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Information Quality and Workplace Safety

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Abstract

This paper examines the effect of internal information quality on workplace safety. Using establishment-level data on workplace injuries from the Occupational Safety and Health Administration (OSHA) and employing a strict fixed-effects structure, we show that higher information quality is associated with significantly lower work-related injury rates. Further investigation reveals that the effect is stronger when more decision rights reside in headquarters, weaker when employees have greater bargaining power, and weaker when firms are subject to financial constraints. Our findings are robust to the use of two plausibly exogenous shocks and other robustness checks. Our study suggests an important economic consequence of information quality not examined by prior literature.

Keywords: Information quality; Workplace safety; Employee welfare; Management accounting

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Information Quality and Workplace Safety

I. INTRODUCTION

Workplace safety is an essential consideration for business and society. Each year companies spend a significant amount of resources on workplace-safety improvements. For example, Kniesner and Leeth (2014) estimate that, in 2010, the annual expense just to comply with the U.S. Occupational Safety and Health Administration (OSHA) regulations amounts to four to five percent of total corporate profits. Workplace injuries can translate to substantial direct and indirect costs. Direct costs include medical expenses, insurance premiums, legal costs, and compensation. According to the Liberty Mutual Research Institute for Safety, in 2017, non-fatal workplace injuries cost U.S. businesses $60 billion in direct workers' compensation expenses.[1] Indirect costs associated with workplace injuries, including lost productivity, lower employee morale, and corrective implementation expenses, are difficult to estimate but are believed to be of equal or greater amount.[2] Scholars from industrial relations and operations management have done extensive research on workplace safety. However, until recently, there has been limited research in accounting and finance.

In this paper, we examine the effect of information quality on workplace safety. According to Gallemore and Labro (2015, 149), internal information quality refers to "the accessibility, usefulness, reliability, accuracy, quantity, and signal-to-noise ratio of the data and knowledge collected, generated, and consumed within an organization." High information quality can provide relevant and reliable information to help managers make better decisions. We argue that high information quality can have a positive effect on workplace safety for the following reasons. First, the benefits of workplace safety are hard to quantify. For example, in a survey of 343 senior finance executives,

[1] See https://www.carpentersafety.org/sites/www.carpentersafety.org/files/assets/2017%20WSI.pdf
[2] See https://www.reminetwork.com/articles/investing-in-workplace-safety/

more than 70% of CFOs do not know the exact financial impact of lost work time.[3] High information quality helps managers to quantify the trade-offs in the cost-benefit analysis of workplace safety, especially the indirect costs, and can thus increase the awareness of managers and stakeholders and motivate them to invest in improving workplace safety. Second, high information quality can increase the efficiency of investment activities that improve workplace safety. These investment activities include both tangible activities (such as equipment maintenance, machine replacement, etc.) and intangible activities (such as workflow organization, training of employees, etc.). Third, high information quality provides timely and useful information about the production process, which enables managers to make reasonable work plans and allocate workloads among establishments and employees. Fourth, high information quality enables firms to incorporate safety-related information in the performance measurement of managers at the establishment level, motivating lower-level managers to pay attention to the issue of workplace safety.

To examine the effect of information quality on workplace safety, we utilize *establishment-level* (e.g., store or factory) injury data from OSHA. Since any one empirical proxy is an imperfect reflection of internal information quality, we use different proxies. Our first measure of information quality is an aggregate measure based on: (1) the accuracy of management earnings forecasts; (2) the speed with which management releases an earnings announcement after its fiscal year end; (3) the absence of internal control weaknesses; and (4) the absence of restatements. These four proxies are based on observable information properties and have been used to measure information quality from different perspectives in recent studies (e.g., Gallemore and Labro 2015; Heitzman and Huang 2019). To capture information quality more comprehensively, we use the average of the standardized values of these four proxies.

[3] See https://www.ibiweb.org/wp-content/uploads/2018/01/Bus_Value_of_Health_full.pdf

Our second measure of information quality is the adoption scope of accounting enterprise resource planning (ERP) systems. ERP systems improve internal information environments by automating, standardizing, and integrating operation performances across business functions (e.g., Morris 2011; Dorantes, Li, Peters, and Richardson 2013; Pincus, Tian, Wellmeyer, and Xu 2017). Therefore, it is a relatively direct and intuitive measure of the internal information environment for the headquarters and the affiliated establishments.

Our multivariate analyses include a number of control variables motivated by prior research. Importantly, we employ a strict fixed-effects structure (*establishment* fixed effects, *state-year*, and *industry-year* fixed effects) to account for unobservable factors.[4] We find a significantly negative association between injury rates and information quality, and our results are robust to various model specifications, such as incorporating a variety of fixed effects and using alternative proxies for information quality. The evidence suggests that information quality has a positive effect on workplace safety. Our results are also robust to including tax avoidance, analysts following, and operational efficiency as additional controls.[5]

We further explore cross-sectional variations in the effects of information quality on workplace safety. First, we find that the effect of information quality is more pronounced when the headquarters have more decision rights in the operations of establishments. This is consistent with high-quality information helping the headquarters effectively allocate resources and thus with the idea that information quality is more important when the headquarters have the relevant decision rights. Second, we find that information quality is less important when establishments have higher labor-

[4] Establishments are at a more granular level than firms; thus, they provide a strong control for unobservable time-invariant factors at the firm and establishment level. Another advantage of using establishment-level data is to allow us to control for establishment-specific time-variant variables, such as working hours, etc.
[5] In Table 10, where we include firm operating efficiency as a control variable, we find that it is positively related to injury rates, suggesting that firms may sacrifice workplace safety to improve operational efficiency in the short run. It also suggests that workplace safety is not just a subset of operating efficiency.

union membership, consistent with the argument that unions aim to ensure reasonable workloads and workers' safety (Kaufman 2005). Finally, we find that information quality is less important when firms are financially constrained, in line with the argument that firms can only improve workplace safety when there are sufficient resources at disposal.

Although the inclusion of fixed effects (and especially the establishment fixed effects) in the main tests can significantly mitigate the possibility of correlated omitted variables, we further employ two quasi-natural experiments. The first is the adoption of SFAS 158 in 2006. SFAS 158 requires firms to use the projected benefit obligation (PBO) for pension liabilities. As a result, firms need to estimate employees' salary until retirement. Shroff (2017) suggests that the process of complying with changes of GAAP motivates firms to collect more relevant information, leading to improved internal information environment and investment. As workplace safety relates to workers' salaries (Moore and Viscusi 1989), the SFAS 158 requirement of projecting future compensation can induce managers to collect more information, including information related to safety issues.[6] Using a difference-in-differences design, we find that firms with higher off-balance-sheet pension liabilities, hence affected by SFAS 158 to a greater extent, are associated with reductions in workplace injury rates after 2006.

The second quasi-natural experiment is the introduction of new flights between the establishments and the firms' headquarters. Previous research finds that the reduced flight stop/time due to exogenously determined new flights leads to a reduction of internal information asymmetry (Giroud 2013; Chen, Martin, Roychowdhury, Wang, and Billet 2018). We identify 804 flight stop cases and 492 flight-time reduction cases between headquarters and establishments. Using a

[6] Practical actuarial guidance suggests that the estimation of the future disability incidence rate is an important input to predict liabilities: https://www.sbcera.org/Portals/0/PDFs/Actuarial%20Valuation%20and%20Review/2008/08_Actuarial_Experience_Study.pdf.

difference-in-differences design, we find that, relative to control establishments, establishments with reductions in flight time or stops to the headquarters experience a significant reduction of injury rates after the introduction of new flights. Taken together, the evidence from these two analyses provide further support for the positive effect of information quality on workplace safety.

Our study makes several contributions. First, our paper adds to the literature on information quality by identifying an important economic consequence of information quality. Although it has long been suggested in management accounting textbooks that high information quality can lead to improvement in managerial decision making (e.g., Horngren, Foster, Datar, Rajan, and Ittner 2012), the empirical evidence is relatively scarce. Studies show that improved information quality can result in more effective tax avoidance (Gallemore and Labro 2015) and can enhance investment efficiency and profitability (Cheng, Cho, and Yang 2018).[7] Our research highlights a positive effect of information quality on an important business issue, workplace safety, extending the related literature.[8]

Second, our article contributes to research on workplace safety from an accounting perspective. Although workplace safety is an important issue for society and firms, only recently have researchers in finance and accounting started to examine it. Studies show that workplace safety is affected by financial constraints (Filer and Golbe 2003; Cohn and Wardlaw 2016), pressure to meet or beat market expectations (Caskey and Ozel 2017), private equity (Cohn, Nestoriak, and Wardlaw 2021), and geographical proximity (Yang, Zhang, and Zhu 2019; Heese and Cavazos 2020). Our study focuses on the information environment within the firm and concludes that high information

[7] Other papers discuss the economic consequences of internal control (one of the individual proxies we use). For example, Feng, Li, McVay, and Skaife (2015) examine the effect of internal control weakness on inventory management. Cheng, Goh and Kim (2018) examine the effect of internal control on operating efficiency.
[8] Because we construct one of primary measures of information quality from proxies of financial reporting, our paper also responds to the call of Roychowdhury, Shroff, and Verdi (2019) for more research on "the idea that managers can learn new information from the financial reporting process."

quality has a positive effect on workplace safety, a topic that is relevant to academics, practitioners, and regulators. More broadly, as workplace safety is an important component of corporate social responsibility (CSR), our study has implications about the role of information quality in improving CSR.

One caveat of our findings is that although we employ a variety of empirical strategies, we cannot fully exclude the possibility that the positive association between internal information quality and workplace safety is driven by unobservable potential correlated omitted variables.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Workplace Safety

Workplace safety is an important consideration for businesses. Every year firms spend significant resources to improve workplace safety. At the same time, safety-related accidents cause significant costs to firms. Workplace safety is also an important dimension of CSR and employee well-being. Research on workplace safety has been focusing primarily on the areas of industrial relations and operations management (e.g., Brown 1996).

Recently, researchers have started to study workplace safety from finance and accounting perspectives. Cohn and Wardlaw (2016) argue that financially-constrained firms have limited financial resources for the required safety-improvement investments; therefore, workplace safety should be lower for financially-constrained firms. Consistent with their arguments, they find that injury rates are positively correlated with leverage and negatively correlated with cash-flow shocks. Caskey and Ozel (2017) show that firms with pressure to meet or beat market expectations have higher injury rates, because firms may cut safety-related expenditures to beat benchmarks. These two papers suggest that necessary investment is an important determinant of workforce safety.

Other studies examine the roles of different stakeholders on workplace safety. For example, Cohn et al. (2021) document that firms experience a decrease in injury rates after private equity buyouts. Their reasoning is that private equity firms have a long-term view and have the incentive to make investments in safety improvements that largely generate long-run returns. In a similar vein, Bai, Lee, and Zhang (2020) use Regulation SHO as a natural experiment and find that treated firms under SHO have an increase in injury rates because managers are more likely to sacrifice long-term activities when facing pressure from short sellers. Bradley, Mao, and Zhang (2019) find that workplace safety is positively associated with analyst coverage due to the monitoring role of financial analysts.

