CEOs experience expenditure restrictions. However, overconfident CEOs tend to be more optimistic about future performance, so perceive cash constraints as less of a hindrance. Hence, even with the cash constraints, the overconfident CEOs continue to invest in capital expenditures, which results in a decline in the number of accidents. In cash rich firms the CEOs face lower expenditure restrictions and hence, there is no significant difference in the investment by overconfident CEOs and other CEOs.

We further explore the impact of capital constraints in Table 6 in which we split the sample by whether the firm had a high or low credit rating. Here, Panel A looks at firms that have a low credit rating (i.e., are relatively more capital constrained) and Panel B contains the sub-sample of firms with a high credit rating (i.e., that are relatively less capital constrained). We find that overconfident CEOs significantly reduce accidents in the capital constrained firms. However, this effect is weaker in firms with better credit ratings. While overconfident CEOs continue to reduce accidents in relatively unconstrained firms, the effect is smaller in magnitude.

4.4 Strict labor laws, overconfidence, and industrial accidents

We expect that overconfidence will have less of an impact in states with strict labor laws. In such states, all firms must spend more on safety and reduce accidents. This would reduce the relative benefits from having an overconfident CEO. We collect data on labor law rankings from the National Security Council. We define a firm as being in a strict law state if the state is in the top quartile.

We first explore the impact of being in a strict labor law state by interacting the strict law indicator with CEO overconfidence. We report these results in Table 7. Here, we find that firms in strict labor law states experience fewer accidents. This is unsurprising and is consistent with the purpose of those laws. Firms in strict labor law states experience around 2.1% fewer industrial accidents and around 1.49% fewer accidents as a proportion of employees. In these regressions, overconfidence remains negatively and significantly related to accident incidence. However, the interaction of overconfidence with the strict law indicator is statistically insignificant. This might be because overconfident CEOs continue to reduce accidents in strict law states. Alternatively, it could be because merely including an interaction does not allow the coefficients on all other variables to change between the strict-state and the non-strict-state subsamples. We address this by splitting the sample in to those subsamples.

Table 8 includes regressions that split the sample into sub-samples of weak labor law states (Pane A) and strict labor law states (Panel B). In this table, overconfidence is only negatively and significantly related to accidents in the weak law state, but is statistically insignificant in the strong law state. When considered in conjunction with Table 7, this suggests that overconfident CEOs might have more impact in weak labor law states and it can be important to let the coefficients on the other regressors vary between subsamples. These results further buttress the argument that overconfident CEOs reduce industrial accident incidence.

4.5 Overconfidence, unionization, and accidents

We anticipate that overconfidence will have a relatively weaker impact in highly unionized states. This is because a high degree of unionization might force firms to improve labor standards. Thus, the relative impact of having an overconfident CEO who might otherwise [over]spend is relatively less. Thus, we interact the high unionization indicator with the overconfidence measures. We obtain unionization data from the Bureau of Labor Statistics. This data is available for year 2000 onwards. We define a firm as being in a high unionization state-industry pair if its state-industry's unionization is in the top quartile for that year.

The results are in Table 9 and are consistent with expectations. Unionization reduces industrial accidents in our sample. Firms in a more unionize state exhibit a 4.8% lower number of accidents and a 1.28% lower number of accidents per employee. However, unionization offsets the impact of overconfidence. Overconfidence per se is negatively related to accidents (as before). However, the interaction of overconfidence with the high unionization indicator is positive and significant and offsets the per se impact of overconfidence. This suggests that either unionization forces non-overconfident CEOs to spend in a manner that brings their accident rate lower.

4.6 Post-SOX results

We ensure that the results are robust to looking at the results after the Sarbanes-Oxley Act. Prior literature indicates that overconfident CEOs significantly reduced their [over]spending after SOX (Banerjee et al., 2015). However, we hypothesize that this overspending helped to reduce accidents through PP&E renewal. Thus, we check whether the results hold after SOX.

While we find that the effect weakens in the full sample but holds in sub-samples where any continued [over]spending might be especially beneficial. We explore this in Table 10. Here, we only include observations from after SOX. In these regressions, we include the overconfidence variables and their interactions with the "accident prone" industry indicator (Panel A) and the strict labor law indictor (Panel B).

We find that after SOX, overconfidence has a significantly weaker impact on accidents in the average firm. However, two other factors are relevant: First, from Panel A, overconfidence remains negatively and significantly related to accidents in accident prone industries. This suggests that while overconfident CEOs' expenditure reduces after SOX, it remains sufficient to reduce accidents in accident-prone industries. Second, from Panel B, we find that overconfidence continues to reduce accidents in weak labor law. Here, the strict labor law indicator remains negatively related to accidents. The interaction between the overconfidence variables and the strict law indicator is mostly statistically insignificant. However, overconfidence by itself remains negatively and significantly related to accidents. This implies that overconfidence remains negatively and significantly related to accidents in weak labor law industries (i.e., due to the sign and significance on the overconfidence variables by themselves).

The results here overall suggest that SOX weakens the impact of overconfidence. But, overconfidence remains negatively related to accidents in the specific industries that would otherwise have been more prone to accidents occurring.

4.7 Overconfident CEO reduces accidents by overspending in R&D and Cap expenditure

Our results thus far document that the CEO overconfidence is negative related to the industrial accidents. We also present supporting evidence that the excessive spending by the overconfident CEOs might cause this negative relationship. In this section we test whether the excessive spending by the overconfident CEOs in R&D and Capital expenditures (CapEx) results in lower accidents. Increase in R&D and CapEx has been related to increase in innovation that can improve the overall work environment in the firm (Hirshleifer, Low, and Teoh, 2012) projects. Among other things, R&D and CapEx help developing new business methods or new technologies, which might improve the efficiency and safety of the labor, resulting in a reduction in the number of accidents. To derive the results presented in Panels A and B of Table 6, we create two dummy variables: Lowrd, which takes the value 1 for R&D expense below the median, 0 otherwise; Lowcapx, which takes the value 1 for CapEx below the median, 0 otherwise. The positive and significant coefficient for the interaction between Lowrd and the three measures of CEO overconfidence in Panel A of Table 6 suggest that the ability of overconfident CEOs to reduce industrial accidents is significantly curtailed as the firm reduces their R&D expense. We find similar results for CapEx in Panel C.

