CEO Risk Taking Equity Incentives and Workplace Misconduct

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Abstract

This paper examines the relation between CEO risk taking stock option incentives, as captured by CEO vega, and workplace misconduct. Workplace misconduct includes health and safety violations, non-compliance with labour laws, and other violations broadly related to labour exploitation. Using regression analysis, matched sample tests, and a quasi-natural experiment we show a positive relation between CEO vega and workplace misconduct. These results suggest that CEO risk taking stock option incentives not only influence investment and financial decision making, but also affect operational decision making.

Keywords: Workplace Misconduct, Executive Compensation, Risk taking Equity Incentives

JEL Classifications: G30, G32, G34

1. Introduction

Stock options are an important component of executive compensation contracts (Hall and Murphy 2003; Jensen 2005; Frydman and Jenter 2010; Murphy 2013). Option compensation aligns the interests of managers with those of shareholders hence reducing the principal-agent conflict prevalent in organisations. Several studies show that equity incentives encourage risk-taking by managers (Armstrong and Vashishtha 2012). These incentives encourage managers to invest in more risky projects and undertake more risky financing choices. Yet, risk-taking equity incentives can also encourage managers to engage in other risky practices such as accounting manipulation and fraud (Armstrong, Larcker, Ormazabal and Taylor 2013).

In this paper, we examine the relation between equity risk-taking incentives and workplace misconduct. Workplace misconduct includes health and safety violations, non-compliance with labour laws, and other violations broadly related to labour exploitation. This misconduct is associated with significant economic costs to employers, employees and society. The International Labor Organization (ILO) estimates that on average 4% of annual global GDP (or US$2.8 trillion) is lost due to direct or indirect costs of workplace misconduct that includes among others medical expenses, worker compensation, and legal costs (ILO, 2013).

Firms often regard financial results and employee wellbeing as the main pillars of their success (Chevron, 2018). They invest significant resources in creating a healthy and environmentally responsible workplace for employees (Celgene, 2019). Yet, although workplace safety is very important for firms, we know very little about how it is affected by the compensation structure of the CEO. Prior research has shown that risk taking CEO equity incentives encourage CEOs to undertake risky investment and financial decisions (Armstrong and Vashishtha 2012; Armstrong, Larcker, Ormazabal and Taylor 2013). Similarly, we expect CEOs subject to risk taking equity incentives to take riskier workplace decisions. Unlike investment and financial decisions, workplace safety decisions have a direct effect on the firm workforce. These decisions can potentially result in workplace misconduct as captured by labour law, and health and safety violations. Workplace violations can have serious repercussions on both the firm and employees. For example, the firm might be legally sanctioned by the regulator or held legally liable for the loss of employee earnings resulting from worker accidents.

Data on workplace misconduct are difficult to obtain as they are typically not publicly available and only kept by local regulators. We, therefore, use data from Violation Tracker that collects data on various types of violations and the ensuing penalties issued by more than 40 federal regulatory agencies and the U.S. Justice Department since 2000. We merge this sample with data on executive compensation and firm characteristics. That gives us a sample of 14,865 firm-year observations for 1,455 unique firms from 2000 to 2018. Sampled firms have on average 0.415 violations per year with an average penalty of $141,000 per violation.

There are several challenges to empirically test the relation between risk-taking incentives and workplace violations. We address these challenges as follows. First, we distinguish between risk-taking incentives arising from vega and the risk taking incentives arising from delta (Armstrong, Larcker, Ormazabal and Taylor 2013; Armstrong, Blouin, Jagolinzer and Larcker 2015). Vega captures the sensitivity of an executive's equity wealth to stock price volatility and provides an explicit channel between equity incentives and risk-taking. Delta measures the sensitivity of an executive's equity wealth to stock price, however its effect on risk-taking is less clear. On one hand, a higher sensitivity to changes in stock price should encourage managers to take risky investment decisions that maximise firm value. Yet, on the other hand, it strengthens the effect of equity risk on the total riskiness of a manager's equity portfolio, generally discouraging risk-averse managers from taking risky projects (Armstrong, Larcker, Ormazabal and Taylor 2013).

Second, we employ several econometric techniques in order to test for the relation between CEO risk-taking incentives and workplace misconduct. Our research design choices closely follow prior literature (Hayes, Lemmon, and Qiu 2012; Armstrong, Larcker, Ormazabal and Taylor 2013; Bakke, Mahmudi, Fernando and Salas 2016; Ferri and Li 2018; Hong 2019). Specifically, we examine the relationship between equity risk-taking incentives and workplace misconduct using both regression and matched-sample tests (Armstrong, Jagolinzer and Larcker 2010; Armstrong, Larcker, Ormazabal and Taylor 2013) with time and firm fixed effects, and standard errors clustered by firm. Subsequently, in order to establish causality, we use a quasi-natural experiment created by the 2005 implementation of Statement of Financial Accounting Standard (SFAS) 123R (Hayes, Lemmon, and Qiu 2012; Bakke, Mahmudi, Fernando and Salas 2016; Ferri and Li 2018; Hong 2019). SFAS 123R mandated the expensing of stock based compensation in the Income Statement. This significantly increased the costs to the firm of compensating executives using stock options (Murphy 2013). As a result of the implementation of SFAS 123R prior literature has documented a significant decrease in the use of stock options in executive compensation contracts (Carter, Lynch and Tuna 2007; Hayes, Lemmon, and Qiu 2012; and Bakke, Mahmudi, Fernando and Salas 2016). The implementation of SFAS 123R and the consequent reduction in the use of stock options in executive remuneration provides an exogenous shock to CEO vega. This shock provides us with a quasi-natural experiment to impute causality in the relation between CEO vega and workplace misconduct.

Our results show that CEO risk taking equity incentives, as captured by vega are positively related to workplace misconduct, as captured by the number and severity of workplace violations. The observed relation between CEO vega and workplace violations is not only statistically but is also economically significant. Specifically, a one standard deviation increase in CEO vega is related to an increase of 19% in the number of violations and an increase of 14% in the value of penalties for the mean observation in our sample.

Further, results for the quasi-natural experiment show that the implementation of SFAS 123R was accompanied by a reduction in the relation between CEO vega and the number and severity of workplace violations. Given that it is unlikely that the implementation of SFAS 123R had an influence on the number and severity of workplace violations other than through its effect on CEO vega, we believe that these reults allow us to impute causality on the relation between CEO vega and workplace misconduct. Finally, the fact that our results are robust to different econometric choices, to a tight fixed effect structure that includes firm and year fixed effects and various firm specific controls suggest that our results are not driven by a correlated omitted variable.

Our study contributes to extant literature in the following ways. First, we contribute to the nascent literature on the determinants of employee welfare. This literature finds that when management is under pressure to perform, employee welfare is compromised. Caskey and Ozel (2017) document a higher injury rate in firms that just meet or beat analyst forecasts than in firms which miss or comfortably beat analyst forecasts. The authors attribute this finding to managers' increased pressure on employees to perform. Similarly, Cohn and Wardlaw (2016) show that financing frictions lower workforce welfare as firms underinvest in employee safety. Heese and Pérez Cavazos (2019) and Christensen, Floyd, Liu and Maffett (2017) show that greater monitoring and investor awareness of employee safety issues result in a reduction in worker injuries and workplace violations. We contribute to this literature by documenting that CEO risk taking incentives influence the amount and severity of workplace misconduct.

Second, we contribute to the literature on executive compensation in general. There are several papers showing that risk taking equity incentives provided by option compensation have important effects on corporate policies. Guay (1999) shows a positive relation between risk-taking equity incentives and riskier investment policies proxied by growth options and R&D expenditures. Further Coles, Daniel and Naveen (2006) demonstrate that higher CEO wealth sensitivity to risk results in higher investment in R&D and higher leverage. Several studies use the implementation of SFAS 123R as an exogenous shock to establish causality between risk-taking equity incentives and corporate policies, yet in general, the results are mixed (Hayes, Lemmon and Qiu 2012; Bakke, Mahmudi, Fernando and Salas 2016; Aboody, Levi and Weiss 2018; Hong 2019).

Also related to our paper is the strand of literature that examines the effects of sensitivity of CEO compensation to stock price volatility on financial misconduct (Bergstresser and Philippon 2006; Burns and Kedia 2006; Erickson, Hanlon and Maydew 2006; Efendi, Srivastava and Swanson 2007; Armstrong, Jagolinzer and Larcker 2010; Armstrong, Larcker, Ormazabal and Taylor 2013). Firms are more likely to engage in financial misreporting if CEOs have high risk-taking incentives. Using matched sample tests, prior literature observes that firms where CEO compensation is more sensitive to stock price volatility have higher discretionary accruals, more accounting restatements and accounting fraud cases (Armstrong, Larcker, Ormazabal and Taylor 2013). We contribute to this literature by presenting evidence on the effects of risk-taking equity incentives on non-financial misconduct, specifically workplace misconduct.

The paper is organized as follows. Section 2 discusses relevant prior literature and develops the hypotheses. Section 3 describes the sample, defines the variables of interest and explains variable construction. Section 4 sets out the empirical model and explains the identification strategy used in the study. Section 5 presents the results for the different empirical analyses and Section 6 concludes.

