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Stock options versus restricted stock: A comparative analysis of their impact on U.S. corporate fraud litigation

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Abstract

Rooted in traditional agency theory, equity-based compensation is frequently used in practice and research. This paper examines the impact of two equity-based compensation types on corporate fraud litigation. I compare stock options and restricted stock as measured by their sensitivity to firm value. Using a matched-pair design based on fraud and control firms, I perform a logistic regression. Stock options positively affect the occurrence of corporate fraud litigation, whereas the effect of restricted stock seems ambiguous. In a comparative setting, stock options have a stronger effect on the occurrence of corporate fraud litigation than restricted stock. The results are more pronounced for tangible, profitable, growth firms operating in an environment characterized by uncertainty. However, the results are not robust to using an unmatched sample design of S&P 1500 firms. The overstatement of fraud within a matched-pair design could explain the difference in significance. Overall, the findings imply that stock options do not appear to be a useful solution to the agency problem, whereas restricted stock may be. The exposure to downside risk is larger for restricted stockholders than for stock options, persuading option holders into fraudulent activities to manipulate the stock price. Still, this statement represents a call for additional research to provide consistent evidence.

Keywords: fraud, litigation, executive compensation, stock options, restricted stock

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INTRODUCTION

Do equity-based compensation components function as a mitigating tool of fraudulent behaviour or has it been a cause of corporate fraud, such as the major accounting scandals in the early 2000s? Corporate fraud and corporate governance gained considerable attention from the public and politics in the last twenty years. The concern was spurred by high-profile fraud scandals of major corporations such as Enron Corporation, Tyco, WorldCom, and Waste Management (Wang, 2004). In December 2001, American energy company Enron filed the largest bankruptcy ever at that time after a period of corporate fraud. A somewhat oblivious board of directors paved the way for Enron's management to pursue its own interest. Investigations of twenty corporate fraud scandals during the Enron-WorldCom era followed. The SEC and The U.S. Department of Justice claimed a loss of approximately $236 billion shareholder value (Mints & Morris, 2016). Moreover, the majority of the fraud scandals in the year 2001, like Enron, were characterised by a chief executive officer cooking the books (Rezaee, 2005). They did so with the intention to overstate revenues and boost the payoff of their own compensation (Markham, 2015).

Hence, in contrast to the traditional agency theory (Jensen & Mackling, 1976; Jensen & Murphy, 1990), equity-based incentives possibly persuade executives into fraudulent accounting activities. In theory, equity-based compensation has the purpose of aligning interests of shareholders and executives, as the two groups have different incentives. An ordinary compensation package often contains equity-based elements, including stock options and restricted stock. Throughout the early 1990s, stock options took the place of base salaries as the largest component of the compensation package (Murphy, 1999). Later, the popularity shifted from stock options towards restricted stock, mainly due to a change in accounting treatment (Murphy, 2013).

Stock options and restricted stock differ on a number of characteristics, influencing the effectiveness of incentive alignment (Bryan, Hwang, & Lilien, 2000). Hou, Lovett & Rasheed (2020) recently confirmed this finding after a comparative analysis of the existing literature. Stock options only have value if the stock price increases, but they do not have downside risk. On the contrary, to offset potential downside risk, restricted stock has value regardless of stock price movements (Hou et al., 2020). Given these facts, the role of stock options and restricted stock in the occurrence of corporate fraud varies. A vast majority of the literature agrees that stock options have a tendency to promote fraudulent behaviour (Burns & Kedia, 2006; Chen et al., in press; Denis, Hanouna, & Sarin, 2006; Dittman & Maug, 2007; Efendi, Srivastava, & Swanson, 2007; Fich & Shivdasani, 2007; Johnson, Ryan, & Tian, 2009; Peng & Roëll, 2008). Whereas others argue restricted stock lacks the positive incentive effects that stock options do elicit (Irving, Landsman, & Lindsey, 2011). As the overall review shows and confirmed by comparative studies (Armstrong, Jagolinzer, & Larcker, 2010; Trompeter, Carpenter, Desai, Jones, & Riley, 2013), there is a need for additional research, sooner rather than later.

As a response, I take a comparative examination of stock options and restricted stock on the occurrence of corporate fraud litigation. Compared to other outcome variables, e.g., performance, I opt for fraud as it has detrimental effects on shareholder and economic value[1], while simultaneously an increase in fraud litigations is perceived in the time period 2012 to 2019 (SCAC, 2021). Moreover, the rationale behind issuing equity-based compensation is to prevent executives from acting in their own self-interest, whereas the opposite is likely to occur. Hence, empirical research is necessary to establish a causal effect and possibly prevent (major) fraud scandals in the future. This leads to the following research question: ***What is the effect of stock options and restricted stock on corporate fraud litigation?***

My analysis addresses this research question with the use of four datasets. To identify cases of corporate fraud, I use the Stanford Securities Class Action Clearinghouse database with a specific filter for violations of Section 10(b) from the 1934 Securities Exchange Act. Using this database, I define fraud as securities fraud, practiced as a lawsuit on behalf of a large group of shareholders (Karpoff, Koester, Lee, & Martin, 2017). Moreover, I use data from the merged CRSP/Compustat, ExecuComp and BoardEx databases on stock prices and firm financials, executive compensation, and board data, respectively. My final sample comprises 101 U.S. fraud firms and 101 U.S. non-fraud firms in the period 2008 to 2019. These firms are matched based on firm size, industry, and year. Results obtained from the descriptive statistics and comparison tests indicate that fraud and control firms are rather similar. Perceived significant differences are seen among stock option sensitivity, book-to-market ratio, sales growth, Altman's Z-score and stock volatility.

To test my hypotheses, I opt for a logistic regression model based on the firm-pairs. I find that stock options significantly positively affect the occurrence of corporate fraud litigation. On the contrary, the findings on restricted stock suggests that there is no impact of restricted stock on corporate fraud litigation. Third, and last, I conduct a Wald Chi-square test. The findings show that stock options have a stronger effect on the occurrence of corporate fraud litigation than restricted stock. However, the above results seem insignificant after conducting the same regressions with an unmatched sample, consisting of the remaining S&P 1500 firms. Moreover, the intersection sample with another fraud database, Audit Analytics, was not large enough to perform an additional analysis.

This paper makes several contributions to the theoretical understanding of equity-based compensation on the occurrence of corporate fraud. First, I offer a novel contribution to the existing literary base with respect to the time frame (e.g., Burns & Kedia, 2006; Denis et al., 2006; Peng & Roëll, 2008). I examine the period from 2008 to 2019: a time frame which is rarely investigated within the area of equity-based compensation on corporate fraud. This large, contemporary time frame enables me to provide modern insights on whether the two types of compensation indeed mitigate agency problems, or, on the contrary, motivate executives into fraudulent behaviour.

[1] The top ten largest settlements, as registered by the Securities Class Action Clearinghouse database, accounted for a total of 33.4 billion dollar settlement fee (Securities Class Action Clearinghouse, 2021).

Second, my research is a response to the recent trend of using restricted stock as equity-based compensation (Hou et al., 2020). Restricted stock used to play a small role in equity-based compensation as evidenced by an examination of the period 1993-2000 (Cheng & Warfield, 2005). Hence, a limitation to the current, yet dated literature base is that studies were often not able to fully capture the impact of restricted stock, simply because restricted stock was rarely granted (Efendi et al., 2007; Sanders & Hambrick, 2007). Hou et al. (2020) address the lack of comparative research on stock options and restricted stock, and which one is better at fulfilling its role in incentive alignment. Third, I am challenged to use new variable inputs for the calculation of the independent variables *Stock Option Sensitivity* and *Restricted Stock Sensitivity.* Based on the well-established Black-Scholes model (Black & Scholes, 1973), I adopt a modern approach using the new reporting method of executive compensation variables as available in ExecuComp.

The remainder of my paper is structured as follows. Section 2 provides an overview of relevant prior literature from which three hypotheses are developed. Section 3 describes the data and research methodology used. Section 4 presents the results. In Section 5 implications of the results are highlighted, and limitations and directions for future research are discussed. Last, Section 6 concludes the paper.

2. LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

In this section I review prior literature related to corporate fraud and securities class action lawsuits, followed by an analysis of equity-ownership as an alignment tool. Thereafter, I discuss and compare the effect of stock options and restricted stock on corporate fraud. From this review, three hypotheses are developed.

2.1 Corporate Fraud

Before discussing corporate fraud[2] and going into detail, I want to establish a common definition. According to Rezaee (2005: p279) financial statement fraud is defined as "a deliberate attempt by corporations to deceive or mislead users of published financial statements, especially investors and creditors, by preparing and disseminating materially misstated financial statements." The significant difference between an error and fraud is the "deliberate attempt", that is, the intentional act (Mintz & Morris, 2016). To divide the concept of fraud into essential elements, Amiram, Bozanic, Cox, Dupont, Karpoff, & Sloan (2018) state that (i) fraud is a misrepresentation, such as misstatement, misreporting, or omission; (ii) must be material; (iii) there must have been intent to make the fault and (iv) in private suits, the accuser suffers from a loss related to the fraud. These four basic elements are important as everyone defines fraud differently (Amiram et al., 2018; Karpoff et al., 2017).

[2] The terms related to corporate fraud are used interchangeably in this paper: "accounting fraud", "accounting restatements" "financial misconduct", "financial misreporting", "financial restatements", "financial reporting misconduct", "financial statement fraud", "financial statement restatements", "fraudulent behavior", "fraudulent misreporting", "misreport financial results", "misstate financial statements", "restating financial statements".

As indicated in element (iv), if shareholders suffer from securities fraud, they can privately sue a company under Section 10(b) of the 1934 Securities Exchange Act. On behalf of a large group of shareholders, a firm can be accused of financial fraud through a federal securities class action lawsuit filing. Such a fraud allegation is related to large declines in shareholder value (Denis et al., 2006). For example, the class action lawsuit against Green Mountain: "A class-action lawsuit was brought against the company alleging fraud based on materially misleading statements made to deceive shareholders about the inventory levels and earnings of the company. The original district court decision went against the plaintiff-shareholders, but it was appealed, and the decision was remanded for further trial. In the end, the shareholders prevailed against Green Mountain" (Mintz & Morris, 2016: p410).

A drawback to private class action lawsuits is the attempt to distinguish between legitimate and frivolous lawsuits (Amiram et al., 2018; Fich & Shivdasani, 2007; Wang et al., 2015). Frivolous lawsuits are lawsuits without merit and initiated by profit-oriented shareholders (Fich & Shivdasani, 2007). To mitigate this problem, the Private Securities Litigation Reform Act of 1995 (PSLRA 1995) was designed in 1995 to prevent frivolous securities litigation, which indeed led to a decrease in frivolous lawsuits (Johnson, Nelson, & Pritchard, 2002).

2.1.1 Fraud triangle

Originally developed by Cressey (1950), a distinguished criminologist, researchers rely on the "Fraud Triangle" in assessing the likelihood of corporate fraud (Hogan, Rezaee, Riley Jr, & Velury, 2008; Schnatterly, Gangloff, & Tuschke, 2018; Trompeter et al., 2013). This framework is based on the principle that generally three conditions are present when fraud occurs (Figure 1). The first element, *Incentives/Pressures,* refers to executives or other employees being motivated by certain incentives or pressure. Whether internal or external, these experienced motivators possibly cause managers to commit fraud. Second, *Opportunity* indicates existing circumstances create the opportunity for the fraud to be executed. Without the "right" circumstances, employees may not be able to misbehave in spite of the imposed incentives or perceived pressure. Third, *Rationalization* means that fraudsters operate with a mindset of rationalization. This mental strategy is adopted to justify their own actions as acceptable.

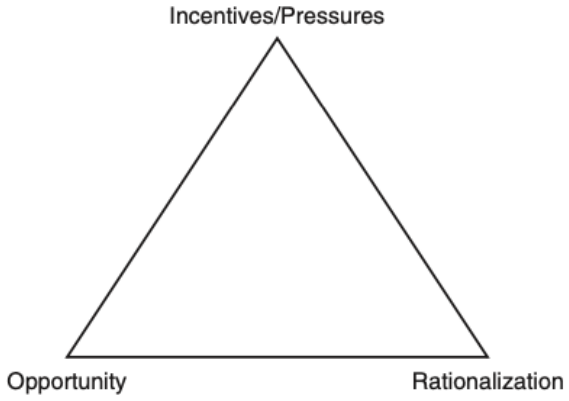

Figure 1. The Fraud Triangle. Reprinted from "Ethical Obligations and Decision Making in Accounting: Text and Cases", by S. M. Mintz & R. E. Morris, 2016, (4th ed.), New York, NY: McGraw-Hill Education.

First, which incentives cause executives to commit fraud? Psychotic, ideological, economic motives, or a combination of, can play a role. Irrespective of the type of incentive, the fraud is usually executed from a selfish perspective (Mintz & Morris, 2016). For publicly traded companies the most prominent explanation for fraud are economic incentives. Meeting or beating analysts' forecasts and satisfying the shareholders are primary motives that persuade executives into fraudulent misreporting (Rezaee, 2005). Boosting their own payoff from equity-compensation is another one (Amiram et al., 2018). Second, how do the circumstances create the opportunity for committing fraud? CEO power is considered a key determinant to employ fraudulent opportunities (Schnatterly et al., 2018). Mintz & Morris (2016) argue that being a CEO equals access to cash and inventory which can be tempered with. Third, how do executives rationalize their actions? CEOs find themselves rationalizing using "We need to protect our shareholders and keep the stock price high," (Mintz & Morris, 2016: p278), when in fact they might be triggered by boosting payoff from their own equity-based compensation.

2.2 Executive Compensation

Publicly traded US firms are characterized by a dispersed ownership structure, known as the concept of "separation of ownership and control". This separation demonstrates itself as shareholders ("owners") and executives ("managers") having different incentives. If so, so-called agency problems arise. CEOs possibly pursue actions for personal gain, rather than fulfilling the interests of the shareholders (Eisenhardt, 1989; Jensen & Meckling, 1976). Shareholders' interest essentially is the construction of a profitable company, generating much revenue that translates into a higher share price and dividends. Agency theory, a dominating theory in corporate governance research since old days, proposes solutions to the agency problems and related costs. Monitoring and incentive alignment are two examples, among others (Pepper & Gore, 2015). However, monitoring is costly and difficult to execute. An easier and less costly method is to focus on aligning the interests of shareholders and executives. A common solution to align incentives is to tie executive compensation to the financial performance of the firm and its share price accordingly (Mintz & Morris, 2016). With this method, executives are encouraged to adopt a long-term perspective that enhances firm value. Equity-based compensation has been, and still is, a popular method (Eisenhardt, 1989; Fama & Jensen, 1983; Jensen & Murphy, 1990; Hou et al., 2020). It is argued that with the distribution of equity to executives, goal alignment is reached, which decreases the likelihood of financial misconduct (Shleifer & Vishny, 1997).

While one would expect equity-based compensation mitigates potential agency problems, the flip side is that it possibly motivates executives into fraudulent misreporting (Armstrong et al., 2010). One view is that executives who commit fraud were possibly motivated to avoid large share price declines (Johnson et al., 2009). Preferably, a manager would try to push up the stock price so that its stock options or other equity-based compensation become more lucrative (Mintz & Morris, 2016).

This counter reaction is in line with the behavioural agency theory, stating that equity-based incentives are not an effective way to motivate executives. Traditional agency theory proposes that with additional monetary rewards, executive motivation increases. Behavioural agency theorists argue this model is too simplistic. Rather than focusing on pecuniary motivation, behavioural theory places human capital at the heart of the model, with a trade-off between intrinsic and extrinsic motivation (Pepper & Gore, 2015).