Table 6, Panels B and D formally tests whether R&D and CapEx serve as a channel through which CEO overconfidence impacts the number of industrial accidents. We use three different tests of mediation: Sobel (1982), Aroian (1968), and Goodman (1960), which confirm our prediction that R&D (Panel B) and CapEx (Panel D) serve as a channel through which CEO overconfidence reduces the number of industrial accidents. The first model includes only our variable of interest, CEO overconfidence (Holder67), and other control variables. In the second model, we include both the mediator (R&D in Panel B and CapEx in Panel D) and CEO overconfidence (Holder67). Based on the mediating analysis we expect a reduction in the magnitude of the coefficient of our variable of interest, Holder67, and the mediator variable should be significant. The results show that when we include the R&D or CapEx in the model, the Holder6 coefficients are reduced and the R&D and CapEx are significant. To assess the significance of the mediation effect, we use Sobel (1982), Aroian (1968), and Goodman (1960) tests. The test statistic from all three tests are statistically significant, suggesting that investment in R&D and CapEx by the overconfident CEOs indeed serves as a channel through which CEO overconfidence reduces the number of accidents.[8]

The reduction in R&D and CapEx curbs the ability of overconfident CEOs to invest in the accident reducing activities by forcing them to focus on more direct firm value enhancing activities. These findings provide supportive evidence to our conjecture that the overspending of overconfident CEOs for R&D and CapEx serves as a channel through which CEO overconfidence reduces industrial accidents.[9]

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[8] The first step in the mediation analysis is to show that dependent variable of interest is related to the independent variable, internal governance: $Accidents = \beta_1 + \tau\ Holder67_i + \varepsilon_1$. Next the mediator and original independent variable are included in the same regression along with the dependent variable of interest, $Accidents = \beta_2 + \tau^*\ Holder67 + \varphi\ \ R\&D + \varepsilon_2$. $\beta_1 and \beta_2$ denote intercept for model 1 and, 2 respectively. τ, τ^* and φ denote the relationship between independent and dependent variables and ε_1, and ε_2, denote unexplained variability. If the mediator variable, R&D, mediates the relation between the dependent variable and the original independent variable, (Holder67), then the significance of the original independent variable will be reduced over the first stage regression and the mediator will be significant. The statistical test of mediation (Sobel, 1982) is given in the formula $t = {(\tau - \tau^*)} \Big/ {\sqrt{(\sigma_\tau^2 - \sigma_{\tau^*}^2 - 2\sigma_{\tau\tau^*}}}$, where σ_τ^2 is the variance of τ, $\sigma_{\tau^*}^2$ is the variance τ^* and $\sigma_{\tau\tau^*}$ is the covariance between τ and τ^*. Aroian (1968) adjusts the standard error for testing the mediation effect using the first- and second-order Taylor series approximation. Goodman (1960) uses the sample-based estimated standard errors, which is the product of the two variances (number of accidents and Holder67) subtracted from the variance of the mediation effect (R&D).

[9] Malmendier and Tate (2005) and Hirshleifer, Low, and Teoh (2012) show that overconfident CEOs spend more of their cash flows on capital expenditures and R&D, reflecting their greater propensity to invest available internal funds.

4.8 Industrial accidents and corporate performance

Our analysis has thus far focused on understanding the role of CEO overconfidence in reducing the industrial accidents. The question that naturally arises is whether this reduction in accidents transfers to an increase in the firm value. We conjecture that the reduced accident risk will translate into higher labor productivity resulting in a higher firm value. We measure corporate performance with both market and accounting based measures.

We start by analyzing the relationship between accidents and performance. We analyze whether accidents in year t influence performance in years $t + 1$ and $t + 2$. We do this by using an OLS regression that includes year times industry effects, controls for the myriad corporate factors that could influence performance, and clusters standard errors by firm. The results are in Table 11 and are consistent with expectations: accidents are negatively related to firm value and operating performance. This supports the notion that reducing accidents benefits both workers and shareholders due to the significant costs that those accidents can impose on firms.

We support the foregoing results with a two stage least squares regression in order to address causality concerns. One concern is that firms that expect better performance might feel that they can afford to spend more on new, improved, or safer equipment. Thus, the expectation of better performance encourages managers to undertake actions that inadvertently reduce accidents. We address this with a 2SLS regression. Here, we instrument the occurrence of an accident with the natural log of the firm's employee count and the number of accidents in the firm's industry. We expect that these would satisfy both the relevance requirement and the exclusion restriction. The number of accidents is very likely to be tied to the number of employees. Further, the number of accidents in an industry would be correlated with he number of accidents in a firm due to industry trends in safety. However, accidents at *other* firms in an industry would not plausibly relate to performance itself.

The results are in Table 12 and are consistent with expectations. From the first stage regressions, we see that the number of employees and the industry accident count are associated with the number of accidents at the firm, this supports the relevance requirement. From the second stage regressions, we see that the predicted number of accidents (or accidents per employee) remain negatively and significantly related to both market to book and operating performance. This supports the prior finding that accidents reduce corporate performance.

5 Additional Results and Robustness Tests

5.1 What happens when CEOs change?

We also explore the impact of CEO turnover. Here, we we explore what happens after a firm appoints an overconfident CEO when they previously had a non-overconfident CEO. We do not focus on the change from an overconfident CEO to a non-overconfident CEO. This is because the previously overconfident CEO's over-expenditure will likely continue to reduce accidents for several years after he/she leaves. Thus, if an overconfident CEO is replaced with a non-overconfident CEO we might falsely attribute any reduction in accidents to the new CEO when it was caused by the old CEO's actions. By contrast, if a non-overconfident CEO is replaced with an overconfident CEO, we would expect an increase in expenditure. This expenditure increase – and its impact on accidents – could logically be attributed to the new CEO.

We capture the change in CEO overconfidence as follows. First, for Holder67, we create a variable that represents whether there was a change from a non-overconfident CEO to an overconfident CEO. For Holder67, this is an indicator that equals one if a non-overconfident CEO is replaced with an overconfident one and equals zero if either (a) there is no CEO turnover, or (b) the non-overconfident CEO is replaced with another non-overconfident CEO. Second, for the continuous "confidence" measure, we capture the change in confidence between year $t-1$ and year t.

The results are in Table 13 and are consistent with expectations. Here, if the firm replaces a non-overconfident CEO with an overconfident one there is a statistically significant reduction in accidents. This is economically meaningful. Replacing a non-overconfident CEO with an overconfident one reduces accidents by 6.35% (Column 1) and accidents per employee by 2.42% (Column 3). These results buttress the foregoing ones and help to ensure causality in our results.

5.2 Other regression techniques

We also ensure that the results are robust to using other regression techniques. We first ensure that the results are robust to using a negative binomial model to analyze the relationship between overconfidence and the number of accidents. The negative binomial model is especially apt to analyzing count data. Here, the dependent variable is the number of accidents (cf. the natural log of the number of accidents, or accidents per employee). The results are in Table 14 and are consistent with the prior results: overconfidence remains negatively and significantly related to the number of accidents that a firm experiences.

The results are also robust to using a Fama-Macbeth regression technique. Our sample involves a firm year panel sample. However, because Holder67 is largely time invariant, it can become collinear with firm fixed effects. However, we can also address panel dimensions of the dataset by using a Fama-Macbeth regression. This involves running yearly cross-sectional regressions. The Fama-Macbeth coefficients are the time series average of those cross-sectional regression coefficients. Fama-Macbeth regressions are also more apt to our setting than firm fixed effects. This is because Fama-Macbeth regressions enable us to compare firms with other firms in a given year rather than comparing firms with their own average, which, due to how the confidence measures are constructed can be relatively static. The results for the Fama-Macbeth regressions are in Table 15 and are consistent with the prior results. Overconfidence remains negatively and significantly related to accidents. This is also economically meaningful: overconfident CEOs experience 2.38% fewer accidents, on average, and 1.45% fewer accidents per employee.

