Audit Committee Equity Incentives and Stock Price Crash Risk

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Abstract

This paper theoretically and empirically investigates whether and how audit committee (AC) equity incentives affect future stock price crash risk. Consistent with our model prediction that equity incentives for ACs contribute to reducing the skewness of return distributions, we document evidence of a negative relationship between AC equity incentives and expected crash risk for a merged sample of 6,550 US-listed firms over the 2001-2018 period, even after controlling for a wide range of other firm characteristics, using alternative variable specifications, and addressing potential endogeneity concerns. On average, a one-standard-deviation increase in AC equity incentives is associated with a reduction of 14.09%-15.46% in stock price crash risk. Further analysis shows that AC equity incentives affect crash risk through financial reporting quality, the negative relationship between AC equity incentives and future stock price crash risk is more pronounced for firms with weaker external governance and for firms with more financial expertise in the AC, and this negative relationship is mainly driven by option-based equity incentives. Taken together, these findings are consistent with the view that equity-based compensation is critical for inducing greater monitoring efforts from AC members and mitigating managerial incentives to withhold bad news.

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JEL Classification: G12; G14; G34; M42

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1. Introduction

Audit committee (AC) effectiveness has become increasingly important since the introduction of the Sarbanes-Oxley Act (SOX). One ongoing discussion among academics and practitioners focuses on whether firms should provide AC members with equity incentives. On the theory side, the conventional wisdom on this debate is largely built upon the framework of Jensen and Meckling (1976) due to the concern that equity incentives might jeopardize AC independence, leading to hidden actions against the long-term interests of shareholders, even if equity-based compensation could motivate AC members to perform their oversight duty better. Empirically, several studies (see Bedard et al. 2004; Campbell et al. 2015; Archambeault et al. 2008) document that AC equity incentives can lead to greater earnings management, reduced financial reporting quality, and even a greater likelihood of restatement. These studies focused on financial statements, but none spoke directly to shareholder wealth. This paper attempts to fill this gap in the empirical literature by relating AC equity incentives to stock price crash risk, a measure directly linked to equity valuation and shareholder interest, in the theoretical analysis and provides insights into whether and how AC equity incentives affect stock price crash risk in the post-SOX period.

Stock price crashes, also known as negative extreme returns (Kim et al. 2014; Callen and Fang 2015), refer to cases in which stock prices fall sharply due to the sudden release of negative firm-specific news. Following the seminal work of Jin and Myers (2006), which provides a theoretical explanation for crash risk, the empirical literature has identified a long list of its determinants, including financial reporting opacity (Hutton et al. 2009; Kim and Zhang 2014), excess perks (Xu et al. 2014), religion (Callen and Fang 2015), accounting conservatism (Kim and Zhang 2016), trust (Li et al. 2017), Chief Executive Officer (CEO) age (Andreou et al. 2017), directors' and officers' liability insurance (Yuan et al. 2016), the composition of the board (Kao et al., 2020), board social capital (Jebran et al., 2022), corporate innovation strategy (Jia 2018), CEO and Chief Financial Officer (CFO) gender (Li and Zeng 2019), corporate customer concentration (Ma et al. 2020), foreign investors (Kim et al. 2020), managerial political orientation (Chen et al. 2022), comment letters (Xu et al., 2022), social media (Hossain et al., 2022), and internet searching (Xu et al. 2021). These crash risk factors are related to managerial incentives to delay the disclosure of bad news and financial reporting quality and/or to corporate governance mechanisms that alleviate agency problems. Given that ACs provide critical professional scrutiny as additional corporate governance to improve financial reporting quality, it is surprising that few studies have examined the impact of AC equity incentives on crash risk.

The importance of using incentive-based compensation to motivate a firm's key players to focus on the long-term interests of shareholders has long been recognized as part of efforts to improve the quality of governance (National Association of Corporate Directors (NACD) 2001, 2003). While the key players may be the firm's executives, directors and even some rank-and-file employees, we focus on AC members because the Sarbanes-Oxley Act (SOX 2002) defines an audit committee as "a committee established by and amongst the board of directors of an issuer for the purpose of overseeing the accounting and financial reporting processes of the issuer and audits of the financial statements of the issuer". We do not focus on top executives because the audit committee, compared to the entire board, has the ultimate board-level responsibility for financial reporting oversight. Indeed, an entity's internal control is under the purview of its audit committee (Krishnan, 2005). If AC members exercise their oversight duties effectively, they will play an important role in curbing the hiding of firm's bad news. We do not focus on rank and file employees because they may be directly involved in misreporting that senior executives spearhead or not (Call et al. 2016). They can choose to keep silent and allow the misreporting or to blow the whistle and expose the misconduct. Rank and file employees are completely different from these audit committee members who are held accountable for the financial reporting quality.

Theoretically, there are at least two different views on how AC equity incentives can affect stock price crash risk. On the one hand, AC equity incentives can reduce the stock price crash risk. Bolton et al. (2006) showed that equity incentives can encourage managers to engage in short-termism behaviors, such as bad news hoarding, to manipulate stock prices. Using a dynamic rational expectation model, Benmelech et al. (2010) showed that equity-based compensation, which supplies corporate managers with incentives to hide bad news about a firm's long-term growth, can lead to misreporting, suboptimal investment, an initial run-up, and a subsequent sharp decline in stock prices. Their predictions are consistent with Jin and Myers (2006), who showed theoretically that bad news hoarding over an extended period by managers can lead to stock price crashes. Motivated by Jensen and Meckling (1976), costly monitoring is one of the two standard solutions to agency problems, including managerial incentives to withhold or delay the release of bad news. Giving AC equity incentives should fix this agency problem by inducing more effective AC monitoring of corporate management and leading to a better information environment, which in turn reduces the likelihood of bad news formation due to inefficient managerial decisions and thus lowers the risk of stock price crashes.

On the other hand, AC equity incentives can result in a greater crash risk. Concerns have long existed in the post-SOX era regarding whether the use of equity incentives for AC members can jeopardize AC independence, leading to unfavorable corporate outcomes. These concerns are valid because equity incentives subject AC members to the same short-term bias as corporate managers. In cases where managers withhold bad news to inflate short-run earnings and stock prices, less independent ACs could perform their oversight duties less effectively, leading to an accumulation of bad news over time to a greater extent. Campbell et al. (2015) documented consistent evidence showing that post-SOX AC stock option equity incentives are associated with reduced financial reporting quality, as proxied by a company's propensity to meet or beat its consensus earnings forecast. Therefore, we expect the stock price crash risk to be increasing with AC equity incentives.

We develop a model that shows how an optimally incentivized AC oversees the CEO of a firm. The CEO can divert benefits from the shareholder at a personal cost. The cost is higher for a CEO whom an AC monitors with a higher equity stake or for a CEO subject to a more effective internal governance mechanism. We show that the model produces skewness in the equity return distribution. The explanation for skewness in the related price crash risk literature rests on information: the firm hides bad news, leading to a fat left tail in the return distribution. Our model uses a hidden action mechanism: it is easier to monitor management in firms that perform poorly than in firms that perform well because the cost of monitoring management increases with firm performance. Therefore, it is optimal to allow some managerial diversions in well-performing firms, creating a thin right tail in the return distribution.

The skewness is reduced in both the equity stake of the AC and the strength of the governance mechanism. The model develops an optimal incentive package for ACs. We find here that the stronger the internal governance strength of a firm, the lower the optimal equity component of the AC. Thus, equity incentives and governance are substitutes. Therefore, the question is whether we can link the skewness of stock returns to AC incentives in cross-sectional regressions. Through simulations, we show a negative association between the equity component in AC compensation and skewness in cross-sectional regressions. Higher levels of equity compensation lead to lower skewness. However, we find that cross-sectionally, AC equity compensation and skewness are positively related when we introduce the strength of governance into the regression model. Thus, the fact that governance and AC equity incentives are substitutes means that we must treat the empirical factors with some degree of caution. The endogenous relationship between AC compensation and governance complicates the empirical picture.

Using a merged US sample of 6,550 US firm-year observations over the 2001–2018 period from BoardEX, Riskmetrics, COMPUSTAT, and CRSP, this paper then moves on to empirically investigate whether and how AC equity incentives affect stock price crash risk. Following Sengupta and Zhang (2015) and Liu et al. (2021), we measure AC equity incentives as the ratio of AC equity-based compensation to AC total compensation. Following Chen et al. (2001) and Hutton et al. (2009), we measure stock price crash risk using the two most popular proxies in prior research: NCSKEW, known as the negative conditional skewness of firm-specific weekly returns, and DUVOL, known as the asymmetric volatility of negative and positive stock returns. We document evidence of a negative relationship between AC equity incentives and crash risk, even after controlling for a wide range of firm characteristics, year fixed effects, and industry fixed effects. On average, a one-standard-deviation increase in AC equity incentives is associated with a 14.09% (15.46%) reduction in NCSKEW (DUVOL). This change is not only statistically significant but also economically meaningful for both shareholders and other nonfinancial stakeholders. This finding is consistent with our hypothesis that AC equity incentives can reduce stock price crash risk by inducing AC members to perform more effective monitoring of corporate managers.

We perform a number of robustness checks to mitigate potential endogeneity concerns. First, we use the average ratio of equity-based compensation to total compensation across all AC members as our alternative measure for AC equity incentives and examine whether our findings remain qualitatively similar. The regression results show that this alternative measure can also predict the cross-section of stock price crash risk. Second, we examine whether our findings are sensitive to alternative estimation methods for measuring stock price crash risk. In addition to the two popular crash risk measures used in the baseline analysis, we consider the other six measures used in previous studies, including those of Hutton et al. (2009), Kim et al. (2011), and Piotroski et al. (2015). We show that our findings are not affected by using these alternative variable specifications and continue to hold in all cases. Third, we examine whether our main findings are driven by corporate governance mechanisms and incentives of CEO and CFO, since CEO and CFO play major roles in bad news hoarding activity and financial reporting quality and these activities can induce stock price crash risk. Our main findings continue to hold after including board size, board independence, CEO deta, CEO vega, CFO delta, and CFO vega. Finally, we examine whether our findings are driven by including firms without AC equity incentives, given that firms with and without AC equity incentives can be quite different in several respects. Subsample analysis show that our main findings do not change qualitatively after excluding firms without AC equity incentives.

We address potential endogeneity concerns using three empirical strategies. First, we explicitly control for high dimensions of fixed effects in the model specification. Second, We also use a panel data structure and firm fixed effects regression to further alleviate the omitted-variable problem. We show that our finding is unlikely to be driven by unobservable factors at the firm level. Finally, we further address the potential reverse causality problem associated with AC equity incentives by using a difference-in-difference design. More specifically, we focus on a subsample of treatment firms that experience an increase of 30% in their AC equity incentives. Using propensity score matching, we identify control firms that are observably similar but do not experience any significant change in their AC equity incentives over the sample period. The difference-in-difference estimation using this carefully matched sample yields three interesting findings to support the notion that the negative relation between AC equity incentives and expected crash risk is likely causal: (1) compared to the change in stock price crash risk for control firms, the change in stock price crash risk over the same period is significantly smaller, on average, for firms that experience a significant increase in AC equity incentives, (2) there is no significant difference in stock price crash risk between treatment and control firms over the three-year period before treatment firms increase their AC equity incentives, indicating that the most important parallel trend assumption for the difference-in-differences analysis is valid, and (3) the impact of increased AC equity incentives on stock price crash risk does not become apparent immediately but shows up in the second and third years following the increase. All these robustness tests lend solid and compelling support to our interpretation of the causal impact of AC equity incentives on crash risk.