There is limited research on the effects of firms' internal operating structures on workplace safety. Yang et al. (2019) find that geographical proximity between the headquarters and plants leads to improved workplace safety. The authors attribute this effect to internal governance and monitoring (but do not test for it). Our paper directly examines the effect of information quality.[9]

Information Quality

According to Gallemore and Labro (2015), high internal information quality is characterized by accessible, useful, and reliable information that is collected and consumed within the organization. With dispersed business operations, firms rely on efficient and timely communication of information within organizations to make informed business decisions. The internal information can be either quantitative or qualitative information, such as production cost and employee morale (Horngren et al. 2012). The accounting literature has long recognized the important role of the

[9] Our paper differs from Yang et al. (2019) in two additional aspects: First, conceptually, our research focus (information quality) can be used not only in monitoring, but also in budgeting, performance measurement, investment, and other business decisions. Second, empirically, our measures of information quality (*IQ* and *Acct ERP*) are different and can be applied in large samples. More generally, our study and Yang et al. (2019) complement each other and suggest an important role of internal operating structures in workforce safety.

internal information environment. For example, Horngren et al. (2012) suggest that high quality internal information helps managers to make better business decisions (see also Gallemore and Labro 2015). Empirically, researchers attempt to link internal information quality with different decisions. Given the internal information quality is unobservable, researchers rely on observable attributes of external information reporting because the literature suggests that the internal and external information quality are highly correlated.[10,11]

Gallemore and Labro (2015) measure information quality using four observable reporting qualities: earnings reporting speed, management forecast accuracy, absence of material weaknesses, and absence of restatements. They hypothesize that higher information quality allows firms to make more effective tax-related decisions. Consistent with that prediction, their empirical results show that higher information quality is associated with lower effective tax rates. Similarly, McGuire, Rane, and Weaver (2018) find that high information quality is associated with more tax-motivated income shifting. Heitzman and Huang (2019) use similar measures and find that a high-quality internal information environment leads firms to rely more on internal signals and less on external signals to make investment decisions. Finally, Morris (2011), Dorantes et al.(2013) and Pincus et al. (2017) document that the implementation of ERP systems improves the internal information environment.

We examine the role of information quality on workplace safety, a research question that has not been studied before. Empirically, because any single proxy cannot perfectly measure internal information quality, we use different proxies to capture different aspects of internal information quality. First, both theoretical and empirical research suggest that there is a positive relation between

[10] See for example, Kaplan (1984), Gallemore and Labro (2015), Shroff (2017), and Heitzman and Huang (2019). In a survey of CFOs, Dichev, Graham, Harvey, and Rajgopal (2013) find that the same financial information is often used for both internal and external communication.

[11] Goodman, Neamtiu, Shroff, and White (2014) find that managers' earnings forecasting ability is positively associated with the quality of acquisition decisions. The underlying intuition is that more accurate earnings forecasts enable managers to assess the value of acquisitions better. Feng et al. (2015) and Cheng et al. (2018) show that effective internal controls are associated with operational effectiveness, which they both attribute to a high-quality internal environment.

firms' internal information quality and external reporting quality as external reporting quality is a manifestation of the internal information environment (Verrecchia 1990; Zimmerman 2013). Therefore, we first follow prior literature using observable reporting qualities to proxy for internal information quality. Following Gallemore and Labro (2015), we construct our measure of information quality (*IQ*) based on four commonly-used proxies for information quality: (1) management forecast accuracy; (2) annual earnings announcement speed; (3) no internal control weakness report based on SOX Section 404; and (4) no error-driven restatements. One drawback of the measure is that it only measures internal information manifested in external financial reporting.

Second, we employ the firm's accounting ERP implementation scope (*Acct ERP*) as an alternative proxy to measure information quality. ERP system is designed to integrate information within the firm and thus improve a firm's internal information environment (Dorantes et al., 2013). This measure is intuitive and straightforward, but is silent on the effectiveness that each firm uses the information system, and is an endogenous decision of firms.

Third, prior literature suggests that the process of compliance with changes in accounting standards induces managers to acquire new information internally (Shroff 2017; Cheng et al. 2018). We therefore also use firm's off-balance-sheet pension liabilities (*OFFBL*) around the adoption of SFAS 158 to measure internal information acquisition. The advantage of this measure is the measure is exogenous to firms' decision. However, it focuses on specific events and cannot capture a whole picture of the effects of information quality. *Acct ERP* and *OFFBL* can capture internal information quality that cannot be manifested in external financial reporting. Fourth, while *IQ*, *Acct ERP* and *OFFBL* measures are likely to measure hard internal information quality of firms, our tests using travel time reduction between headquarters and establishments can capture soft internal information exchange within the firm. In summary, we employ four different empirical proxies to measure internal information quality from different aspects. Although each empirical proxy is imperfect, the consistent results based on all different measures can provide more confidence in our conclusions.

The Effect of Information Quality on Workplace Safety (Hypothesis 1)

While safety-related activities are typically executed at the establishment level, the overall decisions are made at the headquarters level (Cohn and Wardlaw 2016). Internal frictions and conflicts of interests within the firm can impede the implementation of safe-related activities. For example, to meet short-run budget set by the headquarters, an establishment may cut spending on safety and underreport workplace accidents, which can result more serious workplace accidents in the future.[12] The significant consequences, such as legal, reputation and regulatory costs are largely borne by the headquarters instead of the establishments. We argue that enhanced information quality has the potential to reduce the frictions and thus improve workplace safety for the following reasons. First, high information quality helps to quantify the benefits of workplace safety, therefore can increase the awareness of managers and stakeholders to workplace safety and thus motivate them to improve safety. The attitude and engagement of top management are essential for workplace safety. For example, the National Safety Council (NSC) lists "active role of top management in safety" as the first element that leads to better safety outcomes.[13] To increase the awareness of managers, NSC suggests that a cost-benefit analysis of safety-related issues is crucial. Without information available to quantify the cost of a safety problem or the benefit of a safety solution, managers are likely to invest in solving other immediate issues.

[12] See: https://www.thechecker.net/stories/blog/company-leaders-set-the-tone-for-safety-best-practices
[13] See https://www.nsc.org/Portals/0/Documents/JSEWorkplaceDocuments/Journey-to-Safety-Excellence-Safety-Business-Case-Executives.pdf

Investments in safety-related issues often bring positive returns. For example, in a survey of CFOs, over 60% reported that each $1 invested in injury prevention would generate a return of $2 or more.[14,15] However, the benefits often come from increased productivity and may not be easy to quantify.[16] In a survey of 343 senior finance executives, nearly half believe that lost work time due to workplace injuries/illness has a critical impact on firms' performance. However, more than 70% of CFOs do not know the exact financial impact of lost work time.[17] A high-quality information environment can help top managers to collect relevant information and facilitate cost-benefit analyses, therefore increasing managers' awareness and motivating them to improve safety.[18]

Second, high information quality can improve the efficiency of investments in safety. Cheng, Dhaliwal, and Zhang (2013) find that an improved internal information environment leads to higher investment efficiency. Heitzman and Huang (2019) suggest that firms with high information quality make investment decisions in response to internal (rather than external) signals. To improve workplace safety, firms need to invest significant resources on both tangible and intangible activities. Tangible activities include equipment maintenance, replacement of old machines, and automating dangerous tasks. Intangible activities include workflow organization, training of employees, and enforcement of safety regulations. A high-quality information environment can generate more accurate and timely information about safety problems, resources needed for the activities, and financial resources available, and therefore can help top managers identify safety issues that are urgently needed for improvement and facilitate the budgetary process for safety-improvement

[14] See Liberty Mutual Chief Financial Officer Survey (2005). Liberty Mutual Insurance Group, Boston, MA.
[15] For example, Schneider Electric reports $15 million annual savings in direct costs of workplace safety in 2013 after it enhanced its workplace safety. Alcoa saw its EPS increasing from $0.2 to $1.41 five years after it shifted to focus on workplace safety (Morrison, 2014).
[16] In addition, serious workplace accidents are infrequent events, which makes it difficult to quantify the benefits of spending on improving safety.
[17] See https://www.ibiweb.org/wp-content/uploads/2018/01/Bus_Value_of_Health_full.pdf
[18] Within firms there are internal competition for company resources (Ozbas 2005). If the managers do not understand the cost-benefit of safety, firms may put resources to other company activities and underinvest in safety.

investments. In a case study that analyzes the safety management of Baxter Inc., Koehler (2001) notes that the health and safety accounting system of Baxter enables managers to better implement safety programs.[19]

Third, high information quality can help firms make reasonable work plans and allocate workloads among establishments and employees more effectively. Firms need information about establishments to determine work plans and allocations. However, substantial information asymmetry often exists between establishments and the headquarters, and collecting, documenting, and integrating information can be very time-consuming for top managers. High information quality can help top managers coordinate the operations among different departments of the firm (Gallemore and Labro 2015) and therefore allocate workloads more efficiently. Bill Blackburn, the Vice President of Baxter's environmental and health accounting system, suggests that the "right data" and transparency make inter-plant comparisons possible and facilitate the interventions of the plants' workplace-safety measures (Koehler 2001). Further, real-time information about production processes enables firms to monitor the production, adjust the workloads, identify and solve potential problems in workplace safety in a timely manner (Cohn and Wardlaw 2016).

Fourth, with high information quality, firms may incorporate safety-related information in the performance measurement of the managers at the establishment level. Management accounting advocates the Balanced Score Card (BSC), which incorporates measures other than pure financial performance. Kaplan and Norton (2001) argue that workplace-safety objectives should be incorporated in BSC if it is vital for firms' development. Other studies also suggest that incorporating safety-related performances into BSC is important (Karahalios 2014; Köper, Möller,

[19] Baxter's health and safety accounting system helped the firm track and report costs associating with payments for lost workdays and disability periods. Baxter designed a cost model and selected eight cost elements of injuries/illness. After analyzing the data gathered at different plants, Baxter was able to determine the annual costs for different injury cases. With such detailed data, Baxter was able to assess the benefits of various strategies such as whether keeping injured employees on restricted duty was financially viable.

and Zwetsloot 2009). A high-quality information environment makes it possible for headquarters managers to measure the safety-related performance of establishment managers and can motivate lower-level managers to pay attention to workplace safety.

The above analysis leads to our first hypothesis:[20]

H1: Higher information quality is associated with lower workplace injury rates.

However, there is also a possibility that a high information quality may not translate into a high workplace safety. Managers may rely on information sources other than internal accounting information to make decisions on workplace safety issues. For example, Alcoa Inc. develops its own fatality risk categorization tool to manage its workplace safety, which is distinct from the accounting system (Alcoa 2013).[21] A survey of health and safety personnel finds that some do not believe injury-related cost data are useful in their organization, and they suggest that focusing on economic factors may lead to inefficient use of other information (Haefeli, Haslam, and Hsalam 2005).