5.3 Other measures of overconfidence

The results thus far use an option-based measure of overconfidence. However, their might be a possibility that option-based measures of overconfidence merely reflect the impact of CEOs' compensation structure on accidents. We argue that this is unlikely to be the case because the option-based measures of overconfidence are derived from the CEO's exercise (or lack thereof) of vested options, not merely from the receipt of options. Nonetheless, we check that the results are robust to alternative measures of overconfidence.

We use several additional overconfidence measures. First, we use a media-based overconfidence measure, as suggested in Hirshleifer et al (2012). We construct this following the approach in Banerjee et al (2015), who construct this measure by hand collecting news-based data between 2000 and 2006 from Factiva.[10] We report the baseline models using the media-based measure in Table 8. The results in the table are qualitatively similar to the foregoing results: Overconfident CEOs are more likely to reduce industrial accidents than are other CEOs.

Second, we use a confidence measure based on CEOs' behavior when they exercise options. While the option based measure of CEO overconfidence we have used to derive our results is widely accepted in the literature, it might misclassify some of the overconfident CEOs as not overconfident. Sen and Tumarkin (2015) argue that it is optimal for all executives (overconfident and non-overconfident) to exercise options to capture dividends. However, such an exercise of the options might not connote overconfidence. Thus, Sen and Tumarkin (2015) create Share retainer, which is an indicator variable based on whether an executive retains shares acquired on option exercise. We report the baseline models using the share retainer measure in Table 8. The results are qualitatively similar to the reported results: Overconfident CEOs significantly reduce industrial accidents.

Third, we construct permutations of our existing overconfidence measures. These ensure that the results are not merely a reflection of how we have constructed the baseline confidence measures. In Table 16, we show that the results are robust to using an indicator that equals one if

[10] Banerjee et al. (2015) search for newspaper reports that refer to the CEO as "confident," "optimistic," and "positive" (for confident news) as opposed to reports that refer to the CEO as "not confident," "not optimistic," "not positive," or "cautious" (for non-confident news). Net news measure is then constructed as the number of confident reports less the number of non-confident reports.

the CEO's confidence level is above the median. They are also robust to constructing a measure that equals zero if the CEO's confidence level is in the bottom 75% of the sample, but is equal to the continuous Confidence measure if the Confidence level is in the top quartile. The results are qualitatively similar to those in the baseline models.

6 Conclusions

This article indicates that overconfident CEOs are associated with fewer industrial accidents. This appears to be an unintended benefit of overconfident CEOs' propensity to invest in CAPEX and R&D. This is consistent with the notion that workplace practices and equipment improve over time. Therefore, continued investment in expanding and replacing equipment, which overconfident CEOs are more likely to do, would reduce accidents. We highlight that this benefit of overconfident CEOs is especially pronounced in accident prone industries, and in firms with capital or borrowing constraints. While governance-based impediments to overconfident CEOs' expenditure do reduce this effect, they do not eliminate it, especially for firms with capital or borrowing constraints in accident prone industries.

This study makes a significant contribution both to literature and to practice. Workplace accidents cost employees, businesses, and the economy. Workplace accidents can cost employers potentially one day of net profits, representing a significant business expense. Therefore, reducing industrial accidents is an important business consideration.

The Results also make a significant contribution to the literature. Most prior literature has focused on the negative impacts of overconfident CEOs. For example, prior literature indicates that overconfident CEOs' takeovers tend to create less value than do those of other CEOs. Some studies indicate that overconfident CEOs can have positive side effects, including through increased R&D and innovation. Our study further contributes to this stream of research by indicating that overconfident CEOs' investment practices can also reduce industrial accidents. In turn, we add additional nuance to the literature on CEO overconfidence.

7 References

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8 Tables

Table 1: Temporal Distribution of CEO Overconfidence and Industrial Accidents

This table presents the summary statistics for the continuous measure of CEO overconfidence and the number of accidents across years. All variables are defined in the Appendix A.

	CEO Confidence		Industrial Accidents (%)	
year	**mean**	**std**	**mean**	**std**
1994	0.3269	0.2800	0.7106	6.8101
1995	0.3600	0.2548	0.4590	3.3528
1996	0.3757	0.2688	0.3350	2.3271
1997	0.4250	0.2777	0.2580	1.6061
1998	0.3847	0.2923	0.4539	5.7406
1999	0.3613	0.3152	0.5849	8.1467
2000	0.3729	0.4228	0.4299	3.7369
2001	0.3087	0.2538	0.3072	2.2082
2002	0.2228	0.2297	0.2905	2.3666
2003	0.3245	0.2713	0.2594	2.1258
2004	0.3551	0.2514	0.2020	1.8468
2005	0.3530	0.2803	0.2326	2.5279
2006	0.3797	0.2699	0.2073	1.9456
2007	0.3269	0.2795	0.1560	1.5409
2008	0.1679	0.2245	0.1525	1.5754
2009	0.2025	0.2286	0.1491	1.7043
2010	0.2623	0.2463	0.1699	1.8282
2011	0.2517	0.2429	0.1780	2.5604
2012	0.2722	0.2664	0.2064	2.7677
2013	0.3679	0.3726	0.3067	3.9263
2014	0.3588	0.2695	0.3424	6.3448
2015	0.2997	0.2529	0.2243	2.8188

Table 2: Distribution of key variables

This table presents the distribution of the various CEO characteristics and other control variables used in the study. The sample consists of observations from 1994 to 2015. Appendix A contains the variable definitions.

Variable	Mean	Median	P25	P75	Std
Accidents	0.2889	0.0000	0.0000	0.0000	3.5560
CEO Confidence	0.3170	0.2805	0.0687	0.5061	0.2856
CEO Holder67 Indicator	0.1856	0.0000	0.0000	0.0000	0.3888
Ln(CEO Age)	4.0106	4.0254	3.9318	4.0943	0.1309
Ln(CEO Tenure)	2.0725	2.1972	1.6094	2.6391	0.8246
Bonus/Salary	0.6243	0.1278	0.0000	0.9058	1.0779
CEO%Ownership	1.9081	0.2600	0.0021	1.2000	5.1270
Institutional%Ownership	7.1768	7.0910	6.0780	8.2360	1.6583
Stock Return	7.5732	7.4384	6.2729	8.7024	1.7705
Stock Return Volatility	0.1463	0.0950	-0.1376	0.3487	0.4808
Proportion of No Trade Days	0.0269	0.0233	0.0170	0.0328	0.0142
Ln(Assets)	0.6931	0.7247	0.5539	0.8626	0.2285
Ln(Sales)	0.1858	0.1567	0.0288	0.2919	0.1700
Leverage	0.1591	0.0882	0.0123	0.2534	0.1807
Intangible/Assets	0.0520	0.0000	0.0000	0.0421	0.1485
R&D/Sales	0.0733	0.0370	0.0196	0.0709	0.1201
CAPEX/Sales	0.0857	0.0848	0.0408	0.1345	0.0942
Market-to-Book	1.3629	0.9638	0.5053	1.7086	1.3439
EBIT/Assets	0.0836	0.0836	0.0396	0.1329	0.0961

Table 3: Overconfident CEOs and its impact on Industrial Accidents.