We further explore potential channels through which AC equity incentives affect stock price crash risk. First, we explore whether AC equity incentives affect stock price crash risk through financial reporting quality, as predicted by our model. Using the dispersion of financial analysts' earnings forecasts (Sengupta and Zhang 2015) and internal control effectiveness (Naiker and Sharma 2009) to measure financial reporting quality, we document consistent evidence of a negative relation AC equity incentive and analyst forecast dispersion and a positive relation AC equity incentive and internal control effectiveness, which implies that financial reporting quality tends to increase with AC equity incentives. Second, motivated by the findings in the literature highlighting the importance of financial expertise in an AC, we examine whether the impact of AC equity incentives on reducing expected crash risk is more pronounced when an AC has more financial expertise. Our subsample analysis provides consistent evidence that the impact of AC equity incentives on crash risk becomes more pronounced when the chairperson of an AC has financial expertise and when the proportion of AC members with financial expertise is greater. Taken together, these findings indicate that financial expertise is important for AC monitoring and that the use of equity-based compensation for these more responsible and more sophisticated audit committee members is reasonable. Finally, we examine whether the impact of AC equity incentives on reducing stock price crash risk is less pronounced when external governance is strong and firms have few chances of hiding bad news from shareholders over an expanded period of time. Our subsample analysis reveals consistent evidence that the impact of AC equity incentives on crash risk becomes more pronounced when leverage is relatively low and when institutional ownership is relatively low. Collectively, these findings are consistent with previous studies showing that both creditors and institutional investors can monitor firms effectively when they have significant financial stakes in the firms and that AC monitoring appears to be a good substitute for external governance by institutional investors and creditors.

Our paper contributes to the relevant literature in two important ways. First, We add to the understanding of the economic consequences of AC equity incentives. Previous studies have highlighted the dark side of providing AC members with equity incentives, including Bedard et al. (2004), Archambeault et al. (2008), and Campbell et al. (2015). In sharp contrast, our study demonstrates the other side of the coin by showing that ACs with equity incentives can discipline managerial behavior more effectively. Second, our study is also related to the growing literature on the determinants of stock price crash risk. We depart from the empirical literature by presenting novel evidence that providing AC members with equity incentives can be an important contractual arrangement in the best interests of shareholders to combat bad news hoarding.

The remainder of this article proceeds as follows. Section 2 provides a brief description of our institutional background before developing the empirical hypotheses. Section 3 describes the data, sample, and variables used in this study. Sections 4 and 5 present the main results for our empirical analysis before Section 6 concludes the study.

2. Related Literature and Theory

Background

ACs have long been regarded as vital mechanisms to ensure the transparency and integrity of corporate financial reporting. However, recent accounting frauds have caused market participants to question the effectiveness of ACs in fulfilling their oversight role. Such concerns gave rise to the passage of the SOX, which expands ACs' responsibilities, intending to restore the credibility of firms' financial statements. Among these provisions, AC independence has received much attention from auditing academics because independence is the cornerstone on which ACs can effectively exercise their duties delegated by the SOX (e.g., Bronson et al. 2009; Lennox and Park 2007; Menon and Williams 2004, 2008; Naiker and Sharma 2009; Srinivasan 2005; Hillier et al., 2022). Even though Section 301 of the SOX mandates that all AC members be fully independent, they may satisfy this requirement when they are newly appointed but become less independent when they receive equity-based compensation during their tenure periods.

The National Association of Corporate Directors (2001, 2003) currently promotes the use of equity compensation for directors (Archambeault et al. 2008; Magilke et al. 2009), and large US companies have increased the use of stocks and options to compensate for their nonexecutive directors, of which ACs are formed (Taub 2005; Winikoff, 2006). Regulators and the press have expressed serious concerns about whether equity-based compensation compromises AC independence because stocks and options tie AC members' wealth to firms' short- and long-term financial performance (e.g., Barrier 2002; Higgs 2003; Millstein 2002; New York Times 2007; Financial Reporting Council 2003; Wall Street Journal 2006). Therefore, our research question bears important policy implications regarding whether new regulations are needed to govern how ACs should be compensated for to ensure their oversight effectiveness over time.

AC Equity Incentives and Crash Risk

Before the introduction of the SOX, nonindependent directors could sit in an AC, whereas in the post-SOX period, only independent directors are eligible for AC membership. Firms can choose whether or not to provide incumbent AC members with equity incentives. Accepted wisdom offers two different views on whether we should provide equity-based compensation to these independent directors.

One traditional view is that equity-based compensation can harm the effectiveness of AC monitoring and thus increase crash risk. For example, using data from experimental markets, Magilke et al. (2009) found that AC members who do not receive equity-based compensation are the most objective, while AC members who receive equity incentives linked to current (future) stock-based compensation are associated with aggressive (conservative) reporting. Using real data from stock markets, Campbell et al. (2015) examined the association between AC members' equity incentives and financial reporting quality. They found that AC members' stock option awards and holdings are positively associated with the likelihood of meeting or beating analyst earnings forecasts, indicating that the stock option incentives paid to AC members lead to reduced financial reporting quality. In a similar vein, Keune and Johnstone (2015) documented evidence of a positive association between AC short- (long-) term stock option compensation and the likelihood that managers are allowed to waive income-decreasing (increasing) misstatements with a sample of misstatements that existed in financial statements from January 1, 2003 to September 30, 2006. This anecdotal evidence implies that it might not be suitable to provide equity incentives to AC members. The information environment can become opaque, making it easier for managers to withhold bad news from investors.

However, this might not depict the whole picture. The alternative view is motivated by the principal–agent framework (Jensen and Meckling 1976; Fama 1980; Fama and Jensen 1983). In the spirit of agency theory, conflicts of interest may arise between the principal (shareholders and the regulator) and the agent (AC members), leading to less effective AC monitoring. To mitigate this agency problem, standard solutions include costly monitoring and enhanced incentive alignment, such as equity-based compensation. With incentive-compatible compensation, agency problems should be reduced, and AC monitoring should become more effective than in cases without equity-based compensation. This leads to the hypothesis that equity incentives reduce crash risk. Therefore, it is not easy to predict which direction equity compensation pulls. Finally, crash risk and equity incentives are likely to be created endogenously. This leads us to investigate the link between equity incentives and crash risk in a theoretical model.

Model

The model addresses the effects of ACs' remuneration on stock price distributions. It is a hidden action model in which shareholders cannot observe and perfectly discipline a self-interested manager. To fix this problem, the shareholders incentivize an AC to minimize the agency costs for the shareholders by overseeing the manager. We assume that the firm offers AC remuneration consisting of a long-term constant wage and shareholding. The shareholding value fluctuates with the share price, thus creating an incentive effect for the AC. The model is as simple as possible, except that it needs sufficient sophistication to obtain realistic stock price distributions. The manager can divert benefits from the firm's operating income at a private cost. The AC's oversight influences the private costs to the manager by strengthening the financial reporting quality of the firm. The higher the financial reporting quality, the costlier it is for the manager to make private diversions of benefits. The incentives of ACs depend on their remuneration package, which the shareholders determine. The firm has no debt liability and assumes that AC members act as a single individual. The model derives an endogenous link between the AC's remuneration package and the skewness of the stock price distribution.

The firm's gross income at time t is x_t, with $dx_t = x_t(\mu dt + \sigma dB_t)$, where μ is a constant drift rate, σ is a constant volatility term, and dB_t denotes the increments of a standard Brownian motion. We assume that the probability measure governing x_t is risk-neutral. We assume that the drift and volatility terms satisfy the technical condition that $2\mu < r - \sigma^2$, where r is the constant risk-free rate of return (this condition ensures convergence of the solutions).

The manager can divert α percent of the firm's gross income x_t at a private cost of $\ln(1-\alpha)^{-k\gamma\theta}$. The parameter γ represents the strength of the firm's governance functions outside of the AC, and θ represents the additional strengthening provided by the AC. The parameter k is a scaling parameter (to provide sensible ranges for the endogenous parameters of the model). Since the AC may exert higher effort at some points in time than others, we make the AC's choice a function of time θ_t. We fix the parameter γ. Then, Equation (1) gives the manager's optimal diversion policy, which is derived in the appendix:

(1) $\alpha_t = max\left(1 - \frac{T(\theta_t)}{x_t}, 0\right), T(\theta_t) = k\gamma\theta_t.$

If the manager's diversion is the only factor that influences the income stream, the operating income for the firm equals $x_t(1-\alpha_t) = min(x_t, T(\theta_t))$, which implies that the manager diverts all gross income above, and none of the income below, the threshold value $T(\theta_t)$.

The AC has oversight of the firm's financial reporting quality and can thus influence cost-of-benefit diversions. The AC is rewarded by a constant wage w and an equity stake β. The equity stake has a cash flow $\beta(1-\alpha_t)x_t$, so the equity-to-wage ratio is $\beta(1-\alpha_t)x_t/w$.

The cost of effort for the AC is $\frac{1}{2\gamma}\theta_t^2$, so that the smaller the cost, the stronger the firm's governance function (the higher the γ). A robust governance system makes the AC's job easier. The optimal effort of the AC maximizes the benefit flow $w + \beta(1-\alpha_t)x_t - \frac{1}{2\gamma}\theta_t^2$, which is given by Equation (2), derived in the appendix:

(2) $\theta_t = \begin{cases} \beta k\gamma^2 & if\ x_t \geq \bar{T} \\ \frac{x_t}{k\gamma} & if\ x_t < \bar{T} \end{cases}, \bar{T} = \beta k^2\gamma^3.$

The optimal effort by the AC is to put in just sufficient effort for earnings values below the threshold value $\bar{T}$ to prevent managerial benefit diversions until the maximum effort is at the threshold value. The manager then diverts all gross income above the threshold value $\bar{T}$.