2. Literature Review and Hypothesis Development

2.1. Equity incentives and risk taking

The use of stock options in executive compensation contracts encourages the underdiversified manager to undertake risky and value increasing projects (Jensen and Meckling 1976). Smith and Stulz (1985) conclude that managerial compensation should be a convex function of firm value. This can be done by including stock options in executive compensation where increased risk taking increases stock price volatility hence making stock options more valuable. Further theoretical studies, modify this simplistic view and show that stock options might actually have an ambiguous effect on risk taking incentives (Lambert, Larcker and Verrecchia 1991; Carpenter 2000; Ross 2004; Lewellen 2006). Armstrong and Vashishtha (2012) note that the convexity effect that increases the sensitivity of CEO wealth to risk (vega) can be offset by the increase in CEO wealth sensitivity to stock price (delta). Therefore, theoretically, the overall net effect of stock option compensation on risk taking incentives is unclear.

Early empirical studies find a positive relation between the use of stock options in executive compensation contracts and risk taking (e.g. Agrawal and Mandelker 1987; Guay 1999; Rajgopal and Shevlin 2002). Subsequent studies focus on separately examining the relationship between vega and delta, and firm risk. For example, Coles, Daniel, and Naveen (2006) separately examine delta and vega, and show that CEOs whose compensation is more sensitive to stock volatility (vega) take riskier decisions such as investing more in research and development, less in property, plant and equipment and take on higher leverage, yet they find mixed results regarding the effects of delta on risk-taking. Low (2009) shows that the portfolio vega, not delta, encourages risk taking.

Further, several studies show that it is important to distinguish between systematic and idiosyncratic risk when studying the effects of stock options. Tian (2004) shows theoretically that stock options can create incentives to reduce (increase) idiosyncratic (systematic) risk.

Henderson (2005) posits that stock options only incentivise firm-specific risk and not an increase in total firm risk. Similarly, Duan and Wei (2005) show that the incentive effects of executive stock options increase systematic risk. Conversely, Armstrong and Vashishtha (2012) find that CEO vega is associated with market risk (the square root of explained variance from Fama and French (1993) three-factor model) while it has no association with idiosyncratic risk (the square root of unexplained variance from Fama and French (1993) three-factor model).

The studies on equity incentives and risk taking are also fraught with econometric problems such as potential endogeneity and unobservable variables. Several papers try to mitigate these problems and establish causality by using matched samples or exogenous shocks (e.g. Low 2009; Armstrong, Jagolinzer and Larcker 2010; Armstrong, Larcker, Ormazabal and Taylor 2013; Hayes, Lemmon, and Qiu 2012; Gormley 2013). Low (2009) reports that managers with low stock option incentives reduced firm risk after a court ruling in mid-1990s reduced the riskiness of the business environment. Gormley (2013) show that the change in business risk resulting from the discovery of carcinogens' changed the influence of stock option risk taking incentives on firm risk.

Several studies use the implementation of SFAS 123R in 2005 as a quasi-natural experiment, which increased manager risk aversion. Hayes, Lemmon, and Qiu (2012) show that there is little evidence that the decline in the use of options resulted in less risky investment and financing policies. However, other studies do find that the reduction in the use of stock options resulted in significant changes in corporate policies. Bakke, Mahmudi, Fernando and Salas (2016) provide strong evidence that the reduction in stock options resulting from the implementation of SFAS 123R increased hedging intensity in the oil and gas industry. Hong (2019) provides evidence that the reduction in CEO vega resulting from the reduction in the use of stock options after the implementation of SFAS 123R caused an increase in debt maturity. Using the same setting Aboody, Levi, and Weiss (2018) show that managers reduce operating leverage (i.e., the fixed-to-variable cost ratio) associated with firm systematic risk (Lev 1974) in response to reductions in option-based compensation following the issuance of SFAS 123R. Overall, this literature shows that risk taking incentives have important effects on corporate policies.

2.2. Equity incentives and financial misconduct

While equity incentives embedded in executive compensation have been directly linked to changes in firm risk taking, another important strand of literature links these incentives to financial misconduct. Financial misconduct can be perceived as a special type of a risky project that increases expected equity value and firm risk (Armstrong, Larcker, Ormazabal and Taylor, 2013). Therefore, the risk taking incentives embedded in stock options have the same implications for financial misconduct as in the case of corporate policies increasing firm risk taking.

Studies examining the effects of risk taking equity incentives on financial misconduct vary in terms of the financial misconduct studied, the equity incentive measures and the research design used. Using regression analysis Cheng and Warfield (2005) find that equity ownership has a positive effect on earnings management while Bergstresser and Philippon (2006) and Burns and Kedia (2006) find a positive association between delta and earnings management or restatements. Conversely, Erickson, Hanlon and Maydew (2006) and Armstrong, Jagolinzer and Larcker (2010) find no evidence of an association between delta and litigation, restatements, and financial fraud using matched tests.

Armstrong, Larcker, Ormazabal and Taylor (2013) claim that the mixed results arising from prior literature arise from the fact that delta has two countervailing effects on the risk-averse manager: "*reward effect*" resulting from sensitivity of CEO wealth to stock price and "*risk effect*" that magnifies the effect of stock price volatility on the volatility of CEO wealth.

Therefore, the effect of delta on risk taking is unclear. In contrast, vega, provides the manager with clear risk taking incentives as it directly measures the change in CEO wealth resulting from a one unit change in stock price volatility. Given this Armstrong, Larcker, Ormazabal and Taylor (2013) separately examine the effects of CEO delta and CEO vega on financial misreporting. They proxy financial misconduct using measures of earnings management, financial fraud and restatements, and apply various econometric techniques such as regression and matched sample tests in their research design. They find that there is a positive effect of vega on financial misreporting and that the incentives resulting from CEO vega override any incentives arising from CEO delta. Taken together results from this stream of literature suggest that risk taking incentives arising from CEO vega are associated with greater financial misconduct.

2.3. Equity incentives and workplace misconduct

Workplace misconduct is any misconduct perpetrated by the firm management related to the firm work environment. Serious workplace misconduct may be regarded by regulators as constituting a labour violation. Examples of such misconduct include the violation of health and safety regulations, non-compliance with labour laws, or other violations broadly related to labour exploitation. Even though labor violations are associated with significant economic costs for both the firm and the employees, workplace misconduct is much less studied than financial misconduct. Thus, the determinants of workplace misconduct are largely unexplored.

Managers that are under pressure to perform often engage in unusual practices to boost firm profitability. They manipulate firm’s earnings during weak performance periods in order to avoid covenant violation, or before other major corporate events (Watts and Zimmerman 1986; DeFond and Park 1997; Erickson and Wang 1999; Sletten, Ertimur, Sunder, and Weber 2018).[1] They can also compromise on workforce safety and wellbeing in order to meet

[1] Dechow, Ge, and Schrand (2010) provide an excellent review of this literature.

performance expectations. Caskey and Ozel (2017) show that firms that just meet or beat analysts' forecasts have higher injury rates than those that miss or comfortably beat analyst forecasts. This relation is more pronounced in industries with lower union presence. Similarly, Christensen, Floyd, Liu and Maffett (2017) show that local managers violate rules and regulations under pressure. Heese and Pérez Cavazos (2019) show that while onsite visits by managers reduce misconduct in general, yet, if firms are under pressure there is an increase in misconduct. Similar to financial misconduct, workplace misconduct can also be perceived as a special type of a risky project. It can increase the firm equity value, as employees might become more productive, however it also increases firm equity risk as the revelation of workplace violations is typically accompanied by significant penalties and serious reputational damage. While extant literature has shown that management pressure on employees leeds to higher injury rates and greater financial misconduct, prior literature is silent as to what motivates managers to act in such a way.

The main motivation for risk-averse managers to assume risk is the structure of their compensation. Including stock options in executive compensation contracts changes the convexity of the executives' payoff (Smith and Stulz 1985). However, stock options not only increases the CEO wealth sensitivity to risk (vega), but also increases the CEO wealth sensitivity to stock price (delta). While vega is a pure measure of how risk affects managers, delta subsumes two effects: the "*risk effect*" and the "*reward effect*" (Armstrong, Larcker, Ormazabal and Taylor 2013). Therefore, the effect of delta on risk taking is ambiguous. Following Armstrong, Larcker, Ormazabal and Taylor (2013) we use both delta and vega in examining the relation between CEO risk taking incentives and workplace misconduct.

CEO risk taking equity incentives encourage managers to undertake more risky choices. Workplace misconduct, as captured by its incidence (number of violations) and severity (penalties incurred) is an example of such risky choice. CEOs might put more pressure on employees that might result in the form of longer working hours, labour law, and health and safety violations. Such actions although risky might improve productivity, performance and increase the stock price. Yet, once these irregularities are reported or detected there will be a significant drop in the stock price. We posit that management workplace misconduct is a risky action that is intended to increase employee productivity but also increases firm equity risk. Therefore, CEOs with higher risk-taking incentives are more likely to engage in workplace misconduct as it increases stock price volatility. We formalize our hypothesis as follows:

H1: ***Risk-taking CEO equity incentives are positively related to the incidence and severity of workplace misconduct.***

3. Sample and Variable Measurement

3.1. Sample construction

Our sample consists of observations at the intersection of Compustat, Violation Tracker, ExecuComp and the Centre for Research in the Security Prices (CRSP) database. We begin by collecting accounting information from Compustat for the period 1999 to 2018. We start in 1999 to have one year of data before the start of our workplace misconduct data which starts in 2000. This is the first year for which Violation Tracker started collecting data on violations in U.S. public firms. Having accounting data for one year before the violations data allows us to calculate controls with a one-year time lag.