This table reports the results from the regression models that examine the relationship between CEO overconfidence and the number of industrial accidents. Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

	Ln[Accidents]	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0240***		-0.0130***	
	(0.0045)		(0.0029)	
Confidence		-0.0415***		-0.0201***
		(0.0084)		(0.0052)
Ln[Age]	0.0529***	0.0505***	0.0160	0.0149
	(0.0172)	(0.0172)	(0.0111)	(0.0111)
Ln[Tenure]	-0.0107***	-0.0117***	-0.0022	-0.0028*
	(0.0029)	(0.0028)	(0.0015)	(0.0015)
Bonus/Salary	-0.0077***	-0.0076***	-0.0033**	-0.0033**
	(0.0025)	(0.0025)	(0.0017)	(0.0016)
CEO%Ownership	-0.0005*	-0.0006**	-0.0007***	-0.0008***
	(0.0003)	(0.0003)	(0.0002)	(0.0002)
Ln[Sales]	0.0193***	0.0198***	0.0006	0.0008
	(0.0033)	(0.0033)	(0.0019)	(0.0019)
Ln[Assets]	0.0182***	0.0175***	0.0012	0.0009
	(0.0032)	(0.0032)	(0.0020)	(0.0020)
Stock Returns	-0.0056	0.0006	-0.0009	0.0020
	(0.0042)	(0.0044)	(0.0033)	(0.0034)
Stock Return Volatility	0.1941	0.0794	-0.1915*	-0.2519**
	(0.1854)	(0.1849)	(0.1048)	(0.1036)
Institutional%Ownership	0.0236***	0.0243***	0.0075	0.0076
	(0.0091)	(0.0091)	(0.0059)	(0.0059)
Leverage	-0.0179	-0.0193	0.0235**	0.0230**
	(0.0138)	(0.0138)	(0.0101)	(0.0099)
Intangible/Assets	-0.0908***	-0.0903***	-0.0249***	-0.0249***
	(0.0124)	(0.0125)	(0.0054)	(0.0054)
R&D/Sales	-0.1360***	-0.1374***	-0.0918***	-0.0925***
	(0.0175)	(0.0175)	(0.0109)	(0.0109)
CAPX/Sales	0.2001***	0.2029***	0.2610***	0.2619***
	(0.0419)	(0.0420)	(0.0417)	(0.0416)
Constant	-0.3966***	-0.3718***	-0.0561	-0.0440
	(0.0725)	(0.0727)	(0.0458)	(0.0460)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.205	0.205	0.189	0.189
Number of Observations	20705	20705	20584	20584

Table 4: Overconfident CEOs and its impact on Industrial Accidents: Accident prone industries vs non-Accident prone industries

This table reports the results from the regression models that examine the relationship between CEO overconfidence and the number of industrial accidents. The table splits the sample into accident prone industries (Panel A) and non-accident prone industries (Panel B). Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Panel A	**Accident Prone Industries**			
	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0444***	-0.0217***		
	(0.0075)	(0.0050)		
Confidence			-0.0617***	-0.0294***
			(0.0130)	(0.0083)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.206	0.185	0.206	0.185
Number of Observations	12336	12265	12336	12265
Panel B	**Non-Accident Prone Industries**			
	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0040	-0.0003		
	(0.0033)	(0.0010)		
Confidence			-0.0144**	-0.0012
			(0.0062)	(0.0015)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.189	0.174	0.189	0.174
Number of Observations	8369	8319	8369	8319

Table 5: CEO Overconfidence, Cash Constraints, and Its Impact on Industrial Accidents. This table reports the results from the regression models that examine the relationship between CEO overconfidence and the number of industrial accidents. The table splits the sub-sample of firms that face cash constraints (Panel A) and those that do not (Panel B). Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Panel A	**Cash Constrained**			
Dependent Variable	Ln[Accidents]	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0289***		-0.0169***	
	(0.0060)		(0.0042)	
Confidence		-0.0457***		-0.0253***
		(0.0109)		(0.0073)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.226	0.226	0.198	0.198
Number of Observations	15356	15356	15258	15258

Panel B	**Relatively Cash Unconstrained**			
Dependent Variable	Ln[Accidents]	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0030		-0.0022	
	(0.0056)		(0.0017)	
Confidence		-0.0187		-0.0037
		(0.0119)		(0.0050)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.262	0.263	0.243	0.243
Number of Observations	5038	5038	5019	5019

Table 6: CEO Overconfidence, Credit Constraints, and Its Impact on Industrial Accidents.

This table reports the results from the regression models that examine the relationship between CEO overconfidence and the number of industrial accidents. The table splits the sub-sample of firms that face borrowing constraints (Panel A) and those that do not (Panel B). Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Panel A	Borrowing Constrained (Low Rating)			
	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0360***	-0.0151***		
	(0.0046)	(0.0034)		
Confidence			-0.0527***	-0.0185***
			(0.0091)	(0.0057)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.218	0.202	0.218	0.202
Number of Observations	15264	15166	15264	15166
Panel B	Relatively Borrowing Unconstrained (High Rating)			
	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0257*	-0.0072**		
	(0.0142)	(0.0032)		
Confidence			-0.0280	-0.0011
			(0.0271)	(0.0069)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.273	0.309	0.272	0.309
Number of Observations	3139	3130	3139	3130

Table 7: Overconfident CEOs and its impact on Industrial Accidents.

This table reports the results from the regression models that examine the relationship between CEO overconfidence and the number of industrial accidents. The focus is on the interaction between the CEO confidence variables (i.e., Holder67 or CEO confidence) and whether the firm is in a strict labor law state. Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Dependent Variable	Ln[Accidents]	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0255***		-0.0139***	
	(0.0050)		(0.0032)	
Strict Law x Holder67	0.0106		0.0064	
	(0.0104)		(0.0054)	
Confidence		-0.0398***		-0.0189***
		(0.0092)		(0.0058)
Strict Law x Confidence		-0.0078		-0.0053
		(0.0162)		(0.0086)
Strict Law	-0.0209***	-0.0168**	-0.0149***	-0.0122***
	(0.0054)	(0.0071)	(0.0022)	(0.0031)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.206	0.206	0.190	0.190
Number of Observations	20705	20705	20584	20584

Table 8: Overconfident CEOs and its impact on Industrial Accidents: split by strict and less strict labor law states