The shareholders determine the optimal remuneration package for the AC. The remuneration package, consisting of wage payments and an equity stake, is offered at a given time and is subsequently not revised. This assumption ensures that the wage payments to the AC are constant over time. The objective of the shareholders is to maximize the discounted value of the operational profits net of wages and equity payments to the AC, $(1-\beta)(1-\alpha_t)x_t - w$. The benefit flow to the AC is $\beta(1-\alpha_t)x_t + w - \frac{1}{2\gamma}\theta_t^2$. The discounted value of this flow must be equal to zero, which is the AC's participation constraint. Therefore, we find the relationship given in Equation (3):

$$(3)\ E\int_0^\infty e^{-rt}(\beta(1-\alpha_t)x_t + w)dt = E\int_0^\infty e^{-rt}\frac{1}{2\gamma}\theta_t^2 dt.$$

We can use Equation (3) to rewrite the objective function for the shareholders given in Equation (4):

$$(4)\ E\int_0^\infty e^{-rt}(1-\alpha_t)x_t dt - E\int_0^\infty e^{-rt}\frac{1}{2\gamma}\theta_t^2 dt.$$

Therefore, because of the AC's participation constraint, we can write the shareholders' value as the value of the operational profits minus the cost of effort for the AC. Equations (5) and (6) give the shareholders' values:

$$(5)\ E\int_0^\infty e^{-rt}(1-\alpha_t)x_t dt = \begin{cases} \frac{\lambda_1-1}{\lambda_1-\lambda_2}\frac{\bar{T}}{r-\mu}\left(\frac{x_t}{\bar{T}}\right)^{\lambda_2} - \frac{\lambda_1}{\lambda_1-\lambda_2}\frac{\bar{T}}{r}\left(\frac{x_t}{\bar{T}}\right)^{\lambda_2} + \frac{\bar{T}}{r} & ,x_t \geq \bar{T} \\ \frac{\lambda_2-1}{\lambda_1-\lambda_2}\frac{\bar{T}}{r-\mu}\left(\frac{x_t}{\bar{T}}\right)^{\lambda_1} - \frac{\lambda_2}{\lambda_1-\lambda_2}\frac{\bar{T}}{r} + \frac{x_t}{r-\mu} & ,x_t < \bar{T} \end{cases},$$

$$(6)\ E\int_0^\infty e^{-rt}\frac{1}{2\gamma}\theta_t^2 dt =$$

$$\begin{cases} \frac{\lambda_1}{\lambda_2-\lambda_1}\frac{\beta\bar{T}}{2r}\left(\frac{x_t}{\bar{T}}\right)^{\lambda_2} - \frac{\lambda_1-2}{\lambda_2-\lambda_1}\frac{\beta\bar{T}}{2(r-2\mu-\sigma^2)}\left(\frac{x_t}{\bar{T}}\right)^{\lambda_2} + \frac{\beta\bar{T}}{2r} & ,x_t \geq \bar{T} \\ \frac{\lambda_2}{\lambda_2-\lambda_1}\frac{\beta\bar{T}}{2r}\left(\frac{x_t}{\bar{T}}\right)^{\lambda_1} - \frac{\lambda_2-2}{\lambda_2-\lambda_1}\frac{\beta\bar{T}}{2(r-2\mu-\sigma^2)}\left(\frac{x_t}{\bar{T}}\right)^{\lambda_1} + \frac{\beta x_t^2/\bar{T}}{2(r-2\mu-\sigma^2)} & ,x_t < \bar{T} \end{cases},$$

$$(7)\ \lambda_1 = \left(\frac{1}{2}-\frac{\mu}{\sigma^2}\right) + \left(\left(\frac{1}{2}-\frac{\mu}{\sigma^2}\right)^2 + \frac{2r}{\sigma^2}\right)^{1/2},$$

$$(8)\ \lambda_2 = \left(\frac{1}{2}-\frac{\mu}{\sigma^2}\right) - \left(\left(\frac{1}{2}-\frac{\mu}{\sigma^2}\right)^2 + \frac{2r}{\sigma^2}\right)^{1/2}.$$

We notice that the shareholding β enters the optimization program for the shareholders but not the wage w. The constant wage provides no incentive to improve a firm's financial reporting quality. Thus, it serves no other purpose than to give the AC a reservation remuneration package. The optimal wage is therefore determined by Equation (3). We find a particularly simple expression for shareholding in the region where $x_t < \bar{T}$ where the shareholding is independent of the value of x_t (but will, of course, depend on the initial point x_0 at which the remuneration package is offered to the AC). Equation (9) yields the optimal shareholding:

$$(9)\ \beta(2\beta - \lambda_1) = (1-\lambda_1)\left(\frac{\lambda_2}{r} - \frac{\lambda_2 - 1}{r-\mu}\right) \Big/ \left(\frac{\lambda_2}{2r} - \frac{\lambda_2 - 2}{2(r-2\mu-\sigma^2)}\right).$$

There is always a negative relationship between AC equity stake and skewness for an individual firm, as the threshold value for equity diversions creates a truncation of the distribution of future stock prices. To illustrate this effect, we compare the equity values to the present value of the earnings flow. The present value of the earnings flow is $E\int_0^\infty e^{-rt}x_t dt$. Using Equation (4), the difference between the equity value and the discounted earnings flow is $-E\int_0^\infty e^{-rt}\alpha_t x_t dt - E\int_0^\infty e^{-rt}\frac{1}{2\gamma}\theta_t^2 dt$. Both negative terms are increasing in x_t. This means that the optimal remuneration of the AC creates skewness by thinning out the right tail of the return distribution.

Simulation Results

We now turn to the predictions of the model for cross-sectional regressions. AC compensation is an endogenous variable that each firm determines optimally. The resulting skewness is also an endogenous feature of the model. What we observe are equilibrium points describing the two variables. Therefore, it is a priori unclear whether cross-sectional variability in AC equity compensation correlates with skewness. We use simulation results to obtain predictions for cross-sectional analysis. We assume throughout that the starting point for the model is when the gross profits are below the threshold value for benefit diversions given in Equation (2). Then, we identify the optimal shareholding by Equation (9) and the associated wage by Equation (3). We establish the exogenous parameters of the model: the interest rate (0.06), the growth rate (0.015), and the volatility (0.10) of the gross earnings process. We also determine the threshold value $\bar{T}$ (which is kept constant at 15). Moreover, we select a fixed contracting point $x_0 = 3$. Next, from the distribution of x_t (by the assumption of a geometric Brownian motion, the increment $\ln x_t - \ln x_0$ has a normal distribution with mean $\left(\mu - \frac{\sigma^2}{2}\right) t$ and variance $\sigma^2 t$), we draw a random value for x_{100}. Thus, we seek to minimize the impact on the data imposed by the contracting point. The remuneration package for the AC enables us to work out the equity-to-wage ratio for the AC at time 100. We draw a value for governance γ randomly between 2 and 7. We adjust the scaling constant k to make the threshold value constant across firms, thus reducing the exogenous difference between the firms. Next, we draw 1,000 values for x_{105} and calculate the skewness of the return distribution of the value function between time 100 and time 105. Thus, we have one observation of skewness, the equity-to-wage ratio, and governance strength. We repeat the process to generate 1,000 observations.

We investigate the OLS estimates based on two models:

(10) Model 1: $Skew = b_0 + b_1\phi + \epsilon$

(11) Model 2: $Skew = b_0 + b_1\phi + b_2\gamma + \epsilon$

The skewness, *Skew*, is here defined by the nonparametric skewness measure of the mean minus the median, divided by the standard deviation of the sample. The equity-to-wage ratio, ϕ, is the running income from the equity holding divided by the running wage flow. The following table reports the results; we run Models 1A and 2A across the raw variables and Models 1B and 2B across logged variables on the right-hand side. The numbers in parentheses are t-values.

Model	**1A**	**1B**	**2A**	**2B**
$\boldsymbol{b_1}$**:**	-0.0642 (-8.5006)	-0.0635 (-9.7227)	0.0112 (2.4248)	0.0430 (2.2908)
$\boldsymbol{b_2}$**:**	--	--	-0.0634 (-8.4153)	-0.0630 (-9.6574)
$\boldsymbol{R^2}$**:**	6.75%	8.64%	7.29%	9.12%
$\boldsymbol{N}$**:**	1,000	1,000	1,000	1,000

Models 1A and 1B predict a significant negative relationship between skewness and the equity-to-wage ratio. Still, this relationship becomes positive once we include governance strength in the regression results in Models 2A and 2B. Therefore, the theoretical framework predicts that equity incentives for the AC contribute to reducing the skewness in the return distribution. However, since the efforts of the AC and the strength of the internal governance system are substitutes, as the internal governance system is stronger, skewness will also decline. Moreover, there is less need for equity incentives for the AC in this case, so the correlation between skewness and the equity-to-wage ratio now becomes positive. The model thus predicts a negative association between AC equity incentives and price crash risk, but we mitigate or reverse this association by including factors linked to non-AC governance.

Comments

The diversion mechanism employed in the model is similar to those used by Bebchuk and Jolls (1999), Desai et al. (2007), and Liu and Miao (2006). The essential assumption embedded in these models is that managerial diversions are endogenous. It is easier for a manager to divert funds from a firm that is doing well than from a firm that is not.

The value of the nondiverted earnings is linear in the earnings flow. Still, when adding diversions by the manager and the optimally incentivized AC, the resulting value function is no longer linear, thus generating skewness. The hidden action mechanism is similar to the hidden information mechanism in Jin and Myers (2006). The AC's role is primarily to reduce the occurrence of hidden-benefit diversions by increasing the cost of carrying them out for the manager. Thus, an equity stake provides incentives for the AC to exert effort. However, the effort is not free for shareholders, which creates nonlinearities in the equity value and skewness in the equity return distribution.

The optimal contracting environment is straightforward in the region below the threshold value for earnings diversions, but it becomes complicated in the area above the threshold. Above the threshold, optimal shareholding is sensitive to the timing of the optimal contract. Optimal shareholding may not even exist. For simplicity, therefore, we assume that shareholders carry out all contractings in the region below the threshold value for earnings diversions.

3. Data, Sample, and Variables

Data and Sample

We obtain information on equity-based compensation for all AC members from BoardEX to measure AC equity incentives. We start with an initial sample of 13,919 firm-year observations over the 2001–2018 period, with detailed information on AC equity incentives. We exclude 1,031 firm years, as in these cases, we do not have full information on equity incentives for all AC members. Using several identifiers, including *cusip* and *givkey*, we merge our AC sample with COMPUSTAT/CRSP to obtain their stock return information before calculating our measures of stock price crash risk and firm-specific information as control variables. Following previous studies, we further exclude 3,541 observations because we do not find their information from COMPUSTAT/CRSP. We also drop 458 firm-year observations for firms operating in the finance industry (Standard Industrial Classification [SIC] 6000–6999), seven firm years with less than 26 weeks of stock return data to estimate crash risk, and 2,437 firm years with insufficient information on control variables. This filtering procedure yields a final sample of 6,550 firm-year observations over the 2001–2018 period.

***** Insert Table 1 about here *****

Panel A in Table 1 presents the distribution of our sample by year. First, the average number of firm-years with equity information for all AC members is about 364 over the sample period, ranging from the lowest of 45 in 2001 to the highest of 520 in 2004. Except for these two years of extreme observations, the number of observations in the other years appears to be very stable, with small changes between years. Second, the average proportion of firms with equity-based compensation is 86%, increasing steadily over time, from 62% in the early 2000s to about 96% in 2018. This increasing pattern is consistent with the recent trend of equity-based or equity-like compensation plans becoming more popular in practice.

Panel B presents the distribution of our sample by industry. One striking pattern is that all firm-year observations are not evenly distributed across industries. Computers is the largest industry in our sample (SIC 3570–3579, SIC 3670–3679, and SIC 7370–7379), with a total of 1,684 (25.71%) firm-year observations. Pharmaceuticals (SIC 2830–2836) and agriculture (SIC 0100–0900) are the two most underrepresented industries, with no firm-year observations from the former and only 14 observations from the latter.

Measuring AC Equity Incentives

Following Sengupta and Zhang (2015) and Liu et al. (2021), we use the ratio of the sum of stocks and options to total compensation (AC1) to measure AC equity incentives in our baseline analysis. In the follow-up robustness check, we complement our baseline analysis by using the average ratio of equity compensation to total compensation across all AC members of a firm (AC2) as our alternative measure of AC equity incentives. We do not use delta or vega (which measure the sensitivity of equity holdings to changes in stock price and stock return volatility, respectively) as our measure of equity compensation simply because BoardEX does not provide relevant information for all AC members.