Researchers have been triggered by these somewhat opposing theories, which has led to numerous studies on US corporations (e.g., Armstrong, Larcker, Ormazabal, & Taylor, 2013; Burns & Kedia, 2006; Denis et al., 2006; Efendi et al., 2007; Goldman & Slezak, 2006; Peng & Roëll, 2008). Dechow, Sloan, & Sweeney (1996) were one of the first to examine the relationship between equity-based compensation and earnings management. They did not find evidence that managers manipulate earnings to sell their shares at disproportionate prices. Beneish (1999) investigates a sample of firms that are the target of Securities and Exchange Commission (SEC) enforcement actions. He shows that, relative to control firms, CEOs of the overstating firms are more likely to redeem stock appreciation rights during the period of overstated earnings. Following this line of thought, Johnson, Ryan, & Tian (2003) find that executives at fraud firms have larger equity-based compensation than their matched control firms. This finding is supported by Goldman & Slezak (2006) stating that stock-based compensation can persuade managers to misreport financial results. Indeed, Wang, Winton, & Yu (2010) provide evidence financial reporting misconduct increases with executives' compensation incentives.

Not all research, however, points to a positive relation between executive's compensation and cooking the books. After examining a sample of accounting fraud accusations by the SEC, equity incentives could not have been linked to fraud (Erickson, Hanlon, & Maydew, 2006). Moreover, Armstrong et al. (2010) examined CEO equity incentives and found that higher levels of equity incentives decreased the occurrence of accounting irregularities. Given the above literature review, no overall conclusion can be drawn regarding the effect of equity-based compensation on the incidence of accounting fraud. Hence, a closer look should be taken at different compensation elements and their effect on fraud accordingly.

2.3 Stock Options & Restricted Stock

Two types of equity-based compensation most commonly used are stock options and restricted stock (Murphy, 1999; Bryan et al., 2000; Hou et al., 2020). In the following sections, I will review their major characteristics and their impact on the incidence of accounting fraud.

2.3.1 Stock options and fraud incidence

"The use of stock-based compensation for U.S. CEOs has increased significantly throughout the 1990s" (Bryan et al., 2000: p661).

By 2001, stock options accounted for more than 50% of total CEO compensation at large U.S. firms (Sanders & Hambrick, 2007). Stock options give an executive the right, not the obligation, to purchase a specific number of shares at a prespecified price within a prespecified term (Devers, McNamara, Wiseman, & Arrfelt, 2008; Hall & Murphy, 2002). Executives need to hold their stock options for a minimum period until the vesting date. After this specified period, potential rewards of the stock option can be collected (i.e., exercised). Specific rewards are calculated as the difference between the exercise price and the current market stock price. However, exercising is possible up until the expiry date, after which the stock option position might become worthless (Devers et al., 2008). Another distinguishing characteristic of stock options is the upside potential in combination with no downside risk. With an increase in the firm's stock price, the executive's stock options gain in value, whereas a decreasing stock price reduces option value, but no reduction in the executive's personal wealth (Larraza-Kintana, Wiseman, Gomez-Mejia, & Welbourne, 2007).

"As the use of stock options increases, the expected payoff from fraud increases" (Denis et al., 2006: p470). In line with this statement, contemporaneous research agrees that stock options have a tendency to promote fraudulent behaviour. Burns & Kedia (2006) study accounting restatements and detect a positive relationship between total option portfolio sensitivity and accounting restatements. In a research by Bergstresser & Philippon (2006), discretionary accruals are linked to stock options. They show a positive relationship between discretionary accruals manipulation and the CEO's stock option compensation. Recently, Chen et al. (in press) have taken on a more innovative research method approach. In combination with both full sample and matched sample design, they conclude that as an executive's stock options increases, the likelihood of accounting fraud increases.

Yet, some studies report a positive association only for certain components of option-related holdings. As one example, Cheng & Warfield (2005) report a significant relation between unvested stock options and earnings management. Moreover, the research of O'Connor, Priem, Coombs, & Gilley (2006) provides evidence that stock option grants were sometimes associated with less fraudulent misreporting, whereas in other cases with a greater incidence of fraud. Last, Efendi et al. (2007) examine in-the-money stock options and their effect on financial restatements. As a result, CEOs with large in-the-money stock option holdings are more likely to misstate financial statements. Following these results, Dittman & Maug (2007) propose that CEOs should not hold any stock options. Stock options are both in practice and theory a frequently used compensation method, as well as its role in financial reporting misconduct. Despite numerous studies, evidence on the effect of stock options on fraud incidence is mixed.

Regarding studies on securities class action litigation in particular, Denis et al. (2006) find that holding stock options increases the incentive to perform fraudulent behaviour. Even after controlling for other types of the compensation contract, stock options are significantly positively related to the likelihood of fraud litigation. Moreover, Fich & Shivdasani (2007) find that CEOs having stock options increases fraud probability.

Similarly, Peng & Roëll (2008) show that the incidence of litigation increases as executives are given stock options. More recent literature makes a novel contribution to these findings. Call, Kedia, & Rajgopal (2016) examine stock-based compensation for non-executive and non-managerial employees, rather than executive compensation. They find a strong effect of the granting of stock options on securities class action litigation. Though rank-and-file employees fall outside the scope of my research, I believe this finding does strengthen my hypothesis development. Subsequently, I hypothesize the following:

Hypothesis 1 = Stock options have a positive effect on the occurrence of corporate fraud litigation.

2.3.2 Restricted stock and fraud incidence

Restricted stock as an equity-compensation type has become increasingly popular in recent years (Hou et al., 2020). Scholars argue restricted stock is (rapidly) replacing stock options as the prevalent stock ownership method (Hall & Murphy, 2002; Hou et al., 2020; Irving et al., 2011). Restricted stock gives an executive a predetermined number of shares of stock, representing actual ownership of shares. After the vesting period, the shares are assigned a fair market value and they become valuable. The shares are restricted in the sense that there are restrictions on resale (Bryan et al., 2000). In addition, restricted stockholders receive dividends (Hou et al., 2020). Even if stockholders fail to vest their shares, they do not have to refund their received dividends (Irving et al., 2011).

Compared to stock options, research examining restricted stock is limited. Thus, I have singled out studies that do report results on restricted stock, among other compensation components. With a focus on financial restatement announcements, Burns & Kedia (2006) and Efendi et al. (2007) report similar results. The sensitivity of restricted stock holdings to the stock price has no effect on financial restatements (Burns & Kedia, 2006). Moreover, restricted stockholdings insignificantly affect financial statement restatements (Efendi et al., 2007). Johnson et al. (2009), after an examination of firms subject to SEC's Accounting and Auditing Enforcement Releases (AAERs), confirm that the likelihood of financial misconduct is unrelated to manager's holdings of restricted stock.

Based on the above literature review, "unrelated" is a recurring theme. These studies imply no significant effect of restricted stock on fraud incidence. A reason could be that restricted stock was rarely granted, as shown by Cheng & Warfield (2005). Only 18.3 percent of firms in their sample, from 1993-2000 granted restricted stock. Nevertheless, scholars argue that restricted stock discourages risk-taking behaviour (Bryan et al., 2000; Hou et al., 2000). This leads to my second hypothesis:

Hypothesis 2 = Restricted stock has a negative effect on the occurrence of corporate fraud litigation.

2.3.3 Comparative studies on stock options and restricted stock

Previously, stock options were preferred over other types of incentive compensation because of the accounting treatment (Murphy, 2013). In 2006, The Financial Accounting Standard (FAS) 123R was implemented, changing the accounting treatment of stock options. Following this accounting standard, companies were obliged to expense stock options at fair value, similar to the accounting treatment used for restricted stock. As the perceived costs for stock options increased, companies shifted to restricted stock (Murphy, 2013) (Figure 2). Stock options and restricted stock share a couple of conditions. First, as with all types of equity-ownership, ownership stakes in the company are granted. Second, there is a vesting period, restricting executives to exercise the option or assign value to their restricted stock during the specified period. Instead of harmful short-term actions, this is supposed to encourage managers to adopt a long-term perspective (Mintz & Morris, 2016). Third, both compensation types are forfeited if the CEO leaves the company, whether voluntarily or involuntarily.

Aside from past accounting treatment, stock options and restricted stock differ on two important dimensions, influencing the effectiveness of incentive alignment. First, there is a difference regarding the respective payoff functions and related risk taking. Stock options have a payoff function which is convex in stock price. A stock option only has value if the stock price increases, but they do not have any downside risk. Consequently, CEOs are induced to take on risky projects. In contrast, restricted stock payoff follows a linear model. Essentially, it can be viewed as a stock option with an exercise price of zero. Hence, holders are more likely to adopt a risk-averse strategy than engaging in risky investment projects (Bryan et al., 2000; Denis et al., 2006). Second, restricted stock is dividend-protected whereas stock options are not. Restricted stockholders receive dividends even if they fail to vest their shares. Stock option holders, on the other hand, are negatively affected by the payment of dividends, as a current share price drop leads to a decrease in stock option value. (Hou et al., 2020).

Given these differences, the comparative effect of stock options and restricted stock on risk-taking, incentive alignment and fraud occurrence are mixed. Bryan et al. (2000) conclude that even though options are efficient incentives, restricted stock is more likely to prevent the CEO from undertaking risky projects. Hall & Murphy (2002) argue that when a firm is allowed to adjust existing compensation, incentives are better aligned under repurchase stock than options. O'Connor et al. (2006) examine the impact of CEO stock options on fraudulent financial reporting, with a positive effect as result. Though not empirically tested, they propose the view that restricted stock yields better incentive alignment than stock options. Moreover, Dittmann & Maug (2007) show that the optimal compensation package should include salary and restricted stock, in order to optimize incentive alignment. However, Irving et al. (2011) find that, in high-growth firms, stock options would provide a more positive incentive mechanism. Later research states otherwise: Hou et al. (2020) show that stock options have a significantly stronger effect on CEOs investment taking.

Examining corporate fraud, Burns & Kedia (2006) find a positive impact of stock options on the announcements of financial restatements, whereas the effect of restricted stock was not significant. Denis et al. (2006) report similar results, where stock option intensity has a positive significant impact on fraud litigation; restricted share intensity does not. In combination with the results on CEO risk-taking and incentive alignment, I hypothesize the following:

Hypothesis 3 = Stock options have a stronger effect on the occurrence of corporate fraud litigation than restricted stock.

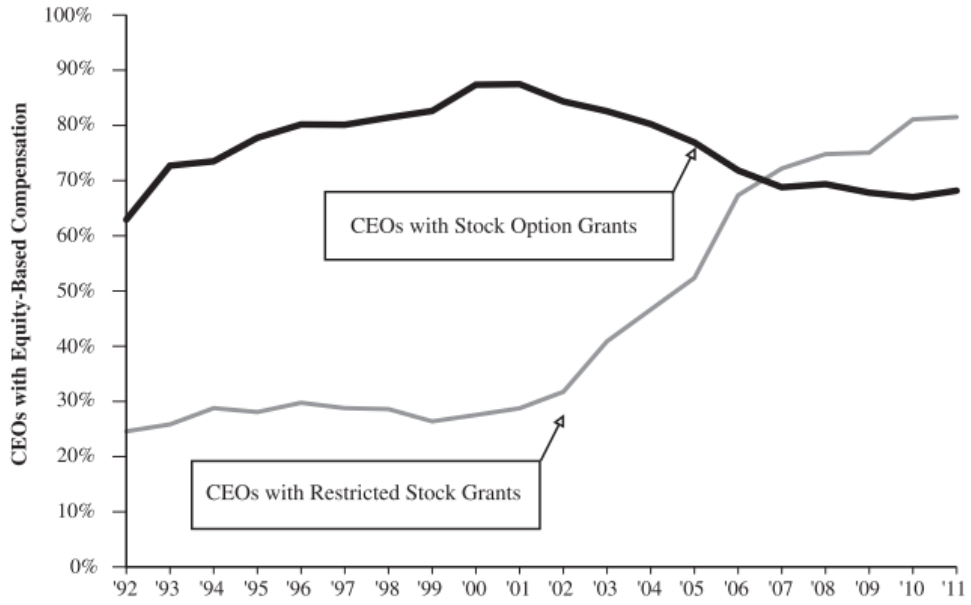

Figure 2. Above figure shows CEO's equity-based compensation for S&P 500 firms, period 1992–2011. The sample is based on S&P's ExecuComp database. Stock grants include both restricted and performance shares. Reprinted from "Executive Compensation: Where We Are, and How We Got There" by H. Murphy, 2013, In G. M. Constantinides, M. Harris, & R. M. Stulz (Eds.), *Handbook of the Economics of Finance*, *2* (pp. 211-356). Amsterdam: Elsevier.

3. DATA & METHODOLOGY

In this section, I discuss the data and methodology related to the paper. I start with defining the variables of interest, followed by an extensive description of the data and sample selection procedure. Thereupon, I present the descriptive statistics for the sample and variables. Collectively, and last, this leads to my research model.

3.1 Variables of Interest

3.1.1 Dependent variable

To test my constructed hypotheses and provide an answer to the research question, I introduce the dependent variable *Fraud*. This is a dichotomous variable, which can take on one of two values: one if a firm is subject to fraud litigation; zero otherwise. A dichotomous dependent variable suggests that either an ordinary least squares (OLS) linear model or a nonlinear logistic (logit) regression model can be considered. Research has shown that a logistic regression is preferred for modelling dichotomous accounting variables, regardless of the sample size (Stone & Rasp, 1991). Hence, a logistics regression model is frequently adopted within the fraud literature. I match each sample firm (fraud firm*)* with a control firm (non-fraud firm*)* that is not subject to fraud litigation. Matched-sample designs have often been used in financial misconduct studies (e.g., Chen et al., in press; Denis et al. 2006; Efendi et al., 2007; Erickson et al. 2006; Harris & Bromiley, 2007; Ndofor, Wesley, & Priem, 2015; O'Connor et al. 2006).

3.1.2 Independent variables

To capture the effect of stock options on financial misreporting, I use a measurement of *Stock Option Sensitivity* as the independent variable. This measurement method is frequently utilized in previous studies (e.g., Burns & Kedia, 2006; Chen et al., in press; Core & Guay, 2002; Denis et al., 2006; Efendi et al., 2007; Erickson et al., 2006; Jensen & Murphy, 1990). It estimates to what extent a CEO's stock option is sensitive to a change in the firm's stock price. The first step in estimating the option sensitivity is calculating the option delta, that is, the change in the executive's stock option holdings to changes in the stock price (Armstrong et al., 2013). Executives with higher portfolio deltas are interpreted as having better incentives to create shareholder value (Murphy, 2003). The measurement of the portfolio delta stems from the Black-Scholes model (Black & Scholes, 1973), modified by Merton (1973) to account for dividend payouts.

Once the option deltas are calculated, the independent variable *Stock Option Sensitivity* can be measured in two ways. The first measure, following Jensen & Murphy (1990), is the change in the dollar value of stock options relative to a *dollar change* in firm value. The more popular second measure is the change in the dollar value of stock options relative to a *percentage change* in firm value (Core & Guay, 1999 & 2002). The two measures are both powerful tools to examine the relationship and often provide comparable results (Burns & Kedia, 2006; Core & Guay, 1999; Denis et al., 2006; Johnson et al., 2003). Yet, Burns & Kedia (2006) favour the latter method because it is regarded as more appropriate for activities that affect the whole firm, such as financial misconduct.

An executive's option portfolio essentially consists of newly granted options (unearned awards), vested (i.e., exercisable) options, and unvested (i.e., unexercisable) options (Burns & Kedia, 2006; Denis et al., 2006). The delta is estimated separately for each component per executive-year (Coles, Daniel, & Naveen, 2013).