Our Compustat sample consists of 165,410 observations for 18,244 unique firms. Following prior literature on executive compensation, e.g., Hong (2019), Caskey and Ozel (2017), we concentrate on industrial firms. Hence, we exclude firms with industry classification codes (SIC) lower than 2000, between 4900 and 4999, and greater than 5999. By concentrating on industrial firms, we drop 91,298 observations. Next, we add the data on Chief Executive Officers (CEOs) compensation from Execucomp and generate measures of sensitivity to risk

(*Vega*) and stock prices (*Delta*) in accordance with Coles, Daniel, and Naveen (2013). These measures require data on stock market returns from the Center for Research in Security Prices (CRSP). We focus only on those CEOs whose compensation includes stock options and is therefore sensitive to stock price volatility (i.e. *Vega* greater than zero). This restriction drops the number of observations in our sample by 56,751 observations. Lastly, we drop 2,496 observations with insufficient information to calculate the vector of controls required for the empirical analysis. Our final sample contains 14,865 observations for 1,455 unique firms, which we merge with data on workplace misconduct from Violation Tracker. Like Heese and Cavazos (2019), we assume that if Violation Tracker does not report any offences for a firm in a particular year then the number of violations as well as the value of penalties for that firm in that year equals zero. The sample selection process is described in further detail in Appendix 2.

3.2. Variable measurement

3.2.1. Measures of workplace misconduct

Measures of the incidence and severity of workplace misconduct are constructed using data from Violation Tracker. This database has been used by Heese and Cavazos (2019). Violation Tracker, developed by the Corporate Research Project of Good Jobs First, contains records of several types of violations broadly defined as environmental, product, and workplace violations. We capture the incidence of workplace misconduct using the number of violations and the severity of workplace misconduct using the value of penalties mandated for identified violations. A violation is classified as a workplace violation if it is identified as such by any of the following regulatory agencies: the Employee Benefits Security Administration, the Equal Employment Opportunity Commission, the Labor Department Office of Workers' Compensation Programs, the Labor Department Wage and Hour Division and the Occupational

Safety and Health Administration. In total, there are 7,039 workplace violations in Violation Tracker. These violations account for $7,980 million worth of penalties.

Violation Tracker contains records of violations that resulted in penalties of a minimum of $5,000 each. The reporting of violations is done at the establishment level, which we aggregate to the firm level. Aggregating the number of violations and the value of the penalties to the firm level is essential for us to link the degree of workplace misconduct to CEO's sensitivity to risk. The detailed composition of the workplace offences is presented in Appendix 3.

3.2.2. Measures of incentives

In measuring CEO incentives we concentrate on incentives originating from executive compensation in general, and executive stock options in particular. While equity incentives encourage risk-averse managers to take risks in order to increase the performance of the firm (and hence stock prices), equity stock options are designed to further encourage risk-taking by giving incentives to increase the volatility of stock prices. Hence in examining the impact of executive stock options on workplace misconduct we need to consider both incentives arising from stock options, i.e. increased CEO wealth sensitivity to stock prices and stock price volatility. To do so, we consider two measures used in prior literature (see e.g. Core and Guay 2002; Coles, Daniel, Naveen 2006; Armstrong and Vashishtha 2012; Armstrong, Larcker, Ormazabal and Taylor 2013) i.e. vega and delta. *Vega* is the sensitivity of CEO's equity portfolio to changes in stock price volatility. *Delta,* the sensitivity of CEO's wealth to changes in stock price. While Armstrong, Larcker, Ormazabal and Taylor (2013) concludes that *Vega* provides risk-taking incentives, *Vega* cannot be examined in isolation from *Delta* since both *Vega* and *Delta* arise from the same stock options. In this regard, throughout our analysis, we examine the relation between *Vega* and workplace misconduct while controlling for *Delta.*

Further, we also control for incentives emanating from cash compensation by including a variable capturing CEO cash compensation in our empirical analysis. We measure CEO cash compensation (*CashComp*), as the natural logarithm of total cash compensation (including bonuses) the CEO received during a year.

3.2.3. Controls

Following Cohn and Wardlaw (2016) in our analysis, we include several time-varying financial controls which have previously been shown to be related to firm misconduct. *Leverage* is the ratio of the total book value of debt to book value of total assets. *CashFlow* is the ratio of cash flows from operations to lagged book value of total assets. *DividendPayout* is the ratio of the total amount of cash dividends declared to common shareholders to lagged book value of total assets. *FirmSize* is the natural logarithm of the market value of a company. *Employees* is the natural logarithm of the number of employees. *LabourIntensity* is the ratio of the number of employees to total book value of total assets. *AssetTurnover* is the ratio of total gross sales to total book value of assets. *Market-to-book* is the ratio of the market value of total assets to book value of total assets. *Tangibility* is the ratio of the value of tangible fixed assets used in the regular business operations of the company to book value of total assets. *Capex* is the ratio of the funds used for investment in long-term tangible assets, excluding those arising from acquisitions to lagged book value of total assets.

We include firm fixed effects to control for time-invariant firm-specific characteristics and year fixed effects to control for time trends in the number and severity of violation reports. Through the use of firm fixed effects, our analysis is essentially a within-firm analysis where we examine the association between CEO vega and violations for a specific firm. Such a tight fixed effects structure reduces the possibility that our results are driven by an omitted correlated variable. To ensure that outliers do not bias our results, we winsorise all of the variables used in the analysis at 1% and 99% level. The balance sheet data is lagged by one year. The definitions of variables used in the analysis are summarised in Appendix 1.

3.2.4. Sample distribution and summary statistics

Table 1 reports the number as well as the percentage of observations across years (Panel A) and across industries (Panel B). The number of observations is stable until 2008, after which it gradually declines. One possible explanation is that the popularity of compensating CEOs with stock options has been in a stable decline since the financial crisis of 2007-2009 (Larcker and Trayan, 2019). Panel B presents the composition of the sample across the 48 Fama French Industries (industries excluded from the sample are set out in section 3.1.). The industries with most observations in our sample are Electronic Equipment, Retail and Pharmaceutical Products with 10.88%, 9.98% and 7.21% of the sample, respectively. Conversely, the industries least represented in our sample are the Fabricated Products and the Tabacco industries, with 0.21% and 0.2% of the sample, respectively.

[Insert Table 1 here]

Table 2 presents summary statistics for the variables used in the analysis. The main variables of interest capture the frequency and severity of workplace misconduct. The average firm has 0.415 violations per year (*Violations*), which are associated with an average penalty of $141,000 per violation (*Penalty*). The distribution of misconducts is negatively skewed, with the majority of offences distributed in the top two deciles of the sample. The maximum number of penalties per year after winsorising is 7 and the largest penalty per violation amounts to $7.58 million. Most of the violations in our sample relate to *workplace safety or health* violations where on average each firm has 0.317 such violation per year. The smallest number of violations relate to c*hild labour or youth employment* violations, *uniformed services employment* violations and *work visa* violations. The average number of violations in our sample is gradually increases from year 2000 when the average number of penalties is reported as 0.233 to 0.581 reported in 2019. The violations are scattered across various industries, with the most frequent violations reported in the food and beverage manufacturing industry (food products reporting on average 1.126 violation per year, candy and soda 1.071, and beer and liquor 1.158), and the petroleum and natural gas industry (with an average level of violations per year of 1.069). The smallest number of violations are reported in the recreation industry where 0.037 violations per year were reported and in the tabacco industry where no violations were recorded. The largest average penalty per violation was reported in the defense industry and amounted to $429,488.60. Further details on the distribution of workplace violations are reported in Appendix 3.

The mean (median) equity compensation sensitivities, *Delta* and *Vega*, are 521.901 (216.287) and 138.72 (65.21) respectively. These statistics suggest that on average a one percent change in stock volatility (prices) results in $138,720 ($521,901) increase in the value of CEO stock options and therefore CEO wealth. The mean *CashComp* is 6.809 which is equivalent to $1,093,295 while median *CashComp* is 6.797 which is equivalent to $893,796.

The mean (median) *Leverage*, *CashFlow* and *DividendPayout* are 0.223 (0.209), 0.079 (0.092) and 0.013 (0.001), respectively. Mean *FirmSize* is $8,363 million, while median *FirmSize* is $1,600 million. The average (median) firm in our sample employs 21,185 (5,845) employees. *LabourIntensity* is standardized hence it has a mean of zero and a standard deviation of one. Finally the mean (median) *LabourIntensity*, *AssetTurnover*, *Market-to-book*, *Tangibility* and *Capex* are 5.642(3.319), 1.253 (1.059), 1.737 (1.329), 0.255 (0.205) and 0.051 (0.037), respectively. These summary statistics are similar to Cohn and Wardlaw (2019).

[Insert Table 2 here]

Table 3 presents pairwise Pearson's correlation coefficients for the variables used in the analysis. As expected we find a significant positive correlation between *Violations* and *Penalties* suggesting that the incidence of violations is related to the severity of violations.

Importantly, in line with our hypothesis, we observe a positive and significant correlation between *Vega* and both *Violations* and *Penalties.* These univariate statistics provide preliminary support for our hypothesis and suggest that risk-taking incentives are related to both the incidence and severity of violations. It is pertinent to note that as expected *Delta* is highly correlated to *Vega.* The correlation of 66.5% between *Delta* and *Vega* suggests that to distinguish the effect of *Vega* from that of *Delta,* one needs to control for *Delta* in the empirical analysis. Similarly, we find a significant positive correlation between *CashComp* and both *Vega* and *Delta* suggesting that CEOs with higher cash compensation have higher wealth sensitivity to changes in stock price and stock price volatility. All control variables other than *Market-to-Book* are positively and significantly correlated with both *Violations* and *Penalties. Market-to-Book* has a negative 7.4% correlation with *Violations* and a negative 2.1% correlation with *Penalties.*

[Insert Table 3 here]

Table 4 presents mean comparisons of firm-year observations of workplace misconduct across various degrees of risk-taking incentives as captured by quantiles of *Vega.* In line with the results for the Pearson correlation shown in Table 3, the general pattern indicates a positive association between both the number and severity of workplace misconduct and risk-taking incentives. The average number of violations (penalties) for the first quintile of *Vega* equals 0.218 ($55,722) and for the fifth quintile equals 0.850 ($341,495). A t-test for difference in means suggests that the difference between the number of violations in the top and bottom quintile of vega is statistically significant at the one percent level. Similarly, the difference between the value of penalties in the top and bottom quintile of vega is statistically significant at the one percent level. These univariate results provide further support to our hypothesis that risk-taking incentives are positively associated with workplace misconduct.