Measuring Stock Price Crash Risk

Following Chen et al. (2001), we use two widely used proxies to measure stock price crash risk: NCSKEW and DUVOL. NCSKEW is the negative coefficient of skewness of firm-specific weekly returns, calculated using the following procedure: We first generate the firm-specific return residual using the extended market model specified in Equation (10) to correct for nonsynchronous trading (Dimson, 1979). We then compute $w_{i,k}$, the idiosyncratic stock return for firm i in week k due to firm-specific shock, using Equation (11). Finally, we obtain NCSKEW using Equation (12).

(12) $r_{i,k} = \beta_0 + \beta_{1,i} * r_{m,k-2} + \beta_{2,i} * r_{m,k-1} + \beta_{3,i} * r_{m,k} + \beta_{4,i} * r_{m,k+1}$,

$+\beta_{5,i} * r_{m,k+2} + \varepsilon_{i,k}$,

(13) $w_{i,k} = \mathrm{Ln}(1 + \varepsilon_{i,k})$,

(14) $NCSKEW_{i,t} = -\frac{n(n-1)^{\frac{3}{2}}\sum w_{i,k}^3}{(n-1)(n-2)(\sum w_{i,k}^2)^{\frac{3}{2}}}$,

where $r_{i,k}$ is the stock return for firm i in week k, $r_{m,k}$ is the market return in week k, $\varepsilon_{i,k}$ is the residual return for stock i in week k, and n is the number of observations of $w_{i,k}$ (i.e., firm i's idiosyncratic weekly stock returns in year t). Noting the minus sign in Equation (12), a higher value of NCSKEW indicates that firm i has a greater stock price crash risk in year t.

DUVOL is the natural logarithm ratio of the standard deviation of $w_{i,k}$ in the down weeks to the standard deviation of $w_{i,k}$ in the up weeks. Following the literature, we estimate DUVOL using Equation (13):

$$(15)\quad \text{DUVOL}_{i,t} = \text{Ln}\left[\frac{(n_u - 1)\sum_{Down} w_{i,k}^2}{(n_d - 1)\sum_{Up} w_{i,k}^2}\right],$$

where n_u (n_d) are the number of up (down) weeks for $w_{i,k}$ in year t, respectively. Up (down) weeks are those during which weekly idiosyncratic return residuals $w_{i,k}$ are greater (smaller) than the mean of $w_{i,k}$ over the year. A higher value of DUVOL indicates that firm i has a greater stock price crash risk in year t.

Control Variables

In the spirit of Chen et al. (2001), Callen and Fang (2013), Callen and Fang (2015), Xu et al. (2014), and Li et al. (2017), we consider a number of control variables in our regression analysis for stock price crash risk, including the annual stock return (RET), standard deviation of $w_{i,t}$ (SIGMA), firm size (SIZE), profitability (ROA), book leverage (LEV), market-to-book ratio (MB), difference in the average monthly turnover rate (DTURN) between year t and year $t–1$, and accounting accruals (ACCM). To minimize impacts arising from some unobservable factors, we also include a number of dummies in our empirical analysis to control for potential year and industry fixed effects.

Descriptive Statistics

Table 2 presents descriptive statistics for all variables used in this study, including measures for stock price crash risk, measures for AC equity incentives, and other firm characteristics explained in the previous section. Appendix A provides a full list of the detailed definitions of all variables.

***** Insert Table 2 about here *****

First, the mean (median) firm-specific return skewness NCSKEW is 0.149 (0.108), and the mean (median) down-to-up volatility DUVOL is 0.097 (0.083). These two measures of stock price crash risk appear to change in a wide range, as the standard deviation of NCSKEW is 0.777 and the standard deviation of DUVOL is 0.497. Second, the mean (median) of AC1 is

0.573 (0.623), while the mean (median) of AC2 is 0.563 (0.612). Both measures of AC equity incentives suggest that AC equity incentives vary significantly among the sample firms. Third, the average RET of these sample firms is -0.088. On average, their SIZE, MB, and LEV are 8.880, 3.710, and 0.208, respectively. These firms are profitable, with an average ROA of 0.064 over the sample period.

Descriptive Statistics

Table 3 presents the Pearson correlation matrix for main variables used in the empirical analysis.

***** Insert Table 3 about here *****

The Pearson correlation coefficient for NCSKEW and DUVOL is 0.894, indicating a strong link between these two measures of crash risk. This result is consistent with the empirical literature, as most studies rely on these two variables for baseline analysis. Table 3 also reveals that these two main measures of crash risk are highly correlated with six alternative measures: CRASH1, CRASH2, COUNT, COUNT2, FREQUENCY, and FREQUENCY2. Importantly, Table 3 provides preliminary evidence of a negative relation between our two AC measures and our two crash risk measures, without controlling for other firm characteristics. This preliminary result is potentially consistent with our hypothesis. In what follows, we confirm whether this unconditional relationship between AC equity incentives and crash risk is entirely driven by known firm characteristics, as Table 3 also shows that both crash risk measures, NCSKEW and DUVOL, are correlated with a number of firm characteristics, which we use as our control variables in the follow-up multivariate regression analysis.

4. Empirical Analysis

Baseline Results

We examine whether AC equity incentives lead to an increase in future stock price crash risk by estimating the following regression model:

$$(16) CRASH\_RISK_{i,t+1} = \beta_0 + \beta_1 * AC1_{i,t} + \beta_2 * X_{i,t} + Industry\ FE + Year\ FE + \varepsilon_{i,t} \ .$$

The dependent variable is stock price crash risk, measured as NCSKEW or DUVOL in our baseline analysis. The independent variable is AC1, defined as the ratio of AC equity-based compensation to AC total compensation. X is a vector of the control variables introduced in Section 3.5. Table 4 presents the estimation results for Equation (14). The *t*-values in parentheses are calculated using robust standard errors clustered by firm.

***** Insert Table 4 about here *****

Consistent with our hypothesis, we find evidence of a negative relationship between AC1 and future stock price crash risk across all six regression specifications. For the column (1) regression, where the dependent variable is NCSKEW and the year fixed effects are controlled for, the coefficient on AC1 is -0.059 (*t*-stat = -1.72). This negative relation continues to hold even after we include industry fixed effects in the column (2) regression and both year and industry fixed effects in the column (3) regression. The coefficient -0.068 (*t*-stat = -1.96) on AC1 in the column (3) regression implies that a one-standard-deviation increase in AC1 can lead to a decrease of 0.020 (= -0.068*0.292) in NCSKEW. Given that the average NCSKEW stands at 0.149, the decrease of 0.020 in NCSKEW represents a decline of 13.42% in relative terms, and this difference is certainly not trivial to stock market investors. This finding is robust to the alternative measure for stock price crash risk DUVOL. The estimated coefficient on AC1 is -0.052 (*t*-stat = -2.44) in the column (6) regression. This difference is not only statistically significant but also economically important since a one-standard-deviation increase in AC1 can lead to a decrease of 0.015 (= -0.052*0.292) in DUVOL, a reduction of 15.46% from its mean. Taken together, these findings lend strong support to our argument that AC equity incentives in the current period can lead to a reduction in future stock price crash risk.

For the control variables, the estimated results are broadly consistent across the column (3) and (6) regressions. First, the coefficient on RET is positive, except for the column (2) and (3) regressions where it is marginally insignificant (*t*-stat = 1.64), indicating that the likelihood of crash risk is significantly higher for firms with higher current stock returns. Second, SIGMA, ROA, and MB are positively correlated with stock price crash risk in all six regression specifications, which implies that they are reliable predictors of future crash risk. However, it is surprising that ROA is significant with a positive coefficient, as it implies that firms with good operating performance have greater crash risk. Finally, although NCSKEW, DTURN, and

ACCM are important determinants of crash risk, as documented in the literature, they do not seem to have much explanatory power for our empirical sample because their estimated coefficients are all insignificant.

Robustness Checks

We perform a number of robustness checks to confirm our main findings. First, since we rely on AC1 in our baseline analysis to measure AC equity incentives, we now use AC2 to examine whether our findings are robust to this alternative variable specification. Unlike AC1, which focuses on the ratio of equity-based compensation to total compensation at the AC level, AC2 is constructed at the level of AC members as the average ratio of equity-based compensation to total compensation across all AC members. Using this alternative measure of AC equity incentives, we repeat our multivariate regression analysis. The regression results presented in Panel A of Table 5 reveal a consistently negative relationship between AC2 and crash risk across all regression specifications. The coefficient on AC2 for the NCSKEW regression in column (3) is -0.074 (*t*-stat = -2.16), while the coefficient on AC2 for the DUVOL regression in column (6) is -0.054 (*t*-stat = -2.58). These results indicate that our findings are not sensitive to alternative measures of AC equity incentives.

***** Insert Table 5 about here *****

Second, we examine whether our findings are robust to alternative measures of stock price crash risk. We consider six alternative measures that are different from the two used in our baseline analysis: (1) CRASH, a dummy that is equal to 1 if a firm-year experiences one or more firm-specific crash weeks and 0 otherwise. Consistent with Hutton et al. (2009), we define crash weeks as those with firm-specific weekly returns below the mean firm-specific weekly returns by over 3.09 standard deviations; (2) CRASH2, a dummy that is equal to 1 if a firm-year experiences one or more firm-specific crash weeks and 0 otherwise. Consistent with Kim et al. (2011), we define crash weeks as those with firm-specific weekly returns below the mean firm-specific weekly returns by more than 3.20 standard deviations; (3) COUNT, defined as the number of firm-specific weekly returns exceeding 3.09 standard deviations below the mean firm-specific weekly returns, following Hutton et al. (2009); (4) COUNT2, defined as the number of firm-specific weekly returns exceeding 3.20 standard deviations below the mean firm-specific weekly returns, following Kim et al. (2011); (5) FREQUENCY, defined as the percentage of crash weeks COUNT among all trading weeks in a given year, following Piotroski et al. (2015); and (6) FREQUENCY2, defined as the percentage of crash weeks COUNT2 among all trading weeks in a given year, following Piotroski et al. (2015). We repeat our multivariate regression analysis using these alternative measures of stock price crash risk. The results shown in Panel B of Table 5 provide robust evidence of a negative relationship between AC1 and all alternative stock price crash risk measures. Note that we include the same set of control variables as those used in our baseline analysis. These findings suggest that our main finding is robust to alternative crash risk specifications.

Third, it is possible that corporate governance mechanisms and equity incentives for CEO and CFO might drive our results. This possibility is important because CEO and CFO play major roles in bad news hoarding activity and financial reporting quality and these activities can induce stock price crash risk. To alleviate this concern, we consider a number of additional control variables which are related to corporate governance and equity incentive for CEO and CFO. Following Asante-Appiah and Sharma (2022), we measure board size (BDSIZE) as the natural logarithm of the number of directors on the board and board independence (BDIND) as the percentage of independent directors on the board. Following Core and Guay (2002), we measure CEODELTA (CEOVEGA) as the dollar change in the CEO's equity holdings for a 1 percent change in stock price (stock return volatility) and CFODELTA (CFOVEGA) as the dollar change in the CFO's equity holdings for a 1 percent change in stock price (stock return volatility). We also follow Dikolli et al. (2014) and consider CEOTENURE, the natural logarithm of the number of years as CEO of the firm, and CEOCHAIRMAN, a dummy variable which takes the value of 1 if AC chairman is also the company's CEO, and 0 otherwise. The Panel C regressions reveal a consistently negative relation between AC1 and stock price crash risk. The coefficient on AC1 is -0.132 (*t*-stat = -2.00) for the NSKEW regression in the Column (3), while the coefficient on AC1 is -0.080 (*t*-stat = -1.97) for the DUVOL regression in the Column (6) regression. These findings lend strong empirical support that the negative relation between AC1 and stock price crash risk is unlikely driven by corporate governance mechanism or equity incentives of corporate top executives.