However, the implementation of the FAS 123R, as noted earlier, caused change. ExecuComp changed its reporting format affecting compensation variables. Among others, reporting of option and restricted stock values changed between 2006 and 2007 (Hou et al., 2020). As a result, newly granted options are not available in the ExecuComp database as a separate item. To cope with the change in reporting, I follow Coles et al.'s (2013) guideline in measuring option sensitivities. This implies estimating total option sensitivity merely as the sum of vested and unvested option sensitivity. The formula and calculation method of stock option sensitivity is to be found in Appendix B.

The other independent variable, *Restricted Stock Sensitivity*, is defined as the change in the value of restricted stock holdings for a 1% change in firm value (Core & Guay, 1999). In this calculation I assume that the delta is one i.e., there is a one-to-one change in restricted stock value to a change in stock price (Burns & Kedia, 2006; Coles et al., 2013). In line with Coles et al. (2013), I use the number of shares of restricted stock held by the CEO that had not yet vested as of fiscal year end, as a proxy for the number of shares of restricted stock held. This is incorporated into the following formula: $Restricted\ Stock\ Sensitivity\ =\ \#\ shares\ of\ restricted\ stock\ held\ *\ (stock\ price\ *\ 1\%)$

Compensation can be measured as CEO compensation or as the aggregate compensation of the top five managers. Several studies have reported similar qualitative results with both measures (Armstrong et al., 2013; Johnson et al., 2003; Peng & Roëll, 2008). Yet, I opt for CEO compensation as I quote Johnson et al. (2003; p17): "The CEO is typically the most powerful executive at a firm and can potentially exert pressure on others to engage in fraud."

3.1.3 Control variables

A matched-pair design controls for industry, firm size, and industry growth opportunities (Johnson et al., 2009). Yet, various other (firm) characteristics possibly affect the incidence of fraud litigation. Hence, these factors are captured as control variables in my model. In identifying these variables, I have followed existing research (e.g., Armstrong et al., 2013; Denis et al. 2006; Erickson et al., 2006; Peng & Roëll, 2008). All control variables are measured as of the fiscal year ending preceding the class action filing and the full definitions are to be found in Appendix C.

First of all, stock options and restricted stock are part of the total executive compensation package. Usually other elements are *Salary, Bonus* and *Other Compensation*. Though it is found that these elements do not significantly impact fraud incidence (Burns & Kedia, 2006; Denis et al., 2006; Efendi et al., 2007), it is believed that they do enhance executive risk-taking (Devers et al., 2008). Hence, taking the logarithm of each, these are added to my model.

Thereafter, I incorporate governance variables. Hogan et al. (2008) review prior research and report that weak corporate governance is correlated with a greater probability of accounting fraud. It is the board of directors' role to represent the first line of defence against managers who act in their own interests. In doing so, board independence is perceived as a valuable characteristic (Denis & McConnel, 2003).

It is expected that as the board independence increases, fraud incidence decreases (Rezaee, 2005). In support, Uzun, Szewczyk, & Varma (2004) present a negative relationship between the percentage of independent directors and fraud allegations. The variable *Board Fraction* captures this percentage. Likewise, they reported results in favour of audit committee independence. Hence, I include *Auditor Fraction* defined as the percentage of independent directors on the audit committee. Moreover, I include *Board Size.* Fraud firms are found to have larger boards, on average (Uzun et al., 2004).

Furthermore, I include corporate governance variables related to CEO power. Over time, a CEO's perceived power increases (Herman & Weisbach,1988; Ndofor et al., 2015). Strengthened CEO power could be a daunting tool to persuade others into committing fraud (Johnson et al., 2009), possibly for personal short-term gain (Burns & Kedia, 2006). The variable *CEO Tenure* captures this increasing power effect. Moreover, the board of directors' role in monitoring the CEO is best performed if it remains independent from the CEO (Hermalin & Weisbach, 1988). Hence, a CEO simultaneously serving as the head of the board manipulates this relationship and increases the likelihood of fraud (Dechow et al., 1996; Efendi et al., 2006; O'Connor et al., 2006). For that reason, I include the dummy variable *CEO Duality.*

Poorly performing firms may employ fraud opportunities to cover up bad performance (Erickson et al., 2006). To control for performance, I include several metrics: *Book to Market (BM)*, *Return On Assets* (*ROA)* and *Sales Growth* (Armstrong et al., 2013; Chen et al., in press; Erickson et al., 2006; Peng & Roëll, 2008). On one hand, a low *BM* could signal overvaluation, resulting in increased pressure on management (Jensen, 2005). On the other hand, *BM* might represent managerial success, hence firms are less likely to be involved in shareholder litigation (Peng & Roëll, 2008). Second, as *ROA* measures profitability, a negative relation to fraud litigation is expected (Cumming et al., 2015). Third, a firm's tendency for fraud relates to growth expectations (Denis et al., 2006). *Sales Growth* controls for the possibility that firms engage in fraudulent activities to boost or sustain their sales growth.

I also control for the risk of financial distress as captured by the variables *Leverage* and *Altman's Z-score* (Denis et al., 2006; Erickson et al., 2006). Firms in financial distress might have greater incentives to commit fraud (Beasley, 1996; Begley, Ming, & Watts, 1996; Erickson et al., 2006). A higher level of leverage is related to fraud incidence (Burns & Kedia, 2006). Furthermore, Denis et al. (2006) find that fraud allegations are negatively related to Altman's Z-score, whereas Erickson et al. (2006) predict a positive relationship between the Z-score and fraud. Next, an executive could be inclined to commit fraud in the need for external financing. I include the dummy variable *Free Cash* to control for this need. As the ratio becomes more negative, the need for external financing and accessing capital markets becomes larger. Such pressure increases the incentives to commit fraud (Dechow et al., 1996; Erickson et al., 2006).

Last, I incorporate firm characteristics. Larger firms are more likely to restate financials (Burns & Kedia, 2006; Johnson et al., 2002). Moreover, younger firms face greater pressure (Wang, 2004). With the variable *Firm Size,* I control for firm size; with *Age* I control for firm age. Next, firms with a higher ratio of intangible assets are more difficult to value and monitor than their counterparts with more tangible assets (Peng & Roëll, 2008). I include the inverse of intangible assets as the control variable *Tangible.* Moreover, stock-based acquisition is positively related to fraudulent accounting practices (Erickson & Wang; 1999). With the variable *Acquisition* I control for this type of activity.

The fact that executive compensation is a choice variable, as well as an independent variable in my model creates possible endogeneity problems (Erickson et al., 2006). To control for endogeneity at an early stage, Erickson et al. (2006) include CEO tenure and stock return volatility into their model. *CEO Tenure* is incorporated and discussed as above. The variable *Volatility* represents the uncertainty in the market. Markets characterized by high uncertainty experience higher monitoring costs, and this paves the way for executives to commit fraud. In this sense, studies report a positive effect of stock return volatility on fraud incidence (Erickson et al. 2006; Peng & Roëll, 2008).

3.2 Data and Sample Selection

For my sample I utilize the Stanford Securities Class Action Clearinghouse (SCAC) database for fraud data. I then use the merged Center for Research in Security Prices (CRSP)/Compustat - Capital IQ (Compustat), ExecuComp and BoardEx databases to collect data on stock prices and firm financials, executive compensation, and board data respectively. My sample is constructed at the intersection of these four databases. A detailed process of my data and sample construction is outlined below.

To generate my sample, I begin with the collection of fraud data from the SCAC database. I collect firms accused of financial fraud through a class action lawsuit on behalf of a large group of shareholders, that is, a federal securities class action lawsuit filing. More specifically, I file for class action filings under Section 10(b) of the 1934 Securities Exchange Act from the Stanford Securities Class Action Clearinghouse (SCAC) database. Section 10(b) class action lawsuits involve "manipulative and deceptive devices related to an already-issued security" (Karpoff et al., 2017: p150).

Next to class action lawsuits as a proxy for financial misconduct, other common approaches are the announcement of financial restatements and the SEC's Accounting and Auditing Enforcement Releases (AAERs) (Fich & Shivdasani, 2007). In total there are four widely recognized fraud databases, of which the Government Accountability Office (GAO) and Audit Analytics (AA) database encompass restatement announcements, and the Berkeley's Center for Financial Reporting and Management (CFRM) consists of AAERs. The SCAC database contains private shareholder class action lawsuits (Wang, 2010). This database, with its proxy for financial misconduct, has several strong characteristics compared to the other databases. First, all cases filed under Section 10(b) can be considered as (alleged) fraud observations, according to the database's own fraud definition (100%) (Karpoff et al., 2017).

Moreover, class action lawsuits cover all 'normal' fraud cases, whereas SEC enforcements are seemingly focused on more high-profile cases due to limited resources (Agrawal & Chadha, 2005).

The SCAC is publicly available via its website. I use the 'Advanced Search' function to search for the filing years from 2008 to 2019 and filter on "1934 act claims - section 10b". The SCAC provides detailed information on every lawsuit filed. I collect the TICKER code and the lawsuit filing date. My initial sample contains 1,904 litigation filings during the twelve-year period 2008-2019. After deducting Privately Traded firms, firms with a missing Ticker Symbol, Headquarters in a non-US country, I am left with 1,433 filing cases. Subsequently, I read the filing statements and exclude filings where the issued firm is not the primary defendant in the lawsuit (Denis et al., 2006; Fich & Shivdasani, 2007). For example, Deloitte & Touche LLP was the primary defendant as the auditors "issued unqualified audit reports on SCANA and SCE&G's financial statements", thereby inducing a lawsuit filing regarding SCANA's securities (Securities Class Action Clearinghouse, 2021). Furthermore, next to privately held firms I exclude OTC firms (Peng & Roëll, 2008). Of the 1,433 cases, 78 are eliminated resulting in 1,354 filings. After that, I manually check whether there are multiple complaints for the same TICKER symbol in a year. In the case of the same firm, I include the first one in my analysis (Denis et al., 2006). In the case of different firms having the same TICKER, I exclude those not part of the S&P 1500. These measures taken together lead to 1,341 unique complaints.

Before matching the lawsuit firms with the Compustat database a critical note must be made regarding the measurement of compensation variables. Often studies on restatement announcements measure compensation variables as of the fiscal year prior to the announcement date (e.g., Burns & Kedia, 2006; Harris & Bromiley, 2007; Ndofor et al., 2015). Among other desirable effects, this effectively excludes initial public offerings from the sample (Peng & Roëll, 2008). However, in the area of securities class action filings, the proper measurement year is less clear. One can measure compensation in the fiscal year preceding the class action period[3] or the fiscal year prior to the lawsuit. In the first case, there is a chance that the measured compensation does not represent the compensation structure in place during the time of the purported fraud; whereas the latter leads to the probability that (part of) the purported fraud took place prior to the measurement of compensation. Peng & Roëll (2008) measure compensation prior to the start of the class period. On the contrary, Denis et al. (2006) measure compensation prior to the lawsuit. Supported by an examination of both measurement methods, I decide to follow Denis et al.'s (2006) approach and measure compensation prior to the lawsuit filing year.

Next, the merging process starts. First, I match these lawsuit firms by TICKER and YEAR with the Compustat database. Out of the 1,341, 916 cases are matched. Meanwhile, I merge the three ExecuComp datasets, based on a unique firm-executive identifier (CO_PER_ROL) and YEAR.

[3] The class action period is defined as: "The period during which the fraudulent activities are alleged to have taken place in the first complaint filed against the company" (Peng & Roëll, 2008: p150)

Data on the dividend yield is not tailored to a specific stock option or restricted stock package, hence this dataset is merged with the others based on GVKEY and YEAR. Thereafter, I match the merged Compustat/SCAC dataset with the merged ExecuComp dataset by GVKEY and YEAR. Since only S&P 1500 companies are included in the ExecuComp database, there is a large drop in lawsuit cases. After that, I merge the ExecuComp/Compustat dataset with the BoardEx dataset, to incorporate data on board characteristics into my final dataset. Last, I exclude firms from the highly regulated industries Financial and Utilities (Jensen & Meckling, 1976; Hall & Murphy, 2002; Murphy, 1999). More recent research has shown that, at least for financial firms, control variables such as leverage, are complex to interpret (Burns & Kedia, 2006; Efendi et al., 2007; Erickson et al., 2006; Peng & Roëll, 2008).

Within the constructed sample, I match each sample firm (*fraud firm)* with a control firm (*non-fraud firm)* that is not subject to a class action lawsuit. I identify a matched non-fraud firm-year for each fraud firm observation. In adherence to the sampling method by Armstrong et al. (2013), Denis et al. (2006), Efendi et al. (2007), and Erickson et al. (2006), the firm-pairs are matched based on two criteria: a SIC industry code and firm size. Specifically, I focus on a two-digit SIC code (Denis et al., 2006; Efendi et al., 2007; Erickson et al., 2006;) and total assets as a proxy for firm size. The total assets of the non-fraud firm should be within a 30% interval of the matched fraud firm (Armstrong et al., 2013; Efendi et al., 2007). Moreover, the fraud firm is matched with a non-fraud firm based on the results of the fiscal year ending preceding the lawsuit (Chen et al., in press; Efendi et al., 2007; Erickson et al., 2006). For example, a firm experiencing a shareholder class action lawsuit in 2010 will be matched with a non-fraud firm based on 2009 information. With this in mind, for each fraud lawsuit, I collect all non-fraud observations from the same industry and fiscal year and then select the firm closest in firm size to the fraud firm, in compliance with the 30% range. Subsequent to matching firm-pairs in STATA, I manually check whether each selected non-fraud firm is indeed free from lawsuit filings. In this process, I check for breaches of the 1934 Section 10(b) as far back as the database reaches, that is, 1996. Consequently, 53 firm-pairs deem ineligible.

The final sample consists of 101 U.S. fraud firms and 101 U.S. non-fraud firms in the period 2008 to 2019. The sample comprises S&P 1500 firms with U.S. headquarters. Rather than the simplistic argument of data availability, the US provides a good sample based on two characteristics. First, equity-based composition plays an important role in the total U.S. compensation package. According to a comparative analysis over the period 2002-2009, U.S. executives receive a higher fraction of their total pay in the form of equity-based compensation than European countries (Figure 3) (Edmans, Gabaix, & Jenter, 2017). Second, sticking with the U.S. is an eligible choice for comparison purposes. The vast majority of existing research on related topics examine the U.S. too (e.g., Armstrong et al., 2013; Burns & Kedia, 2006; Denis et al., 2006; Fich & Shivdasani, 2007; Peng & Roëll, 2008).

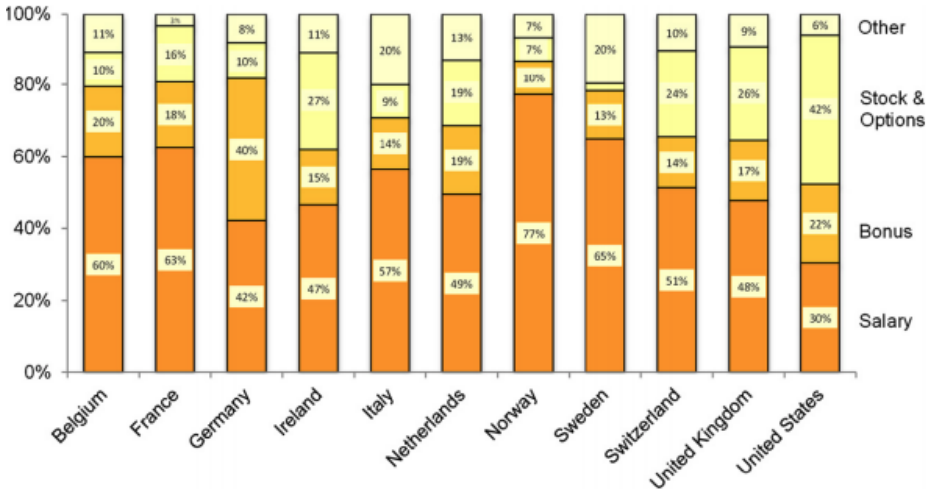

Figure 3. Above diagram shows the structure of average CEO compensation per country from 2002 - 2009. "Bonus includes all non-equity incentive payments, Stock & Options include grant-date values of stock options and restricted stock (including performance shares), and Other includes pensions and other benefits". Reprinted from "Executive Compensation: A Survey of Theory and Evidence", by A. Edmans, X. Gabaix, & D. Jenter, 2017, In Hermalin, B.E., Weisbach, M.S. (Eds.), *Handbook of the Economics of Corporate Governance, 1*. Amsterdam: Elsevier.