Cross-Sectional Predictions (Hypotheses 2-4)

In this section, we develop three hypotheses to explore cross-sectional variations in the extent to which the information quality affects workplace safety (if any). First, we expect that the effect of information quality on workplace safety is stronger when the headquarters have more decision rights in the operations of establishments. Safety-related investments are typically implemented at the establishment level, but the decisions are made at the firm level through budgetary and policy

[20] All hypotheses are stated in the alternative form.

[21] A contra argument is that the financial information system has a spill-over effect on firms' operation systems. Prior literature suggests that the same systems are often used for both internal operation management and financial reporting (Kaplan 1984; Dichev et al. 2013; Feng et al. 2015; Shroff 2017; Cheng et al. 2018).

initiatives (Cohn and Wardlaw 2016). Therefore, firms need to rely on information to reduce the information asymmetry between the headquarters and establishments, and to determine where and how much to invest in safety activities. Internal information can improve the efficiency of the decision process. However, in some firms, the headquarters may delegate the safety-related decision rights to its subsidiaries (Ghoshal and Nohria 1989). For these firms, the role of headquarters' overall planning will be less important, and as a result, the effect of information quality on these establishments' workplace safety will be weaker.

Another channel through which information quality can affect workplace safety is through the reasonable allocation of workloads among establishments. However, the allocation among establishments is only possible when headquarters have the decision rights. If establishments have more decision rights, the headquarters are less likely to make work plans. Therefore, the demand for information is reduced and information quality plays a less important role. Based on the above arguments, we propose the following hypothesis:

H2: The effect of information quality on workplace safety is more pronounced when the headquarters have more decision rights relative to establishments.

Our second cross-sectional prediction is based on employees' bargaining power. As argued above, information quality can affect workplace safety by increasing the awareness of top managers and motivate them to invest in safety issues. This effect will become weaker when employees have more bargaining power. Employees naturally care more about their own safety. Therefore, when employees have more bargaining power, they will likely bargain over safety issues and make top managers aware of the importance of workplace safety. Studies find that unionized employees bargain over safety issues and tend to have fewer workplace injuries (Kaufman 2005; Morantz 2013).

In addition, many workplace injuries are due to work overload (Brown 1996). High information quality can affect workforce safety through reasonable allocations of workloads among employees. However, when employees can bargain for more reasonable workloads, information quality is likely less important. These analyses lead us to our third hypothesis:

H3: The effect of information quality on workplace safety is weaker when employees have higher bargaining power.

Finally, we consider firms' financial resources. Firms need to deploy resources in safety investments to improve or maintain their level of workplace safety. Consequently, for information quality to play an important role in workplace safety, a prerequisite is that firms should have sufficient financial resources. Cohn and Wardlaw (2016) suggest that investments in safety are more likely to be cut when firms face financial constraints, because the returns to safety investments accrue over the long run but managers are often short-term oriented. They note that a high level of workplace safety may be considered a "luxury" that financially-constrained firms cannot afford. As a result, we predict that the effect of information quality is weaker if firms are financially constrained:

H4: The effect of information quality on workplace safety is weaker when firms are financially constrained.

III. SAMPLE AND RESEARCH DESIGN

Sample Selection

We obtain workplace injury data from OSHA. According to the OSHA Data Initiative Program (ODI), OSHA surveys about 60,000 to 80,000 private-sector establishments with more than ten employees every year, and collects workplace-safety related data, including basic information of establishments such as location, SIC code, number of employees, total working hours of all the employees, and work-related injuries and illnesses.[22] Our sample period is from 2002 to 2011. In 2002, OSHA revised the recording rule, so the data before 2002 are not comparable with the data later. The year 2011 is the last year with data from OSHA publicly available.

We match establishments from OSHA to firms in Compustat based on the link table provided by Caskey and Ozel (2017). We then exclude financial firms (SIC code 6000 – 6999), observations with obvious errors, such as when the number of employees is less than 10, or when working hours per employee (in one year) is longer than 8,760 hours (24 hours × 365 days), and observations with missing variables for our baseline regressions.[23] Because we include state-year, industry-year, and establishment fixed effects, we drop 9,241 observations from singleton groups.[24] Our final sample consists of 69,056 establishment-year observations from 2002 to 2011, with 1,297 unique firms and 16,927 unique establishments.[25] In the baseline regressions, the sample size varies depending on the different proxies for information quality. Panel A of Table 1 summarizes the sample-selection process.

[22] OSHA enforces the accuracy of the data through audit and verification program, and fines and penalties for recordkeeping violations (Federal Register number 66:5916-6135).
[23] Our inferences are robust to excluding firms in the utility industry (untabulated).
[24] Singleton group are groups with only one observation. These observations are common in regressions with multiple levels of fixed effects and keeping these singleton observations may overstate the statistical significance of the regression coefficients. See http://scorreia.com/research/singletons.pdf.
[25] The OSHA data provide the name, zip code, and phone number of establishments. We get the gvkey of the establishments by merging the OHSA data with the link provided by Caskey and Ozel (2017). We identify unique establishments using unique gvkey, zip code, and phone-number combinations. Because two establishments of the same company can exist in the same zip code, there are more than 2,000 duplicate establishments if we identify unique establishments by gvkey and zip code. Our inferences are not sensitive to different ways of identifying unique establishments.

Research Design

We employ the following OLS regression to test the relation between information quality in year t and workplace safety of establishments in year t+1. We use *one-year-ahead* (t+1) workplace-safety measures to mitigate reverse causality concerns.[26]

$$TCR_{i,t+1} = \alpha + \beta_1 Information\ Quality_{i,t} + \beta_2 Size_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 Cash/Assets_{i,t} + \beta_5\ Market\ to\ Book_{i,t} + \beta_6 PPE/Assets_{i,t} + \beta_7 Cashflow/Assets_{i,t+1} + \beta_8 Dividend/Assets_{i,t+1} + \beta_9 Asset\ Turnover_{i,t+1} + \beta_{10} CapEx/Assets_{i,t+1} + \beta_{11} Suspect_{\,i,t+1} + \beta_{12} Log(Employees)_{i,t+1} + \beta_{13} Log(Hours/Employee)_{\,i,t+1} + \beta_{14} Natural\ Disaster_{i,t+1} + \beta_{15} Strike_{i,t+1} + \beta_{16} Shutdown_{i,t+1} + \beta_{17} Seasonal_{i,t+1} + Fixed\ Effects + \varepsilon \quad (1)$$

Following OSHA's definition, our main dependent variable is the Total Case Rate (*TCR*), measured by the total number of cases of work-related injuries, illnesses, or deaths in a given establishment-year divided by the number of hours worked by all employees and multiplied by 10,000. In a robustness test, following prior literature (Cohn and Wardlaw, 2016; Caskey and Ozel, 2017), we alternatively measure workplace safety using the number of work-related injuries and illness cases that result in days away from work, job restriction or transfer (*DART*), or that result in days away from work only (*DAFW*).

We measure information quality from different perspectives. First, following Gallemore and Labro (2015), we construct our measure of information quality based on four commonly-used proxies for information quality: (1) management forecast accuracy (*MFAccuracy*); (2) annual earnings announcement speed (*Speed*); (3) no internal control weakness report based on SOX

[26] For example, when firms have many workplace safety cases, it may lead to lower forecast accuracy or decrease in the earnings announcement timeliness.

Section 404 (*NoICW*); and (4) no error-driven restatements obtained from Audit Analytics (*NoRestate*). Because none of these proxies can perfectly measure information quality, we create a composite index (*IQ*), which is the average of the standardized values of the four proxies. We require at least two of the four measures to be not missing.[27]

Second, we employ the firm's accounting ERP implementation scope to measure information quality. ERP systems attempt to integrate information across business functions and different organizational positions into one central platform, which allows the corporate information more visible to managers (Dechow and Mouritsen 2005). Dorantes et al.(2013) and Pincus et al. (2017) also document that the implementation of ERP systems improves the internal information environment. Therefore, it is a relatively direct and intuitive measure of the internal information environment for the headquarters and the affiliated establishments. The ERP data comes from Computer Intelligence database. The Computer Intelligence (CI) database surveys 3,103 North American firms on IT investments, including their accounting ERP investments. Our measure of accounting ERP adoption (*Acct ERP*) is a firm-level accounting ERP adoption measure. The firm-level measure is the weighted average of accounting ERP implementation in each establishment weighted by the number of employees.

We further control for a set of firm characteristics that may affect workplace safety. Specifically, *Size* is the natural logarithm of the firm's total assets. *Leverage* is the firm's total short-term and long-term debt divided by total assets. This variable controls for the effect of financial constraints on workplace safety as documented by Cohn and Wardlaw (2016).[28] *Cash/Assets* is the total cash and cash equivalents divided by total assets. *Market to Book* is the market value of assets

[27] As an alternative to using the average of standardized values of four proxies to construct our composite measure, we use principal component analysis to construct an aggregate measure and observe that no inferences are affected (untabulated).
[28] We further control for financial constraint using alternative measures when testing H4.

divided by the book value of assets. *PPE/Assets* is net property, plant, and equipment divided by total assets. *Cashflow/Assets* is the sum of income before extraordinary items and depreciation and amortization, divided by total assets. *Dividend/Assets* is the total cash dividends paid to common shares divided by total assets. *Asset Turnover* is sales divided by total assets. *CapEx/Assets* is capital expenditures divided by beginning total assets. We control for the manager's incentive for benchmark beating using an indicator variable *Suspect*, which equals one if the distance between the current year and prior year net income scaled by beginning of prior year's market value is between zero and 0.01 (Caskey and Ozel 2017).[29]

We also include several time-varying establishment-level variables from OSHA to control for establishment characteristics that may affect workplace safety (e.g., Caskey and Ozel 2017). *Log(Employees)* is the natural logarithm of the establishment's number of employees. *Log(Hours/Employee)* is the natural logarithm of the establishment's total number of annual hours worked in a given establishment divided by the number of employees. *Natural Disaster* is an indicator variable equal to one if the establishment is affected by natural disasters or adverse weather conditions during the year. *Strike* is an indicator variable equal to one if there was a strike/lockout in the establishment during the year. *Shutdown* equals one if there was a shutdown/layoff in the establishment during the year. *Seasonal* equals one if the establishment employs seasonal workers during the year. Appendix A provides detailed variable definitions. All continuous variables are winsorized at the 1st and 99th percentiles, and all stock variables are measured at year t.

Importantly, we also include a number of fixed effects to control for unobservable potential correlated omitted variables. For our test of H1, we tabulate results using a variety of combinations

[29] In their main analysis, Caskey and Ozel (2017) use analysts' forecasts to proxy for market expectations. They note that using previous earnings produces similar results. We employ the previous year's earnings because the requirement of analyst data leads to a significant reduction of observations.

of state, industry, year, firm, and establishment fixed effects. In the ensuing analyses, we rely on the most stringent fixed-effects structure: establishment, state-year, and industry-year fixed effects.