[Insert Table 4 here]

4. Research Design

Our research design follows closely extant literature examining the effects of CEO risk-taking equity incentives on CEO behaviour. In particular, we implement 1) regression analysis (Bergstresser and Philippon 2006; Burns and Kedia 2006), 2) matched-sample tests (Erickson, Hanlon and Maydew 2006; Efendi, Srivastava and Swanson 2007; Armstrong, Jagolinzer and Larcker 2010, Armstrong, Larcker, Ormazabal and Taylor 2013), and 3) an identification strategy that uses SFAS 123R as a quasi-natural experiment and we employ a difference-in-differences methodology to impute a causal effect of risk-taking equity incentives on workplace misconduct (Hong 2019).

4.1. Regression analysis and matched-sample tests

We examine the relation between risk taking equity incentives and workplace misconduct using the following Ordinary Least Squares (OLS) regression model:

$$Y_{i,t} = \alpha_0 + \theta \; Incentives_{i,t-1} + \beta \; Controls_{i,t-1} + FE + \varepsilon_{i,t} \qquad (1)$$

where the dependent variable $Y_{i,t}$ refers to our measures for workplace misconduct by firm i incurred during year t. These measures are discussed in Section 3.2.1 above. *Incentives* refers to the CEO incentives: *Vega*, *Delta* and *CashComp*. As discussed in greater detail in Section 3.2.2, *Vega* captures the sensitivity of the CEO equity compensation to risk, *Delta* captures the sensitivity of the CEO equity compensation to changes in share price while *CashComp* captures CEO total cash compensation. Whereas we do not have any a priori expectation of the association between workplace misconduct and *Delta* or *CashComp*, in line with our hypothesis we expect a positive significant association between *Vega* and workplace misconduct. *Controls* refer to the vector of controls described in Section 3.2.3 while *FE* refers to the firm and year fixed effects. We estimate this regression model with standard errors clustered by firm.

We estimate this regression model for unmatched and matched samples. In order to create matched samples, we apply two matching techniques. First, following Erickson, Hanlon and Maydew (2006), Efendi, Srivastava and Swanson (2007), and Armstrong, Larcker, Ormazabal and Taylor (2013) we create a matched sample based on the outcome-based matching procedure. We match each violator firm in our sample with a non-violator firm based on the similarity of size and industry. We do this matching with replacement, hence the same non-violator firm can be matched with more than one violator firm.

Second, following Armstrong, Jagolinzer and Larcker (2010) and Armstrong, Larcker, Ormazabal and Taylor (2013) we match based on the propensity score for Eq. (1). We solve numerically for the set of matched pairs where we apply an algorithm that minimises the difference in estimated propensity scores and maximises the difference in CEO risk-taking incentives, *Vega*. This results in a matched sample where all differences in firm characteristics between the violator and non-violator firms are minimized except for *Vega*, i.e. risk taking incentives (Rosenbaum 2002).

4.2. Identification strategy

While matched tests allow us to mitigate some of the endogeneity concerns, we try to impute causality by using a change in the accounting treatment of stock options, SFAS 123R, as a quasi-natural experiment. SFAS 123R was published in December 2004 and became effective for financial periods beginning after June 15, 2005. SFAS 123R mandated the expensing of share-based payments in the Income Statement. Before SFAS 123R firms were able to either use the intrinsic method and disclose the value of stock options in the notes to the accounts or expense the stock options in the Income Statement. Given this choice, firms opted for the former approach since this approach mandated the disclosure but not the recognition of the stock option expense in the financial statements (Hong 2019).

SFAS 123R removed this option and mandated that firms issuing share-based payments such as CEO stock options had to expense these stock options in the Income Statements. Specifically, at grant date firms have to calculate the fair value of the CEO stock options and have to systematically recognize the value of these stock options over the period over which the CEO is deemed to provide service to the firm. Expensing the cost of stock options in the Income Statement has a significant effect on the firms' bottom line, hence it significantly increased the cost of issuing options as part of CEOs compensation (Murphy 2013).

SFAS 123R had dramatic consequences on executive compensation. Many studies report a significant drop in the use of stock options in the period after SFAS 123R became effective (Carter, Lynch and Tuna 2007; Hayes, Lemmon and Qiu 2012; Bakke, Mahmudi, Fernando and Salas 2016). Given SFAS 123R deals exclusively with the accounting for share-based payments, it can be regarded as exogenous with respect to risk taking incentives. The exogeneity of SFAS 123R to risk taking incentives provides us with a shock to CEO compensation that allows us to impute causality to the relation between CEO risk taking incentives and workplace misconduct.

We design a difference-in-difference test with observations for the period 2002 to 2006. SFAS 123R became effective in 2005, thus we define fiscal years 2002 and 2003 as the pre-SFAS 123R period and fiscal years 2005 to 2006 as the post-SFAS 123R period. To obtain a cleaner sample for this analysis we drop observations for 2004, the year in which SFAS 123R was published since for part of this year firms knew about the provisions of SFAS 123R. The treatment group consists of firms that throughout our sample period used stock options as part of their CEO compensation, while the control group consists of firms that throughout our sample period did not use stock options as part of their CEO compensation. In other words, the treatment group consists of firms that were affected by SFAS 123R while the control group consists of firms that were not affected by SFAS 123R as they did not grant stock options during our sample period (Bakke, Mahmudi, Fernando and Salas, 2016; Hong, 2019).

In order to validate this experiment we first check if SFAS 123R had an effect on stock compensation of firms in our sample. In line with prior studies, in untabulated results, we observe a significant drop in *Vega* in the period after SFAS 123R became effective. Subsequently, we examine the relationship between equity incentives and workplace misconduct using the following Ordinary Least Squares (OLS) regression model:

$$Y_{i,t} = \alpha_0 + \boldsymbol{Post\ x\ Treatment} + Treatment_{i,t} + Post + \beta\ Controls_{i,t-1} + FE + \varepsilon_{i,t} \quad (2)$$

where the dependent variable, $Y_{i,t}$ is workplace misconduct by firm *i* incurred during year *t*. The main explanatory variable *Treatment* takes the value of one if the firm used stock options in CEO executive compensation, and zero otherwise. *Post* takes the value of one in the post-FAS 123R period (years 2003 and 2004), and zero in the pre-FAS 123R period (years 2006 and 2007). Our main variable of interest is $Post\ x\ Treatment$. We expect this variable to be positive and statistically significant. In Eq. (2) we include the same controls as in Eq. (1)[2] and time fixed effects. Standard errors are robust and clustered by firm.

5. Results

In order to test our hypothesis, i.e. whether CEO risk taking incentives are positively related to workplace misconduct, we conduct three types of analyses. First, we test the relationship between risk-taking equity incentives and workplace misconduct using regression

[2] With the vector of control variables we also include *Delta* and *CashComp*. In doing so, we ensure that *Post*Treatment* only captures the effect of the change in *Vega* after SFAS 123R became effective.

analysis for the full sample. Second, to improve the efficiency of our estimates we run the tests for matched samples. Finally, we use a quasi-natural experiment and employ the difference-indifferences methodology to estimate the causal effect.

5.1. Unmatched-sample tests

Table 5 shows the results when we examine the relation between CEO risk taking incentives and the incidence of workplace violations using Eq. (1). We first run this test as an OLS regression where we use the natural logarithmic transformation of *Violations* as the dependent variable. Subsequently, we estimate Eq. (1) as a Poisson regression where the dependent variable is the count of *Violations*.

In the results for both specifications, the coefficient on the main variable of interest, i.e. *Vega*, is positive and statistically significant at the five percent level (t-statistic of 2.01 in the OLS model and z-statistic of 2.56 in the Poisson model). The results are not only statistically significant but also economically significant. Specifically, if we take the results of the Poisson model one standard deviation in *Vega* results in an increase of 0.08 number of violations per year. For the average firm in our sample, this increase equates to an increase of 19% in the number of violations.[3] These results buttress the previously discussed univariate results and provide further support to our hypothesis.

Further, the coefficients on both *Delta* and *CashComp* are insignificant in both specifications suggesting that *Vega* completely captures the incentives arising from CEO compensation. These results are generally in line with prior literature, in particular, Armstrong, Larcker, Ormazabal and Taylor (2013).

In both models, the number of employees is significantly positively related to the number of violations suggesting that the greater the number of workers employed by the firm

[3] The standard deviation of *Vega* is 1.484. Multiplying this figure by the coefficient on *Vega* in specification (2) of Table 5 gives 0.08. Given that the average firm has 0.415 violations per year, an increase of 0.08 equates to a 19% increase in the number of violations.

the greater the incidence of workplace violations. Conversely, in both models, the *LabourIntensity* is statistically and negatively related to *Violations*, suggesting that workplace misconduct is less frequent in firms where labor is particularly important. In other words, our results indicate that while the number of employees is positively related to the number of workplace violations, the importance of labor (relative to the firm total assets) is negatively related to the number of workplace violations.