I opt for the time frame 2008 to 2019 because of a few reasons. First, similar research has not been conducted in recent years with the exception of Chen et al. (in press). Most researchers investigate a period within the time frame 1992 to 2005 (e.g., Burns & Kedia, 2006; Denis et al., 2006; Johnson et al., 2009; Peng & Roëll; 2008). Pointing to the increased popularity of restricted stock, I investigate a new, contemporary time frame. Second, a twelve-year period is chosen to increase the generalizability of my results. Focusing on a specific type of violation (Section 10(b)) and including solely S&P 1500 firms puts constraints on data availability, which is to be offset by a large time period. Third, the year 2008 is chosen as the starting year, because of the implementation of the FAS 123R by the FASB in 2004. From fiscal years 2007 on, all firms on ExecuComp report compensation using a new format (Coles et al., 2013).

3.3 Descriptive Statistics

3.3.1 Distribution fraud firms

As stated above, the final sample consists of 101 fraud firms. After analysing the fraud sample, Table 1 presents the sample distribution by different factors. Panel A reports the distribution of the lawsuit filings by year, from 2008 to 2019. There are several peaks shown in the distribution. The years 2008 and 2009 are tied to the financial crisis, representing 25.74% of the total lawsuits. It is believed that the executive compensation at that time triggered excessive risk-taking, with the financial crisis as a result (Murphy, 2013). Another stimulating observation is the steep decline in fraud cases after the cluster 2013-2016. Rather than a compelling explanation, this is simply a coincidence, as the overall sample of fraud cases showed a different distribution, with its peak in 2019 (Appendix A).

Panel B reports the frequency of lawsuits by industry to examine industry concentration. Note, however, that I have excluded Financial and Utility firms, explaining the zero contribution of the Finance, Insurance, Real Estate division. The fraud firms are categorized as of the eleven SIC-divisions. The frequency per division is reported as well as the percentage of the total. The fraud firms are disproportionately represented in Manufacturing, covering approximately 60% of the total sample. This is followed by Services (17.82%) and Retail Trade (8.91%). Interestingly, the distribution is a reasonable representation of the distribution of ExecuComp S&P 1500 firms (Appendix D), disregarding Financial and Utility firms. Related to fraud literature, prior studies have examined the frequency of using stock-based compensation among industries. Bryan et al. (2000) show that compared to other industries, Manufacturing firms use the highest amount of equity-based compensation. Moreover, among S&P 500 firms, Irving et al. (2011) report that firms operating in the Manufacturing division issue the highest amounts of stock options and restricted stock.

Last, Panel C provides a more detailed insight, as I list the frequency of lawsuits by the two-digit SIC industry classification. The overrepresented industries are: Chemical & Allied Products (23.76%), Business Services (12.87%), Instruments & Related Products (8.91%), and Industrial Machinery & Equipment (7.92%). Considering firms accused of fraud, I am not the first to report a cluster in these industries (Dechow et al. 1996; Efendi et al., 2007)

TABLE 1
Description of the fraud sample

This table describes the distribution of the fraud sample. The fraud sample consists of firms that are the primary defendant in a securities class action lawsuit between 2008 and 2019, as identified by the Stanford Securities Class Action Clearinghouse database. Panel A reports the fraud firms according to their lawsuit year. Panel B shows the fraud sample categorized as of the SIC-groups, corresponding to the two-digit SIC industry code. In Panel C, the fraud sample is reported according to their specific two-digit SIC industry code.

Panel A: By year

Year of filing	Number of cases	Percentage of total
2008	13	12.87%
2009	13	12.87%
2010	6	5.94%
2011	8	7.92%
2012	3	2.97%
2013	13	12.87%
2014	10	9.90%
2015	9	8.91%
2016	14	13.86%
2017	4	3.96%
2018	3	2.97%
2019	5	4.95%
	101	100.00%

TABLE 1 (continued)

Panel B: By industry division

Code	Industry name	Number of cases	Percentage of total
Division A	Agriculture, Forestry & Fishing	0	0.00%
Division B	Mining	3	2.97%
Division C	Construction	1	0.99%
Division D	Manufacturing	60	59.4%
Division E	Transportation & Public Utilities	7	6.93%
Division F	Wholesale Trade	3	2.97%
Division G	Retail Trade	9	8.91%
Division H	Finance, Insurance, Real Estate	0	0.00%
Division I	Services	18	17.82%
Division J	Public Administration	0	0.00%
		101	100.00%

Panel C: By industry

Two-digit SIC code	Industry name	Number of cases	Percentage of total
12	Coal Mining	1	0.99%
13	Oil & Gas Extraction	2	1.98%
16	Heavy Construction, Except Building	1	0.99%
20	Food & Kindred Products	2	1.98%
26	Paper & Allied Products	1	0.99%
28	Chemical & Allied Products	24	23.76%
30	Rubber & Miscellaneous Plastics Products	1	0.99%
31	Leather & Leather Products	1	0.99%
33	Primary Metal Industries	2	1.98%
34	Fabricated Metal Products	2	1.98%
35	Industrial Machinery & Equipment	8	7.92%
36	Electronic & Other Electric Equipment	6	5.94%
37	Transportation Equipment	3	2.97%
38	Instruments & Related Products	9	8.91%
39	Miscellaneous Manufacturing Industries	1	0.99%
47	Transportation Services	1	0.99%
48	Communications	6	5.94%
50	Wholesale Trade – Durable Goods	2	1.98%
51	Wholesale Trade – Nondurable Goods	1	0.99%
53	General Merchandise Stores	2	1.98%
56	Apparel & Accessory Stores	1	0.99%
58	Eating & Drinking Places	2	1.98%
59	Miscellaneous Retail	4	3.96%
73	Business Services	13	12.87%
79	Amusement & Recreation Services	1	0.99%
80	Health Services	1	0.99%
82	Educational Services	2	1.98%
87	Engineering & Management Services	1	0.99%
		101	100.00%

3.2.1 Sample characteristics

Table 2 reports descriptive statistics for the 101 fraud firms and 101 control firms on measurements of executive compensation, governance and firm characteristics. All variables are measured as of the fiscal year-end prior to the lawsuit filing and winsorized at 1% and 99% levels, except for *Total Assets*. Both *Stock Option* and *Restricted Stock Sensitivity* are higher for fraud firms, on all levels (mean, p25, median, p75). The average *Stock Option Sensitivity* is $286 thousand per 1% change in stock price for the fraud firms and $206 thousand per 1% change in stock price for the control firms. The mean value of *Restricted Stock Sensitivity* for fraud firms is $34.8 thousand per 1% change in stock price, as compared to $33.1 thousand for control firms. Other elements of the compensation package, *Bonus, Salary* and *Other Compensation* are economically higher for control firms.

Regarding the governance variables, on average, *Auditor Fraction* and *Board Fraction* are comparable, whereas *Board Size* yields a slightly higher result for fraud firms. *CEO Tenure* and *CEO Duality* are higher for fraud firms, though the difference is modest. Measuring firm size, both *Total Assets* and *Market Value of Equity* yields slightly higher values for control firms. Profitability is measured via *Book to Market Value of Equity (BM), Return on Assets (ROA)* and *Sales Growth*. There are higher *BM* and *ROA* levels obtained for control firms, whereas for *Sales Growth* I report substantially higher results for fraud firms (Mean=0.09 vs. Mean=0.06). The results on financial distress vary. *Altman's Z-Score* shows substantially higher mean values for fraud firms (Mean=1.07 vs. Mean=0.97), the results on *Free Cash Dummy* between fraud and control firms are similar, and median *Leverage* is only slightly higher for control firms. Hence, overall, the results on the risk of financial distress are ambiguous. Last, I find marginally higher values for fraud firms on *Acquisition Dummy.* Moreover, control firms are on average older *(Firm Age)* and have more tangible resources *(Tangible).* Last, *Volatility* is, on average, larger for fraud firms (Mean=0.51 vs. Mean=0.47).

TABLE 2

Descriptive statistics of the fraud and control firms

This table reports the descriptive statistics for the matched sample: fraud and control firms. A fraud firm is the primary defendant in a securities class action lawsuit between 2008 and 2019. Control firms are not involved in a securities class action lawsuit as stated in the Stanford Securities Class Action Clearinghouse database. The fraud and control firms are matched based on size, industry, and year. The matching-year is the fiscal year prior to the lawsuit. The final sample consists of 101 fraud firms and 101 control firms, based on the intersection of the BoardEx, Compustat, and ExecuComp databases. From these databases relevant data is collected. This includes CEO compensation measures, governance variables, firm characteristics, and financials. The independent variable *Stock Option Sensitivity* is defined in Appendix B; *Restricted Stock Sensitivity* is explained in the Data section. All other variables are defined in Appendix C. The significance levels are denoted as ***, ** and *, which represents 1%, 5% and 10% significance levels, respectively. All continuous variables are winsorized at the 1% and 99% levels except for total assets, being winsorized at the 5% and 95% levels.

	Fraud firms						**Control firms**					
Variable	N	Mean	SD	p25	Median	p75	N	Mean	SD	p25	Median	p75
CEO compensation												
Stock Option Sensitivity ($ thousand)	101	286	451	49.2	112	3445	101	206	254.3	33.8	111	217
Restricted Stock Sensitivity ($ thousand)	101	34.8	41.9	6.47	19.1	45.8	101	33.1	55.1	4.32	18.5	34.0
Bonus ($ thousand)	101	110	340	0.00	0.00	0.00	101	119	324	0.00	0.00	0.00
Salary ($ thousand)	101	823	286	600	775	1000	101	831	310	565	850	1000
Other Compensation ($ thousand)	101	130	263	12.4	46.0	142	101	170	283	12.9	60.9	186
Governance												
Auditor Fraction	101	0.33	0.23	0.00	0.42	0.50	101	0.33	0.23	0.00	0.38	0.50
Board Fraction	101	0.59	0.38	0.00	0.78	0.88	101	0.58	0.37	0.00	0.78	0.85
Board Size	101	6.46	4.34	0.00	8.00	9.00	101	6.33	4.22	0.00	8.00	10.00
CEO Duality	101	0.41	0.49	0.00	0.00	1.00	101	0.40	0.49	0.00	0.00	1.00
CEO Tenure	101	6.57	6.33	2.00	6.00	10.00	101	6.17	6.40	2.00	5.00	9.00
Firm size												
Total Assets ($ million)	101	4804	7966	601	1741	4677	101	4998	8055	681	1882	4748
Market Value of Equity ($ million)	101	6291	1268	950	1628	4562	101	6341	12383	899	1977	5158
Profitability												
Book to Market Value of Equity (BM)	101	0.48	0.50	0.21	0.36	0.60	101	0.40	0.31	0.23	0.38	0.55
Return On Assets (ROA)	101	0.03	0.14	0.01	0.04	0.09	101	0.03	0.10	0.02	0.05	0.08
Sales Growth	101	0.15	0.31	0.02	0.09	0.22	101	0.06	0.20	-0.04	0.06	0.11

TABLE 2 (continued)

	Fraud firms						Control firms					
Variable	N	Mean	SD	p25	Median	p75	N	Mean	SD	p25	Median	p75
Financial distress												
Altman's Z-score	101	1.07	0.65	0.63	0.85	1.34	101	0.97	0.60	0.57	0.88	1.23
Free Cash Dummy	101	0.02	0.14	0.00	0.00	0.00	101	0.02	0.14	0.00	0.00	0.00
Leverage	101	0.41	0.30	0.21	0.35	0.49	101	0.41	0.35	0.19	0.34	0.55
Firm characteristics												
Acquisition Dummy	101	0.03	0.17	0.00	0.00	0.00	101	0.02	0.14	0.00	0.00	0.00
Firm Age	59	13.76	6.45	9.00	13.00	19.00	57	14.7	7.88	8.00	16.00	19.00
Tangible	101	0.20	0.18	0.07	0.14	0.81	101	0.24	0.21	0.08	0.17	0.34
Volatility	101	0.51	0.19	0.40	0.49	0.61	101	0.47	0.21	0.31	0.44	0.56

In Table 3, I provide the results of two pairwise difference tests: a t-test and two-sided Wilcoxon test (Burns & Kedia, 2006; Dechow et al., 1996; Denis et al., 2006; Efendi et al. 2007; Erickson et al., 2006; Fich & Shivdasani, 2007; Peng & Roëll, 2008). A t-test compares means, whereas a Wilcoxon test focuses on medians. Based on these tests, I report the t-statistic and Wilcoxon Z-statistic, as well as the related p-values. *Stock Option Sensitivity* is significantly higher for fraud firms. The difference is significant at the 0.04 level using a pairwise t-test. Median *Stock Option Sensitivity* is also larger for fraud firms, though it only seems statistically significant, not economically ($112 vs. $111). Using a Wilcoxon Z-test, a significance level of 0.07 is obtained. In contrast, the results on *Restricted Stock Sensitivity* do not reach sufficient significance levels. Even though at a higher level, the mean value for fraud firms is not statistically different from the mean value for control firms. Similarly, median values are neither economically nor statistically significant, as shown by the Wilcoxon Z-test. Supportive, yet unfortunate, the insignificant results are in line with prior research (Burns & Kedia, 2006; Efendi et al., 2007; Johnson et al., 2009). For the other compensation elements, *Bonus*, *Salary*, and *Other Compensation*, mean and medians are economically higher for control firms, though not statistically significant.

Thereafter, I look at firm differences between fraud and control firms. In terms of corporate governance variables, I find no significant differences between fraud and control firms. The results on *Auditor Fraction*, *Board Fraction*, *Board Size*, *CEO Tenure* and *CEO Duality* are fairly alike and yield no significant differences. Firm size is measured by *Total Assets* and *Market Value of Equity*. *Total Assets* are significant only at the median level, with a significance of 0.05; *Market Value of Equity* is not. Regarding profitability measures, *ROA* is insignificant, whereas *Sales Growth* is significant at the 0.01 level for both mean and median. The average *BM* is significantly greater for fraud firms, at the 0.10 level; however, the median difference is insignificant.

Altman's Z-score is significant for mean differences, whereas *Free Cash Dummy* and *Leverage* are not. Last, the differences between *Acquisition Dummy*, *Firm Age* and *Tangible* are both economically and statistically insignificant. The only significant difference in this category is *Volatility* both at the mean (*p*-value=0.032) and median level (*p*-value=0.051). All in all, fraud firms and control firms display rather similar characteristics, as shown by the majority of insignificant results obtained from the pairwise differences comparison.