IV. EMPIRICAL RESULTS

Descriptive Statistics

Panel B of Table 1 presents the summary statistics of our main variables. The mean (median) *Log(Employees)* and *Log(Hours/Employee)* are 4.942 (4.844) and 7.558 (7.598), respectively, which implies that an establishment on average has 140 (127) employees and each employee works 1,916 (1,994) hours per year. The mean (median) raw value of injury cases is 16.67 (8.00).The mean (median) value of the dependent variable *TCR* is 0.398 (0.321).[30] The mean case rate implies that in an average establishment-year, an employee has 7.62% probability of getting work-related injuries.[31] The mean (median) firm has *Size* of 9.006 (9.352), which indicates that the mean (median) firm has total assets of 8,151 (11,521) million dollars and thus that the sample firms are relatively large.

Panel C presents the correlation matrix for the information quality variables. All five individual proxies of information quality are positively correlated with each other. Four measures of *IQ* are highly correlated with the composite measure of *IQ*. Panel D presents the annual distribution of our sample. As shown in the table, the year 2011 is underrepresented in our sample. This is because the OSHA survey was discontinued in 2011.[32] Panel E presents average establishment-level case rates by Fama-French 48 industry classifications. The healthcare and

[30] Caskey and Ozel (2017) defines *TCR* as number of cases divided by the number of hours worked by all employees in the establishment and multiplied by 200,000. In this paper, we multiply by 10,000 to ease the presentation of the coefficients. The raw mean (median) value of injury cases in this paper is comparable to Cakey and Ozel (2017).
[31] TCR equals the number of injuries in a given establishment-year divided by the number of hours worked by all employees in the establishment and multiplied by 10,000. The probability is calculated as: (0.398/10,000)×1,916=7.62%.
[32] This is consistent with the sample distribution in Caskey and Ozel (2017). Our conclusions are not sensitive to the exclusion of 2011 from the sample.

transportation industries have the highest total case rates, while computers have the lowest total case rates. The industry distribution is consistent with Caskey and Ozel (2017).[33]

Test Results for H1

We employ an OLS regression to examine the relation between information quality in year t and workplace safety of the establishment in year t+1. The results are shown in Table 2. In columns (1)-(3) of Panel A, we proxy for information quality by the composite measure *IQ*. In columns (4)-(6), we proxy for information quality by the adoption scope of accounting ERP system (*Acct ERP*). From columns (1) to (6), we add different fixed effects (state-year, industry-year, firm, and establishment) to control for different types of sample characteristics. The coefficients on *Information Quality* are all significantly negative (at the 5% level or better using two-sided tests), consistent with H1. The consistent significance also suggests that our results are robust to different fixed effects. We control for establishment, state-year, and industry-year fixed effects in the later analyses. In column (3), the coefficient on *IQ* is -0.020. The economic significance of the coefficient indicates that a one standard deviation increase of *IQ* is associated with a decrease of injuries of 3.3%.[34] In column (6), the coefficient on *Acct ERP* is -0.063, which indicates that a one standard deviation increase of *Acct ERP* is associated with a decrease of injuries of 4.3%.[35]

The coefficients on the control variables are generally comparable to prior literature. For example, the coefficients on *Leverage* are positive and significant in most columns, which is consistent with the findings of Cohn and Wardlaw (2016). The positive coefficient on *Strike* indicates that there are also more cases in establishments in which employees go on a strike. The

[33] Note the cases include employee work-related illness, which may explain the high case rates related to healthcare.
[34] The percentage is calculated as: 0.658×(-0.02)/0.398=-3.3%
[35] The percentage is calculated as: 0.272×(-0.063)/0.398=-4.3%

negative coefficient on *Log(Hours/Employees)* is consistent with the findings of Caskey and Ozel (2017).

In Panel B of Table 2, we redo the analyses using the four individual proxies of *IQ*. The coefficients on all four proxies are significantly negative. The evidence suggests that the effect of *IQ* on workplace safety is not driven by any specific aspect of *IQ* and provides further support for using a composite measure.

Because the adoption of accounting ERP system is likely endogenous, we alternatively use Heckman two-stage regressions following Pincus et al. (2017) in Appendix C. The first-stage results are presented in Panel A of Appendix C. Panel B of Appendix C reports the second-stage regression results. The coefficients on the Inverse Mills Ratio (IMR) are significant (at the 10% level using two-sided tests). More importantly, in all columns the coefficients on *Acct ERP* are significantly negative, which provides further support to the above analyses and H1.

Cross-Sectional Analyses (Results for H2-H4)

In this section, we execute three cross-sectional analyses of the relation between information quality and workplace safety. First, we consider the allocation of decision-rights between headquarters and establishments. The intuition is that if the headquarters are less involved in the establishments' operational decisions, i.e., the firm is more decentralized, the relation between information quality and workplace safety should be weaker.

Our proxy of headquarters involvement is the relative size of the establishment, an indicator that equals one if the number of employees of the establishment divided by the number of employees of the firm is below the sample median in year t (*RelativeSize*). It is easier for managers at headquarters to obtain and process the information needed to facilitate decision-making if establishments are relatively smaller. Hence, smaller subsidiaries are more likely to have less decision rights.[36]

We adapt the regression model in equation (1) by including the proxies for headquarters involvement, and the interaction between information quality and headquarters involvement. As the results of Table 3 show, the coefficients on the interaction terms are significantly negative in both columns, which implies that the relation between information quality and workplace safety is stronger when the headquarters have more decision rights. The results are consistent with H2.

Second, we test the effect of labor's bargaining power. Our prediction is that the effect of information quality on safety is weaker when employees have more bargaining power. Kaufman (2005) suggests that labor unions have strong bargaining power, and often bargain over the workloads and workplace safety issues. We therefore assume that employees of establishments in higher labor-union membership industries likely have higher bargaining power over workplace safety relative to the headquarters. We obtain data from the Union Membership and Coverage Database, which surveys the labor union membership of U.S. firms by census industry codes. We match the census industry codes to 2-digit NAICS industry codes and calculate the average union membership over 2002-2011. We define the establishment as *High Labor Union* if the industry of the establishment is above the sample median in the average union membership.[37] We adapt the regression model in equation (1) by including the proxy of bargaining power, and the interaction between information quality and bargaining power. Table 4 reports the results. We find that the

[36] For robustness, we also use two alternative measures of the headquarters involvements. First, we use product market competition. Firms facing higher competition are less likely to centralize the decision rights at headquarters, in order to quickly react to the competitors' movements. Second, we use unrelated diversification. Firms with higher unrelated diversification are less likely to centralize the decision rights, since the decisions could be more different and complex. Our results show that the effect of information quality on workplace safety is more pronounced when firms face lower market competition, or when firms have lower unrelated diversification, consistent with H2.

[37] Another measure of employees' bargaining power is industry bargaining agreement coverage. We redo the analysis based on industry bargaining agreement coverage. The establishments in the high (low) group of the bargaining agreement coverage are exactly the same as the high (low) group of union membership in our sample. Therefore, we only report the results of union membership.

relation between information quality and workplace safety is weaker when the establishment's labor union membership is higher, consistent with H3.

Finally, we examine the potential effect of financial constraints on the relation of information quality and workplace safety. We predict that the relation will be weaker if firms are more financially constrained. We proxy for financial constraints using *WW Index* and *NoRating*. *WW High* is an indicator variable equal to one if the firm's *WW index*, calculated according to Whited and Wu (2006), is above the sample median in the given year and zero otherwise. *NoRating* is an indicator variable equal to one if the firm does not receive S&P Domestic Long-Term Issuer Credit or receives an "in default" rating in the given year, and zero otherwise (Almeida and Campello 2007). Firms with *WW High*=1 or *NoRating*=1 are more likely to have financial constraints. We adapt the regression model in equation (1) by including the proxy of financial constraints, and the interaction between information quality and financial constraints. Table 5 reports the results. We find that the coefficients on the interaction terms are significantly positive, which implies that the relation between IQ and workplace safety is weaker when firms are financially constrained, consistent with H4.

The above cross-sectional analyses also add further credence to our H1 results in that we find evidence that the effect is more pronounced for subsamples for which we have clear ex ante predictions.

V. ADDITIONAL ANALYSES AND ROBUSTNESS TESTS

Use of Plausibly Exogenous Shocks to Further Sharpen Identification

In Table 2, we include establishment fixed effects that control for possible time-invariant omitted variables. To further control for potential unknown sources of endogeneity, we employ two plausibly exogenous shocks. The first shock we use is based on the adoption of SFAS 158 in 2006.[38] SFAS 158 is effective for firms with fiscal years ending after December 15, 2006, and requires firms to use the projected benefit obligation (PBO) instead of the accumulated benefit obligation (ABO) to account for their pension liabilities. One major difference between PBO and ABO is that PBO includes estimated salary increases up to the retirement date, while the ABO only uses employees' current compensation.

Prior literature suggests that the process of compliance with changes in accounting standards induces managers to acquire new information, which improves the internal information environment and their investment decisions (Shroff 2017; Cheng et al. 2018). Compliance with new standards also requires firms to hire external experts (e.g., actuaries) to obtain estimates of assets/liabilities, which further expands the information set of managers. As workplace safety relates to workers' salaries (Moore and Viscusi 1989), the SFAS 158 requirement of projecting future compensation can induce managers to collect more information, including information related to safety issues.[39] Therefore, we employ the implementation of SFAS 158 as a shock to the internal information environment.[40] We employ the following model to test our prediction:

$$TCR = \alpha + \beta_1\, Post + \beta_2\, OFFBL + \beta_3\, Post \times OFFBL + \beta_4\, Control\ Variables + \varepsilon \qquad (3)$$

[38] We do not use the enactment of SOX as the shock to information quality as in Gallemore and Labro (2012) because 95% of our sample firms are accelerated filers.

[39] Practical actuarial guidance suggests that the estimation of the future disability incidence rate is an important input to predict liabilities: https://www.sbcera.org/Portals/0/PDFs/Actuarial%20Valuation%20and%20Review/2008/08_Actuarial_Experience_Study.pdf.

[40] Because only firms with defined benefit pension plans have pension liabilities, in this test the sample is restricted to firms with defined benefit pension plans.

Following Khan, Li, Rajgopal, and Venkatachalam (2018), we define our "affected" firms as firms with large off-balance-pension liabilities (scaled by total assets), as SFAS 158 has a stronger effect on them. Specifically, we partition the sample based on firms' off-balance-sheet pension liabilities each year. *OFFBL* equals one if a firm's off-balance-sheet pension liabilities scaled by total assets is above the sample median in the given year and zero otherwise.[41,42] *Post* equals one if it is after 2006 and zero otherwise. We expect the coefficient on β_3 to be negative. We present the results in Table 6. The coefficient on β_3 is significantly negative, which is consistent with our hypothesis and further mitigates potential endogeneity concerns.