[Insert Table 5 here]

Given the observed positive relation between *Vega* and the incidence of workplace violations, we examine the relation between *Vega* and the severity of workplace violations. Table 6 presents the results for these tests. Specifically, in column (1) we present the results for Eq. (1) using OLS regression where the dependent variable in the natural logarithm of the value of penalties while in Column (2) we run Eq. (1) as a Poisson regression where the dependent variable is a categorical variable created by from the transformation of the dollar value of *Penalties* into deciles. The coefficient of the main variable of interest, i.e. *Vega*, is positive and statistically significant at five percent level (t-statistic of 2.23) in the OLS model and at the one percent level (z-statistic of 2.65) in the Poisson model. The economic significance of these results suggests that a one standard deviation increase in *Vega* increases the dollar value of the average penalty for each violation by 14%.[4]

[Insert Table 6 here]

5.2. Matched-sample tests

To attenuate the possibility that our results are driven by a correlated omitted variable we run further analysis using matched samples. Specifically, as explained in Section 4.1 we do

[4] Economic significance is computed using the coefficient on *Vega* from specification (1) presented in Table 6. Specifically, a one standard deviation in *Vega* (1.484) multiplied by the coefficient on *Vega* (0.097) increase *ln(Penalties)* by 0.144. Given mean dollar value of penalties per violation is $141,000 (ln($141,000)=11.86) a one standard deviation increase in *Vega* would increase the dollar value of penalties per violation to $162,830 which is equivalent to an increase of around 14%.

two types of matching. First, we match each violator firm to a non-violator firm based on the similarity in size and industry. In doing this matching with replacement we lose a number of observations, hence our sample for this analysis is 8,300 observations. Second, we match using propensity score matching where we match based on the closeness of a propensity score estimated for a model where *Vega* is expressed as a function of the controls in Eq. (1). This matching minimises differences in the control variables while maximising differences in *Vega*. As a result of this matching we lose a number of observations, hence our sample for this analysis is of 9,480 observations.

We present the results for this analysis in Table 7. Columns (1) and (3) show the results when we estimate Eq. (1) using OLS regression where the dependent variable is the natural logarithm of violations while Columns (2) and (4) show the results when we estimate Eq. (1) using Poisson regression where the dependent variable is the count of violations. In columns (1) and (2) we report the results when matching is based on size and industry while in columns (3) and (4) we report the results for the propensity score matched sample.

Similar to previous results, the coefficients on *Vega* are positive and statistically significant in all specifications. Irrespective of the type of matching, when we run Eq. (1) as an OLS regression with the logarithmic transformation of vega as the dependent variable (specifications (1) and (3)) the coefficient on *Vega* is positive and significant at the five percent level. Similarly, irrespective of the type of matching, when we run Eq. (1) as a Poisson regression with the dependent variable being the count of violations (specifications (2) and (4)) the coefficient on *Vega* is positive and significant at the one percent level.

[Insert Table 7 here]

Similar to Table 7, in Table 8 we present results for the matched sample analysis, however in these test the dependent variable is the dollar value of penalties. In columns (1) and (3) we show the results when we estimate Eq. (1) using OLS regression where the dependent variable is the natural logarithm of the value of penalties while in columns (2) and (4) we present the results when we run Eq. (1) as Poisson regression where the dependent variable is a categorical variable created by deciles of *Penalties*. As in our main results, in all specifications, the coefficient on *Vega* is positive and significant. Specifically, when we run Eq. (1) as an OLS regression with the dependent variable being the logarithmic transformation of the dollar value of penalties (specification (1) and (3)) the coefficient on *Vega* is significant at the five percent level. When we run Eq. (1) as Poisson regression and matching is on size and industry (specification (2)) the coefficient on *Vega* is significant at the five percent level while when Eq. (1) is run as Poisson regression and matching is based on the propensity score, *Vega* is significant at the one percent level.

[Insert Table 8 here]

5.3. Identification strategy

In this subsection, we present the results of a quasi-natural experiment – the introduction of SFAS 123R discussed in subsection 4.2. The introduction of SFAS 123R resulted in a significant drop in *Vega* as documented in many previous studies. We validate this experiment in our sample as well. In untabulated results, we also find a large and statistically significant drop in *Vega* in the period after SFAS 123R was introduced.

We present the results for the difference-in-difference regressions in Table 9, where the dependent variable is *ln(Violations)* in Column (1) and *ln(Penalties)* in Column (2). The main variable of interest is *Treatment x Post*. It captures the average effects of the exogenous drop in *Vega* on workplace misconduct after the introduction of SFAS 123R for treated firms (firms that award CEOs with stock options) relative to control firms (firms that do not award CEOs with stock options).[5]

[5] We conduct tests to ensure that the parallel trend assumption holds in the pre-period. Results for this untabulated tests suggest that the parrelel trend assumption holds.

The coefficient on *Treatment x Post* is negative and statistically significant (t-statistic of -2.13 in Column (1) and -2.10 in Column (2)) in both models suggesting that the reduction in *Vega* resulting from the implementation of SFAS 123R resulted in a reduction in the incidence and severity of workplace violations. Interestingly, the coefficient on *Treatment* is positive and significant in both specifications suggesting that prior to the implementation of SFAS 123R, firms which pay their CEOs using stock options (hence, have high vega) had a higher incidence of violations than firms which did not pay their CEOs using stock options. Conversely, the positive and significant coefficient on *Post* suggest that the incidence and severity of violations increased for both treatment and control firms, however this increase was much smaller for treatment firms as evident by the negative and significant coefficient on *Treatment*Post*.

[Insert Table 9 here]

6. Conclusion

The paper examines the relation between CEO risk taking incentives embedded in stock options and workplace misconduct. Previous literature shows that the use of stock options in CEO compensation increases both the performance and risk of the firm. Increased CEO risk taking might take various forms such as increased incidence of earnings management or fraud. However, CEO risk taking incentives might also result in aggressive decision making with respect to firm insiders, specifically employees. Aggressive decision making with respect to employees typically takes the form of workplace misconduct, which might ultimately result in regulatory sanctions. Regulatory sanctions might take various forms, however the most common sanction is the issue of penalties.

While prior literature has shown that workplace violations are more common when managers are pressured to perform, prior literature is silent as to the influence of CEO compensation on workplace misconduct. In this study we examine whether the risk taking incentives embedded in CEO stock options are related to workplace misconduct. In our analysis we distinguish between the incentive effects resulting from vega and delta, and show that only the risk-taking incentives resulting from vega affect the workplace misconduct.

We test our predictions using regression and matched sample tests where we control for firm characteristics which might be correlated with workplace violations. Further, we use the implementation of SFAS 123R as a quasi-natural experiment where we examine whether the sudden reduction in vega resulting from the implementation of SFAS 123R caused a reduction in workplace violations. In line with our prediction, we find that following the implementation of SFAS 123R there was a significant reduction in the incidence and severity of workplace violations for firms that have stock options as part of their CEO compensation contract.

Taken together our results provide strong evidence of a positive relation between CEO risk taking incentives captured by vega and the incidence and severity of workplace violations. The use of a tight fixed effect structure and the fact that our results are robust to different econometric specifications suggest that it is unlikely that a correlated omitted variable is driving our results. Our study contributes to the executive compensation, financial and workplace misconduct literature. Importantly our study shows that other than corporate policies and financial misconduct, CEO risk taking incentives also influence the incidence of workplace misconduct.

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TABLE 1

Sample composition

This table reports the composition of the sample by fiscal year in Panel A and by industry (in accordance with the Fama-French Industry Classification Type-48) in Panel B.

Panel A. Sample Composition by Year

Year	*Freq.*	*Percent*	*Cum.*
2000	863	5.81	5.81
2001	833	5.6	11.41
2002	836	5.62	17.03
2003	865	5.82	22.85
2004	871	5.86	28.71
2005	850	5.72	34.43
2006	858	5.77	40.2
2007	935	6.29	46.49
2008	944	6.35	52.84
2009	909	6.12	58.96
2010	885	5.95	64.91
2011	861	5.79	70.7
2012	825	5.55	76.25
2013	776	5.22	81.47
2014	725	4.88	86.35
2015	680	4.57	90.92
2016	565	3.8	94.73
2017	507	3.41	98.14
2018	277	1.86	100
Total	14,865	100	

Panel B. Sample Composition by Industry

Industry Code	*Industry Name*	*Freq.*	*Percent*	*Cum.*
2	Food Products	437	2.94	2.94
3	Candy & Soda	70	0.47	3.41
4	Beer & Liquor	101	0.68	4.09
5	Tobacco Products	30	0.2	4.29
6	Recreation	109	0.73	5.03
8	Printing and Publishing	170	1.14	6.17
9	Consumer Goods	419	2.82	8.99
10	Apparel	319	2.15	11.13
12	Medical Equipment	817	5.5	16.63
13	Pharmaceutical Products	1,072	7.21	23.84
14	Chemicals	694	4.67	28.51
15	Rubber and Plastic Products	116	0.78	29.29
16	Textiles	81	0.54	29.84
17	Construction Materials	532	3.58	33.41

19	Steel Works Etc	378	2.54	35.96
20	Fabricated Products	31	0.21	36.17
21	Machinery	1,003	6.75	42.91
22	Electrical Equipment	279	1.88	44.79
23	Automobiles and Trucks	471	3.17	47.96
24	Aircraft	179	1.2	49.16
25	Shipbuilding, Railroad Equipment	23	0.15	49.32
26	Defense	54	0.36	49.68
30	Petroleum and Natural Gas	131	0.88	50.56
32	Communication	551	3.71	54.27
34	Business Services	74	0.5	54.77
35	Computers	625	4.2	58.97
36	Electronic Equipment	1,617	10.88	69.85
37	Measuring and Control Equipment	581	3.91	73.76
38	Business Supplies	335	2.25	76.01
39	Shipping Containers	119	0.8	76.81
40	Transportation	663	4.46	81.27
41	Wholesale	745	5.01	86.28
42	Retail	1,484	9.98	96.27
43	Restaurants, Hotels, Motels	446	3	99.27
48	Other	109	0.73	100
	Total	14,865	100	

TABLE 2

Summary Statistics

The table presents summary statistics for the sample containing 14,865 observations for the period 2000-2018. The definitions of all variables are provided in the Appendix. The statistics for *FirmSize*, *Employees* and *LabourIntensity* are presented for untransformed versions of variables. Specifically the *FirmSize* is presented in millions of dollars, *Employees* in thousands of people, and *LabourIntensity* is a ratio of a number of employees to total assets.