TABLE 3
Pairwise differences

This table reports the mean, medians, and pairwise differences for the matched sample: fraud and control firms. A fraud firm is the primary defendant in a securities class action lawsuit between 2008 and 2019. Control firms are not involved in a securities class action lawsuit as stated in the Stanford Securities Class Action Clearinghouse database. The fraud and control firms are matched based on size, industry, and year. The matching-year is the fiscal year prior to the lawsuit. The final sample consists of 101 fraud firms and 101 control firms, based on the intersection of the BoardEx, Compustat, and ExecuComp databases. From these databases relevant data is collected. This includes CEO compensation measures, governance variables, firm characteristics, and financials. The independent variable *Stock Option Sensitivity* is defined in Appendix B; *Restricted Stock Sensitivity* is explained in the Data section. All other variables are defined in Appendix C. Based on the variables, comparisons between sample and control firms are made. Significance levels are computed for these mean and median differences using a t-test and Wilcoxon two-sided test, respectively. The significance levels are denoted as ***, ** and *, which represents 1%, 5% and 10% significance levels, respectively. All continuous variables are winsorized at the 1% and 99% levels except for total assets, being winsorized at the 5% and 95% levels.

	Fraud firms		Control firms		Pairwise differences			
Variable	Mean	Median	Mean	Median	T-test *t*-statistic	*P*-value	Wilcoxon *Z*-statistic	*P*-value
CEO compensation								
Stock Option Sensitivity ($ thousand)	286	112	206	111	1.74**	*(0.040)*	1.85*	*(0.073)*
Restricted Stock Sensitivity ($ thousand)	34.8	19.1	33.1	18.5	0.27	(0.39)	1.04	(0.30)
Bonus ($ thousand)	110	0.00	119	0.00	-0.20	(0.58)	0.09	(0.95)
Salary ($ thousand)	823	775	831	850	-0.37	(0.64)	-0.40	(0.69)
Other Compensation ($ thousand)	130	46.0	170	60.9	-1.07	(0.86)	-1.28	(0.20)
Governance								
Auditor Fraction	0.33	0.42	0.33	0.38	-0.05	(0.52)	0.12	(0.91)
Board Fraction	0.59	0.78	0.58	0.78	0.10	(0.46)	0.87	(0.38)
Board Size	6.46	8.00	6.33	8.00	0.22	(0.41)	0.22	(0.82)
CEO Duality	0.41	0.00	0.40	0.00	0.14	(0.44)	0.14	(1.00)
CEO Tenure	6.57	6.00	6.17	5.00	0.49	(0.31)	0.73	(0.47)

TABLE 3 (continued)

	Fraud firms		Control firms		Pairwise differences			
Variable	Mean	Median	Mean	Median	T-test *t*-statistic	*P*-value	Wilcoxon *Z*-statistic	*P*-value
Firm size								
Total Assets ($ million)	4804	1741	4998	1882	-1.19	(0.88)	-1.99**	*(0.046)*
Market Value of Equity ($ million)	6291	1628	6342	1977	0.50	(0.31)	-0.07	(0.95)
Profitability								
Book to Market Value of Equity (BM)	0.48	0.36	0.40	0.38	1.39**	*(0.047)*	0.17	(0.87)
Return On Assets (ROA)	0.03	0.04	0.03	0.05	-0.42	(0.66)	-0.54	(0.59)
Sales Growth	0.15	0.09	0.06	0.06	2.38***	*(0.009)*	2.76***	*(0.005)*
Financial distress								
Altman's Z-score	1.07	0.847	0.97	0.88	1.68*	*(0.082)*	1.13	(0.26)
Free Cash Dummy	0.02	0.00	0.02	0.00	0.00	(1.00)	0.00	(0.50)
Leverage	0.41	0.35	0.41	0.34	-0.02	(0.51)	0.20	(0.84)
Firm characteristics								
Acquisition Dummy	0.03	0.00	0.02	0.00	0.45	(0.33)	0.45	(1.00)
Firm Age	13.76	13.00	14.70	16.00	-0.52	(0.70)	-0.50	(0.62)
Tangible	0.20	0.14	0.24	0.17	-1.79	(0.96)	-1.57	(0.12)
Volatility	0.51	0.49	0.47	0.44	1.89**	*(0.032)*	1.93*	*(0.051)*

After identifying significant variables in Table 3, I look at trend lines for three significant variables, as graphically depicted in Appendix E. It is interesting to observe how the variables are affected in the period surrounding the class action filing. In terms of *Sales Growth,* a significant drop is shown in the period before the filing date. Thereafter, the trend line has a decreasing nature, while experiencing some sharp peaks. However, the firms fail to live up to the pre-filing levels. Next, *Stock Option Sensitivity* is not affected by the class action filing, in the sense that a similar trend is observed in the pre-and post-filing period. Hence, overall, the sensitivity of a CEO's stock options to firm value does not change. Last, I observed the trend of *Volatility.* Despite the absence of a short-term drop preceding the filing, the value significantly drops post-filing. While obtaining a level of approximately 0.51 in the year of the filing, the decreasing trend lowers the value to about 0.33 at the end of the period.

Besides a comparative analysis on control firms, I conduct comparison tests estimating the difference between fraud firms and the remaining 6,718 firm-year S&P 1500 observations (Table 4). Various variables yield economically significant and/or statistically significant results. *Stock Option Sensitivity* and *Restricted Stock Sensitivity* are significantly higher for fraud firms at the median level. *Salary* is both economically and statistically higher for fraud firms. Again, *Sales Growth* provides significant differences: fraud firms report higher mean and median values at the 0.05 level. The last significant result is *Leverage*. On average, fraud firms report a higher value (p-value=0.054).

TABLE 4
Comparison tests

This table reports the mean, medians, and comparisons test for the unmatched sample: fraud firms and unmatched firms. A fraud firm is the primary defendant in a securities class action lawsuit between 2008 and 2019. Unmatched firms include the remaining 6,718 firm-year S&P 1500 observations from ExecuComp. These observations are retrieved based on the intersection of the BoardEx, Compustat, and ExecuComp databases. From these databases relevant data is collected. This includes CEO compensation measures, governance variables, firm characteristics, and financials. The independent variable *Stock Option Sensitivity* is defined in Appendix B; *Restricted Stock Sensitivity* is explained in the Data section. All other variables are defined in Appendix C. Based on these variables, comparisons between sample and unmatched firms are made. Significance levels are computed for these mean and median differences using a t-test and Wilcoxon two-sided test, respectively. The significance levels are denoted as ***, ** and *, which represents 1%, 5% and 10% significance levels, respectively. All continuous variables are winsorized at the 1% and 99% levels except for total assets, being winsorized at the 5% and 95% levels.

	Fraud firms		Unmatched firms		Comparison tests			
Variable	Mean	Median	Mean	Median	T-test *t*-statistic	*P*-value	Wilcoxon *Z*-statistic	*P*-value
CEO compensation								
Stock Option Sensitivity ($ thousand)	286	112	241	88.6	1.20	(0.11)	1.91*	*(0.056)*
Restricted Stock Sensitivity ($ thousand)	34.8	19.1	30.0	11.9	0.27	(0.39)	2.78***	*(0.005)*
Bonus ($ thousand)	110	0.00	128	0.00	-0.18	(0.57)	0.40	(0.69)
Salary ($ thousand)	823	775	776	734	1.42*	*(0.078)*	2.16**	*(0.031)*
Other Compensation ($ thousand)	130	46.0	179	50.9	-1.14	(0.87)	-0.88	0.38
Governance								
Auditor Fraction	0.33	0.42	0.45	0.43	-0.33	(0.37)	-0.99	(0.32)
Board Fraction	0.59	0.78	0.80	0.83	0.73	(0.23)	-0.93	(0.35)
Board Size	6.46	8.00	8.82	9.00	0.55	(0.29)	-0.64	(0.52)
CEO Duality	0.41	0.00	0.45	0.00	-0.99	(0.84)	-0.99	(0.32)
CEO Tenure	6.57	6.00	6.88	5.00	-0.49	(0.31)	-0.11	(0.92)
Firm size								
Total Assets ($ million)	4804	1741	4264	1882	0.85	(0.20)	1.28	(0.20)
Market Value of Equity ($ million)	6291	1628	6217	1494	0.72	(0.23)	1.43	(0.15)
Profitability								
Book to Market Value of Equity (BM)	0.48	0.36	0.50	0.42	-0.25	(0.60)	-1.22	(0.22)
Return On Assets (ROA)	0.03	0.04	0.03	0.05	-0.04	(0.65)	-1.02	(0.31)
Sales Growth	0.15	0.09	0.09	0.06	1.93**	*(0.027)*	2.26**	*(0.024)*
Financial distress								
Altman's Z-score	1.07	0.85	1.13	0.97	-1.12	(0.87)	-1.37	(0.17)
Free Cash Dummy	0.02	0.00	0.02	0.00	0.11	(0.45)	0.11	(0.91)
Leverage	0.41	0.35	0.36	0.32	1.61*	*(0.054)*	1.31	(0.19)

TABLE 4 (continued)

Variable	Fraud firms		Unmatched firms		Comparison tests			
	Mean	Median	Mean	Median	T-test *t*-statistic	*P*-value	Wilcoxon *Z*-statistic	*P*-value
Firm characteristics								
Acquisition Dummy	0.03	0.00	0.04	0.00	0.33	(0.63)	0.33	(0.74)
Firm Age	13.76	13.00	13.98	14.00	-0.18	(0.57)	-0.14	(0.89)
Tangible	0.20	0.14	0.23	0.16	-1.44	(0.93)	-1.17	(0.24)
Volatility	0.51	0.49	0.51	0.47	0.56	(0.28)	1.21	(0.23)

Finally, I plot a Pearson correlation matrix to check for multicollinearity (Table 5). This test allows me to choose my control variables consciously and reduce bias in the analyses. Only the control variable *Sales Growth* significantly correlates with the dependent variable *Fraud* (0.16**). Other notable strong correlations mostly include *Log Total Assets* and *Log Market Value of Equity*. Specifically, *Log Total Assets* with *Log Market Value of Equity* yields the highest correlation coefficient (0.81***). Including both *Log Total Assets* and *Log Market Value of Equity* into the model creates multicollinearity issues, as the coefficient surpasses the threshold of 0.70 (Ratner, 2009). *Log Total Assets* also violates this rule-of-thumb in its correlation with *Salary* (0.77***). Hence, as a proxy for firm size, I adopt *Log Market Value of Equity* into my model. Instead of, or next to, a correlation matrix, few studies adopt a Variance Inflation Factor (VIF) test for multicollinearity (Hou et al., 2020; O'Connor et al., 2006). However, Lindner, Puck, & Verbeke (2020) raise their concerns regarding this approach. They argue that the incorrect omission of relevant variables from the regression model produces biased coefficients and deflated standard errors. Rather, I include more control variables into my regression model than excluding ones.

TABLE 5

Pearson correlation

This table reports the Pearson correlations for all variables of interest. The correlation is measured for the full sample, including fraud and control firms. The matrix is divided into Panel A, Panel B and Panel C. All panels show the correlation between compensation variables and control variables. Panel A comprises governance variables, Panel B reports firm size and profitability measurements, and Panel C includes financial distress and other firm characteristics. The significance levels are denoted as ***, ** and *, which represents 1%, 5% and 10% significance levels, respectively. All continuous variables are winsorized at the 1% and 99% levels.

Panel A

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*
(1) Fraud	1.00										
(2) Stock Option Sensitivity	0.11	1.00									
(3) Restricted Stock Sensitivity	0.02	0.26	1.00								
(4) Log Bonus	-0.01	-0.12*	-0.11	1.00							
(5) Log Salary	0.00	0.30***	0.17**	-0.10	1.00						
(6) Log Other Compensation	-0.06	0.15**	0.11	0.04	0.51***	1.00					
(7) Auditor Fraction	0.02	-0.11	-0.09	-0.04	-0.05	0.04	1.00				
(8) Director Fraction	0.09	-0.14*	0.03	-0.19**	0.11	-0.02	0.23***	1.00			
(9) Board Size	0.08	-0.01	0.11	-0.12	0.54***	0.34***	-0.30***	0.20**	1.00		
(10) CEO Duality	0.01	0.11	0.03	0.07	0.16**	0.32***	-0.01	-0.04	-0.01	1.00	
(11) CEO Tenure	0.04	0.02	-0.02	0.06	-0.11	0.00	0.06	0.15	-0.12	0.38***	1.00

Panel B

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*
(1) Fraud	1.00										
(2) Stock Option Sensitivity	0.11	1.00									
(3) Restricted Stock Sensitivity	0.02	0.26	1.00								
(4) Log Bonus	-0.01	-0.12*	-0.11	1.00							
(5) Log Salary	0.00	0.30***	0.17**	-0.10	1.00						
(6) Log Other Compensation	-0.06	0.15**	0.11	0.04	0.51***	1.00					
(7) Log Total Assets	-0.02	0.39***	0.33***	-0.16**	0.77***	0.54***	1.00				

TABLE 5 (continued)

Panel B

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*
(8) Log Market Value of Equity	-0.04	0.59***	0.46***	-0.22***	0.63***	0.39***	0.81***	1.00			
(9) BM	0.09	-0.13*	-0.06	0.05	0.11	0.13*	0.21***	-0.16**	1.00		
(10) ROA	-0.03	0.14*	0.16**	-0.21***	0.14**	0.10	0.19***	0.34***	-0.21***	1.00	
(11) Sales Growth	0.16**	0.04	-0.03	-0.03	-0.17**	-0.19***	-0.17**	0.01	-0.16**	0.12*	1.00

Panel C

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*
(1) Fraud	1.00												
(2) Stock Option Sensitivity	0.11	1.00											
(3) Restricted Stock Sensitivity	0.02	0.26	1.00										
(4) Log Bonus	-0.01	-0.12*	-0.11	1.00									
(5) Log Salary	0.00	0.30***	0.17**	-0.10	1.00								
(6) Log Other Compensation	-0.06	0.15**	0.11	0.04	0.51***	1.00							
(7) Altman's Z-score	0.08	-0.21***	-0.11	-0.03	0.07	0.00	1.00						
(8) Free Cash Dummy	0.00	-0.07	-0.09	0.20***	-0.12*	-0.14*	-0.15**	1.00					
(9) Leverage	-0.00	-0.02	-0.11	0.05	0.28***	0.13*	-0.02	0.09	1.00				
(10) Acquisition Dummy	0.03	-0.09	-0.10	0.02	-0.08	-0.01	-0.05	0.21***	0.09	1.00			
(11) Firm Age	-0.07	0.11	-0.12	-0.07	0.22**	0.07	0.05	-0.12	-0.04	-0.06	1.00		
(12) Tangible	-0.09	-0.05	-0.02	0.08	0.27***	0.24***	0.07	0.00	0.10	-0.03	0.02	1.00	
(13) Volatility	0.10	-0.12*	-0.05	0.19***	-0.31***	-0.24***	-0.06	0.02	0.03	-0.00	-0.24***	0.05	1.00

3.4 Research Model

The findings above signify a significant effect of stock option sensitivity on the likelihood of fraud litigation, whereas no statistical effect of restricted stock sensitivity on fraud litigation is found. To explore the effects further, I perform a logistic regression based on the matched firm-pairs. Taking into account the collinearity findings, I define *Log Firm Size* as *Log Market Value of Equity.* The hypotheses are tested using the following research models: (1) without control variables, (2) with control variables except for compensation controls, and (3) with all control variables. In addition to control variables, I control for year and industry fixed effects, denoted as *i.Year and i.SIC*.