Finally, we examine whether our main findings are driven by significant differences between firms with and without AC equity incentives. According to Table 1, 14.03% of our firm-year obseravations are those without AC equity incentives. It is unclear whether our main findings also hold for those firms with AC equity incentives. Panel D presents regression results for subsample analysis which excludes firms without AC equity incentives. We continue to find a negative relation between AC1 and stock price crash since the coefficient on AC1 is -0.082 (*t*-stat = -2.32) for the column (3) regression and the coefficient on AC1 is -0.059 (*t*-stat = -2.70) for the column (6) regression. These findings suggest that the negative relation between AC1 and stock price crash holds not only for firms with and without AC equity incentives, but also for firms with AC equity incentives.

Addressing Potential Endogeneity Concerns

Our empirical analysis documents a robust and statistically negative relationship between AC equity incentives and future stock price crash risk. However, this finding might be entirely driven by the omitted variable problem associated with unobservable factors. For example, the empirical literature has provided a long list of variables that are relevant to stock price crash risk. Given that this list of determinants will continue to grow in the future, and it is impossible to include all these variables in one study, our finding is subject to this omitted variable problem. In this section, we use three empirical approaches to alleviate this potential endogeneity problem: (1) high dimensions of fixed effects, (2) panel data regression with firm fixed-effects estimation, and (3) difference-in-differences estimation based on a propensity-score-matched sample.

First, we consider both industry fixed effects and year fixed effects in our baseline analysis, explicitly controlling for unobservable factors that are either time invariant in nature or relatively stable over time for a particular industry. To the extent that unobservable factors tend to change over time or vary across industries, our finding still suffers from the potential omitted variable problem. Following Gormley and Matsa (2014), we use higher-order fixed effects, the interaction of industry fixed effects, and year fixed effects to mitigate this concern. We repeat our regression analysis with high-dimensional fixed effects. The estimation results presented in Panel A of Table 6 show that the coefficients on AC1 in the column (3) and (6) regressions are -0.118 (t-stat = -2.30) and -0.068 (t-stat = -2.16), respectively, both of which are greater in absolute terms than their respective coefficients in the column (2) and (5) regressions. Thus, we conclude that our main finding of a negative relationship between AC1 and future crash risk is unlikely to be driven by unobservable time-varying or unstable industry-specific factors.

***** Insert Table 6 about here *****

Second, we use the panel data structure and firm fixed effects estimation to further alleviate other potential endogeneity concerns. For example, some unobservable factors are not relevant to a particular industry but to a particular firm only, such as corporate culture. If these unobservable factors are related to both AC equity incentives and crash risk, it is possible that we would end up with an empirically negative relationship between AC1 and future crash risk. We explore this possibility using panel data regressions. Panel B in Table 6 presents the regression results when we use firm fixed effects. The coefficient on AC1 in the column (3) regression is -0.068 (t-stat = -1.96), and the one in the column (6) regression is -0.052 (t-stat = -2.44). Both are significant at the 5% level after controlling for other known determinants of stock price crash risk. Since this empirical estimation takes unobservable firm-level factors into account, we conclude that unobservable factors at the firm level do not seem to account for the negative relationship between AC equity incentives and future stock price crash risk.

Third, the causality may not necessarily be running from AC equity incentives to future stock price crash risk but the other way around. It is possible that an AC expecting a greater crash risk for a firm might choose to reduce rather than increase its monitoring efforts in order to maximize its equity valuation. In this case, we would also end up with a negative relationship between AC equity incentives and crash risk, but there would only be a causal impact of expected crash risk on AC equity incentives. To establish the causal link between AC equity incentives and stock price crash risk, we use a difference-in-differences design and propensity score matching. Specifically, we first identify a sample of treatment firms that experience a significant increase of 30% or more in their AC equity holdings in a particular year (t = 0). We compare their crash risk three years after (t = +1, +2, and +3) relative to its level three years before the equity-incentive-increasing event (t = –1, –2, and –3), and we obtain the first difference for the treatment firms. To control for the effect on the change in expected crash risk due to industry- or market-wide factors, we use the propensity score-matching algorithm to identify a sample of control firms that are observably comparable to the treatment firms, with the only difference being that they do not experience any significant increase or decrease in AC equity incentives over the sample period. In a similar way, we compare their crash risk three years before and after the event, allowing us to obtain the second difference for control firms. Finally, we compare these two differences to obtain the difference-in-differences estimator, which captures the impact on crash risk due to an increase in AC equity incentives. We examine whether the decline in expected crash risk is greater for treatment firms by estimating the following regression:

$$(17)\quad CRASH\_RISK_{i,t+1} = \beta_0 + \beta_1 * TREATED_{i,t} * POST_{i,t} + \beta_2 * TREATED_{i,t} + \beta_3 * POST_{i,t} + \beta_4 * X_{i,t} + Industry\ FE + Year\ FE + \varepsilon_{i,t},$$

where TREATED is a dummy equal to 1 for the treatment firms and 0 otherwise, POST is a dummy variable equal to 1 for the years after the equity-increasing year, and X is the same set of control variables used in the baseline analysis. Our focus is the coefficient on the interaction term TREATED*POST, and we expect this coefficient to be negative. Table 7 presents the regression results.

***** Insert Table 7 about here *****

Consistent with our expectation, we find that the coefficient on TREATED*POST is -0.196 (*t*-stat = -3.03) for the column (1) regression where the dependent variable is NCSKEW, while it is -0.120 (*t*-stat = -3.03) for the column (2) regression when DUVOL is the measure of crash risk. Note that both regressions explicitly include the baseline control variables and industry and year fixed effects, and they address firm-level unobservable factors implicitly using the difference-in-difference methodology. These findings provide further evidence that AC equity incentives have a causal impact on future crash risk. Unreported results show that our findings are broadly similar when we use 25% and 35% as alternative thresholds to define treatment firms.

We also examine whether the parallel trend between the treatment and control firms is satisfied using pre-event data and how the impact of AC equity incentives on crash risk changes over time. The regression results reported in columns (3) and (4) reveal that the coefficients on TREATED*Before3, TREATED*Before2, and TREATED*Before1 are all insignificant, implying that there is no statistically significant difference in stock price crash risk over the three-year period before the event. Thus, the parallel assumption for the difference-in-differences analysis is met. The column (3) and (4) regressions also show that the impact of a significant increase in AC equity ownership does not emerge shortly after the change occurs. The fact that the coefficients on both TREATED*After2 and TREATED*After3 are significantly negative implies that it takes some time for improved monitoring to reduce the likelihood of managerial bad news hoarding. Taken together, our empirical analysis is consistent with the notion that AC equity incentives can reduce stock price crash risk by more effectively disciplining corporate manager behaviors.

5. Further Analysis

We perform a number of additional tests to examine whether AC equity incentives affect stock price crash risk through the financial reporting quality channel. Our model implicitly assumes that AC monitoring should improve the quality of financial reporting thus we look at financial reporting quality to complement our baseline analysis. Intuitively, AC monitoring effectiveness should be more (less) pronounced when external governance is relatively weak (strong) and when the AC has more (less) financial expertise.

Financial Reporting Quality

We examine the empirical relationship between AC monitoring and financial reporting quality. The empirical literature documents mixed evidence on the relation between audit committee equity incentive and financial reporting quality. While some studies find that equity holdings motivate audit committees to oppose earnings management and minimize the risk of misreporting in order to protect the members' wealth (Beasley, 1996; Klein, 2002; Vafeas, 2005), others find the opposite is true in the sense that equity compensation appears to motivate audit committee members to focus on stock appreciation in order to maximize the value of their equity investments (Bedard et al., 2004; Yang and Krishnan, 2005). We assume the positive impact of AC equity incentives on financial reporting quality due to the SOX (Klein, 2002; Vafeas, 2005; Magilke et al., 2009). Following previous studies such as Sengupta and Zhang (2015), we use the dispersion in financial analysts' earnings forecast (ANADISP) to measure a firm's information environment. ANADISP is defined as the log of the standard deviation of analyst's forecasts based on the last forecast issued by analysts over the 90-day period ending on the fiscal year-end date, divided by the stock price at the beginning of the fiscal year. Following Naiker and Sharma (2009), we also use internal control effectiveness (INTERCONTR) to measure financial reporting quality. INTERCONTR is a dummy variable which takes the value of 1 if a company's internal control is effective and 0 otherwise. Consistent with our assumption, we find a positive relation between AC equity incentives and financial reporting quality, either measured as analyst forecast dispersion or internal control effectiveness, even after we include those baseline control variables in the regression. Both the negative coefficient on AC1 for the column (3) regression and the positive coefficient on AC1 for the column (6) regression imply that financial reporting quality tends to improve with AC equity incentives. Table 8 presents regression results, with *t* values in parentheses calculated using robust standard errors clustered by firm.

***** Insert Table 8 about here *****

External Governance

We examine whether the impact of AC monitoring on stock price crash risk varies with the level of external governance. We first use institutional ownership as a proxy for the intensity of external governance. Previous studies, such as those of Burns et al. (2010) and Ni et al. (2020), have shown that institutional investors can improve corporate governance due to their monitoring, especially when they have significant financial stakes in the firm. Following the literature, we define institutional ownership as the sum of all ownership positions greater than 5% held by institutional investors and divide our sample into a high institutional ownership subsample and a low institutional ownership subsample using the median value of institutional ownership. We repeat our multivariate regression analysis, controlling for year fixed effects, industry fixed effects, and firm fixed effects, as we did in the baseline analysis. Panel A of Table 9 presents the regression results for the high institutional ownership subsample in columns (1)-(4) and for the low institutional ownership subsample in columns (5)-(8). Consistent with our expectations, we find that the coefficients on AC1 are not significant in all regressions for the high institutional ownership subsample when external governance from institutional investors is relatively stronger. In the low institutional ownership subsample, the coefficients on AC1 are negative and significant in the column (6) and (8) regressions when the level of institutional shareholding is relatively lower.

***** Insert Table 9 about here *****

We also use leverage as another proxy for the intensity of external governance. The literature has shown both theoretically and empirically that lenders have strong incentives and an informational advantage in screening and monitoring borrowers (Campbell and Kracaw 1980; Diamond 1984, 1991; Fama 1985; Datta et al. 1999). We divide our sample into a high-leverage subsample and a low-leverage subsample using median leverage. We also repeat our multivariate regression analysis, controlling for unobservable factors at the year, industry, and firm levels that might drive our results. Panel B of Table 9 presents all of the regression results in columns (1)-(4) for the high-leverage subsample and in columns (5)-(8) for the low-leverage subsample. Consistent with our expectations, we find that the impact of AC equity holdings on stock price crash risk is only negative and significant for all the regressions in columns (5)-(8) when book leverage is relatively lower and their external governance is relatively weak. In contrast, the coefficients on AC1 are insignificant for all regression specifications, except for the column (2) regression. Overall, these findings are consistent with the idea that AC monitoring can complement external governance in mitigating managerial opportunism to some extent.