	Mean	Std. dev.	Min.	10th	Median	90th	Max.
Main Variables of Interest							
Violations	0.415	1.14	0	0	0	1	7
Penalties	141,000	887,000	0	0	0	24,935	7,580,000
Incentives Variables							
Vega	4.085	1.484	0.173	2.046	4.193	6.033	6.441
Delta	5.368	1.425	1.662	3.543	5.381	7.256	8.176
CashComp	6.809	0.604	5.2	6.075	6.797	7.618	8.224
Financial Controls							
Leverage	0.223	0.187	*0*	0	0.209	0.46	0.892
CashFlow	0.079	0.112	-0.5	-0.009	0.092	0.179	0.297
DividendPayout	0.013	0.021	0	0	0.001	0.038	0.107
FirmSize ($m)	8,363	20,772	35	232	1,600	18,848	142,000
Employees('000)	21.185	43.578	0.105	0.576	5.845	52.8	280
LabourIntensity	5.642	6.883	0.327	1.034	3.319	12.459	40.719
AssetTurnover	1.253	0.79	0.15	0.476	1.059	2.255	4.279
Market-to-book	1.737	1.334	0.367	0.663	1.329	3.244	8.119
Tangibility	0.255	0.189	0.012	0.058	0.205	0.539	0.832
Capex	0.051	0.046	0.003	0.012	0.037	0.107	0.252

TABLE 3

Correlation Matrix

This table presents the matrix of correlations coefficients. * indicates the significance of the correlation coefficient at 5% level. Definitions of all variables are provided in Appendix 1.

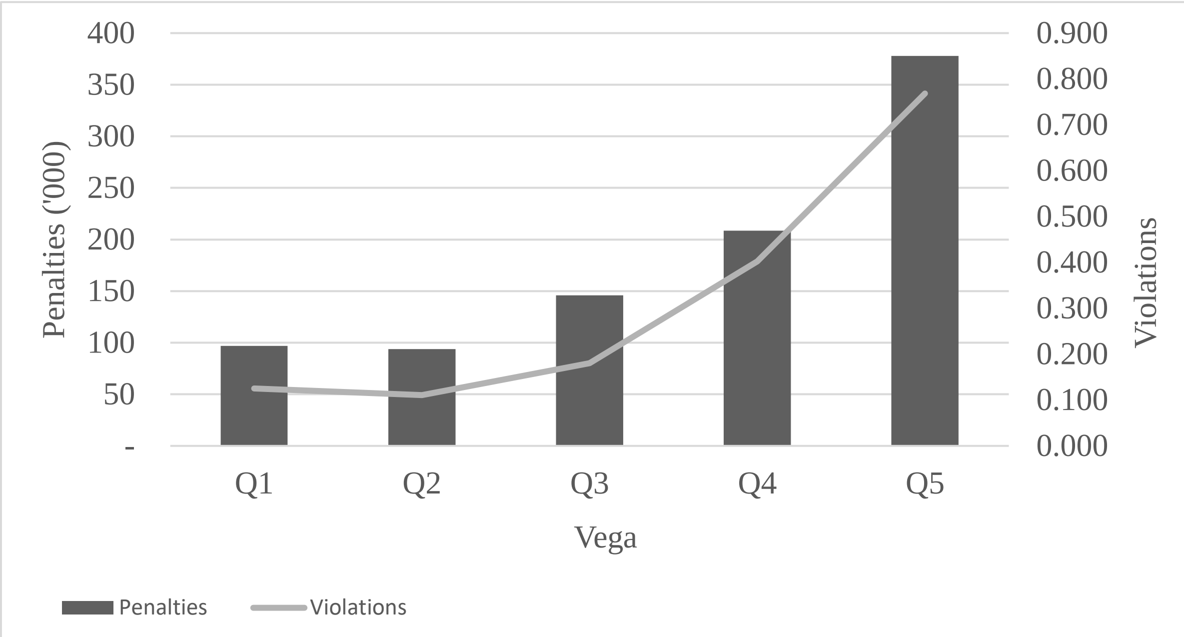
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*
(1) Violations	1.000													
(2) Penalties	0.433*	1.000												
(3) Vega	0.182*	0.108*	1.000											
(4) Delta	0.169*	0.110*	0.665*	1.000										
(5) CashComp	0.231*	0.118*	0.487*	0.429*	1.000									
(6) Leverage	0.098*	0.040*	0.076*	0.001	0.205*	1.000								
(7) CashFlow	0.065*	0.036*	0.229*	0.357*	0.195*	-0.072*	1.000							
(8) DividendPayout	0.129*	0.073*	0.213*	0.198*	0.190*	0.028*	0.284*	1.000						
(9) FirmSize	0.331*	0.194*	0.667*	0.693*	0.556*	0.097*	0.345*	0.383*	1.000					
(10) Employees	0.398*	0.232*	0.464*	0.395*	0.568*	0.236*	0.236*	0.271*	0.683*	1.000				
(11) LabourIntensity	0.022*	0.052*	-0.096*	-0.061*	0.013	-0.036*	0.138*	-0.012	-0.158*	0.302*	1.000			
(12) AssetTurnover	0.084*	0.054*	-0.094*	0.014	0.047*	-0.123*	0.263*	0.035*	-0.058*	0.177*	0.393*	1.000		
(13) Market-to-book	-0.074*	-0.021*	0.153*	0.290*	-0.057*	-0.144*	0.209*	0.193*	0.232*	-0.183*	-0.017*	0.045*	1.000	
(14) Tangibility	0.142*	0.074*	-0.034*	-0.006	0.091*	0.182*	0.179*	0.047*	0.031*	0.290*	0.373*	0.082*	-0.145*	1.000
(15) Capex	0.018*	0.031*	-0.010	0.118*	0.003	-0.065*	0.276*	-0.016*	0.045*	0.113*	0.369*	0.221*	0.206*	0.544*

TABLE 4

Distribution of Offences Across Values of Vega

This table presents the distribution of employee-related *Violations* and *Penalties* across CEO Vega quintiles. In Panel A bars represent the mean values of *Violations* and line plots the mean values of *Penalties*. The horizontal axis represents the quintiles of *Vega.* Panel B presents the mean test of *Violations* and *Penalties* using t-test. *** indicates the significance at 1% level. Definitions of variables are reported in Appendix 1.

Panel A. Bar Graph of Penalties and Violations across Quintiles of Vega



Panel B. Average Penalties and Violations across Quintiles of Vega

Quintiles of Vega	Range		*Violations*	*Penalties*
Q1	(0;16.44>		0.218	55,722
Q2	<16.44;44.04>		0.211	49,209
Q3	<44.06;95.92>		0.329	80,070
Q4	<95.92;229.38>		0.469	178,864
Q5	<229.43;626.23>		0.850	341,495
		Mean comparison (Q1-Q5)	-0.632***	-285,773***
		t-test	(-19.273)	(-10.540)

TABLE 5

Determinants of Violations

This table reports the estimation results for two models. Column (1) reports the coefficients of OLS regression, where the dependent variable is the natural logarithm of violations. Column (2) reports the coefficients of Poisson regression, where the dependent variable is a count of violations. *Leverage, Employees*, *Market-to-Book*, and *Tangibility* are lagged one year, while *CashFlow*, *DividendsPayout*, *LabourIntensity, AssetTurnover*, and *Capex* are measured contemporaneously. The sample spans the period 2000-2018. All variables are defined in Appendix 1. The values reported in parentheses below coefficients represent t-statistics in the model (1) and z-statistics in model (2). Standard errors are clustered at firm level. *, **, *** represent significance at 1%, 5%, and 10% respectively.

	(1)	*(2)*
Dependent variable	*ln(Violations)*	*Violations*
Vega	0.009**	0.054**
	(2.01)	(2.56)
Delta	-0.005	-0.033
	(-0.97)	(-1.34)
CashComp	-0.002	0.054
	(-0.24)	(1.05)
Leverage	0.018	0.056
	(0.72)	(0.26)
CashFlow	-0.001	0.493*
	(-0.04)	(1.67)
DividendPayout	0.079	-2.025
	(0.29)	(-1.26)
FirmSize	0.011	0.048
	(1.55)	(1.12)
Employees	0.035***	0.287***
	(3.42)	(5.04)
LabourIntensity	-0.037**	-0.157***
	(-2.32)	(-2.86)
AssetTurnover	0.012	0.096
	(1.05)	(1.52)
Market-to-book	0.006*	0.053
	(1.91)	(1.32)
Tangibility	-0.031	0.184
	(-0.53)	(0.61)
Capex	-0.095	-0.978
	(-0.91)	(-1.27)
Constant	0.007	-2.751***
	(0.09)	(-5.82)
R-squared	0.645	
Log-likelihood		-6607.29
Observations	14,865	14,865
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Model	OLS	Poisson

TABLE 6

Determinants of Penalties

This table reports the estimation results for two models. Column (1) reports the coefficients of OLS regression, where the dependent variable is the natural logarithm of the total value of penalties. Column (2) reports the coefficients of Poisson regression, where the dependent variable categorical variable created by deciles of Penalties. *Leverage*, *Employees*, *Market-to-Book*, and *Tangibility* are lagged one year, while *CashFlow*, *DividendsPayout*, *LabourIntensity*, *AssetTurnover*, and *Capex* are measured contemporaneously. The sample spans the period 2000-2018. All variables are defined in Appendix 1. The values reported in parentheses below coefficients represent t-statistics in the model (1) and z-statistics in the model (2). Standard errors are clustered at firm level. *, **, *** represent significance at 1%, 5%, and 10% respectively.