In the first regressions, I estimate the impact of *Stock Option Sensitivity* on *Fraud.*

$$Fraud = a + B_1 Stock\ Option\ Sensitivity + \varepsilon \quad \text{(Model 1A)}$$

$$Fraud = a + B_1 Stock\ Option\ Sensitivity + B_2 Auditor\ Fraction + B_3 BoardFraction + B_4 Board\ Size + B_5 CEO\ Duality + B_6 CEO\ Tenure + B_7 Log\ Firm\ Size + B_8 BM + B_9 ROA + B_{10} Sales\ Growth + B_{11} Altman's\ Z\text{-}score + B_{12} Free\ Cash\ Dummy + B_{13} Leverage + B_{14} Acquisition\ Dummy + B_{15} Firm\ Age + B_{16} Tangible + B_{17} Volatility + i.Year + i.SIC + \varepsilon \quad \text{(Model 1B)}$$

$$Fraud = a + B_1 Stock\ Option\ Sensitivity + B_2 Log(1+Bonus) + B_3 Log(1+Salary) + B_4 Log\ (1+Other\ Compensation) + B_5 Auditor\ Fraction + B_6 Board\ Fraction + B_7 Board\ Size + B_8 CEO\ Duality + B_9 CEO\ Tenure + B_{10} Log\ Firm\ Size + B_{11} BM + B_{12} ROA + B_{13} Sales\ Growth + B_{14} Altman's\ Z\text{-}score + B_{15} Free\ Cash\ Dummy + B_{16} Leverage + B_{17} Acquisition\ Dummy + B_{18} Firm\ Age + B_{19} Tangible + B_{20} Volatility + i.Year + i.SIC + \varepsilon \quad \text{(Model 1C)}$$

In the second round of regressions, I estimate the impact of *Restricted Stock Sensitivity* on *Fraud.*

$$Fraud = a + B_1 Restricted\ Stock\ Sensitivity + \varepsilon \quad \text{(Model 2A)}$$

$$Fraud = a + B_1 Restricted\ Stock\ Sensitivity + B_2 Auditor\ Fraction + B_3 Board\ Fraction + B_4 Board\ Size + B_5 CEO\ Duality + B_6 CEO\ Tenure + B_7 Log\ Firm\ Size + B_8 BM + B_9 ROA + B_{10} Sales\ Growth + B_{11} Altman's\ Z\text{-}score + B1_2 Free\ Cash\ Dummy + B_{13} Leverage + B_{14} Acquisition\ Dummy + B_{15} Firm\ Age + B_{16} Tangible + B_{17} Volatility + i.Year + i.SIC + \varepsilon \quad \text{(Model 2B)}$$

$$Fraud = a + B_1 Restricted\ Stock\ Sensitivity + B_2 Log(1+Bonus) + B_3 Log(1+Salary) + B_4 Log\ (1+Other\ Compensation) + B_5 Auditor\ Fraction + B_6 Board\ Fraction + B_7 Board\ Size + B_8 CEO\ Duality + B_9 CEO\ Tenure + B_{10} Log\ Firm\ Size + B_{11} BM + B_{12} ROA + B_{13} Sales\ Growth + B_{14} Altman's\ Z\text{-}score + B_{15} Free\ Cash\ Dummy + B_{16} Leverage + B_{17} Acquisition\ Dummy + B_{18} Firm\ Age + B_{19} Tangible + B_{20} Volatility + i.Year + i.SIC + \varepsilon \quad \text{(Model 2C)}$$

In the third regressions, I estimate the comparative impact of stock option and restricted stock on fraud.

$$Fraud = a + B_1 Stock\ Option\ Sensitivity + B_2 Restricted\ Stock\ Sensitivity + \varepsilon \quad \text{(Model 3A)}$$

$$Fraud = a + B_1 Stock\ Option\ Sensitivity + B_2 Restricted\ Stock\ Sensitivity + B_3 Auditor\ Fraction + B_4 Board\ Fraction + B_5 Board\ Size + B_6 CEO\ Duality + B_7 CEO\ Tenure + B_8 Log\ Firm\ Size + B_9 BM + B_{10} ROA + B_{11} Sales\ Growth + B_{12} Altman's\ Z\text{-}score + B_{13} Free\ Cash\ Dummy + B_{14} Leverage + B_{15} Acquisition\ Dummy + B_{16} Firm\ Age + B_{17} Tangible + B_{18} Volatility + i.Year + i.SIC + \varepsilon \quad \text{(Model 3B)}$$

$$Fraud = a + B_1 Stock\ Option\ Sensitivity + B_2 Restricted\ Stock\ Sensitivity + B_3 Log(1+Bonus) + B_4 Log(1+Salary) + B_5 Log\ (1+Other\ Compensation) + B_6 Auditor\ Fraction + B_7 BoardFraction + B_8 Board\ Size + B_9 CEO\ Duality + B_{10} CEO\ Tenure + B_{11} Log\ Firm\ Size + B_{12} BM + B_{13} ROA + B_{14} Sales\ Growth + B_{15} Altman's\ Z\text{-}score + B_{16} Free\ Cash\ Dummy + B_{17} Leverage + B_{18} Acquisition\ Dummy + B_{19} Firm\ Age + B_{20} Tangible + B_{21} Volatility + i.Year + i.SIC + \varepsilon \quad \text{(Model 3C)}$$

Which regression method to use, given a matched-sample design, depends on which research you rely on. One group of researchers adopt a classic logistic regression model (Burns & Kedia, 2006; Chen et al., in press; Denis et al., 2006; Efendi et al., 2007; Erickson et al., 2006). On the contrary, Harris & Bromiley (2007), Johnson et al. (2009), Ndofor et al. (2007), and O'Connor et al. (2006) estimate their research question using a conditional logistic model. Given the nature of my research, the definition of my variables and the similar characteristics with existing research, I choose to adopt the first regression method: the classic logistic regression model.

4. RESULTS

In this section I report the results of the main regressions, thereby estimating the formed hypotheses. Thereafter, I perform two additional analyses to test the robustness of my main results.

4.1 Main Analysis

4.1.1 Stock option on corporate fraud litigation

The first analysis is executed to provide an answer to H1, stating "*Stock options have a positive effect on the occurrence of corporate fraud litigation*". The results of my regressions are shown in Table 6 Panel A. First, I estimate the singular effect of stock options on fraud (model 1A). Thereupon, I incorporate all control variables except for other compensation elements (model 1B). Additionally, I add the compensation elements as independent variables (model 1C). The controls include control variables, and firm and industry fixed effects. The industry fixed effects are based on the two-digit SIC groups as identified in Appendix D.

I start with model 1A. Even though the coefficient of *Stock Option Sensitivity* is positive (0.04), as predicted, the result fails to comply with the established significance levels (*p*-value=0.13 > *p*-value=0.1). Second, in model 1B, *Stock Option Sensitivity* has a positive coefficient, significant at the 0.05 level. This suggests a significant positive effect of executive stock options on the occurrence of corporate fraud litigation. Other than stock options, *BM, Sales Growth,* and *Altman's Z-score* positively affect *Fraud* at the 0.05 significance level. Furthermore, at the 0.10 significance level, *Tangible* negatively affects *Fraud*. Third, the positive effects remain after adding *Log (1+Bonus), Log(1+Salary)* and *Log(1+Other Compensation)* (model 1C). With slightly lower coefficients of *BM* (1.09 vs. 1.04)*, Sales Growth* (1.87 vs. 1.86)*,* and *Altman's Z-score* (0.78 vs. 0.76), the effects stay relevant at the 0.05 significance level. More importantly, *Stock Option Sensitivity* remains significant at the 0.05 significance level, at a comparable coefficient level. With the addition of the independent compensation variables, the variable *Tangible* loses its significance.

Conform hypothesis H1, stock options positively impact the occurrence of corporate fraud litigation. The inclusion of control variables pushes the effect of stock options on corporate fraud litigation over the significance threshold into a significant effect. Other significant predictors of corporate fraud litigation are *BM, Sales Growth, Altman's Z-score* and *Tangible.* As predicted in Appendix C, *Sales Growth* positively impacts fraud, whereas *Tangible* is negatively related. The sign of *BM* so far is not clearly determined, and according to my results it positively affects corporate fraud litigation. Last, *Altman's Z-score* is a positive predictor of corporate fraud litigation.

TABLE 6
Logistics regressions (matched sample)

This table reports the logistic regressions for the matched sample: fraud and control firms. The fraud dummy equals one if the firm is the primary defendant in a securities class action lawsuit between 2008 and 2019. Control firms are not involved in a securities class action lawsuit as stated in the Stanford Securities Class Action Clearinghouse database; hence their dummy variable has a value of zero. The fraud and control firms are matched based on firm size, industry, and year. The matching-year is the fiscal year prior to the lawsuit. The final sample consists of 101 fraud firms and 101 control firms. In Panel A, I measure the impact of *Stock Option Sensitivity* on *Fraud*. In Panel B, the impact of *Restricted Stock Sensitivity* on *Fraud.* In Panel C, I measure the impact of both *Stock Option Sensitivity* and *Restricted Stock Sensitivity* on *Fraud*. For all three models, the coefficients are estimated (A) without control variables, (B) with control variables except for compensation controls and (C) including all control variables. For all variables the coefficient is given, with the standard error in parentheses, all rounded to two decimals. The significance levels are denoted as ***, ** and *, which represents 1%, 5% and 10% significance levels, respectively. All continuous variables are winsorized at the 1% and 99% levels.

TABLE 6 (continued)

Panel A: Stock Option Sensitivity

	Dependent variable: Fraud					
	(1A) No controls		(1B) No compensation controls		(1C) Yes controls	
Independent variable	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Intercept	-0.157	(0.17)			-2.28	(4.07)
Stock Option Sensitivity	0.04	(0.00)	0.09**	(0.00)	0.08**	(0.00)
Log (1+ Bonus)					-0.00	(0.07)
Log (1+ Salary)					0.36	(0.71)
Log (1+ Other Compensation)					-0.07	(0.13)
Auditor Fraction			-0.16	(1.52)	-0.05	(1.53)
Board Fraction			-0.75	(1.56)	-0.82	(1.59)
Board Size			0.09	(0.10)	0.09	(0.10)
CEO Duality			-0.09	(0.39)	-0.05	(0.40)
CEO Tenure			0.00	(0.03)	0.00	(0.03)
Log Firm Size			-0.13	(0.18)	-0.15	(0.22)
BM			1.09**	(0.49)	1.04**	(0.53)
ROA			-0.91	(1.61)	-0.93	(1.61)
Sales Growth			1.87**	(0.96)	1.86**	(0.99)
Altman's Z-score			0.78**	(0.39)	0.76**	(0.39)
Free Cash Dummy			-0.09	(1.31)	-0.14	(1.34)
Leverage			0.55	(0.60)	0.46	(0.66)
Acquisition Dummy			-0.23	(1.15)	-0.19	(1.16)
Firm Age			-0.00	(0.02)	-0.00	(0.02)
Tangible			-1.71*	(1.04)	-1.74	(1.06)
Volatility			1.52	(1.03)	1.52	(1.05)
Industry fixed effects	No		Yes		Yes	
Year fixed effects	No		Yes		Yes	
Number of observations	202		202		202	
Pseudo R-squared	0.01		0.09		0.10	
Chi-square (*p*-value)	2.55 (0.11)		26.19 (0.83)		26.67 (0.90)	

4.1.2 Restricted stock on corporate fraud litigation

The second analysis is performed to provide an answer to H2, stating "*Restricted stock has a negative effect on the occurrence of corporate fraud litigation*". From the analysis of the descriptive statistics and pairwise differences tests, a preliminary conclusion is drawn. That is, restricted stock is unrelated to the occurrence of corporate fraud litigation. In this section, I provide more research regarding this statement. The approach used is similar to section 4.1.1, and the results are shown in Table 6 Panel B.

The first regression (model 2A) shows that *Restricted Stock Sensitivity* has neither a sensible coefficient (0.00), nor a significant significance level (*p*-value=0.81). The inclusion of control variables appears to be inadequate to change this outcome (model 2B and 2C). *Fraud* is, however, significantly affected by other independent variables in both models. These are *BM, Sales Growth, Altman's Z-score* and *Tangible.* Again, *BM*, *Sales Growth* and *Altman's Z-score* positively affect *Fraud*, whereas *Tangible* has a negative effect on *Fraud.* Again, after the inclusion of *Log (1+Bonus), Log(1+Salary)* and *Log(1+Other Compensation)* (model 2C), the coefficient values slightly fall and/or the significance threshold values change. This takes effect as follows: *BM* (1.03** vs. 0.96*), *Altman's Z-score* (0.72* vs. 0.69*), *Tangible* (-1.89* vs. -1.92*). In conclusion, I cannot accept or reject hypothesis H2. After performing the regressions, the effect of restricted stock on corporate fraud litigation is best defined as ambiguous.

4.1.3 Comparative analysis on corporate fraud litigation

The third analysis provides an answer to H3, stating: "*Stock options have a stronger effect on the occurrence of corporate fraud litigation than restricted stock*". The approach used is similar to section 4.1.1 and 4.1.2, and the results are reported in Table 6 Panel C.

As can be seen, the results are qualitatively similar to the regressions performed in 4.1.1 and 4.1.2. To estimate whether *Stock Option Sensitivity* has a stronger effect on *Fraud* than *Restricted Stock*, I perform a Wald Chi-square test (Hou et al., 2020). These test results are based on the logistic regressions from Panel C. The results of the Wald test are reported in Table 7. Without control variables, the comparative impact is insignificant. Including control variables, the results are significant at the 0.10 significance level. This applies to both models: excluding compensation variables ($\chi 2$=4.80, *p*-value=0.08) and including compensation variables ($\chi 2$=4.47, *p*-value=0.09). The results indicate that stock options have a stronger effect on the occurrence of corporate fraud litigation than restricted stock. Hence, I can accept H3.

TABLE 6 (continued)

Panel B: Restricted Stock Sensitivity

	Dependent variable: Fraud					
	(2A) No controls		(2B) No compensation controls		(2C) Yes controls	
Independent variable	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Intercept	-0.02	(0.17)	-1.94	(2.20)	-4.24	(3.89)
Restricted Stock Sensitivity	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
Log (1 + Bonus)					-0.01	(0.07)
Log (1 + Salary)					0.49	(0.69)
Log (1 + Other Compensation)					-0.09	(0.12)
Auditor Fraction			-0.35	(1.51)	-0.19	(1.52)
Board Fraction			-0.36	(1.53)	-0.46	(1.57)
Board Size			0.05	(0.10)	0.06	(0.10)
CEO Duality			-0.03	(0.38)	0.02	(0.39)
CEO Tenure			0.01	(0.03)	0.01	(0.03)
Log Firm Size			0.10	(0.17)	0.05	(0.22)
BM			1.03**	(0.05)	0.96*	(0.53)
ROA			-1.14	(1.57)	-1.17	(1.57)
Sales Growth			1.91**	(0.95)	1.91**	(0.98)
Altman's Z-score			0.72*	(0.38)	0.69*	(0.38)
Free Cash Dummy			-0.01	(1.27)	-0.05	(1.30)
Leverage			0.53	(0.60)	0.04	(0.66)
Acquisition Dummy			-0.22	(1.15)	-0.16	(1.16)
Firm Age			-0.00	(0.02)	-0.00	(0.02)
Tangible			-1.89*	(1.01)	-1.92*	(1.04)
Volatility			1.66	(1.05)	1.65	(1.06)
Industry fixed effects	No		Yes		Yes	
Year fixed effects	No		Yes		Yes	
Number of observations	202		202		202	
Pseudo R-squared	0.00		0.07		0.08	
Chi-square (*p*-value)	0.06 (0.81)		20.19 (0.97)		21.14 (0.98)	

TABLE 6 (continued)

Panel C: Stock Option Sensitivity & Restricted Stock Sensitivity

	Dependent variable: Fraud					
	(3A) No controls		(3B) No compensation controls		(3C) Yes controls	
Independent variable	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Intercept	-0.14	(0.19)	-0.43	(2.29)	-2.28	(4.06)
Stock Option Sensitivity	0.04	(0.00)	0.08**	(0.00)	0.06**	(0.00)
Restricted Stock Sensitivity	-0.00	(0.00)	(0.00)	(0.00)	0.00	(0.00)
Log (1 + Bonus)					-0.00	(0.07)
Log (1 + Salary)					0.38	(0.72)
Log (1 + Other Compensation)					-0.07	(0.13)
Auditor Fraction			-0.14	(1.52)	-0.03	(1.53)
Board Fraction			-0.76	(1.56)	-0.81	(1.59)
Board Size			0.09	(0.10)	0.09	(0.11)
CEO Duality			-0.09	(0.39)	-0.05	(0.40)
CEO Tenure			0.00	(0.03)	0.00	(0.03)
Log Firm Size			-0.15	(0.20)	-0.18	(0.24)
BM			1.08**	(0.50)	1.02**	(0.53)
ROA			-0.90	(1.61)	-0.91	(1.68)
Sales Growth			1.87**	(0.96)	1.86*	(0.98)
Altman's Z-score			0.77**	(0.39)	0.75*	(0.39)
Free Cash Dummy			-0.08	(1.31)	-0.12	(1.34)
Leverage			0.56	(0.60)	0.46	(0.66)
Acquisition Dummy			-0.20	(1.16)	-0.16	(1.17)
Firm Age			-0.00	(0.02)	-0.00	(0.02)
Tangible			-1.68	(1.04)	-1.73	(1.07)
Volatility			1.47	(1.06)	1.47	(1.07)
Industry fixed effects	No		Yes		Yes	
Year fixed effects	No		Yes		Yes	
Number of observations	202		202		202	
Pseudo R-squared	0.01		0.09		0.10	
Chi-square (*p*-value)	2.59 (0.27)		26.25 (0.86)		26.75 (0.91)	

TABLE 7
Wald Chi-square analysis

This table reports the results of the Wald Chi-square test based on the logistic regressions from Model 3A, Model 3B, and Model 3C (Table 6 Panel C).