The second shock we use is the introduction of new airline routes between headquarters and establishments following the method proposed in Giroud (2013) and Bernstein, Giroud, and Townsend (2016). The introduction of airlines are exogenous shocks in that they are not affected by firm decisions. In addition, compared to *IQ* and *Acct ERP* in the main test, the introduction of airlines is more likely to capture soft internal information exchange within a firm. The shorter travel time can lower information asymmetry between headquarters and establishments, because headquarters can monitor and validate information that the establishments report. Chen et al. (2018) find that the introduction of new airlines between headquarters and establishments can significantly reduce internal information asymmetry. We provide the details of our method in Appendix B. We identify 804 flight-stop reduction cases and 492 flight-time reduction cases between headquarters and

[41] Off-balance-sheet pension liabilities is the sum of unamortized prior service costs, unamortized gains or losses, and unamortized net transition assets defined by SFAS 87 in both pre-158 and post-158 periods.
[42] In untabulated analyses, we instead use the raw value of *OFFBL* (i.e., a continuous variable) and the inferences are unaffected.

establishments.[43] Panel A of Table 7 shows the annual distribution of these cases. We employ a difference-in-differences design as in equation (2) and tabulate the results in Panel B of Table 7.[44]

$$TCR = \alpha + \beta_1 Treat\ Stop\ (Treat\ Time) + \beta_2\ Control\ Variables + Fixed\ Effects + \varepsilon \qquad (2)$$

In the table, the coefficients on *Treat Stop* and *Treat Time* are -0.020 and -0.032 (and statistically significant), respectively. The economic significance of the coefficients indicates that compared to control establishments, treatment establishments see a decrease of injuries by 5.0% - 8.0%. Thus, these findings are consistent with those presented in Table 2 and suggest that high information quality can improve workplace safety. More importantly, the evidence suggests that unknown correlated omitted variables are unlikely to explain the results.

Alternative Measures of Workplace Safety

In Table 8, following Cohen and Wardlaw (2016), we use two alternative measures for workplace safety. In columns (1) and (3), we measure workplace safety by *DART* (the number of injuries resulting in days away from work, job restriction, or transfer in a given establishment-year, divided by the number of hours worked by all employees in the establishment and multiplied by 10,000). In columns (2) and (4), we measure workplace safety by *DAFW* (the number of injuries resulting in days away from work in a given establishment-year, divided by the number of hours

[43] The 804 (492) cases are the treatment sample. The control sample are the establishment whose flight stops (time) to headquarters do not change.

[44] One theoretical possibility is that local shocks could drive both the introduction of new airlines and reduction of workplace injuries. Because a treatment is uniquely defined by two airport locations (i.e., headquarters and establishment), we control for such local shocks by our inclusion of establishment state-year fixed effects.

worked by all employees in the establishment and multiplied by 10,000). As Table 8 shows, our inferences are robust to different measurements of workplace safety.[45]

Heterogeneous Effect of Industry Labor Intensity

We further explore whether the effect of information quality on workplace safety varies with labor intensity. Firms with high labor intensity rely more heavily on human capital and have higher labor costs (Agrawal and Matsa 2013). For these firms, the cost and benefit information related to workplace safety is not only more important but also more difficult to collect. High information quality can play a more important role by enabling firms to collect, quantify, and analyze safety-related information, therefore having a stronger effect on safety improvement. In Table 9, we interact *Information Quality* with *High Labor Intensity*. We find that the coefficient on interaction term is significantly negative, which is consistent with our argument.

Additional Controls

Although our main analyses include many firm and establishment characteristics as control variables (in addition to the strict fixed-effects structure), we consider whether our conclusions are robust to the inclusion of additional controls. First, we include a DEA-based measure of firm's operational efficiency as an additional control variable (Demerjian, Lev, and McVay, 2012). Gallemore and Labro (2015) find that information quality is associated with tax avoidance. Consequently, we examine whether our results are robust to controlling for tax avoidance. In Table 10, we include the effective tax rate (*GAAP ETR*, total income tax/ pre-tax income) as an additional

[45] We also redo the cross-sectional tests using *DART* and *DAFW* as dependent variables (untabulated). Our conclusions are unaltered.

control variable.[46] Bradley et al. (2019) find that workplace safety is positively associated with analyst coverage. We also control for analyst coverage in this section. Table 10 shows that our inferences are robust to these additional controls. Interestingly, the coefficient on firm operation efficiency is significantly positive, which suggests that firms may sacrifice workplace safety to improve operational efficiency in the short run. It also suggests that workplace safety is not a subset of operating efficiency and captures some other aspects of firm performance.

VI. CONCLUSION

In this study, we examine the effect of information quality on workplace safety. We find that a higher information quality is significantly associated with improved workplace safety. We further show that the effect depends on the decision rights of the headquarters, bargaining power of employees, and financial constraints of the firms.

We use a variety of research-design strategies to address the potential for correlated omitted variables, including different measures of internal information quality, an extensive set of control variables, a highly restrictive fixed-effects structure, and two exogenous shocks. We find that our conclusions are robust to these tests. However, we acknowledge that these tests cannot eliminate the possibility of unknown time-varying omitted variables driving our results.

Our study relates to the literature on internal information quality and corporate social responsibility. The paper extends and contributes to the literature by providing empirical evidence that high information quality plays an important role in workplace safety, an issue of considerable concern to firms, employees, and society.

[46] Because we need to drop loss firms to calculate the effective tax rate, our sample size is reduced, which is why we do not include this control in the main analyses.

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Appendix A: Variable Definitions

Variable	Definition
TCR	Total case rate, defined as the number of work-related injuries and illness cases in a given establishment-year divided by the number of hours worked by all employees in the establishment and multiplied by 10,000. The cases include cases that result in days away from work, job transfer or restriction, death, and other recordable cases. (OSHA)
DART	The number of work-related injuries and illness cases that result in days away from work, job transfer or restriction in a given establishment-year, divided by the number of hours worked by all employees in the establishment and multiplied by 10,000. (OSHA)
DAFW	The number of work-related injuries and illness cases that result in days away from work in a given establishment-year, divided by the number of hours worked by all employees in the establishment and multiplied by 10,000. (OSHA)
MF Accuracy	The absolute value of (management's last available estimate of EPS before year-end minus actual EPS) multiplied by negative one, divided by stock price 3 days prior to the announcement date. (IBES and CRSP)
Speed	The number of days between the end of the fiscal year and the firm's earnings announcement, divided by 365 and multiplied by negative one. (Compustat)
NoICW	An indicator variable equal to one if the firm does not report a Section 404 material weakness in the current fiscal year and zero otherwise. (Audit Analytics)
NoRestate	An indicator variable equal to one if the firm does not restate in the current fiscal year due to error, and zero otherwise. (Audit Analytics)
IQ	The average of the standardized values of *MF Accuracy*, *Speed*, *NoICW* and *NoRestate*. We require at least two of the above variables available to compute IQ.
Acct ERP	Aggregated from firms' establishments based on whether an establishment has adopted an accounting ERP in the given year. *Acct ERP =(∑Employees×ERP Adoption)/Total Employees*
Treat Stop	An indicator variable equal to one in year t and after if the flight stops between headquarters and establishments reduce because of a new airline introduction, and zero otherwise.
Treat Time	An indicator variable equal to one in year t and after if the traveling time reduces more than 60 minutes compared to the time spent in the previous year, and zero otherwise.
OFFBL	An indicator variable equal to one if the firm's off-balance-sheet pension liabilities scaled by total assets is above the sample median in a given year, and zero otherwise.
Size	The natural logarithm of a firm's total assets. (Compustat *at*)
Leverage	Firm's total short-term debt and long-term debt divided by total assets. (Compustat (*dlc*+*dltt*)/*at*)
Cash/Assets	Firm's total cash and cash equivalents divided by total assets. (Compustat *ceq/at*)

Market to Book	Firm's market value of assets divided by book value of assets. Market value of assets equals the sum of market value of equity, book value of total liabilities, and liquidation value of preferred stock minus deferred tax liabilities. (Compustat ((*cshpri*×*prcc_f*)+*pstkl*+(*dlc*+*dltt*)-*txdb*)/*at*)
PPE/Assets	Firm's net property, plant, and equipment divided by total assets. (Compustat *ppent*/*at*)
Cashflow/Assets	The sum of income before extraordinary items and depreciation and amortization, divided by total assets. (Compustat *(ib+dp)/at*)
Dividend/Assets	Firm's total cash dividends paid to common shares divided by total assets. (Compustat *dvc/at*)
Asset Turnover	Firm's sales divided by total assets. (Compustat *sale*/*at*)
CapEx/Assets	Firm's capital expenditures divided by beginning total assets. (Compustat *capx*/*at*)
Suspect	An indicator variable equal to one if the distance between the current year and prior year net income scaled by beginning of prior year's market value is between zero and 0.01, and zero otherwise.
Log(Employees)	The natural logarithm of the establishment's number of employees (OSHA).
Log(Hours/Employee)	The natural logarithm of the establishment's total number of annual hours worked in a given establishment divided by the number of employees (OSHA).
Natural Disaster	An indicator variable equal to one if the establishment is affected by natural disasters or adverse weather conditions during the year, and zero otherwise (OSHA).
Strike	An indicator variable equal to one if there was a strike/lockout in the establishment during the year, and zero otherwise (OSHA).
Shutdown	An indicator variable equal to one if there was a shutdown/layoff in the establishment during the year, and zero otherwise (OSHA).
Seasonal	An indicator variable equal to one if the establishment employs seasonal workers, and zero otherwise (OSHA).
GAAP ETR	Firm's effective tax rate. (Compustat *txt/pi*)
Analyst Forecasts	The natural logarithm of the number of analysts forecast reports plus one. (Compustat *txt/pi*)
RelativeSize	An indicator variable equal to one if (the number of establishment employees/ the number of firm employees) is below the sample median.
High Labor Union	An indicator variable equal to one if the industrial union membership rate of establishment is above the sample median in the sample period.
WW High	An indicator variable equal to one if the firm's WW index is above the sample median in the given year, WW index = –0.091 × cash flow/assets – 0.062 × positive dividend indicator + 0.021 × long-term debt/assets – 0.044 × log(assets) + 0.102 × industry sales growth – 0.035 × sales growth.
NoRating	An indicator variable equal to one if the firm does not receive the S&P Domestic Long-term Issuer Credit or receives an "in default" rating

Appendix B: Details of Computation of Exogenous Shock Related to Flight Changes

We use the following procedures to perform the test. First, we identify the location of headquarters and establishments based on their longitudes and latitudes. We obtain the historical location of headquarters data from the website of *Notre Dame Software Repository for Accounting and Finance (SRAF).* Second, for each headquarters and establishment, we identify the three nearest airports. We determine the fastest airline route between any two airports using the itinerary information from the T-100 Domestic Segment Database. The T-100 contains monthly data for each airline and route in the U.S. The data include the origin and destination airports, flight duration, scheduled departures, departures performed, passengers enplaned, and aircraft type. These data are compiled from Form 41 of the U.S. Department of Transportation and provided by the Bureau of Transportation Statistics. We use the *NETFLOW* procedure in SAS to calculate the fastest airline and assume that each layover adds 60 minutes to the total flight time.

Third, we calculate the driving time between the headquarters (establishments) and the three nearest airports. We calculate the driving distance and time using the application *HERE API* (https://developer.here.com). The total flight time between headquarters and establishments include the driving time from headquarters to the airports, average ramp-to-ramp time, layover time for every stop, and driving time from destination airports to the establishments. We then keep the shortest total flight time for each headquarter-establishment pair in each year.