This table reports the results from the regression models that examine the relationship between CEO overconfidence and the number of industrial accidents. The focus is on the impact of CEO confidence variables (i.e., Holder67 or CEO confidence) and whether the firm is in a strict labor law state. Panel A contains the sub-sample of firms in weak labor law states and Panel B those firms in strong labor law states. Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Panel A	**Weak State Labor Law**			
	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0264***	-0.0140***		
	(0.0051)	(0.0035)		
Confidence			-0.0493***	-0.0219***
			(0.0096)	(0.0062)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.230	0.214	0.230	0.214
Number of Observations	16783	16674	16783	16674
Panel B	**Strict State Labor Law**			
	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0079	-0.0012		
	(0.0097)	(0.0027)		
Confidence			0.0023	-0.0163
			(0.0063)	(0.0187)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.330	0.226	0.226	0.330
Number of Observations	3540	3527	3527	3540

Table 9: Overconfident CEOs and its impact on Industrial Accidents: The role of unionization

This table reports the results from the regression models that examine the relationship between CEO overconfidence, the amount of unionization in the company's state, and the number of industrial accidents. Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Column	Ln[Accidents] [1]	Ln[Accidents] [2]	Ln[Accidents/ Employees] [3]	Ln[Accidents/ Employees] [4]
A: High Unionization State	-0.0421***	-0.0480***	-0.0128***	-0.0152***
	(0.0100)	(0.0123)	(0.0040)	(0.0043)
B: Holder67	-0.0261***		-0.0149***	
	(0.0047)		(0.0034)	
A x B	0.0364***		0.0267***	
	(0.0120)		(0.0046)	
C: Confidence		-0.0362***		-0.0152**
		(0.0089)		(0.0061)
A x C		0.0428*		0.0248***
		(0.0253)		(0.0080)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.195	0.195	0.175	0.175
Number of Observations	16789	16789	16719	16719

Table 10: Post Sarbanes-Oxley Act

This table reports the results from the regression models that examine the relationship between CEO overconfidence and accidents after the Sarbanes Oxley Act. Panel A explores the impact of overconfidence in accident prone industries. Panel B explores overconfidence in states with strict labor laws. Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Panel A	**Accident prone industries**			
Dependent Variable	Ln[Accidents]	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	0.0083**		0.0015	
	(0.0036)		(0.0015)	
Accident Prone * Holder67	-0.0465***		-0.0196***	
	(0.0088)		(0.0056)	
Confidence		0.0085		-0.0004
		(0.0066)		(0.0030)
Accident Prone * Confidence		-0.0509***		-0.0129
		(0.0144)		(0.0092)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.187	0.187	0.161	0.160
Number of Obervations	15217	15217	15163	15163
Panel B	**Strict Labor Laws**			
Dependent Variable	Ln[Accidents]	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0179***		-0.0105***	
	(0.0053)		(0.0038)	
Strict Law * Holder67	0.0027		0.0071	
	(0.0103)		(0.0048)	
Confidence		-0.0160*		-0.0055
		(0.0095)		(0.0068)
Strict Law * Confidence		-0.0308*		-0.0128
		(0.0172)		(0.0084)
Strict Law	-0.0164***	-0.0116***	-0.0126***	-0.0077***
	(0.0055)	(0.0069)	(0.0021)	(0.0028)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.187	0.187	0.161	0.160
Number of Observations	15217	15217	15163	15163

Table 11: Accidents and performance

This table contains OLS regressions that analyze the impact of accidents on performance. The column header states the dependent variable. The regressions include year x industry fixed effects and clusters standard errors by year. Parentheses contain standard errors. Superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Market to Book (t+1)		**Market to Book (t+2)**		**EBIT/ Assets (t+1)**		**EBIT/ Assets (t+2)**	
Ln(Accidents)	-0.1317***		-0.1220***		-0.0108***		-0.0107***	
	(0.0157)		(0.0166)		(0.0020)		(0.0031)	
Ln(Accidents/ Employee)		-0.1550***		-0.1510***		-0.0125*		-0.0097
		(0.0343)		(0.0367)		(0.0067)		(0.0074)
CEO Holder67	0.5404***	0.5448***	0.4699***	0.4740***	0.0253***	0.0254***	0.0249***	0.0252***
	(0.0247)	(0.0248)	(0.0255)	(0.0257)	(0.0021)	(0.0022)	(0.0024)	(0.0024)
Ln(CEO Age)	-0.4608***	-0.4676***	-0.3409***	-0.3437***	-0.0275***	-0.0280***	-0.0207***	-0.0210***
	(0.0677)	(0.0679)	(0.0717)	(0.0718)	(0.0075)	(0.0075)	(0.0077)	(0.0077)
Ln(CEO Tenure)	0.0281***	0.0296***	0.0269**	0.0281***	0.0032***	0.0034***	0.0023*	0.0025*
	(0.0097)	(0.0097)	(0.0105)	(0.0105)	(0.0011)	(0.0012)	(0.0013)	(0.0013)
CEO Bonus/Salary	0.0795***	0.0800***	0.0765***	0.0769***	0.0077***	0.0077***	0.0067***	0.0067***
	(0.0111)	(0.0112)	(0.0111)	(0.0112)	(0.0010)	(0.0010)	(0.0011)	(0.0011)
CEO%Ownership	-0.0059***	-0.0059***	-0.0062***	-0.0062***	0.0004**	0.0004**	0.0002	0.0002
	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Institutional%Ownership	0.2201***	0.2182***	0.1904***	0.1891***	0.0450***	0.0449***	0.0400***	0.0401***
	(0.0186)	(0.0187)	(0.0197)	(0.0198)	(0.0031)	(0.0031)	(0.0025)	(0.0025)
Stock Return	-0.2967***	-0.3008***	-0.2630***	-0.2672***	-0.0423***	-0.0427***	-0.0370***	-0.0375***
	(0.0186)	(0.0187)	(0.0194)	(0.0195)	(0.0030)	(0.0030)	(0.0024)	(0.0024)
Stock Return Volatility	0.4551***	0.4543***	0.2957***	0.2961***	0.0338***	0.0340***	0.0197***	0.0199***
	(0.0247)	(0.0248)	(0.0249)	(0.0251)	(0.0033)	(0.0033)	(0.0031)	(0.0032)
Ln(Assets)	-13.5516***	-13.6911***	-12.8484***	-13.0055***	-2.5942***	-2.6099***	-2.4178***	-2.4260***
	(0.9774)	(0.9830)	(1.0065)	(1.0089)	(0.1229)	(0.1241)	(0.1326)	(0.1341)
Ln(Sales)	0.2011***	0.1973***	0.1209**	0.1117**	0.0704***	0.0705***	0.0580***	0.0577***
	(0.0461)	(0.0462)	(0.0488)	(0.0489)	(0.0063)	(0.0063)	(0.0067)	(0.0067)
Leverage	-1.2408***	-1.2242***	-1.0844***	-1.0681***	-0.0074	-0.0063	0.0044	0.0052
	(0.0747)	(0.0748)	(0.0787)	(0.0788)	(0.0112)	(0.0113)	(0.0121)	(0.0122)
Intangible/Assets	-0.4171***	-0.4129***	-0.2878***	-0.2788***	0.0073	0.0078	0.0116**	0.0121**
	(0.0536)	(0.0536)	(0.0577)	(0.0578)	(0.0052)	(0.0052)	(0.0058)	(0.0058)
R&D/Sales	1.8397***	1.8453***	1.8058***	1.8081***	-0.2404***	-0.2407***	-0.2040***	-0.2035***