	(1)	*(2)*
Dependent variable	*ln(Penalties)*	*Q(Penalties)*
Vega	0.097**	0.028***
	(2.23)	(2.65)
Delta	-0.053	-0.027*
	(-0.94)	(-1.94)
CashComp	0.020	0.036
	(0.20)	(1.38)
Leverage	0.203	0.050
	(0.76)	(0.54)
CashFlow	0.146	0.158
	(0.59)	(1.51)
DividendPayout	4.755	0.920
	(1.49)	(1.15)
FirmSize	0.076	0.015
	(0.95)	(0.64)
Employees	0.255**	0.068**
	(2.51)	(2.33)
LabourIntensity	-0.331*	-0.049
	(-1.93)	(-1.45)
AssetTurnover	0.067	0.009
	(0.59)	(0.29)
Market-to-book	0.049	0.018
	(1.47)	(1.39)
Tangibility	-0.109	0.016
	(-0.19)	(0.09)
Capex	-0.964	-0.297
	(-0.94)	(-0.91)
Constant	0.364	0.841***
	(0.45)	(3.52)
R-squared	0.555	
Log-likelihood		-26,985.350
Observations	14865	14865
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Model	OLS	Poisson

TABLE 7

Matched Sample Tests for Violations

This table reports the estimation results from OLS regression (1, 3) and Poisson regression (2, 4). *Leverage, Employees, Market-to-Book*, and *Tangibility* are lagged one year, while *CashFlow, DividendsPayout, LabourIntensity, AssetTurnover*, and *Capex* are measured contemporaneously. The sample spans the period 2000-2018. Models (1) and (2) are estimated on a subsample matched on size and industry, while models (3) and (4) are estimated on a subsample matched in accordance with Armstrong, Jagolinzer and Larcker (2010) and Armstrong, Larcker, Ormazabal and Taylor (2013). All models include time and firm fixed effects. All variables are defined in Appendix 1. The values reported in parentheses below coefficients represent t-statistics in models (1) and (3) and z-statistics in models (2) and (4). Standard errors are clustered at firm level. *, **, *** represent significance at 1%, 5%, and 10% respectively.

	(1)	*(2)*	(3)	(4)
Dependent variable	*ln(Violations)*	*Violations*	*ln(Violations)*	*Violations*
Vega	0.016**	0.063***	0.014**	0.058***
	(2.23)	(2.76)	(2.10)	(2.62)
Delta	-0.009	-0.032	-0.010	-0.041
	(-1.06)	(-1.26)	(-1.26)	(-1.53)
CashComp	0.009	0.062	0.009	0.046
	(0.58)	(1.15)	(0.55)	(0.88)
Leverage	0.019	0.050	0.049	0.171
	(0.41)	(0.22)	(1.08)	(0.81)
CashFlow	0.086	0.575*	0.034	0.395
	(1.47)	(1.81)	(0.75)	(1.30)
DividendPayout	0.027	-1.770	-0.014	-2.268
	(0.06)	(-0.98)	(-0.03)	(-1.38)
FirmSize	0.008	0.040	0.011	0.067
	(0.61)	(0.92)	(0.87)	(1.49)
Employees	0.067***	0.296***	0.055***	0.267***
	(3.83)	(4.93)	(3.24)	(4.55)
LabourIntensity	-0.054**	-0.156***	-0.051*	-0.157***
	(-2.04)	(-2.84)	(-1.87)	(-2.79)
AssetTurnover	0.021	0.113*	0.018	0.084
	(1.07)	(1.71)	(0.95)	(1.24)
Market-to-book	0.012*	0.060	0.009	0.047
	(1.73)	(1.41)	(1.47)	(1.21)
Tangibility	-0.003	0.187	-0.022	0.216
	(-0.03)	(0.59)	(-0.23)	(0.66)
Capex	-0.216	-1.239	-0.123	-0.671
	(-1.15)	(-1.55)	(-0.66)	(-0.84)
Constant	-0.066	-22.443***	-0.077	-3.459***
	(-0.52)	(-20.50)	(-0.61)	(-6.95)
R-squared	0.606		0.616	
Log-likelihood		-5,876.624		-6,200.716
Observations	8,300	8,300	9,480	9,480
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Model	OLS	Poisson	OLS	Poisson

Matching	Size & Industry	Size & Industry	Propensity Score	Propensity Score

TABLE 8

Matched Sample Tests for Penalties

This table reports the estimation results from OLS regression (1, 3) and Poisson regression (2, 4). *Leverage*, *Employees*, *Market-to-Book*, and *Tangibility* are lagged one year, while *CashFlow*, *DividendsPayout, LabourIntensity, AssetTurnover, and Capex* are measured contemporaneously. All models include time and firm fixed effects. The sample spans the period 2000-2018. Models (1) and (2) are estimated on a subsample matched on size and industry, while models (3) and (4) are estimated on a subsample matched in accordance with Armstrong, Jagolinzer and Larcker (2010) and Armstrong, Larcker, Ormazabal and Taylor (2013). The definitions of all variables are provided in Appendix 1. The values reported in parentheses below coefficients represent t-statistics in models (1) and (3) and z-statistics in models (2) and (4). Standard errors are clustered at firm level. *, **, *** represent significance at 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)
Dependent variable	*ln(Penalties)*	*Q(Penalties)*	*ln(Penalties)*	*Q(Penalties)*
Vega	0.144**	0.031**	0.157**	0.037***
	(2.15)	(2.44)	(2.38)	(2.94)
Delta	-0.099	-0.036**	-0.108	-0.038**
	(-1.12)	(-2.10)	(-1.21)	(-2.23)
CashComp	0.174	0.058*	0.147	0.051
	(1.11)	(1.80)	(0.91)	(1.59)
Leverage	0.203	0.037	0.504	0.089
	(0.40)	(0.30)	(1.03)	(0.74)
CashFlow	1.107*	0.353*	0.662	0.276*
	(1.68)	(1.91)	(1.32)	(1.76)
DividendPayout	7.481	1.337	5.983	0.724
	(1.54)	(1.38)	(1.23)	(0.77)
FirmSize	0.007	0.003	0.015	0.008
	(0.05)	(0.11)	(0.11)	(0.28)
Employees	0.524***	0.095**	0.391**	0.076**
	(3.02)	(2.53)	(2.31)	(2.12)
LabourIntensity	-0.479*	-0.055	-0.409	-0.047
	(-1.65)	(-1.38)	(-1.30)	(-1.08)
AssetTurnover	0.081	0.014	0.078	0.004
	(0.42)	(0.35)	(0.43)	(0.10)
Market-to-book	0.108	0.028	0.093	0.028
	(1.39)	(1.34)	(1.30)	(1.39)
Tangibility	0.305	0.064	0.187	0.077
	(0.32)	(0.32)	(0.19)	(0.38)
Capex	-2.095	-0.563	-1.326	-0.252
	(-1.12)	(-1.29)	(-0.69)	(-0.55)
Constant	0.018	-0.776***	-0.018	0.358
	(0.01)	(-2.75)	(-0.01)	(1.18)
R-squared	0.490		0.509	
Log-likelihood		-19,092.786		-20,796.882
Observations	8,300	8,300	9,480	9,480
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Model	OLS	Poisson	OLS	Poisson
Matching	Size & Industry	Size & Industry	Propensity Score	Propensity Score

TABLE 9

The Effect of FAS123R on Violations and Penalties

This table reports the estimation results from OLS regression. To ensure we have a balanced sample, for this analysis our sample period runs from 2002 to 2006. We drop observations for 2004, the year in which SFAS 123R since for part of this year firms knew about the provisions of SFAS 123R. Given this the pre-period consists of years 2002 and 2003 and the post-period consists of years 2005 and 2006. *Treatment* is an indicator variable that takes the value of one if CEO compensation is sensitive to stock volatility, i.e. *(Vega>0*), and zero otherwise. *Post* is an indicator variable that takes the value of one in the post-period, i.e. after SFAS 123R was implemented, and zero otherwise. *Leverage*, *Employees*, *Market-to-Book*, and *Tangibility* are lagged one year, while *CashFlow*, *DividendsPayout*, *LabourIntensity*, *AssetTurnover*, and *Capex* are measured contemporaneously. All models include year fixed effects. The definitions of all variables are provided in Appendix 1. The values reported in parentheses below coefficients represent t-statistics. Standard errors are clustered at firm level. *, **, *** represent significance at 1%, 5%, and 10% respectively.