Financial Expertise

We examine whether the impact of AC monitoring on stock price crash risk varies with the level of financial expertise of the AC. The general findings in the literature indicate that AC financial sophistication is important for improving financial reporting quality and constraining earnings management. For example, Xie et al. (2003) showed that the composition of an AC is related to the likelihood that a firm will engage in earnings management. Lisic et al. (2019) found that AC accounting expertise can safeguard auditors from dismissal following adverse internal control opinions, leading to better audit quality. Krishnamoorthy et al. (2023) and Hsu and Liao (2023) found that accounting financial expertise and task-specific experience (similar to auditors) of audit committee members are associated with enhanced monitoring of the audit process and lower levels of earnings management. Following Dhaliwal et al. (2010), we define financial expertise as accounting experts with work experience as a certified public accountant (CPA), CFO, vice president of finance, financial controller, or any other major accounting position. We first use AC_CHAIR as a proxy for financial expertise, which is a dummy variable equal to 1 if the chairperson of a firm's AC has financial expertise and 0 otherwise. We repeat our regression analysis for two subsamples in which the chairperson of an AC has or does not have financial expertise. Panel A in Table 10 presents regression results for firms where AC_CHAIR = 1 in columns (1)–(4) and for firms where AC_CHAIR = 0 in columns (5)–(8). Consistent with our reasoning, we find that the impact of AC monitoring on stock price crash risk is more pronounced in the presence of an AC chairperson with financial expertise. The coefficients on AC1 are negative in all four regression specifications when AC_CHAIR = 1, even after controlling for observable and unobservable factors at the firm, industry, and year levels. This is in sharp contrast to the regression results in columns (5)–(8), where AC_CHAIR = 0 and all coefficients on AC1 are insignificant.

We also use AC_EXPERTISE as another proxy for financial expertise, defined as the ratio of the number of AC members with financial expertise to the total number of AC members. We rely on the median value of AC_EXPERTISE to divide our sample into two groups, high AC_EXPERTISE and low AC_EXPERTISE, and we repeat our regression analysis using these two subsamples. Likewise, Panel B in Table 10 presents the results in columns (1)–(4) for firms where AC_EXPERTISE is greater than the median and in columns (5)–(8) for firms where AC_EXPERTISE is less than the median. Consistent with our expectations, we find that the impact of AC monitoring on stock price crash risk is significant only for the high AC_EXPERTISE subsample. while the coefficient on AC1 becomes insignificant for all four regressions in columns (5)–(8) using the low AC_EXPERTISE subsample. Again, these findings lend strong support to our argument that AC can reduce stock price crash risk through the monitoring channel and the widely held view that financial expertise is important for effective AC monitoring.

***** Insert Table 10 about here *****

Stock-based Versus Option-based Equity Incentives

Prior research suggests that not all equity-based compensation can reduce agency problems

(Archambeault et al., 2008; Campbell et al, 2013; Tan et al., 2023). In this section, we follow Campbell et al. (2013) and separate AC equity incentives into option-based compensation (option awards) and non-option equity compensation (stock awards and holdings), very similar in spirit to the two components of AC remuneration package analyzed in our model. OPTIONAWD is defined as the natural logarithm of the value of annual option awards provided to the audit committee, while STOCKAWD is defined as the natural logarithm of the value of annual stock awards provided to the audit committee. Option-based equity compensation should be able to reduce agency problems while stock-based equity compensation cannot. We repeat our regression analysis using these two very different measures of AC equity incentives. Table 11 presents regression results. In Panel A where we focus on AC option-based equity compensation, the coefficient on OPTIONAWD is -0.004 (t-stat = -2.02) for the column (3) regression. In sharp contrast, in Panel B where we use AC stock-based equity compensation instead, the coefficient on STOCKAWD is insignificant. These findings suggest that the negative relation between AC1 and stock price crash risk is mainly driven by the option component in AC equity incentives. Unreported analysis shows that using the value of annual option awards provided to the audit committee standardized by AC total compensation yields similar results.

***** Insert Table 11 about here *****

6. Conclusion

In recent years, ACs have been entrusted with increasing responsibility for improving the quality of financial reporting. While investors, regulators, and the public all expect ACs to serve as watchdogs, it is not clear whether the independent directors in the AC should be provided with equity incentives and, if so, how equity incentives impact the effectiveness of AC monitoring. These questions are particularly important in the post-SOX period. Using a sample of US firms over the 2001–2018 period, this paper attempts to provide initial answers to these vital questions. The paper first documents strong evidence of a negative relationship between AC equity incentives and stock price crash risk. This main finding is robust to controlling for a number of firm characteristics, alternative measures of crash risk and AC equity incentives, and different econometric methods to address potential endogeneity problems. On average, a one-standard-deviation increase in AC equity incentives is associated with a reduction of 14.09%–15.46% in stock price crash risk. This paper further shows that the effect of AC equity incentives on reducing crash risk is more pronounced when firms have greater institutional ownership or greater financial leverage and when the AC is characterized by more financial expertise. Taken together, these findings are consistent with our argument that providing ACs with equity incentives can reduce stock price crash risk through their monitoring role.

Our study lends empirical support to the ongoing debate on whether firms should provide ACs with equity incentives. Previous studies have focused on accounting performance to examine the effect of AC equity incentives (Bedard et al. 2004; Archambeault and Hermanson 2008; Campbell et al. 2015) and have shown the dark side of AC equity incentives. Our study complements the literature by focusing on market performance and, more importantly, by providing compelling evidence regarding the bright side of AC equity incentives, an important issue that deserves more attention and further research. In this sense, our study has important implications for policymakers and stock market investors in the post-SOX era.

APPENDIX A: Variable Definitions

This table provides the names and definitions of all variables used in the empirical analysis.

Variable	Definition
Dependent Variables	
NCSKEW	Negative skewness of firm-specific weekly returns, as defined in Equation (3).
DUVOL	Natural logarithm of the ratio of the standard deviation in down weeks to the standard deviation in up weeks, as defined in Equation (4).
CRASH	A dummy variable, equal to 1 if a firm-year observation experiences one or more firm-specific crash weeks over a year and 0 otherwise. Following Hutton et al. (2009), we define crash weeks as those with firm-specific weekly returns below the mean by over 3.09 standard deviations.
CRASH2	A dummy variable, equal to 1 if a firm-year observation experiences one or more firm-specific crash weeks over a year and 0 otherwise. Following Kim et al. (2011), we define crash weeks as those with firm-specific weekly returns below the mean by over 3.20 standard deviations.
COUNT	Number of firm-specific weekly returns below the mean by more than 3.09 standard deviations threshold in a given year.
COUNT2	Number of firm-specific weekly returns below the mean by more than 3.20 standard deviations threshold in a given year.
FREQUENCY	Percentage of crash weeks among all trading weeks in a given year, where crash weeks are defined as those with firm-specific weekly returns below the mean by over 3.09 standard deviations, following Hutton et al. (2009).
FREQUENCY2	Percentage of crash weeks among all trading weeks in a given year, where crash weeks are defined as those with firm-specific weekly returns below the mean by over 3.20 standard deviations, following Kim et al. (2011).
Independent Variables	
AC1	Ratio of AC's equity-based compensation to AC's total compensation.
AC2	Average ratio of equity compensation to total compensation across all AC members of a firm.
Control Variables	
RET	Mean of firm-specific weekly returns over the fiscal year period times 100.
SIZE	Natural logarithm of the market value of equity.
MB	Market value of equity divided by the book value of equity.
SIGMA	Standard deviation of idiosyncratic return for $w_{i,t}$, as defined in Equation (2)
DTURN	Difference between the average monthly turnover in year t and year t–1.
LEV	Ratio of total long-term debts to total assets.
ROA	Incomes before extraordinary items divided by lagged total assets.
ACCM	The prior three years' moving sum of the value of discretionary accruals, where discretionary accruals are estimated based on Kothari's performance-adjusted discretionary accruals.
BDSIZE	Natural logarithm of the number of directors on the board.
BDIND	Percentage of independent directors on the board.
CEODELTA	Dollar change in the CEO's equity holdings for a 1 percent change in stock price.
CEOVEGA	Dollar change in the CEO's equity holdings for a 1 percent change in stock return volatility.
CFODELTA	Dollar change in the CFO's equity holdings for a 1 percent change in stock price.
CFOVEGA	Dollar change in the CFO's equity holdings for a 1 percent change in stock return volatility.
CEOTENURE	Natural logarithm of the number of years as CEO of the firm.
CEOCHAIRMAN	A dummy which takes the value of 1 if AC chairman is also the company's CEO, and 0 otherwise.

Variables Used in Further Analysis	
ANADISP	Log of the standard deviation of analyst's forecasts based on the last forecast issued by analysts over the 90-day period ending on the fiscal year-end date, divided by the stock price at the beginning of the fiscal year.
INTERCONTR	A dummy variable which takes the value of 1 if a company's internal control is effective and 0 otherwise.
AC_EXPERTISE	Ratio of the number of AC members with financial expertise to the total number of AC members. Following Dhaliwal et al. (2010), the scope of financial expertise includes accounting experts with work experience as a CPA, CFO, vice president of finance, financial controller, or any other major accounting position.
AC_CHAIR	An indicator that equals 1 if the AC chair has working experience as a CPA, CFO, vice president of finance, financial controller, or any other major accounting position and 0 otherwise.
INSTITUTIONAL_OWN	Sum of all ownership positions greater than 5% held by institutional investors.
OPTIONAWD	Natural logarithm of the value of annual option awards provided to the audit committee.
STOCKAWD	Natural logarithm of the value of annual stock awards provided to the audit committee.

APPENDIX B: Derivations

Equation (1): The first-order condition for the program $\max_{\alpha} \alpha x - \ln(1-\alpha)^{-k\gamma\theta}$ is $x = \frac{\bar{T}}{1-\alpha}$, which implies $\alpha = 0$ for $x < \bar{T}$ and $\alpha = 1 - \frac{\bar{T}}{x}$ for $x \geq \bar{T}$. Thus, the nondiverted earnings flow to the shareholders is x below the threshold value $\bar{T}$ and $\bar{T}$ above, which equals $\min(x, \bar{T})$.

Equation (2): The remuneration to the AC is $w + \beta(1-\alpha)x - \frac{1}{2\gamma}\theta^2$, and the AC seeks to choose an effort to maximize the remuneration flow. First, consider that $x < \bar{T}$ so that the remuneration flow is $x + \beta x - \frac{1}{2\gamma}\theta^2$, which is maximized by minimizing effort. Second, consider that $x \geq \bar{T}$ so that the remuneration flow is $w + \beta\bar{T} - \frac{1}{2\gamma}\theta^2$, with first-order condition $\beta k\gamma = \frac{1}{\gamma}\theta$. Therefore, the optimal effort is to set θ so that it is the minimum of $\frac{x}{k\gamma}$ and $\beta k\gamma^2$.