	(0.1061)	(0.1062)	(0.1169)	(0.1171)	(0.0191)	(0.0192)	(0.0214)	(0.0215)
CAPEX/Sales	0.4727***	0.4730***	0.3414***	0.3504***	-0.0188	-0.0170	-0.0462**	-0.0447**
	(0.1041)	(0.1057)	(0.1103)	(0.1124)	(0.0218)	(0.0221)	(0.0209)	(0.0214)
Intercept	3.9517***	4.0150***	3.4474***	3.4969***	0.1979***	0.2026***	0.1727***	0.1764***
	(0.2775)	(0.2781)	(0.2944)	(0.2948)	(0.0307)	(0.0309)	(0.0323)	(0.0325)
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.415	0.414	0.387	0.386	0.419	0.419	0.362	0.362
Number of Observations	18131	18027	16073	15971	18117	18013	16062	15960

Table 12: Accidents and performance: two stage least squares regressions

This table contains 2SLS regressions that analyze the impact of accidents on performance. The column header states the dependent variable. Columns 1 and 2 contain the first stage regressions. Columns 3-6 contain the second stage regressions. The regressions include year x industry fixed effects and clusters standard errors by year. Parentheses contain standard errors. Superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	First Stage Regressions		Second Stage Regressions			
Dependent Variable	**Ln(Accidents)**	**Ln(Accidents/ Employee)**	**Market to Book (t+1)**		**EBIT/Assets (t+1)**	
Ln(Accidents)			-0.589**		-0.0407**	
			(0.290)		(0.0195)	
Ln(Accidents/ Employees)				-1.770**		-0.114*
				(0.899)		(0.0599)
Industry Accidents	0.00227***	0.000789***				0.00227***
	(0.000491)	(0.000234)				(0.000491)
Num Employee	-0.0001***	-0.00005***				-0.0001***
	(0.00004)	(0.00001)				(0.00004)
CEO Holder67	-0.0242***	-0.0129***	0.614***	0.606***	0.0210***	0.0205***
	(0.00454)	(0.00294)	(0.0330)	(0.0344)	(0.00167)	(0.00180)
Ln(CEO Age)	0.0595***	0.0199*	-0.403***	-0.403***	-0.0125**	-0.0126**
	(0.0181)	(0.0118)	(0.0868)	(0.0882)	(0.00502)	(0.00512)
Ln(CEO Tenure)	-0.0108***	-0.00204	0.0212*	0.0240**	0.00149*	0.00170**
	(0.00309)	(0.00164)	(0.0118)	(0.0118)	(0.000798)	(0.000797)
CEO Bonus/ Salary	-0.00961***	-0.00439***	0.0698***	0.0677***	0.00722***	0.00711***
	(0.00233)	(0.00148)	(0.0125)	(0.0131)	(0.000750)	(0.000791)
CEO %Ownership	-0.000467	-0.000674***	-0.00725***	-0.00817***	0.000164	0.000106
	(0.000292)	(0.000172)	(0.00191)	(0.00202)	(0.000140)	(0.000146)
Institutional %Ownership	0.0209***	0.000312	0.232***	0.220***	0.0383***	0.0375***
	(0.00385)	(0.00230)	(0.0265)	(0.0258)	(0.00140)	(0.00135)
Stock Return	0.0207***	0.00125	-0.291***	-0.301***	-0.0353***	-0.0360***
	(0.00366)	(0.00221)	(0.0264)	(0.0261)	(0.00138)	(0.00133)
Stock Volatility	0.000653	0.00486	0.564***	0.572***	0.0362***	0.0368***
	(0.00405)	(0.00297)	(0.0463)	(0.0472)	(0.00160)	(0.00165)
Ln(Assets)	0.110	-0.341***	-8.670***	-9.337***	-2.207***	-2.251***
	(0.189)	(0.120)	(1.221)	(1.251)	(0.0743)	(0.0784)
Ln(Sales)	0.0213**	0.00979	0.230***	0.236***	0.0449***	0.0451***
	(0.00950)	(0.00626)	(0.0657)	(0.0669)	(0.00355)	(0.00365)

Leverage	-0.0133	0.0290**	-1.168***	-1.109***	-0.00890*	-0.00504
	(0.0146)	(0.0115)	(0.110)	(0.117)	(0.00478)	(0.00529)
Intangible/Assets	-0.0974***	-0.0224***	-0.588***	-0.570***	0.0136***	0.0150***
	(0.0127)	(0.00562)	(0.0705)	(0.0674)	(0.00416)	(0.00396)
R&D/Sales	-0.133***	-0.0880***	2.024***	1.946***	-0.148***	-0.152***
	(0.0177)	(0.0111)	(0.156)	(0.166)	(0.00770)	(0.00897)
CAPEX/Sales	0.178***	0.226***	0.585***	0.880***	0.0286***	0.0472***
	(0.0425)	(0.0416)	(0.162)	(0.260)	(0.00911)	(0.0167)
Intercept	-0.277***	-0.0711	3.716***	3.755***	0.132***	0.135***
	(0.100)	(0.0509)	(0.394)	(0.393)	(0.0250)	(0.0246)
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year and Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.177	0.150	0.299	0.270	0.389	0.361
Number of Observations	18,173	18,173	18,173	18,173	18,159	18,159