Finally, we identify the optimal route by comparing the total travel time between headquarters and establishments in each year. We define the treatment group based on flight-stop reduction or traveling time reduction. Specifically, *Treat Stop* equals one in year t and after if the flight stops between headquarters and establishments reduce because of a new airline introduction. *Treat Time* equals one in year t and after if the traveling time is reduced by more than 60 minutes compared to the time spent in the previous year. Following Giroud (2013), we drop the observations that relocate their headquarters to different cities during our sample period as the flight stop or time reduction may not be exogenous. In total, we have 51,069 observations in this analysis.

Appendix C: Potential Self-Selection Bias of ERP Adoption

This table presents the result of the first-stage ERP selection model. *Acct ERP Indicator* equals one if the firm adopts the accounting ERP system in the given year, and zero otherwise. The definitions of all independent variables are shown in Panel B. *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels for two-tailed tests. The *t-statistics* are computed using standard errors robust to clustering at the firm level.

Panel A: First-Stage ERP Selection Model

	Acct ERP Indicator
Related Diversification	0.016**
	(2.42)
Unrelated Diversification	0.603***
	(4.78)
Concentration	0.270
	(1.38)
Uncertainty	-0.935**
	(-2.28)
Profit	-0.113
	(-0.25)
Debt Ratio	0.080
	(0.35)
Average sale growth	-1.226***
	(-7.55)
LogSale	0.482***
	(13.28)
Automate	-0.036
	(-0.12)
Transform	0.322
	(0.98)
High Tech	-0.387*
	(-1.79)
Low Tech	-0.215
	(-1.30)
Year FE	Yes
Industry FE	Yes
Pseudo R-squared	0.307
N	5.760

Panel B: Second Stage Regression

	(1)	(2)	(3)
Variables	*TCR*	*TCR*	*TCR*
Acct ERP	-0.059**	-0.060**	-0.063**
	(-2.12)	(-2.32)	(-2.55)
Size	-0.011	-0.029	-0.028
	(-0.99)	(-1.38)	(-1.27)
Leverage	0.200**	0.145	0.156
	(2.40)	(1.47)	(1.51)
Cash/Assets	0.088	0.036	0.085
	(1.21)	(0.44)	(0.91)
Market to Book	0.021	0.021	0.022*
	(1.09)	(1.61)	(1.72)
PPE/Assets	-0.015	-0.169	-0.158
	(-0.21)	(-1.50)	(-1.30)
Cashflow/Assets	-0.106	-0.029	-0.029
	(-0.94)	(-0.47)	(-0.45)
Dividend/Assets	-1.123*	-0.653	-0.596
	(-1.77)	(-1.31)	(-1.24)
Asset Turnover	-0.009	-0.028	-0.038*
	(-0.47)	(-1.42)	(-1.72)
CapEx/Assets	0.173	-0.307*	-0.419**
	(0.35)	(-1.91)	(-2.23)
Suspect	-0.000	0.008	0.011
	(-0.02)	(0.81)	(1.22)
Log(Employees)	0.008	0.001	-0.028***
	(1.36)	(0.27)	(-2.75)
Log(Hours/Employee)	-0.347***	-0.264***	-0.221***
	(-5.54)	(-4.24)	(-6.77)
Natural Disaster	0.040*	0.025	0.005
	(1.70)	(1.31)	(0.25)
Strike	0.113***	0.103***	0.047*
	(3.26)	(3.53)	(1.68)
Shutdown	0.022	0.019***	-0.001
	(1.57)	(3.12)	(-0.27)
Seasonal	-0.007	0.010	-0.021
	(-0.27)	(0.63)	(-1.48)
IMR	-0.012	-0.091*	-0.084*
	(-0.23)	(-1.83)	(-1.73)
State × Year FE	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes
Firm FE	No	Yes	No
Establishment FE	No	No	Yes
Adj. R-squared	0.248	0.378	0.621
Observations	54,929	54,929	54,929

Panel C: Variable Definitions for the First-Stage Model

Variable	Definition
Related Diversification	Related diversification measure of the extent to which firms operate across four-digit SIC codes that are within a two-digit SIC code (Dewan, Michael, and Min 1998) (Compustat *sale*)
Unrelated Diversification	Unrelated diversification measure of the extent to which firms operate across two-digit SIC codes (Dewan et al. 1998) (Compustat *sale*)
Concentration	Firm's industry concentration at the four-digit SIC level (Compustat *sale*)
Uncertainty	The standard deviation of firm i's net income for the previous 5 years, scaled by sales (Compustat *ib* and *sale*)
Profit	Operating income scaled by sales (Compustat *oibdp/ sale*)
Debt Ratio	Long-term debt divided by total assets (Compustat *dltt/ at*)
Average sale growth	The average of the sales growth of the current and previous years (Compustat *sale*)
LogSale	The natural logarithm of sales (Compustat *sale*)
Automate	An indicator for whether or not a client company belongs to an automate industry, according to Anderson et al. (2006)
Transform	An indicator for whether or not a client company belongs to a transform industry, according to Anderson et al. (2006)
High Tech	An indicator for whether or not a client company belongs to a high-tech industry, according to Francis and Schipper (1999)
Low Tech	An indicator for whether or not a client company belongs to a low-tech industry, according to Francis and Schipper (1999)

Table 1: Descriptive Statistics

Panel A: Sample Selection

Data Restrictions	**Observations**
Original workplace safety data from OSHA between 2002 to 2011	649,925
Less: Observations with obvious mistakes	(630)
Less: Observations that cannot be linked to CRSP/Compustat merged database	(560,444)
Less: Observations with missing data to calculate control variables	(9,232)
Less: Observations that belong to financial firms (SIC codes 6000-6999)	(123)
Less: Observations with missing *IQ* data	(1,199)
Less: Singleton observations	(9,241)
Sample for main analysis	69,056

Panel B: Summary Statistics of Main Variables

Variable	Obs.	Mean	P25	Median	P75	Std.
TCR	69,056	0.398	0.145	0.321	0.565	0.335
DART	69,056	0.265	0.067	0.196	0.390	0.256
DAFW	69,056	0.119	0.000	0.066	0.163	0.155
MFAccuracy	46,389	-0.007	-0.008	-0.004	-0.002	0.012
Speed	69,056	-0.098	-0.121	-0.082	-0.066	0.055
NoICW	39,077	0.960	1.000	1.000	1.000	0.197
NoRestate	69,056	0.915	1.000	1.000	1.000	0.279
IQ	69,056	-0.014	-0.175	0.209	0.369	0.658
Acct ERP	54,929	0.379	0.150	0.338	0.585	0.272
Size	69,056	9.006	7.594	9.352	10.340	1.803
Leverage	69,056	0.270	0.140	0.246	0.381	0.162
Cash/Assets	69,056	0.387	0.277	0.411	0.498	0.180
Market to Book	69,056	1.383	0.838	1.179	1.675	0.743
PPE/Assets	69,056	0.391	0.245	0.385	0.558	0.182
Cashflow/Assets	69,056	0.093	0.067	0.099	0.133	0.065
Dividend/Assets	69,056	0.017	0.001	0.013	0.028	0.018
Asset Turnover	69,056	1.434	0.953	1.319	1.739	0.706
CapEx/Assets	69,056	0.058	0.029	0.048	0.078	0.038
Suspect	69,056	0.235	0.000	0.000	0.000	0.424
Log(Employees)	69,056	4.942	4.331	4.844	5.421	0.955
Log(Hours/Employee)	69,056	7.558	7.473	7.598	7.652	0.173
Natural Disaster	69,056	0.005	0.000	0.000	0.000	0.074
Strike	69,056	0.002	0.000	0.000	0.000	0.049
Shutdown	69,056	0.075	0.000	0.000	0.000	0.264
Seasonal	69,056	0.034	0.000	0.000	0.000	0.181

Panel C: Pearson Correlation Matrix of Information Quality Measures

	MFAccuracy	*Speed*	*NoICW*	*NoRestate*	*IQ*
Speed	0.214***				
NoICW	0.057***	0.232***			
NoRestate	0.051***	0.046***	0.366***		
IQ	0.622***	0.651***	0.733***	0.617***	
Acct ERP	0.078***	0.133***	0.066***	0.074***	0.137***

Panel D: Sample Distribution by Year

Year	*Observation*	*TCR*
2002	6,804	0.557
2003	8,425	0.490
2004	7,841	0.503
2005	9,136	0.399
2006	9,227	0.369
2007	7,690	0.350
2008	8,763	0.290
2009	4,504	0.331
2010	5,898	0.277
2011	768	0.325
Total	69,056	0.398

Panel E: Injury Rates by Fama-French 48 Industrial Classification

Industry	*Observations*	*TCR*
Healthcare	4,920	0.605
Transportation	10,309	0.581
Candy & Soda	2,589	0.538
Entertainment	29	0.506
Wholesale	4,720	0.461
Fabricated Products	952	0.449
Beer & Liquor	102	0.429
Food Products	2,953	0.427
Automobiles and Trucks	1,946	0.422
Business Services	2,957	0.418
Others	1,871	0.417
Agriculture	263	0.414
Retail	12,993	0.374
Personal Services	86	0.369
Steel Works Etc.	1,400	0.346
Shipbuilding, Railroad Equipment	156	0.337
Construction Materials	3,928	0.328
Consumer Goods	918	0.325
Rubber and Plastic Products	1,692	0.284
Machinery	2,328	0.281
Apparel	171	0.271
Recreation	189	0.267
Electrical Equipment	1,291	0.252
Restaurants, Hotels, Motels	20	0.241
Textiles	360	0.238
Utilities	58	0.233
Business Supplies	1,583	0.223
Construction	37	0.206
Aircraft	717	0.203
Printing and Publishing	495	0.193
Shipping Containers	2,065	0.182
Defense	193	0.166
Medical Equipment	624	0.158
Tobacco Products	25	0.143
Communication	36	0.133
Chemicals	1,426	0.132
Measuring and Control Equipment	488	0.124
Pharmaceutical Products	361	0.118
Electronic Equipment	1,370	0.117
Petroleum and Natural Gas	150	0.104
Computers	285	0.070
Total	69,056	0.398

Table 2: Information Quality and Workplace Safety

This table presents the results of estimating OLS regressions of workplace safety on information quality and other control variables. The dependent variable is total case rate (*TCR*), measured as the number of work-related injuries and illness cases, including those result in days away from work, job transfer or restriction, death, and others, in a given establishment-year divided by the number of working hours in the establishment and multiplied by 10,000. In Panel A, we use the composite IQ measure (*IQ*) and the scope of accounting ERP implementation (*Acct ERP*), and present the results with various fixed effects. In Panel B, we use four individual measures and present results with establishment fixed effects, industry-year fixed effects, and state-year fixed effects. *MF Accuracy* is the mean value of management forecast accuracy in a given year, multiplied by negative 1. *Speed* is measured as the number of days between the end of the fiscal year and the earnings announcement date, divided by 365 and multiplied by negative 1. *NoICW* is an indicator variable equal to one if SOX 404 internal control is not effective, and zero otherwise. *NoRestate* is an indicator variable equal to one if the firm does not restate in the current fiscal year due to error, and zero otherwise. *IQ* is the average of the standardized values of these four proxies. *Acct ERP* is aggregated from firms' establishments based on whether an establishment has adopted an accounting ERP in the given year. Other control variables are defined in Appendix A. *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels for two-tailed tests. The *t-statistics* are computed using standard errors robust to clustering at the firm level.