Equation (5): The cash flow $(1-\alpha)x$ is equal to $\min(\bar{T}, x)$, which has a discounted value of $\frac{\bar{T}}{r}$ for the cash flow $\bar{T}$ and $\frac{x}{r-\mu}$ for the cash flow x. The value of this cash flow also contains optional elements that do not generate a cash flow but are associated with the transition of the cash flow through the barrier point $\bar{T}$. Denote the value of the optional cash flows by v, and it must be the case that $\frac{\sigma^2}{2}x^2 v'' + \mu x v' - rv = 0$ to satisfy arbitrage-free pricing. The ODE has general solutions $v = Ax^{\lambda_1} + Bx^{\lambda_2}$, where the constants A and B are fitted to the boundary conditions for v. The boundary conditions are $\lim_{x\to 0} v = 0$, $\lim_{x\to\infty} v = 0$, $\lim_{x\uparrow\bar{T}} v + \frac{x}{r-\mu} = \lim_{x\downarrow\bar{T}} v + \frac{\bar{T}}{r}$, and $\lim_{x\uparrow\bar{T}} v' + \frac{1}{r-\mu} = \lim_{x\downarrow\bar{T}} v'$. The first boundary condition implies that $B = 0$ for the region below the threshold value, and the second boundary condition implies that $A = 0$ in the region above the threshold value. The third and fourth imply the following system:

$$A\bar{T}^{\lambda_1} + \frac{\bar{T}}{r-\mu} = B\bar{T}^{\lambda_2} + \frac{\bar{T}}{r},\ A\lambda_1\bar{T}^{\lambda_1 - 1} + \frac{1}{r-\mu} = B\lambda_2\bar{T}^{\lambda_2 - 1}.$$

The system can be solved with respect to A and B, and plugging these back into the value functions yields Equation (5).

Equation (6): If x follows a geometric Brownian motion with drift μ and volatility σ, then x^2 is another geometric Brownian motion with drift $2\mu + \sigma^2$ and volatility 2σ. Therefore, the discounted value of x^2 is $\frac{x^2}{r-2\mu-\sigma^2}$, which requires that the denominator is positive to ensure convergence. The AC's effort cost is $\frac{1}{2\gamma}\theta^2$, which has a value $\frac{\beta}{\bar{T}}\frac{x^2}{2(r-2\mu-\sigma^2)}$ in the region below the threshold and $\frac{\beta\bar{T}}{2r}$ in the region above. As for the derivation of Equation (5) above, there are optional elements associated with the transition through the threshold barrier, which take the value of $w = Cx^{\lambda_1} + Dx^{\lambda_2}$ for constants fitted to a similar set of boundary conditions as above. The constant $D = 0$ for the region below the threshold value, and the constant $C = 0$ for the region above. The smooth transition through the barrier implies the following system:

$$C\bar{T}^{\lambda_1} + \frac{\beta\bar{T}}{2(r-2\mu-\sigma^2)} = D\bar{T}^{\lambda_2} + \frac{\beta\bar{T}}{2r},\ C\lambda_1\bar{T}^{\lambda_1-1} + \frac{\beta}{r-2\mu-\sigma^2} = D\lambda_2\bar{T}^{\lambda_2-1}.$$

The system can be solved with respect to C and D, and plugging these back into the value functions yields Equation (6).

Equation (9): We need to calculate the optimal shareholding at the contracting point, which involves maximizing the shareholders' value (the net of the AC's holding). The shareholders' value at this point is given as the discounted value of all future nondiverted earnings minus the cost of effort for the AC. Therefore, for a given point below the threshold value for diversions, the program can be stated as follows:

$$\max_{\beta} Ax^{\lambda_1} + \frac{x}{r-\mu} - Cx^{\lambda_1} - \frac{\beta}{\bar{T}}\frac{x^2}{2(r-2\mu-\sigma^2)},$$

where we use the constants A and B from the previous derivations. This program can be written as $\max_{\beta} A + B$, as the term x^{λ_1} is just a positive constant and because in the term $\frac{\beta}{\bar{T}}$, the β cancels out in the numerator and the denominator. Therefore, optimal shareholding does not depend on the contracting point if the program is carried out below the threshold value for benefit diversions. A straightforward derivation yields the results.

References

Archambeault, D.S., F.T. Dezoort, and D. Hermanson. 2008. Audit committee incentive compensation and accounting restatements. *Contemporary Accounting Research* 25 (4): 965-992.

Asante-Appiah, B., and D. S. Sharma. 2022. Determinants and consequences of the severity of executive compensation clawbacks. *Contemporary Accounting Research* 39 (4): 2409-2455.

Barrier, M. 2002. The compensation balance. *Internal Auditor* 59 (3): 42-47.

Beasley, M. 1996. An empirical analysis of the relation between the board of director composition and financial statement fraud. *The Accounting Review* 71 (4): 443-466.

Bebchuk, L.A., and C. Jolls. 1999. Managerial value diversion and shareholder wealth. *Journal of Law, Economics and Organization* 15: 487-502.

Bedard, J.C., S.M. Chtourou, and L. Courteau. 2004. The effect of audit committee expertise, independence, and activity on aggressive earnings management. *Auditing: A Journal of Practice and Theory* 23 (2): 13-35.

Benmelech, E., E. Kandel, and P. Veronesi. 2010. Stock-based compensation and CEO (dis)incentives. *Quarterly Journal of Economics* 125: 1769-1820.

Bleck, A., and X. Liu. 2007. Market transparency and the accounting regime. *Journal of Accounting Research* 45: 229-256.

Bolton, P., J. Scheinkman, and W. Xiong. 2006. Executive compensation and short-termist behaviour in speculative markets. *Review of Economic Studies* 73 (3): 577-610.

Bronson, S., J. Carcello, C. Hollingsworth, and T. Neal. 2009. Are fully independent audit committees really necessary? *Journal of Accounting and Public Policy* 28 (4): 265-280.

Burns, N., S. Kedia, M. Lipson. 2010. Institutional ownership and monitoring: Evidence from financial misreporting. *Journal of Corporate Finance* 16: 443-455.

Call, A.C., S., Kedia and S. Rajgopal. Rank and file employees and the discovery of misreporting: The role of stock options. *Journal Accounting and Economics* 62 (2-3): 277-300.

Callen, J.L., and X.H. Fang. 2013. Institutional investor stability and crash risk: Monitoring versus short-termism? *Journal of Banking Finance* 37: 3047-3063.

Callen, J.L., and X.H. Fang. 2015a. Religion and stock price crash risk. *Journal of Financial* *and Quantitative Analysis* 50: 169-195.

Callen, J.L., and X.H. Fang. 2015b. Short interest and stock price crash risk. *Journal of Banking and Finance* 60: 181-194.

Campbell, J. L., J. Hansen, C. A. Simon, and J. L. Smith. 2013. Are audit committee stock options, non-option equity and compensation mix associated with financial reporting quality? *Auditing: A Journal of Practice and Theory* 34: 91-120.

Campbell, J.L., J. Hansen, C.A. Simon, and J.L. Smith. 2015. Audit committee stock options and financial reporting quality after the Sarbanes-Oxley Act of 2002. *Auditing: A Journal of Practice and Theory* 34 (2): 91-120.

Campbell, T.S., and W.A. Kracaw. 1980. Information production, market signaling and the theory of financial intermediation. *Journal of Finance* 35 (4): 863-882.

Chen, J., H. Hong, J. Stein. 2001. Forecasting crashes: Trading volume, past returns, and conditional skewness in stock prices. *Journal of Financial Economics* 61: 345-381.

Chen, W., H. Jin, and Y. Luo. 2022. Managerial political orientation and stock price crash risk. *Journal of Accounting, Auditing and Finance* 37 (4): 829-847.

Core, J., and W. Guay. 2002. Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. *Journal of Accounting research* 40 (3): 613-630.

Datta, S., M. Iskandar-Datta, and A. Patel. 1999. Bank monitoring and the pricing of corporate public debt. *Journal of Financial Economics* 51: 435-449.

Desai, M., A. Dyck, and L. Zingales. 2007. Theft and taxes. *Journal of Financial Economics* 84: 591-623.

Dhaliwal, D., V. Naiker, and F. Navissi. 2010. The association between accrual quality and the characteristics of accounting experts and mix of expertise on audit committee. *Contemporary Accounting Research* 27 (3): 787-827.

Diamond, D.W. 1984. Financial intermediation and delegated monitoring. *Review of Financial Studies* 51: 393-414.

Diamond, D.W. 1991. Debt maturity structure and liquidity risk. *Quarterly Journal of Economics* 106: 709-737.

Dikolli, S. S., W. J. Mayew, and D. Nanda. 2014. CEO tenure and the performance-turnover relation. *Review of Accounting Studies* 19: 281-327.

Dimson, E. 1979. Risk measurement when shares are subject to infrequent trading. *Journal of Financial Economics* 7 (2): 197-226.

Fama, E.F. 1980. Agency problems and the theory of the firm. *Journal of Political Economy* 88 (2): 288-307.

Fama, E.F., and M. Jensen. 1983. The separation of ownership and control. *Journal of Law and Economics* 26: 301-325.

Fama, E. 1985. What's different about banks? *Journal of Monetary Economics* 15: 29-39.

Financial Reporting Council. 2003. *Combined code on corporate Governance.* London, U.K.: FRC, http://www.frc.org.uk/documents/pdf/combinedcodefinal.pdf

Gormley, T.A., and D.A. Matsa. 2014. Common errors: How to (and not to) control for unobserved heterogeneity. *Review of Financial Studies* 27: 617-661.

Higgs, D. 2003. Review of the role and effectiveness of non-executive directors. *London: Department of Trade and Industry.*

Hillier, D., P. McColgan, and A. Tsekeris. 2022. How did the Sarbanes-Oxley Act affect managerial incentives? Evidence from corporate acquisitions. *Review of Quantitative Finance and Accounting* 58: 1395-1450.

Hong, H., and J. Stein. 2003. Differences of opinion, short-sales constraints, and market crashes. *Review of Financial Studies* 16: 487-525.

Hossain, M.M., B. Mammadov, and H. Vakilzadeh. 2022. Wisdom of the crowd and stock price crash risk: evidence from social media. *Review of Quantitative Finance and Accounting* 58: 709-742.

Hsu, A.W. H., and C.H. Liao. 2023. Auditor industry specialization and real earnings management. *Review of Quantitative Finance and Accounting* 60(2): 607-641.

Hutton, A.P., A. Marcus, and H. Tehranian. 2009. Opaque financial reports, R^2, and crash risk. *Journal of Financial Economics* 94: 67-86.

Jebran, K., S. Chen, and R. Zhang. 2022. Board social capital and stock price crash risk. *Review of Quantitative Finance and Accounting* 58: 499-540.

Jensen, M.C., and W.H. Meckling. 1976. Theory of the firm, managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3 (1): 305-360.

Jia, N. 2018. Corporate innovation strategy and stock price crash risk. *Journal of Corporate*

Finance 53: 155-173.

Jin, L., and S.C. Myers. 2006. R^2 round the world: New theory and new tests. *Journal of Financial Economics* 79: 257-292.

Kao, E.H., H.C. Huang, H.G. Fung, and X. Liu. 2020. Co-opted directors, gender diversity, and crash risk: evidence from China. *Review of Quantitative Finance and Accounting* 55: 461-500.

Keune, M.B., and K.M. Johnstone. 2015. Audit committee incentives and the resolution of detected misstatements. *Auditing: A Journal of Practice & Theory* 34 (4): 109-137.

Kim, Y., H.D. Li, and S.Q. Li. 2014. Corporate social responsibility and stock price crash risk. *Journal of Banking and Finance* 43: 1-13.