Table 13: CEO turnover

This table reports the results from the regression models that examine the impact of changing from a non-overconfident CEO to an overconfident CEO. Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Dependent Variable	Ln[Accidents]	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Change in CEO (Non-OC to OC, Holder67)	-0.0635***		-0.0242**	
	(0.0182)		(0.0105)	
Change in CEO (Non-OC to OC, Confidence)		-0.0425***		-0.0202***
		(0.0160)		(0.0069)
Ln[Age]	0.0845***	0.0842***	0.0349**	0.0348**
	(0.0217)	(0.0217)	(0.0143)	(0.0142)
Ln[Tenure]	-0.0165***	-0.0168***	-0.0072***	-0.0074***
	(0.0042)	(0.0043)	(0.0019)	(0.0019)
Bonus/Salary	-0.0084***	-0.0083***	-0.0053***	-0.0053***
	(0.0030)	(0.0030)	(0.0017)	(0.0017)
CEO%Ownership	-0.0084	-0.0079	-0.0248	-0.0243
	(0.0428)	(0.0429)	(0.0256)	(0.0256)
Ln[Sales]	0.0156***	0.0156***	0.0044*	0.0044*
	(0.0039)	(0.0039)	(0.0026)	(0.0026)
Ln[Assets]	0.0278***	0.0279***	-0.0014	-0.0014
	(0.0044)	(0.0044)	(0.0024)	(0.0024)
Stock Returns	-0.0094	-0.0089	0.0005	0.0007
	(0.0067)	(0.0067)	(0.0038)	(0.0038)
Stock Return Volatility	0.4740**	0.4717**	-0.0720	-0.0729
	(0.2398)	(0.2396)	(0.1457)	(0.1457)
Institutional%Ownership	0.0560***	0.0562***	0.0337***	0.0338***
	(0.0105)	(0.0105)	(0.0079)	(0.0079)
Leverage	0.0085	0.0090	0.0321***	0.0323***
	(0.0169)	(0.0169)	(0.0123)	(0.0124)
Intangible/Assets	-0.1430***	-0.1434***	-0.0390***	-0.0392***
	(0.0216)	(0.0217)	(0.0084)	(0.0084)
R&D/Sales	-0.2313***	-0.2319***	-0.1340***	-0.1342***
	(0.0481)	(0.0482)	(0.0215)	(0.0215)
CAPX/Sales	0.2316***	0.2316***	0.2852***	0.2852***
	(0.0536)	(0.0536)	(0.0642)	(0.0642)
Constant	-0.5838***	-0.5815***	-0.1496**	-0.1485**
	(0.0963)	(0.0963)	(0.0622)	(0.0621)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.196	0.196	0.167	0.167
Number of Observations	17821	17821	17674	17674

Table 14: Negative binomial option for accident count

This table reports the results for a negative binomial model that analyzes accident counts. Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Dependent Variable	#Accidents	
Column	[1]	[2]
Holder67	-0.8074***	
	(0.1486)	
Confidence		-1.1949***
		(0.2030)
Ln[Age]	0.1309	0.1561
	(0.3708)	(0.3707)
Ln[Tenure]	-0.0851	-0.1058*
	(0.0593)	(0.0588)
Bonus/Salary	-0.0998**	-0.0901*
	(0.0500)	(0.0500)
CEO%Ownership	-0.0467***	-0.0483***
	(0.0150)	(0.0149)
Ln[Sales]	0.6105***	0.6327***
	(0.1203)	(0.1199)
Ln[Assets]	0.2315**	0.2095*
	(0.1165)	(0.1163)
Stock Returns	0.1097	0.3433***
	(0.1183)	(0.1282)
Stock Return Volatility	-2.8791	-5.5477
	(5.3741)	(5.3717)
Institutional%Ownership	0.7322***	0.7316***
	(0.2722)	(0.2717)
Leverage	-0.1015	-0.2233
	(0.3374)	(0.3391)
Intangible/Assets	-1.1625***	-1.1057***
	(0.3395)	(0.3389)
R&D/Sales	-8.2252***	-8.7040***
	(1.3198)	(1.3346)
CAPX/Sales	2.8873***	2.9722***
	(0.4746)	(0.4761)
Observations	20851	20851

Table 15: Fama-Macbeth Regression

This table reports the results for Fama Macbeth regression models. Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Dependent Variable	Ln[Accidents]	Ln[Accidents]	Ln[Accidents/ Employees]	Ln[Accidents/ Employees]
Column	[1]	[2]	[3]	[4]
Holder67	-0.0238***		-0.0145***	
	(0.0071)		(0.0040)	
Confidence		-0.0537**		-0.0240*
		(0.0242)		(0.0122)
Ln[Age]	0.1243***	0.1220***	0.0363*	0.0351*
	(0.0434)	(0.0427)	(0.0198)	(0.0197)
Ln[Tenure]	-0.0156**	-0.0165***	-0.0035*	-0.0040**
	(0.0055)	(0.0051)	(0.0019)	(0.0016)
Bonus/Salary	-0.0128**	-0.0115**	-0.0025	-0.0020
	(0.0049)	(0.0048)	(0.0027)	(0.0025)
CEO%Ownership	-0.0010**	-0.0011***	-0.0007***	-0.0008***
	(0.0004)	(0.0003)	(0.0002)	(0.0002)
Ln[Sales]	0.0364***	0.0364***	0.0013	0.0011
	(0.0064)	(0.0064)	(0.0027)	(0.0028)
Ln[Assets]	0.0047	0.0048	0.0013	0.0015
	(0.0031)	(0.0032)	(0.0019)	(0.0020)
Stock Returns	0.0030	0.0126***	0.0043*	0.0084**
	(0.0052)	(0.0041)	(0.0023)	(0.0033)
Stock Return Volatility	-0.1057	-0.0884	-0.0967	-0.0812
	(0.3754)	(0.3459)	(0.2343)	(0.2260)
Institutional%Ownership	0.0343*	0.0397*	0.0356**	0.0371**
	(0.0169)	(0.0200)	(0.0152)	(0.0168)
Leverage	0.0220	0.0164	0.0323	0.0308
	(0.0212)	(0.0191)	(0.0203)	(0.0191)
Intangible/Assets	-0.1117***	-0.1080***	-0.0470**	-0.0465**
	(0.0329)	(0.0306)	(0.0183)	(0.0175)
R&D/Sales	0.0322	0.0328	-0.0551***	-0.0554***
	(0.0216)	(0.0212)	(0.0163)	(0.0160)
CAPX/Sales	0.4687***	0.4709***	0.4279***	0.4276***
	(0.0404)	(0.0403)	(0.0481)	(0.0481)
Constant	-0.7089***	-0.6903***	-0.1712*	-0.1616*
	(0.1888)	(0.1866)	(0.0868)	(0.0868)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry * Year FE	Yes	Yes	Yes	Yes
Adjusted R-sqrd	0.078	0.079	0.099	0.100
Number of Observations	20851	20851	20731	20731

Table 16: Alternate Measures of CEO Overconfidence and Its Impact on Industrial Accidents

This table tests the robustness of the results from the regression models that examine the relationship between CEO overconfidence and the number of industrial accidents using alternate measures of CEO overconfidence. Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Variable	Model 1	Model 2	Model 3	Model 4
NetNews Measure	-0.0540***			
	(0.0179)			
Share Retainer Measure		-0.1221**		
		(0.0524)		
CEO Confidence_Median			-0.3095*	
			(0.176)	
CEO Confidence_Top25				-0.3192***
				(0.1015)
Controls	Yes	Yes	Yes	Yes
Year and Industry F.E.	Yes	Yes	Yes	Yes
R-Squared	0.0648	0.0489	0.0484	0.0483
Number of Observations	10305	10050	18,317	18,317