		Dependent variable: Fraud	
Model	*Control*	Chi-square	*P*-value
Model 3A	No controls	2.27	0.32
Model 3B	No compensation controls	4.80*	0.08
Model 3C	Yes controls	4.47*	0.09

4.2 Additional Analysis

4.2.1 Unmatched sample regression

Burns & Kedia (2006) address the problem of using a matched-pair design. Matching firms based on similar characteristics is likely to overstate the likelihood of financial restatements, they argue. To deal with this issue, I perform an additional logistic regression based on the unmatched sample. This implies comparing the 101 fraud firms to 6,819 S&P 1500 firm-years as retrieved from ExecuComp. The results do not point to a statistical impact of *Stock Option Sensitivity* on *Fraud* (Table 8). Previously, Erickson et al. (2006) examined the effect of equity-compensation incentives on accounting fraud. Their results suggest a strong impact of compensation sensitivity on fraud. However, the initial significant effect becomes insignificant after incorporating control variables. In my research, untabulated results show that the impact of neither *Stock Option Sensitivity* nor *Restricted Stock Sensitivity* on *Fraud* reaches significance levels irrespective of control variables. The reported *p*-values are disproportionately large as compared to the matched-sample regression.

TABLE 8
Logistics regressions (unmatched sample)

This table reports the logistic regressions for the unmatched sample: fraud and unmatched firms. The fraud dummy equals one if the firm is the primary defendant in a securities class action lawsuit between 2008 and 2019. Unmatched firms include the remaining 6,718 firm-year S&P 1500 observations from ExecuComp. These observations are retrieved based on the intersection of the BoardEx, Compustat, and ExecuComp databases. For all variables the coefficient is given, with the standard error in parentheses, all rounded to two decimals. The significance levels are denoted as ***, ** and *, which represents 1%, 5% and 10% significance levels, respectively. All continuous variables are winsorized at the 1% and 99% levels.

TABLE 8 (continued)

	Dependent variable: Fraud					
	Stock Option		Restricted Stock		Both	
Independent variable	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Intercept	-9.37***	(2.30)	-4.99**	(2.28)	-5.21	(2.31)
Stock Option Sensitivity	0.00	(0.00)			0.00	(0.00)
Restricted Stock Sensitivity			0.00	(0.00)	0.00	(0.00)
Log (1 + Bonus)	0.01	(0.04)	0.01	(0.04)	0.01	(0.04)
Log (1 + Salary)	0.73*	(0.38)	0.73*	(0.38)	0.73*	(0.38)
Log (1 + Other Compensation)	-0.13*	(0.07)	-0.13*	(0.07)	-0.13*	(0.07)
Auditor Fraction	0.40	(0.82)	0.39	(0.82)	0.40	(0.82)
Board Fraction	0.58	(1.01)	0.55	(1.01)	0.57	(1.01)
Board Size	-0.02	(0.07)	-0.02	(0.07)	-0.01	(0.07)
CEO Duality	-0.21	(0.23)	-0.21	(0.23)	-0.21	(0.23)
CEO Tenure	0.00	(0.02)	8.00	(0.02)	0.00	(0.02)
Log Firm Size	0.07	(0.12)	0.08	(0.12)	0.06	(0.13)
BM	0.32	(0.29)	0.32	(0.29)	0.32	(0.29)
ROA	0.04	(0.83)	0.03	(0.82)	0.05	(0.83)
Sales Growth	0.42	(0.27)	0.42	(0.27)	0.42	(0.27)
Altman's Z-score	-0.14	(0.19)	-0.14	(0.19)	-0.15	(0.19)
Free Cash Dummy	0.17	(0.79)	0.17	(0.79)	0.17	(0.79)
Leverage	0.45	(0.40)	0.45	(0.40)	0.45	(0.40)
Acquisition Dummy	-0.51	(0.60)	-0.50	(0.60)	-0.51	(0.60)
Firm Age	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)
Tangible	-1.12*	(0.67)	-1.20*	(0.66)	-1.19*	(0.67)
Volatility	0.57	(0.50)	0.58	(0.50)	0.57	(0.50)
Industry dummies	Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes	
Number of observations	6,819		6,819		6,819	
Pseudo R-squared	0.04		0.04		0.04	
Chi-square (*p*-value)	36.38 (0.50)		36.35 (0.50)		36.44 (0.54)	

4.2.2 Restatement announcements

I increase the robustness of the research on fraud by using two fraud databases, rather than one. Such an approach is desired, because each of the four electronic databases on fraud use a different proxy for fraud and captures a different subset of fraudulent events accordingly (Karpoff et al., 2017). Hence, Amiram et al. (2018) ask future researchers to offset the gaps in fraud data, for example through running multiple tests using a sample from different databases.

I perform an additional analysis using the Audit Analytics (AA) restatement announcements to comprise an intersection of firms that restated their financials and faced a shareholder lawsuit afterwards. The method of using restatement announcements in an additional analysis is based on Denis et al. (2006). Instead of using the GAO database, I opt for the AA database because of two reasons. First, the GAO database only covers restatement announcements until June 2006 (Karpoff et al., 2017), which is beyond the scope of my research. As an additional advantage, nearly all restatements reported by the GAO are included in the AA database (Chen, 2016). Besides filling the gap, the use of the AA database mitigates the disadvantage of the SCAC possibly containing frivolous fraud-related lawsuits. It strengthens the results as it replaces allegations of fraud with actual fraud (Amiram et al., 2018).

From the Audit Analytics - Restatements database I select all restatements. However, only a marginal portion of the 101 fraud firms comprise the intersection with Audit Analytics. In deriving this intersection, I have equalized the restatement announcement year with the fiscal year prior to the lawsuit filing. Based on this condition, only 2 out of 101 fraud firms restated their financials. Stretching the condition to a financial restatement announcement prior to the lawsuit, irrespective of the year, 37 firms satisfy the condition. In this respect, 18.45% of the fraud sample has restated its financials (Table 9). Unfortunately, the intersection sample is too small to properly execute regressions and draw inferences.

TABLE 9
Restatement announcements

This table represents the intersection of 101 fraud firms and restatement announcements as presented in the Audit Analytics – Restatements database. A fraud firm is the primary defendant in a securities class action lawsuit between 2008 and 2019. The restatement announcements took place in a year preceding lawsuit filing.

Number of restatement announcements	Number of firms	Percentage
0	64	63.37%
1	19	18.81%
2	10	9.90%
3	5	4.95%
4	1	0.99%
5	1	0.99%
6	0	0.00%
7	0	0.00%
8	0	0.00%
9	0	0.00%
10	1	0.99%
	101	100.00%

5. DISCUSSION

In this section, I summarize the results and provide implications accordingly. This is followed by a discussion about the key limitations of my research and the provision of a few suggestions for future research. Last, I form an overall conclusion about the research.

5.1 Main results / implications

In this research I assess the comparative effect of two seemingly similar, yet substantially different, compensation types on interest alignment. Specifically, I examine the effect of stock options and restricted stock on the occurrence of corporate fraud litigation stated in the research question: "*What is the effect of stock options and restricted stock on corporate fraud litigation?".* After the main analysis, the following results are reported. First, stock options have a significant positive impact on the occurrence of corporate fraud litigation. Second, the effect of restricted stock, on the other hand, appears to be ambiguous. Third, after a comparative analysis, stock options proved itself to have a stronger effect than restricted stock. However, the effect of stock options on corporate fraud seemed insignificant using an unmatched sample design. This suggests the likelihood of fraud was overstated in the previous reported findings. Moreover, analysing restatement announcements was not useful in supporting the significant result. Besides stock options, several variables proved to be significant predictors of fraud. The Book-to-market ratio, Sales growth and Altman's Z-score positively affect corporate fraud. Tangibility, on the other hand, turned out to negatively impact the incidence of fraud. Including other elements of the compensation package did not significantly impact the above-mentioned effects.

The economic rationale behind these findings can possibly be found in the nature of the payoffs. Restricted stockholders are exposed to more downside risk than stock option holders. In the case of restricted stock, an executive receives the fair market value upon vesting. However, if the executive fails to cash out at the moment of a high stock price, he/she will receive the value-decreased shares related to the fraud detection (Denis et al., 2006). Stock options, on the other hand, gives executives incentives to adopt a value-enhancing, more-risky strategy. Consequently, the suitability of stock options as incentives is mitigated. Rather, ownership incentivizes executives to manipulate the firm's share price in order to boost their option's payoff.

Which implications can be drawn from above findings? What practical advice may be offered to the board of directors and policy makers regarding CEO compensation contracts? It is somewhat surprising that the issuance of stock options remains high. From past experience and research, it is shown that stock options are likely to induce fraudulent behaviour. This side of the coin has been addressed through imposed legislation. For instance, effective in 2010, the Dodd-frank act requires companies to get shareholders' approval on the executive compensation packages in a non-binding vote occurring at least every three years (Murphy, 2013). Yet, in 2019 the highest number of Section (10)b violations was reported within the examined time frame (Securities Class Action Clearinghouse, 2021). This number should ring the alarm bells for boards of directors and policy makers. While the goal is to mitigate agency problems, the reported numbers show otherwise. I would suggest the board to include other types of pay into the compensation contract, for example restricted stock.

This is especially relevant for highly profitable firms. Firms considered profitable or as "growth firms" may feel pressure to meet or beat their earnings targets and/or sales growth. As stated by Mintz & Morris (2016), it is likely that such continued pressure eventually results in fraud. Moreover, the effect of stock options is more pronounced in an operating environment characterized by uncertainty and growth opportunities. Firms alleged in fraud litigation have significantly higher growth potential than their counterparts (Wang, 2004). Executives operating in volatile environments are more prone to committing fraud. The concerned board of directors should be careful in structuring their CEO compensation structures. Furthermore, it is a call for policy makers to be aware to what extent an industry is characterized by uncertainty and how this affects the optimal compensation structure.

Although the results seem insignificant comparing fraud firms to an unmatched sample of firms, this does not affect the above implications. Alternatively, the results can be interpreted in a more positive way. The adverse effects of stock options on shareholder wealth, and its negative effect on society, may not be as substantial as initially thought. That does not change the advice and call for a more careful examination of the CEO compensation contracts. Instead, it creates the opportunity for more research and discussions.

5.2 Limitations

The first limitation of this research is the problem of endogeneity. As I quote Erickson et al. (2006: p128): "Compensation structure is a choice variable, so using it as an explanatory variable runs the risk of endogeneity problems". I addressed the omitted variables type of endogeneity by including a variety of specific control variables (Erickson et al., 2006). Even though the effort is made, there is still a risk of endogeneity. Using an instrumental variables analysis did not seem appropriate. Conyon & He. (2016) point to the problem of finding a legitimate instrument that fits within the research area of fraud and executive compensation. Hence, the observed estimates could still be influenced by omitted variables to some extent.

The second limitation is related to the sample selection. All firms in this research are collected from ExecuComp. This explicitly entails the S&P 1500 firms. Firms that make the Fortune 1500 cut are primarily selected on market value of equity and industry representation, and share similar characteristics (Murphy, 2013). As a result, my final sample does not represent the whole economy, also known as selection bias (Armstrong et al., 2010). This reduces the generalization strength of the results.

Third, the relatively small sample size used possibly lacks the statistical power to derive an accurate conclusion. Due to a specific focus on Section 10(b) claims and compensation data available on ExecuComp, my fraud sample merely consists of 101 fraud firms. A sub-group of prior literature uses a sample of similar size. The studied fraud firms range from 50 to 102 (Chen et al., in press; Efendi et al., 2007; Erickson et al., 2006; O'Connor et al., 2006). However, Efendi et al. (2007) emphasize the disadvantage of using a relatively small sample, that is, between 50 and 200 observations.

Especially since corporate fraud is a relatively rare event, it is difficult to draw inferences in the case of no statistically significant effect. For the effect of restricted stock on corporate fraud this possibly poses problems, with a Type II error as result.

Fourth, in my additional research I was not able to properly backup my results with the Audit Analytics database. The importance of using multiple fraud databases is stressed by Amiram et al. (2018). Each database uses a different definition of fraud, with fraud interpretation issues as a result. Hence, there is a possibility that the usage of a different fraud database has influence on the outcomes of the research. To what extent this will possibly affect the outcome has yet to be investigated.

5.3 Future research

There are some suggestions for future research which could extend the results of my research. First, it seems that research design choice influences outcomes of the research. I have covered both a size-and-industry matched-pair design and unmatched design, where the unmatched design produces insignificant results. According to Armstrong et al. (2010), a propensity-score matched-pair design should be considered for future accounting research on compensation. One of the advantages of this design is the assessment of correlated omitted variables. Hence, an examination of different research designs improves the generalization of my results.

Second, my research is limited in the sense that I use only one type of compensation measurement: the stock option and restricted stock delta unscaled by pay. Alternatively, compensation sensitivity could be measured as: the amount of equity ownership or portfolio delta scaled by pay. Lack of a standardized measurement might be the reason for conflicting results in the literature (Amiram et al., 2018; Armstrong et al., 2010). Moreover, though the calculation was already quite challenging, there is more room for a detailed examination. For instance, the difference between vested and unvested options. Specifying compensation variables in such manner could provide more detailed insights.

Third, the purpose of using executive compensation is rooted in the traditional agency theory. This grounded and rational, yet somewhat outdated theory neglects behavioural assumptions. Pepper & Gore (2015) argue that aside from extrinsic motivation, research models should incorporate the intrinsic motivation of executives. The suggestion would be to take a more behavioural approach by incorporating behavioural considerations (Edmans et al., 2017). Rather than assuming that executives' motivation is primarily driven by monetary rewards, intrinsic motivations should also be considered. Factors such as overconfidence, uncertainty, and pressure could be a fruitful addition to examination of the effect of executive compensation on corporate fraud.

Fourth, the majority of studies examine the effects of executive compensation among publicly traded U.S. firms, often S&P 1500 firms. Naturally, the U.S. lends itself well to studies, due to the vast number of businesses and data availability. Not to mention the accessibility of ExecuComp and other databases.