Panel A: Information Quality and Workplace Safety

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	*TCR*	*TCR*	*TCR*	*TCR*	*TCR*	*TCR*
Information Quality Measure	*IQ*	*IQ*	*IQ*	*Acct ERP*	*Acct ERP*	*Acct ERP*
Information Quality	-0.031**	-0.019**	-0.020***	-0.060**	-0.061**	-0.063**
	(-2.23)	(-2.36)	(-2.63)	(-2.12)	(-2.31)	(-2.54)
Size	-0.005	-0.024	-0.020	-0.009	-0.026	-0.024
	(-0.79)	(-1.48)	(-1.19)	(-1.22)	(-1.19)	(-1.10)
Leverage	0.173**	0.143*	0.162*	0.198**	0.137	0.149
	(2.53)	(1.69)	(1.72)	(2.43)	(1.39)	(1.45)
Cash/Assets	0.097	0.058	0.097	0.088	0.032	0.082
	(1.48)	(0.83)	(1.22)	(1.21)	(0.39)	(0.88)
Market to Book	0.010	0.018	0.021*	0.021	0.022	0.023*
	(0.66)	(1.48)	(1.74)	(1.09)	(1.62)	(1.75)
PPE/Assets	0.034	-0.062	-0.074	-0.015	-0.171	-0.160
	(0.60)	(-0.78)	(-0.85)	(-0.21)	(-1.54)	(-1.34)
Cashflow/Assets	0.075	0.001	-0.007	-0.102	-0.040	-0.039
	(0.89)	(0.02)	(-0.14)	(-0.92)	(-0.66)	(-0.61)
Dividend/Assets	-0.961*	-0.676	-0.465	-1.102*	-0.649	-0.597
	(-1.88)	(-1.38)	(-0.95)	(-1.82)	(-1.25)	(-1.20)
Asset Turnover	-0.002	-0.016	-0.022	-0.009	-0.027	-0.037*
	(-0.11)	(-0.96)	(-1.26)	(-0.46)	(-1.36)	(-1.67)
CapEx/Assets	-0.026	-0.147	-0.162	0.169	-0.296*	-0.407**
	(-0.07)	(-0.95)	(-1.04)	(0.35)	(-1.85)	(-2.18)
Suspect	0.009	0.002	0.006	-0.000	0.007	0.011
	(0.93)	(0.38)	(1.10)	(-0.04)	(0.80)	(1.21)
Log(Employees)	0.009*	0.000	-0.024***	0.008	0.001	-0.028***
	(1.69)	(0.07)	(-2.83)	(1.36)	(0.26)	(-2.76)
Log(Hours/Employee)	-0.316***	-0.241***	-0.218***	-0.346***	-0.264***	-0.221***
	(-5.92)	(-4.51)	(-8.39)	(-5.62)	(-4.24)	(-6.75)

Natural Disaster	0.048**	0.039**	0.019	0.040*	0.026	0.006
	(2.12)	(2.15)	(0.98)	(1.69)	(1.33)	(0.27)
Strike	0.134***	0.116***	0.052**	0.113***	0.103***	0.046*
	(3.69)	(3.89)	(2.08)	(3.25)	(3.50)	(1.67)
Shutdown	0.018	0.015***	-0.000	0.022	0.020***	-0.001
	(1.53)	(3.08)	(-0.07)	(1.56)	(3.31)	(-0.10)
Seasonal	-0.001	0.010	-0.024*	-0.007	0.011	-0.021
	(-0.06)	(0.63)	(-1.72)	(-0.27)	(0.65)	(-1.43)
State × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	No	Yes	No
Establishment FE	No	No	Yes	No	No	Yes
Adj. R-squared	0.263	0.387	0.618	0.248	0.378	0.621
Observations	69,056	69,056	69,056	54,929	54,929	54,929

Panel B: Disaggregation of Information Quality

	(1)	(2)	(3)	(4)
Variables	*TCR*	*TCR*	*TCR*	*TCR*
Information Quality Measure	*MFAccuracy*	*Speed*	*NoICW*	*NoRestate*
Information Quality	-0.704**	-0.093***	-0.019**	-0.054**
	(-2.01)	(-3.03)	(-2.03)	(-2.02)
Control Variables	Yes	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes
Adj. R-squared	0.634	0.618	0.631	0.619
Observations	44,714	69,056	42,743	69,056

Table 3: Conditional on the Location of Decision Rights

This table presents the results from estimating the effect of information quality on workplace safety conditional on the location of decision rights. The dependent variable is the total case rate of the establishment (*TCR*). We measure the location of decision rights based on the relative size of the establishment. *RelativeSize* is an indicator equal to one if the relative size of the establishment (the number of establishment's employees/ the number of firm's employees) is below the median in a given year. Other control variables are defined in Appendix A. The proxy of information quality is *IQ* in column (1) and *Acct ERP* in column (2). *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels for two-tailed tests. The *t-statistics* are computed using standard errors clustered at the firm level.

	(1)	(2)
Variables	*TCR*	*TCR*
Information Quality Measure	*IQ*	*Acct ERP*
Information Quality	-0.007*	-0.038**
	(-1.72)	(-2.21)
RelativeSize	-0.008	0.045**
	(-1.12)	(2.40)
Information Quality × *RelativeSize*	-0.036**	-0.106***
	(-2.14)	(-2.75)
Size	-0.018	-0.027
	(-1.19)	(-1.25)
Leverage	0.161*	0.157
	(1.82)	(1.52)
Cash/Assets	0.100	0.089
	(1.25)	(0.95)
Market to Book	0.021*	0.021*
	(1.76)	(1.69)
PPE/Assets	-0.073	-0.140
	(-0.88)	(-1.24)
Cashflow/Assets	-0.005	-0.032
	(-0.12)	(-0.51)
Dividend/Assets	-0.510	-0.546
	(-1.06)	(-1.16)
Asset Turnover	-0.019	-0.039*
	(-1.17)	(-1.69)
CapEx/Assets	-0.195	-0.385**
	(-1.27)	(-2.02)
Suspect	0.006	0.011
	(1.13)	(1.06)
Log(Employees)	-0.025***	-0.027***
	(-2.99)	(-2.60)
Log(Hours/Employee)	-0.221***	-0.224***
	(-9.04)	(-7.09)
Natural Disaster	0.019	0.005
	(0.97)	(0.22)
Strike	0.051**	0.047*
	(2.07)	(1.70)

Shutdown	-0.000	-0.001
	(-0.10)	(-0.18)
Seasonal	-0.023*	-0.020
	(-1.70)	(-1.43)
State × Year FE	Yes	Yes
Industry × Year FE	Yes	Yes
Establishment FE	Yes	Yes
Adj. R-squared	0.619	0.622
Observations	68,911	54,888

Table 4: Conditional on Employee Bargaining Power

This table presents the results from estimating the effect of information quality on workplace safety conditional on establishment employee bargaining power. The dependent variable is the total case rate of the establishment (*TCR*). *High Labor Union* is an indicator of high employee bargaining power, which equals one if an establishment operates in an industry with union membership rate higher than the median in the sample period. Other control variables are defined in Appendix A. The proxy of information quality is *IQ* in column (1) and *Acct ERP* in column (2). *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels for two-tailed tests. The *t-statistics* are computed using standard errors clustered at the firm level.

	(1)	(2)
Variables	*TCR*	*TCR*
Information Quality Measure	*IQ*	*Acct ERP*
Information Quality	-0.085**	-0.182***
	(-2.30)	(-2.86)
High Labor Union	-0.034	-0.085**
	(-0.88)	(-2.31)
Information Quality × High Labor Union	0.075**	0.142**
	(2.05)	(2.30)
Size	-0.013	-0.021
	(-1.05)	(-1.02)
Leverage	0.132*	0.139
	(1.94)	(1.45)
Cash/Assets	0.106	0.086
	(1.37)	(0.95)
Market to Book	0.021*	0.024*
	(1.79)	(1.84)
PPE/Assets	-0.052	-0.140
	(-0.73)	(-1.28)
Cashflow/Assets	-0.014	-0.042
	(-0.29)	(-0.67)
Dividend/Assets	-0.520	-0.629
	(-1.09)	(-1.28)
Asset Turnover	-0.020	-0.035*
	(-1.26)	(-1.65)
CapEx/Assets	-0.181	-0.405**
	(-1.17)	(-2.16)
Suspect	0.007	0.012
	(1.26)	(1.18)
Log(Employees)	-0.023***	-0.028***
	(-2.86)	(-2.79)
Log(Hours/Employee)	-0.222***	-0.223***
	(-9.54)	(-7.17)
Natural Disaster	0.016	0.003
	(0.85)	(0.15)
Strike	0.052**	0.046*
	(2.09)	(1.65)

Shutdown	-0.001	-0.001
	(-0.11)	(-0.09)
Seasonal	-0.022*	-0.020
	(-1.67)	(-1.42)
State × Year FE	Yes	Yes
Industry × Year FE	Yes	Yes
Establishment FE	Yes	Yes
Adj. R-squared	0.620	0.621
Observations	69,056	54,929

Table 5: Conditional on Financial Constraints

This table presents the results from estimating the effect of information quality on workplace safety conditional on financial constraints. The dependent variable is the total case rate of the establishment (*TCR*). *WW High* is an indicator variable equal to one if the firm's *WW index* is above the sample median, and zero otherwise. *NoRating* is an indicator variable equal to one if the firm does not receive the S&P Domestic Long-term Issuer Credit or receives an "in default" rating, and zero otherwise. Other control variables are defined in Appendix A. The proxy of information quality is *IQ* in column (1) and column (2) and *Acct ERP* in column (3) and column (4). *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels for two-tailed tests. The *t-statistics* are computed using standard errors clustered at the firm level.