Appendix A: Variable definitions

Variable Name	Definitions
CEO Confidence	A measure of how in-the-money (ITM) the CEO's vested stock options are. First, we obtain the total value-per option of the ITM options by dividing the value of all unexercised exercisable options (Execucomp: opt_unex_exer_est_val) by the number of options (Execucomp: opt_unex_exer_num). Next, we scale this 'value-per-option' by the price at the end of the fiscal year (Compustat: prcc_f).
CEO Holder67 Indicator	This indicator variable is computed in the same way as in Malmendier et al. (2011). This is an indicator that equals one from the first time that the CEO holds options that are (on average) at least 67% in the money if the CEO does so on at least two occasions in three consecutive years.
CEO Confidence_median	Same as the CEO Confidence measure above but we replace the values below median by zero.
NetNews	This measure is provided by Banerjee et al. (2015). They search for newspaper reports that refer to the CEO as "confident," "optimistic," and "positive" (for confident news) as opposed to reports that refer to the CEO as "not confident," "not optimistic," "not positive," or "cautious" (for non-confident news). Net news measure is then constructed as the number of confident reports less the number of non-confident reports.
Share Retainer	Share Retainer is defined as 1 if the cumulative shares retained by a CEO on option exercise days during a fiscal year exceeds 1% and 0 otherwise. This data is provided by Sen and Tumarkin (2015).
CEO Confidence_Top25	Indicator variable that equals one if the CEO's confidence measure is in the top quartile of all firms in a given year.
Ln(CEO Age)	The natural log of the CEO's age.
Ln(CEO Tenure)	The natural log of one plus the number of years that the CEO has been the CEO of the company.
Bonus/Salary	The CEO's bonus payment as a ratio of his or her fixed salary.
CEO%Ownership	The percentage of the firm owned by the CEO.
Institutional%Ownership	The percentage of the firm owned by the institutional traders.
Stock Return	The firm's cumulative daily stock return over the year.
Stock Return Volatility	The firm's standard deviation of daily stock return over the year.
Proportion of No Trade Days	The proportion of days in year t on which there was no trade in the company's stock.
Ln(Assets)	Natural log of the firm's total assets.
Ln(Sales)	Natural log of the firm's net sales.
Leverage	The firm's long-term debt (Compustat: dltt) scaled by its assets (Compustat: at).
Intangible/Assets	The firm's intangible assets (Compustat: intan) scaled by its total book assets (Compustat: at).
R&D/Sales	The firm's R&D expenditure (Compustat: xrd) divided by its sales (Compustat: sale).
CAPEX/Sales	The firm's capital expenditure (Compustat: capx) divided by its sales (Compustat: sale).
Market-to-Book	The firm's market-to-book ratio, calculated as the ratio of its market value at the end of the fiscal and the book value of the total assets (Compustat: at).
EBIT/Assets	The firm's EBIT (Compustat: ebit) scaled by its book assets (Compustat: at) measured at the start of the year.

Table OA1: Correlation between variables

This table presents the Pearson's product-moment correlation between the key variables included in the study. Appendix A contains the variable definitions.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1)	Accidents	1																
(2)	CEO Holder67 Indicator	-0.024	1															
(3)	CEO Confidence	-0.017	0.439	1														
(4)	Ln(CEO Age)	0.029	0.004	-0.026	1													
(5)	Ln(CEO Tenure)	-0.017	0.231	0.112	0.353	1												
(6)	Bonus/Salary	0.005	0.098	0.187	0.030	0.028	1											
(7)	CEO%Ownership	-0.021	0.088	0.049	0.092	0.269	0.052	1										
(8)	Institutional%Ownership	0.009	0.040	0.058	0.011	0.028	-0.103	-0.168	1									
(9)	Stock Return	-0.011	0.113	0.349	-0.018	0.016	0.107	0.031	-0.002	1								
(10)	Stock Return Volatility	-0.029	0.073	-0.111	-0.137	-0.017	-0.077	0.088	-0.127	-0.003	1							
(11)	Proportion of No Trade Days	-0.003	-0.012	-0.014	0.002	-0.022	-0.007	0.004	-0.036	0.014	0.040	1						
(12)	Ln(Assets)	0.086	-0.064	-0.046	0.111	-0.065	0.179	-0.180	0.071	-0.073	-0.333	-0.051	1					
(13)	Leverage	0.022	-0.063	-0.100	0.026	-0.027	-0.004	-0.033	-0.023	-0.075	-0.042	-0.004	0.236	1				
(14)	Intangible/Assets	-0.036	0.052	0.029	-0.023	-0.015	-0.059	-0.065	0.113	-0.032	-0.115	-0.007	0.083	0.149	1			
(15)	R&D/Sales	-0.021	0.049	-0.006	-0.105	0.017	-0.077	-0.030	0.005	0.029	0.266	-0.007	-0.258	-0.170	0.000	1		
(16)	CAPEX/Sales	0.054	0.021	0.041	-0.024	0.015	0.009	-0.007	-0.047	-0.028	0.062	-0.006	0.013	0.160	-0.192	0.060	1	
(17)	EBIT/Assets	-0.005	0.107	0.236	0.042	0.045	0.082	0.021	0.133	-0.038	-0.309	-0.008	0.070	-0.058	0.099	-0.339	-0.084	1

Table OA2: Matched firms, Overconfident CEOs, and Its Impact on Industrial Accidents

This table tests the robustness of the results from the regression models that examine the relationship between CEO overconfidence and the number of industrial accidents by creating a control sample matched with the firms with overconfident CEOs based on industry, size (±25%), market-to-book (±25%), and year (with replacement). Appendix A contains the variable definitions. All models include industry and year fixed effects, and use standard errors, reported in the parenthesis, clustered by firm and year. The significance levels at 1%, 5%, and 10% are denoted by ***, **, and *, respectively.

Variable	**Model 1**	**Model 2**
CEO Holder67 Indicator	-0.0310***	
	(0.0108)	
CEO Confidence		-0.0550*
		(0.0304)
Ln(CEO Age)	0.0693	0.0740
	(0.092)	(0.0554)
Ln(CEO Tenure)	-0.0008	-0.0182**
	(0.0128)	(0.009)
Bonus/Salary	-0.0018	0.0054
	(0.0106)	(0.0103)
CEO Ownership Pct.	0.0840	0.1950*
	(0.1149)	(0.1175)
Institutional Ownership Pct.	0.0450***	0.1056***
	(0.0163)	(0.0312)
Stock Return	-0.0089	0.0141

	(0.0108)	(0.0176)
Stock Return Volatility	0.8541	-0.5475
	(1.2452)	(0.3949)
Proportion of No Trade Days	0.0193	0.2443*
	(0.077)	(0.1266)
Ln(Assets)	0.0645***	0.0164
	(0.0244)	(0.0198)
Ln(Sales)	0.0118	0.0307
	(0.0092)	(0.0196)
Leverage	-0.0569	0.0734*
	(0.0531)	(0.0407)
Intangible/Assets	-0.1180***	-0.0744**
	(0.0372)	(0.0297)
R&D/Sales	-0.1650***	-0.1575***
	(0.0632)	(0.0577)
CAPEX/Sales	0.0385	0.3919
	(0.1754)	(0.2936)
EBIT/Assets	-0.1669**	-0.3845**
	(0.0686)	(0.1689)
Intercept	-0.7858	-0.5729**
	(0.4884)	(0.2718)
Year and Industry F.E.	Yes	Yes
R-Squared	0.0332	0.0836
Number of Observations	22,463	23,960