	(1) *ln(Violations)*	(2) *ln(Penalties)*
Treatment	0.087***	0.807**
	(2.59)	(2.08)
Treatment x Post	-0.160**	-1.691**
	(-2.13)	(-2.10)
Post	0.172**	1.914**
	(2.36)	(2.44)
Delta	0.000	0.000
	(0.39)	(0.42)
CashComp	0.008	0.027
	(0.42)	(0.15)
Leverage	0.005	0.388
	(0.09)	(0.62)
CashFlow	-0.254***	-1.906**
	(-3.14)	(-2.50)
DividendPayout	-0.015	0.974
	(-0.02)	(0.16)
FirmSize	0.005	0.083
	(0.30)	(0.54)
Employees	0.105***	0.941***
	(6.52)	(6.33)
LabourIntensity	-0.007***	-0.056**
	(-3.36)	(-2.42)
AssetTurnover	0.046***	0.442***
	(2.95)	(2.65)
Market-to-book	0.007	0.091
	(0.71)	(0.90)
Tangibility	0.147*	1.439*
	(1.86)	(1.92)
Capex	-0.247	-2.967
	(-0.96)	(-1.20)
Constant	-0.238*	-2.235*
	(-1.83)	(-1.70)

R-squared	0.193	0.181
Observations	1,793	1,793
Year Fixed Effects	Yes	Yes

APPENDIX 1

Variable Definitions

The table reports definitions of variables used in the analysis. The data used for calculation of the variables are sourced from the Violation Tracker [VT] produced by the Corporate Research Project of Good Jobs First (available at https://www.goodjobsfirst.org/violation-tracker), Compustat [C], and Center for Research in Security Prices [CRSP].

Variables	Definition [Database]
Dependent	
Violations	The total number of employee-related violations per year.[VT]
ln(Violations)	Natural logarithm of one plus the total number of employee-related violations per year. [VT]
Penalties	The total value of penalties for employee-related violations per year. [VT]
ln(Penalties)	Natural logarithm of the total value of penalties of employee-related violations per year. [VT]
Q(Penalties)	Categorical variable dividing the sample into 10 equal parts depending on the total value of violations. [VT]
Incentives	
Vega	Natural logarithm of one plus the sensitivity of the CEO's equity portfolio to 0.01 change in volatility (Coles, Daniel and Naveen 2013). [C, CRSP]
Delta	Natural logarithm of one plus the sensitivity of the CEO's equity portfolio to 0.01 change in stock prices (Coles, Daniel and Naveen 2013). [C, CRSP]
CashComp	Natural logarithm of one plus the total cash compensation received by the CEO during the year. [C: ln(1+total_curr_w)]
Controls	
Leverage	The ratio of the total book value of debt to book value of total assets. [C: (dlc+dltt)/at]
CashFlow	The ratio of cash flows from operations to lagged book value of total assets.[C: (ib+dp)/at]
DividendPayout	The ratio of cash dividends to common shareholders to lagged the book value of total assets. [C: dvc/at_{t-1}]
FirmSize	Natural logarithm of market value. [C: ln(mkvalt)]
Employees	Lagged natural logarithm of a number of employees. [C: ln(emp_{t-1})]
LabourIntensity	The standardised ratio of a number of employees to total assets. [C: emp/(at/1000)]
AssetTurnover	The ratio of total sales to lagged value of the total book value of total assets. [C: sale/at_{t-1}]
Market-to-book	Ratio of market value of total assets to book value of total assets. [C: (cshpri*prcc_f+pstkl+dlc+dltt-txdb)/at]
Tangibility	The ratio of net property, plant, and equipment to book value of total assets. [C: ppent/at]
Capex	The ratio of capital expenditure to lagged book value of total assets. [C: capx/at_{t-1}]

APPENDIX 2

Sample Selection

This table describes the sample selection.

		# firms	*# firm/year observations*
Number of firms available on Compustat between 1999-2018		18,244	165,410
Less :			
Firms from excluded industries			
	SIC<2000	1,699	15,200
	SIC>5999	7,741	69,333
	SIC<4900;4999>	553	6,765
Firms with incomplete CEO's compensation data		7,461	54,612
Firms with CEOs without options in the compensation package		735	2,139
Firms with missing financial controls		1,283	2,496
Final sample		**1,455**	**14,865**

APPENDIX 3

Distribution of Violations and Penalties

This table presents the distribution of employee-related violations across violation categories (Panel A), years (Panel B) and industries in accordance with the Fama-French Type 48 Industry Classification (Panel C). The reported figures represent the mean values of the number of employee-related offences (Violations) and value of penalties (Penalties).

Panel A. Distribution by Category of Violations

	Violations	*Penalties*
Work visa	0.000	1,950.89
Family and Medical Leave Act	0.006	98.07
Uniformed Services Employment	0.000	48.35
Medicare Coverage Gap Discount Program	0.001	335.27
Child labour or youth employment	0.000	26.93
Benefit plan administrator	0.008	150,696.20
Employment discrimination	0.024	73,571.74
Workplace safety or health violation	0.317	5,086.06
Wage and hour	0.062	228,602.70
Labor relations	0.056	9,028.23
Workplace whistleblower retaliation	0.001	102.83

Panel B. Distribution by Year of Violation

	Violations	*Penalties*
2000	0.233	42,177.46
2001	0.279	95,254.67
2002	0.321	81,470.64
2003	0.319	59,206.06
2004	0.380	112,498.00
2005	0.371	118,913.50
2006	0.331	116,447.30
2007	0.393	173,670.50
2008	0.382	128,505.50
2009	0.402	166,337.80
2010	0.487	166,178.30
2011	0.476	167,356.10
2012	0.493	136,558.00
2013	0.456	131,923.40
2014	0.469	169,190.10
2015	0.569	194,911.10
2016	0.660	342,080.20
2017	0.617	239,831.30
2018	0.581	187,125.80

Panel C. Distribution by Industry

	Violations	*Penalties*
Food Products	1.126	164,171.10
Candy & Soda	1.071	392,716.20
Beer & Liquor	1.158	243,834.60
Tobacco Products	0.000	-
Recreation	0.037	721.79
Printing and Publishing	0.071	34,214.78
Consumer Goods	0.320	132,665.50
Apparel	0.260	172,060.20
Medical Equipment	0.083	15,806.49
Pharmaceutical Products	0.041	50,028.33
Chemicals	0.386	70,559.88
Rubber and Plastic Products	0.147	2,903.22
Textiles	0.136	95,680.99
Construction Materials	0.618	37,387.77
Steel Works Etc	0.950	159,896.40
Fabricated Products	0.129	1,008.42
Machinery	0.418	58,273.43
Electrical Equipment	0.179	20,212.34
Automobiles and Trucks	0.713	146,945.40
Aircraft	1.050	349,379.90
Shipbuilding, Railroad Equipment	0.652	14,572.13
Defense	0.870	429,488.60
Petroleum and Natural Gas	1.069	259,876.50
Communication	0.628	415,615.30
Business Service	0.554	213,783.80
Computers	0.064	102,262.70
Electronic Equip	0.094	26,367.25
Measuring and Control Equipment	0.126	12,457.01
Business Supplies	0.603	59,350.48
Shipping Containers	0.966	168,204.60
Transportation	0.704	308,496.50
Wholesale	0.352	104,088.30
Retail	0.727	385,931.70
Restaurants, Hotels, Motels	0.361	324,733.30
Other	0.239	11,851.39

APPENDIX 4

Sample of Violations and Penalties

This table presents the distribution of employee-related violations across violation categories (Panel A), years (Panel B) and industries in accordance with the Fama-French Type 48 Industry Classification (Panel C). The reported figures represent the *Sum of Violations* and total value of penalties (*Total Penalties*) considered in the analysis. In total the sample includes a record of 7,039 violations penalised by close to $7,980 million penalties. The reported figures are unwinsorised.

		Sum of Violations	*Total Penalties ('000$)*
Panel A. Distribution by Category of Violations			
Work visa		2	29,000
Family and Medical Leave Act		90	1,458
Uniformed Services Employment and Reemp		3	719
Medicare Coverage Gap Discount Program		11	4,984
Child labor or youth employment		2	400
Benefit plan administrator		117	2,240,099
Employment discrimination		353	1,093,644
Workplace safety or health violation		4710	75,604
Wage and hour		916	3,398,180
Labor relations		827	134,205
Workplace whistleblower retaliation		8	1,529
Panel B. Distribution by Year of Violation			
	2000	214	61,656
	2001	260	399,656
	2002	275	115,314
	2003	310	125,774
	2004	359	475,284
	2005	336	293,677
	2006	316	414,315
	2007	439	427,218
	2008	449	899,251
	2009	392	633,310
	2010	537	342,978
	2011	511	452,971
	2012	461	200,233
	2013	375	266,807
	2014	377	234,447
	2015	437	375,171
	2016	433	738,878
	2017	386	146,633
	2018	172	376,248
Panel C. Distribution by Industry			
Food Products		582	120,646
Candy & Soda		81	239,324
Beer & Liquor		135	29,173

Recreation	4	79
Printing and Publishing	12	5,817
Consumer Goods	135	172,880
Apparel	83	70,090
Medical Equipment	68	20,531
Pharmaceutical Products	44	145,179
Chemicals	268	134,264
Rubber and Plastic Products	17	337
Textiles	11	18,167
Construction Materials	341	19,890
Steel Works Etc	652	302,337
Fabricated Products	4	31
Machinery	421	167,780
Electrical Equipment	50	5,639
Automobiles and Trucks	343	113,627
Aircraft	200	289,766
Shipbuilding, Railroad Equipment	15	335
Defense	47	77,615
Petroleum and Natural Gas	190	38,276
Communication	411	689,753
Business Service	41	31,150
Computers	40	360,606
Electronic Equip	152	179,746
Measuring and Control Equipment	73	7,238
Business Supplies	216	27,300
Shipping Containers	115	21,933
Transportation	536	872,184
Wholesale	262	160,763
Retail	1303	2,412,367
Restaurants, Hotels, Motels	161	243,707
Other	26	1,292