	(1)	(2)	(3)	(4)
Variables	*TCR*	*TCR*	*TCR*	*TCR*
Information Quality Measure	*IQ*	*IQ*	*Acct ERP*	*Acct ERP*
Information Quality	-0.053**	-0.027***	-0.149***	-0.114***
	(-2.57)	(-2.74)	(-2.84)	(-3.08)
WW High	0.009		-0.060**	
	(0.84)		(-2.26)	
Information Quality × WW High	0.047**		0.115**	
	(2.30)		(2.47)	
NoRating		0.037***		-0.033
		(3.63)		(-1.19)
Information Quality × NoRating		0.030**		0.097***
		(2.52)		(2.79)
Size	-0.019	-0.019	-0.031	-0.027
	(-1.25)	(-1.16)	(-1.39)	(-1.17)
Leverage	0.147*	0.168*	0.168	0.162
	(1.82)	(1.83)	(1.57)	(1.55)
Cash/Assets	0.099	0.099	0.101	0.084
	(1.25)	(1.25)	(1.07)	(0.90)
Market to Book	0.021*	0.021*	0.017	0.020
	(1.76)	(1.77)	(1.33)	(1.55)
PPE/Assets	-0.088	-0.069	-0.143	-0.166
	(-1.00)	(-0.81)	(-1.27)	(-1.43)
Cashflow/Assets	-0.025	-0.002	-0.019	-0.033
	(-0.54)	(-0.04)	(-0.29)	(-0.50)
Dividend/Assets	-0.527	-0.418	-0.581	-0.542
	(-1.17)	(-0.84)	(-1.24)	(-1.17)
Asset Turnover	-0.022	-0.021	-0.036*	-0.036*
	(-1.34)	(-1.24)	(-1.69)	(-1.66)
CapEx/Assets	-0.161	-0.178	-0.410**	-0.399**
	(-1.06)	(-1.15)	(-2.30)	(-2.20)
Suspect	0.007	0.006	0.011	0.012
	(1.18)	(1.09)	(1.10)	(1.18)
Log(Employees)	-0.024***	-0.024***	-0.028***	-0.027***
	(-2.84)	(-2.85)	(-2.77)	(-2.74)
Log(Hours/Employee)	-0.219***	-0.219***	-0.222***	-0.222***

	(-9.02)	(-8.56)	(-7.02)	(-6.94)
Natural Disaster	0.020	0.019	0.005	0.005
	(1.02)	(1.02)	(0.22)	(0.24)
Strike	0.051**	0.052**	0.048*	0.045
	(2.01)	(2.08)	(1.75)	(1.60)
Shutdown	0.001	-0.000	-0.001	0.000
	(0.16)	(-0.09)	(-0.16)	(0.04)
Seasonal	-0.023*	-0.024*	-0.020	-0.020
	(-1.72)	(-1.72)	(-1.40)	(-1.39)
State × Year FE	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes
Adj. R-squared	0.619	0.619	0.622	0.621
Observations	68,655	69,056	54,885	54,929

Table 6: Information Quality and Workplace Safety: External Shock of SFAS 158

This table presents the result of estimating the effect of information quality on workplace safety using the adoption of SFAS 158 as an exogenous shock and a difference-in-differences design. The dependent variable is the total case rate of the establishment (*TCR*). *OFFBL* equals one if the firm's off-balance-sheet pension liabilities scaled by total assets is above the sample median, and zero otherwise. *Post* equals one if the firm's fiscal year ending date is after December 15, 2006, and zero otherwise. Other control variables are defined in Appendix A. *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels for two-tailed tests. The *t-statistics* are computed using standard errors clustered at the firm level.

Variables	*TCR*
OFFBL	0.006
	(0.74)
Post	0.013
	(1.05)
Post×OFFBL	-0.025**
	(-1.99)
Size	0.011
	(0.80)
Leverage	-0.045
	(-1.00)
Cash/Assets	0.101
	(1.36)
Market to Book	0.032**
	(2.15)
PPE/Assets	0.035
	(0.52)
Cashflow/Assets	-0.080
	(-1.16)
Dividend/Assets	-1.140**
	(-2.17)
Asset Turnover	-0.024
	(-1.35)
CapEx/Assets	-0.052
	(-0.37)
Suspect	-0.002
	(-0.47)
Log(Employees)	-0.015
	(-1.63)
Log(Hours/Employee)	-0.238***
	(-9.88)
Natural Disaster	-0.001
	(-0.05)
Strike	0.058**
	(1.99)
Shutdown	0.001
	(0.19)
Seasonal	0.010

	(0.59)
State × Year FE	Yes
Industry × Year FE	Yes
Establishment FE	Yes
Adj. R-squared	0.665
Observations	40,085

Table 7: Information Quality and Workplace Safety: External Shock of Flight Changes

Panel A presents the annual distribution of flight stop (time) reduction cases. Panel B presents the result of estimating the effect of information quality on workplace safety using flight changes as an exogenous shock and a difference-in-differences design. The dependent variable is the total case rate (*TCR*). *Treat Stop* equals one in the year and after, if the flight stops between headquarters and establishment reduce because of a new airline introduction, and zero otherwise. *Treat Time* equals one in the year and after, if the traveling time reduces more than 60 minutes compared to the time spent in the previous year, and zero otherwise. Other control variables are defined in Appendix A. *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels for two-tailed tests. The *t-statistics* are computed using standard errors clustered at the firm level.

Panel A: Annual Distribution of Flight Stop (Time) Reduction Cases

	Flight stop reduction cases		Flight time reduction cases		
Year	0	1	0	1	Total
2001	5,043	0	5,043	0	5,043
2002	6,318	120	6,370	68	6,438
2003	5,570	107	5,612	65	5,677
2004	6,616	107	6,652	71	6,723
2005	6,679	114	6,715	78	6,793
2006	5,567	97	5,588	76	5,664
2007	6,415	114	6,458	71	6,529
2008	3,154	78	3,202	30	3,232
2009	4,363	61	4,391	33	4,424
2010	540	6	546	0	546
Total	50,266	804	50,578	492	51,069

Panel B: Difference-in-Differences Regression

Variables	(1) *TCR*	(2) *TCR*
Treat Stop	-0.020*	
	(-1.79)	
Treat Time		-0.032**
		(-2.17)
Size	0.023	0.023
	(1.28)	(1.28)
Leverage	0.148**	0.148**
	(2.08)	(2.09)
Cash/Assets	0.103	0.102
	(0.87)	(0.87)
Market to Book	0.016	0.016
	(1.38)	(1.38)
PPE/Assets	0.019	0.020
	(0.29)	(0.30)
Cashflow/Assets	0.035	0.035
	(0.51)	(0.52)
Dividend/Assets	-0.842	-0.842
	(-1.60)	(-1.60)
Asset Turnover	-0.005	-0.005
	(-0.19)	(-0.18)
CapEx/Assets	-0.562**	-0.560**
	(-2.39)	(-2.39)
Suspect	0.015	0.015
	(1.49)	(1.49)
Log(Employees)	-0.027**	-0.027**
	(-2.38)	(-2.38)
Log(Hours/Employee)	-0.246***	-0.245***
	(-8.84)	(-8.84)
Natural Disaster	0.015	0.015
	(0.59)	(0.59)
Strike	0.043	0.043
	(1.31)	(1.31)
Shutdown	-0.006	-0.007
	(-1.07)	(-1.08)
Seasonal	-0.031	-0.031
	(-1.06)	(-1.06)
State × Year FE	Yes	Yes
Industry × Year FE	Yes	Yes
Establishment FE	Yes	Yes
Adj. R-squared	0.615	0.615
Observations	51,069	51,069

Table 8: Alternative Measure of Workplace Safety

This table presents the results from estimating the effect of information quality on workplace safety using the alternative measures of workplace safety. The dependent variable in column (1) and column (3) is *DART*, measured by the number of work-related injuries and illness cases that result in days away from work, job transfer or restriction, divided by the number of working hours in the establishment and multiplied by 10,000. The dependent variable in column (2) and column (4) is *DAFW*, measured by the number of work-related injuries and illness cases that result in days away from work, divided by the number of working hours in the establishment and multiplied by 10,000. The proxy of information quality is *IQ* in column (1) to column (2) and *Acct ERP* in column (3) to column (4). *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels for two-tailed tests. The *t-statistics* are computed using standard errors clustered at the firm level.

	(1)	(2)	(3)	(4)
Variables	*DART*	*DAFW*	*DART*	*DAFW*
Information Quality Measure	*IQ*	*IQ*	*Acct ERP*	*Acct ERP*
Information Quality	-0.015***	-0.008***	-0.054***	-0.026**
	(-3.09)	(-2.65)	(-2.60)	(-2.37)
Control Variables	Yes	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes
Adj. R-squared	0.592	0.555	0.585	0.555
Observations	69,056	69,056	54,942	54,942

Table 9: Heterogeneous Effect of Labor Intensity

This table presents the heterogeneous effect of injury rate on the internal information environment. We first measure firm's labor intensity by sales per employee and then calculate the industrial mean labor intensity based on firm's Fama-French 48 industrial classification. *High Labor Intensity* is an indicator variable equal to one if the industry-adjusted labor intensity of firm is above the sample median in the given year, and zero otherwise. The proxy of information quality is *IQ* in column (1), and *Acct ERP* in column (2). *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels for two-tailed tests. The *t-statistics* are computed using standard errors clustered at the firm level.

	(1)	(2)
Variables	*TCR*	*TCR*
Information Quality Measure	*IQ*	*Acct ERP*
Information Quality	-0.010**	-0.010**
	(-2.14)	(-1.99)
High Labor Intensity	-0.005	-0.005
	(-0.66)	(-0.59)
Information Quality × High Labor Intensity	-0.026**	-0.025*
	(-2.10)	(-1.96)
Control Variables	Yes	Yes
State × Year FE	Yes	Yes
Industry × Year FE	Yes	Yes
Establishment FE	Yes	Yes
Adj R-squared	0.619	0.621
Observations	69,056	54929

Table 10: Additional Controls

This table presents the results of robustness tests that include additional control variables. The dependent variable is the total case rate of the establishment (*TCR*). *GAAP ETR* is the firm's GAAP effective tax rate in year t, which equals to total income tax divided by pre-tax income. To calculate effective tax rate, we drop the loss firms (i.e., firms with negative pre-tax income) and winsorize *GAAP ETR* at [0, 1]. *Analyst Forecast* is the natural logarithm of the number of analysts forecast report plus one in year t. *Firm Efficiency* is a firm's DEA-based measure of operational efficiency. The proxy of information quality is *IQ* in column (1) to column (2) and *Acct ERP* in column (3) to column (4). *, **, *** represent significance at the 10 percent, 5 percent, and 1 percent levels for two-tailed tests. The *t-statistics* are computed using standard errors clustered at the firm level.

	(1)	(2)	(3)	(4)
Variables	*TCR*	*TCR*	*TCR*	*TCR*
Information Quality Measure	*IQ*	*IQ*	*Acct ERP*	*Acct ERP*
Information Quality	-0.021**	-0.022**	-0.058**	-0.049*
	(-2.38)	(-2.58)	(-2.15)	(-1.82)
GAAP ETR	0.001	0.011	-0.009	-0.003
	(0.09)	(0.83)	(-0.73)	(-0.23)
Analyst Forecast	0.005	0.002	0.002	0.006
	(0.84)	(0.25)	(0.25)	(0.52)
Firm Efficiency	0.132***	0.132***	0.137**	0.151**
	(3.00)	(3.16)	(2.15)	(2.14)
Control Variables	Yes	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	No	Yes	No
Establishment FE	No	Yes	No	Yes
Adj. R-squared	0.391	0.622	0.349	0.612
Observations	62,419	62,419	52,080	52,080