Despite these advantages, research on private, non-US firms, and other employees aside from top management may be interesting. For example, Jaskiewicz et al. (2017) conducted a comparative study on family-owned versus founder-owned businesses. CEO equity-based compensation was more beneficial for family-owned businesses in the sense that they also pursue socio-emotional goals with the issuance.

6. CONCLUSION

This research examines the comparative effect of two types of compensation on the likelihood of corporate fraud litigation among S&P 1500 firms in the period 2008-2019. As the issuance of restricted stock has become more prominent in the past years, this research allows me to provide contemporary insights into the effect of the CEO compensation structure on fraud. The compensation components investigated are stock options and restricted stock, both measured as their sensitivity to firm value. Corporate fraud litigation is measured as the filing of a shareholder class action lawsuit. The sample comprises 101 fraud and 101 non-fraud firms matched on size, industry and year. The effect of restricted stock on corporate fraud litigation is both economically and statistically insignificant. The effect of stock options on corporate fraud litigation is positively significant, and more pronounced compared to restricted stock. However, the results become insignificant using an unmatched S&P 1500 sample.

Reaching the goal of aligning the interests of shareholders and executives, while preventing corporate fraud litigation, is a challenging task. The task gets more complicated as specific firm and operating environment characteristics become more distinct, such as profitability, tangibility, volatility and related growth opportunities. Stock options do not seem to be the solution, whereas restricted stock may be. One explanation for this difference has its foundation in the nature of the payoff function, since restricted stockholders are exposed to more downside risk than stock option holders. Consequently, stock options incentivize executives to push up the share price and increase profit accordingly. As these preliminary conclusions are based on the agency theory, I believe a more behavioural approach would benefit insights into the effect of the CEO compensation structure. Additional research is necessary to draw a conclusion on which compensation type is better at fulfilling its role in incentive alignment, if any.

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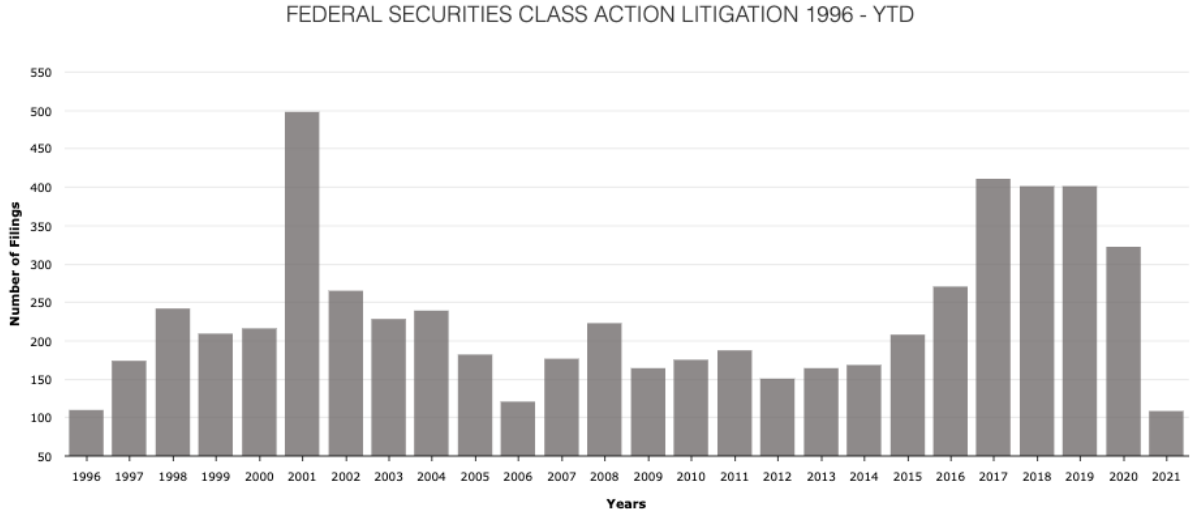
APPENDICES

Appendix A.

The table below shows the distribution of securities class action lawsuit filings as of year, including violations of all claims. Reprinted from Securities Class Action Clearinghouse (2021). Securities Class Action Clearinghouse a collaboration with Cornerstone Research, StanfordLawSchool.



Appendix B. Stock option sensitivity calculation

To estimate the sensitivity of stock options to changes in firm value, I use the Black-Scholes model (Black & Scholes, 1973), modified by Merton (1973) to account for dividend payments. These estimations are based on the valuation of a European call option.

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

where:

d = The expected dividend yield over the life of the option. It is estimated as the average dividend yield over the current year and two prior years. The dividend yield is winsorized at the 5th and 95th levels and divided by 100 to use in the option delta formula. The variable dividend yield per year is provided by ExecuComp.

T = The time to maturity of the option, as of fiscal year-end. It is calculated as the option's expiry date minus the last day of the fiscal year, divided by 365. It is rounded to years, to derive the risk-free rate. The necessary input variables are provided by Compustat and ExecuComp.

N = The cumulative probability function of the normal distribution.

S = Stock price of the underlying stock, as of fiscal year-end. This variable is provided by ExecuComp.

X = Exercise price of the option, as of fiscal year-end. This variable is provided by ExecuComp.

r = The risk-free interest rate, as of fiscal year-end. The rates are divided by 100 to use it in the option delta formula. The rates are obtained from the Federal Reserve website (http://www.federalreserve.gov/releases/h15/data.htm#fn11). They provide historical data for "Treasury constant maturities" using the "annual" series. The given interest rates correspond to the rounded maturity of the options. The rates are given for 1, 2, 3, 5, 7, and 10-year Treasury securities. I interpolate the given rates to obtain risk-free rates for the remaining years, up to 10 years. If the option maturity is more than 10 years, I use the 10-year interest rate.

σ = The expected stock-return volatility over the life of the option. It is estimated over the 60 months prior to the fiscal year in question. It is measured by taking the standard deviation of daily stock returns, annualized assuming 252 trading days per year. After that, volatility is winsorized at the 5th and 95th levels. The daily stock prices are obtained from CRSP/Compustat.

The delta is estimated separately for each stock option observation per executive-year, for vested and unvested stock options. After estimating the deltas, *Stock Option Sensitivity* is calculated for all CEO observations corresponding to the concerned year and then summed up afterwards.

Vested Stock Option Sensitivity = Option Delta * Number of Securities Underlying Unexercised Options at Fiscal Year-End (Exercisable) * (Stock Price*1%)

Unvested Stock Option Sensitivity = Option Delta * Number of Securities Underlying Unexercised Options at Fiscal Year-End (Unexercisable) * (Stock Price*1%)

Total Stock Option Sensitivity = sum(sum*Vested Stock Option Sensitivity*, sum*Unvested Stock Option Sensitivity*)

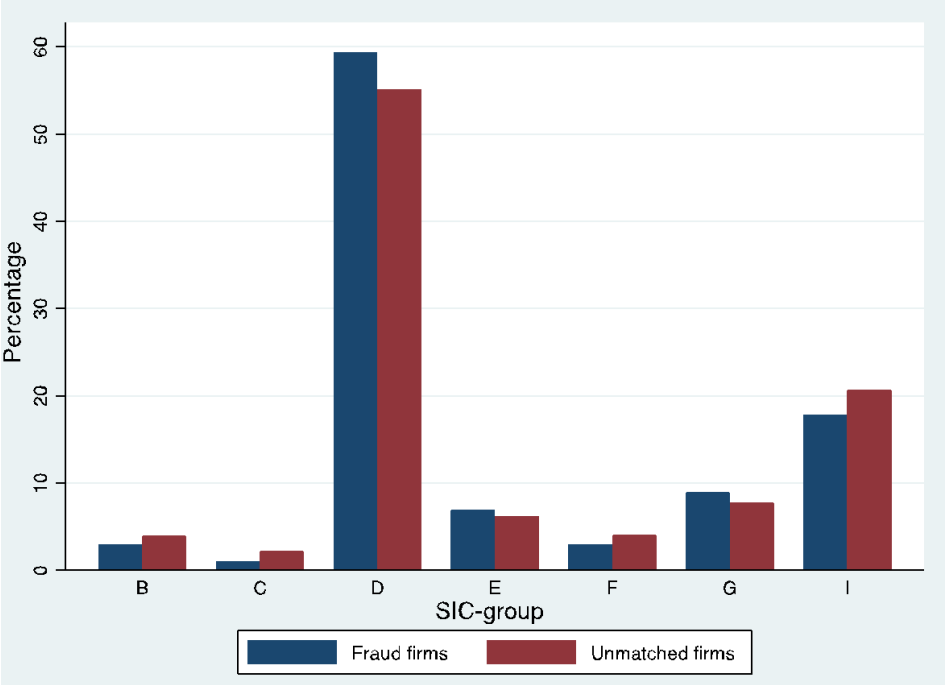
Appendix C. Control variables definitions

Variable	Definition	Expected effect on fraud
Bonus	"The dollar value of a bonus earned by the named executive officer during the fiscal year." *ExecuComp:* BONUS	(?)
Salary	"The dollar value of the base salary earned by the named executive officer during the fiscal year. " *ExecuComp:* SALARY	(?)
Other Compensation	"Other compensation received by the executive including perquisites and other personal benefits, termination or change- in-control payments, contributions to defined contribution plans (e.g., 401K plans), life insurance premiums, gross-ups and other tax reimbursements, discounted share purchases etc." *ExecuComp:* OTHCOMP	(?)
Auditor Fraction	The fraction of independent directors on the audit committee. *BoardEx:* Independent Audit Committee members/NumberDirectors	(-)
Board Fraction	The fraction of independent directors on the board of directors. *BoardEx:* Independent Board of Directors members/NumberDirectors	(-)
Board Size	The total number of directors on the board. *BoardEx:* NumberDirectors	(+)
CEO Tenure	The number of years between the current fiscal year and the variable BECAMECEO. *ExecuComp:* BECAMECEO.	(+)
CEO Duality	A dummy variable equal to one if the CEO (CEOANN) also holds the title of Chairperson or Chairman (TITLEANN); zero otherwise. *ExecuComp:* CEOANN & TITLEANN	(+)
Size	1) Total assets 2) The natural logarithm of the market value of equity. *Compustat:* log (mkvalt = prcc_f*csho)	(+)

BM	Book value of equity / Market value of equity. *Compustat*: ceq/(prcc_f*csho)	(?)
ROA	Net income scaled by total assets. *Compustat*: ib/at	(-)
Sales Growth	The percentage in sales from the prior year to the current year. *Compustat:* $(sale_{t=0} - sale_{t-1}) / sale_{t-1}$	(+)
Altman's Z-score	0.12*(Working capital/Total assets) + .014*(Retained earnings/Total assets) + .033*(Earnings before interest and taxes/Total assets) + .006*(Market value of equity/Total liabilities) + .999*(Net sales/Total assets) *Compustat:* 0.12*(wcap/at) + .014*(re/at) + .033*(Ebit/at) + .006*((prcc_f*csho)/tl) + .999*(sale/at)	(?)
Free Cash	A dummy variable equal to one if the company's free-cash ratio is less than -0.5; zero otherwise. (Cash from operations$_t$ - Average capital expenditures$_{t-3 \text{ to } t-1}$) / Current assets$_{t-1}$) *Compustat:* $((oancf_t - xidoc_t) - (capx_{t-3tot-1}/3))/ac_{t-1}$	(+)
Leverage	(Short-term debt + Long-term debt) / (Short-term debt + Long-term debt + Common equity + Preferred stock at carrying value. *Compustat:* (dltt+dlc)/(dltt+dlc+ceq+upstk)	(+)
Acquisition	A dummy variable equal to one if an acquisition accounts for 20% or more of the sales; zero otherwise. *Compustat:* aqs/sale	(+)
Firm Age	Number of years the firm appears on Compustat. *Compustat:* fyear - year(IPODATE)	(-)
Tangible	Net plant, property, and equipment scaled by total assets. *Compustat:* ppent/at	(-)
Volatility	The standard deviation of daily stock returns annualized assuming 252 trading days per year.	(+)

Appendix D. Distribution SIC-groups

This bar graph shows the distribution of fraud firms and unmatched firms as of the SIC-groups, which is comparable to the two-digit SIC industry code. A fraud firm is the primary defendant in a securities class action lawsuit between 2008 and 2019. Unmatched firms include the remaining 6,718 firm-year S&P 1500 observations from ExecuComp. These observations are retrieved based on the intersection of the BoardEx, Compustat, and ExecuComp databases. Note: also in the unmatched sample, Finance, Insurance and Real Estate firms were excluded.



SIC-groups

This table shows the division codes and industry names, corresponding to the two-digit SIC industry codes. Reprinted from McKimmon Center for Extension & Continuing Education. (n.d.). 2-Digit SIC (Standard Industrial Classification) Codes, https://mckimmoncenter.ncsu.edu/2digitsiccodes/.

Division code	*Codes*	*Industry name*
A	01-09	Agriculture, Forestry, Fishing
B	10-14	Mining
C	15-17	Construction
D	20-39	Manufacturing
E	40-49	Transportation & Public Utilities
F	50-51	Wholesale Trade
G	52-59	Retail Trade
H	60-67	Finance, Insurance, Real Estate
I	70-89	Services
J	91-98	Public Administration
K	99	Non-Classifiable Establishments

Appendix E. Trend lines

These graphs present the trend lines for fraud firms regarding the variables *Sales Growth, Stock Option Sensitivity,* and *Volatility* respectively. The graphs show the values 12 years prior and 12 years after the class action filing date (year 0) for the 101 fraud firms. A fraud firm is the primary defendant in a securities class action lawsuit between 2008 and 2019. *Sales Growth* and *Volatility* are depicted as a ratio; *Stock Option Sensitivity* is given in a thousand dollars.

Figure 1: Trend line Sales Growth

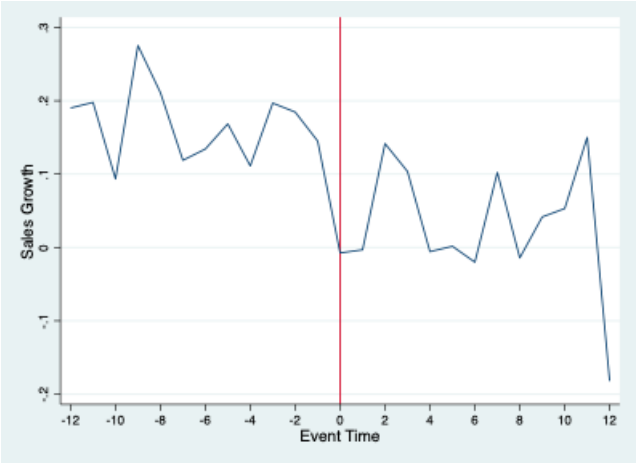


Figure 2: Trend line Stock Option Sensitivity

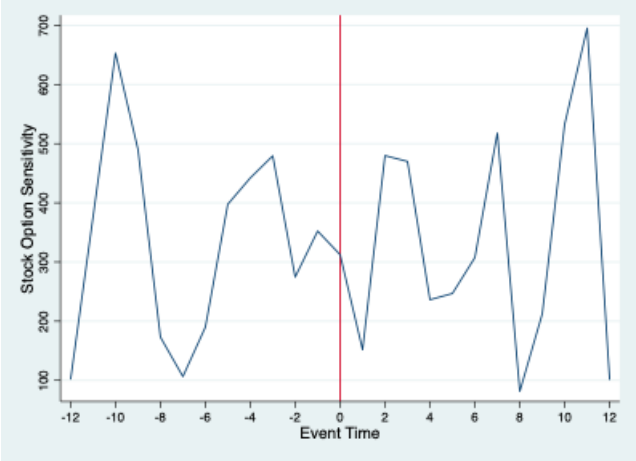


Figure 3: Trend line Volatility