Kim, J.B., X. Li, Y. Luo, and K. Wang. 2020. Foreign investors, external monitoring, and stock price crash risk. *Journal of Accounting, Auditing and Finance* 35 (4): 829-853.

Kim, J.B., Y. Li, and L. Zhang. 2011. CFOs versus CEOs: Equity incentives and crashes. *Journal of Financial Economics* 101 (3): 713-730.

Kim, J.B., L.Y. Lu, and Y. Yu. 2019. Analyst coverage and expected crash risk: Evidence from exogenous changes in analyst coverage. *Accounting Review* 94: 345-364.

Kim, J.B., Z. Wang, and L. Zhang. 2016. CEO overconfidence and stock price crash risk. *Contemporary Accounting Research* 33: 1720-1749.

Kim, J.B., and L. Zhang. 2016. Accounting conservatism and stock price crash risk: Firm-level evidence. *Contemporary Accounting Research* 33: 412-441.

Klein, A. 2002. Economic determinants of audit committee independence. *The Accounting Review* 77 (2): 435-452.

Krishnamoorthy, G., L. Bruynseels, S. De Groote, A.M. Wright and M. Van Peteghem. 2023. The accounting financial expertise of the audit committee chair and oversight effectiveness. *Auditing: A Journal of Practice and Theory* 42(1): 75-100.

Krishnan, J. 2005. Audit committee quality and internal control: An empirical analysis. *The Accounting Review* 80 (2): 649-675.

Lennox, C., and C. Park. 2007. Audit firm appointments, audit firm alumni, and audit committee independence. *Contemporary Accounting Research* 24 (1): 235-258.

Li, X., S.S. Wang, and X. Wang. 2017. Trust and stock price crash risk. *Journal of Banking* *and Finance* 76: 74-91.

Li, Y., and Y. Zeng. 2019. The impact of top executive gender on asset prices: Evidence from stock price crash risk. *Journal of Corporate Finance* 58: 528-550.

Lisic, L., L. Myers, T. Seidel, and J. Zhou. 2019. Does audit committee accounting expertise help to promote audit quality? Evidence from auditor reporting of internal control weaknesses. *Contemporary Accounting Research* 36 (4): 2521-2553.

Liu, H., and J. Miao. 2006. Managerial preferences, corporate governance, and financial structure. http://ssrn.com/abstract=891414

Liu, X., G.J. Lobo, and H.C. Yu. 2021. Is audit committee equity compensation related to audit fees? *Contemporary Accounting Research* 38(1): 740-769.

Ma, X., W. Wang, J. Wu, and W. Zhang. 2020. Corporate customer concentration and stock price crash risk. *Journal of Banking and Finance* 119: 105903.

Magilke, M.J., B.W. Mayhew, and J.E. Pike. 2009. Are independent audit committee members objective? Experimental evidence. *The Accounting Review* 84 (6): 1959-1981.

Menon, K., and D.D. Williams. 2004. Former audit partners and abnormal accruals. *The Accounting Review* 79 (4): 1095-1118.

Menon, K., and D.D. Williams. 2008. Management turnover following auditor resignations. *Contemporary Accounting Research* 25 (2): 567-604.

Naiker, V., and D. Sharma. 2009. Former audit partners on the audit committee and internal control deficiencies. *The Accounting Review* 84 (2): 559-587.

Naiker, V., D. Sharma, and V. Sharma. 2013. Do former audit firm partners on audit committees procure greater nonaudit services from the auditor? *The Accounting Review* 88 (1): 297-326.

National Association of Corporate Directors (NASD). 2001. *Director compensation: Purposes, principles, and best practices*. Washington DC: NACD.

National Association of Corporate Directors (NASD). 2003. *Director compensation survey 2002-2003.* Washington DC: NACD.

New York Times. 2007. Holding the line (unsigned editorial), *The New York Times*, January 2, A18.

Ni, X., Q. Peng, S. Yin, and T. Zhang. 2020. Attention! Distracted institutional investors and stock price crash. *Journal of Corporate Finance* 64: 101701.

Piotroski, J.D., T.J. Wong, and T. Zhang. 2015. Political incentives to suppress negative information: Evidence from Chinese listed firms. *Journal of Accounting and Economics* 53 (2): 405-459.

Sengupta, P., and S. Zhang. 2015. Equity-based compensation of outside directors and corporate disclosure quality. *Contemporary Accounting Research* 32 (3): 1073-1098.

Srinivasan, S. 2005. Consequences of financial reporting failure for outside directors: Evidence from accounting restatements and audit committee members. *Journal of Accounting Research* 43 (2): 291-334.

Tan, H. T., T. Xu, and Y. Yu. 2023. Language, perceived warmth, and investors' reactions to audit committee reports. *Contemporary Accounting Research* 40: 1388-1417.

Taub, S. 2005. Board pay surges by double digits. *CEO.com*, October 3, http://www.cfo.com/

Vafeas, N. 2005. Audit committees, boards, and the quality of reported earnings. *Contemporary Accounting Research* 22 (4): 1093-1122.

Wall Street Journal. 2006. Study cites role outside directors had with options. *The Wall Street Journal*, 18 December, B3.

Winikoff, E. 2006. *Director compensation: NASDAQ 100 vs. NYSE 100.* Frederic W. Cook & Co., Inc.

Xie, B., W.N. Davidson, and P.J. DaDalt. 2003. Earnings management and corporate governance: The role of board and the audit committee. *Journal of Corporate Finance* 9 (3): 295-316.

Xu, L., Z.J. Huang, and F. Wen. 2022. Comment letters and stock price synchronicity: evidence from China. *Review of Quantitative Finance and Accounting* 59(4): 1387-1421.

Xu, N., X. Li, Q. Yuan, and K.C. Chan. 2014. Excess perks and stock price crash risk: Evidence from China. *Journal of Corporate Finance* 25: 419-434.

Xu, Y., Y. Xuan, and G. Zheng. 2021. Internet searching and stock price crash risk: Evidence from a quasi-natural experiment. *Journal of Financial Economics* 141 (1): 255-275.

Yang, J., and J. Krishnan. 2005. Audit committees and quarterly earnings management. *International Journal of Auditing* 9 (3): 201-219.

Yuan, R., J. Sun, and F. Cao. 2016. Directors' and officers' liability insurance and stock price crash risk. *Journal of Corporate Finance* 37: 173-192.

TABLE 1: Sample Distribution

This table presents the distribution of sample firms across years in Panel A and across sectors in Panel B.

Panel A: Sample Distribution by Years

Year	Firms without Equity-based Compensation		Firms with Equity-based Compensation		All	
	No. of Obs	%	No. of Obs	%	No. of Obs	%
2001	17	37.78	28	62.22	45	0.69
2002	148	37.85	243	62.15	391	5.97
2003	175	36.69	302	63.31	477	7.28
2004	175	33.65	345	66.35	520	7.94
2005	125	23.06	417	76.94	542	8.27
2006	53	10.77	439	89.23	492	7.51
2007	39	9.24	383	90.76	422	6.44
2008	35	9.43	336	90.57	371	5.66
2009	30	8.52	322	91.48	352	5.37
2010	20	6.02	312	93.98	332	5.07
2011	13	4.09	305	95.91	318	4.85
2012	16	5.05	301	94.95	317	4.84
2013	10	3.13	310	96.88	320	4.89
2014	13	4.04	309	95.96	322	4.92
2015	15	4.76	300	95.24	315	4.81
2016	12	3.73	310	96.27	322	4.92
2017	10	2.88	337	97.12	347	5.30
2018	13	3.77	332	96.23	345	5.27
Total	919	14.03	5,631	85.97	6,550	100.00

Panel B: Industry distribution

SIC Industry	Total	%
Agriculture (0100–0999)	14	0.21
Mining and Construction (1000–1999)	152	2.32
Food (2000–2111)	332	5.07
Textiles and Printing/Publishing (2200–2799)	297	4.53
Chemicals (2800–2824, 2840–2899)	704	10.75
Pharmaceuticals (2830–2836)	0	0.00
Extractive (1300–1399, 2900–2999)	490	7.48
Durable Manufacturing (3000–3999, excluding 3570–3579 and 3670–3679)	972	14.84
Transportation (4000–4899)	472	7.21
Utilities (4900–4999)	455	6.95
Retailing (5000–5999)	722	11.02
Finance (6000–6999)	0	0.00
Services (7000–9999, excluding 7370–7379)	256	3.91
Computers (3570–3579, 3670–3679, and 7370–7379)	1,684	25.71
Total	6,550	100.00

TABLE 2: Descriptive Statistics

This table presents descriptive statistics for all the variables used in the empirical analysis. See Appendix A for full definitions of the variables.

Variable	N	Mean	Median	St Dev	Min.	p10	p25	p75	p90	Max.
$NCSKEW_{t+1}$	6,550	0.149	0.108	0.777	-1.840	-0.720	-0.297	0.532	1.080	2.690
$DUVOL_{t+1}$	6,550	0.097	0.083	0.497	-1.040	-0.529	-0.233	0.415	0.730	1.460
$CRASH_{t+1}$	6,550	0.253	0	0.435	0	0	0	1	1	1
$CRASH2_{t+1}$	6,550	0.222	0	0.415	0	0	0	0	1	1
$COUNT_{t+1}$	6,550	0.262	0	0.460	0	0	0	1	1	2
$COUNT2_{t+1}$	6,550	0.227	0	0.431	0	0	0	0	1	2
$FREQUENCY_{t+1}$	6,550	0.005	0	0.008	0	0	0	0.019	0.019	0.019
$FREQUENCY2_{t+1}$	6,550	0.004	0	0.008	0	0	0	0	0.019	0.019
$AC1_{t}$	6,550	0.573	0.623	0.292	0	0	0.460	0.786	0.910	1
$AC2_{t}$	6,550	0.563	0.612	0.290	0	0	0.446	0.772	0.900	1
RET_{t}	6,550	-0.088	-0.049	0.114	-0.825	-0.196	-0.095	-0.026	-0.016	-0.009
$SIGMA_{t}$	6,550	0.037	0.032	0.021	0.013	0.018	0.023	0.045	0.063	0.133
$NCSKEW_{t}$	6,550	0.162	0.125	0.748	-1.720	-0.686	-0.280	0.536	1.060	2.650
$SIZE_{t}$	6,550	8.880	9	1.540	4.760	6.740	8.040	9.850	10.80	12.30
ROA_{t}	6,550	0.064	0.065	0.089	-0.316	-0.016	0.029	0.109	0.160	0.310
LEV_{t}	6,550	0.208	0.203	0.152	0	0	0.095	0.309	0.409	0.652
MB_{t}	6,550	3.710	2.680	3.690	0.481	1.060	1.530	4.400	7.180	27.90
$DTURN_{t}$	6,550	0.004	0.002	0.079	-0.303	-0.071	-0.027	0.032	0.083	0.306
$ACCM_{t}$	6,550	0.204	0.158	0.163	0.019	0.051	0.085	0.272	0.417	1.010
$AC\_EXPERTISE_{t}$	6,550	0.412	0	0.492	0	0	0	1	1	1
AC_CHAIR_{t}	6,550	0.437	0	0.496	0	0	0	1	1	1
$INSTITUTIONAL\_OWN_{t}$	4,434	0.723	0.758	0.175	0	0.516	0.679	0.853	0.927	1.450
$BDSIZE_{t}$	3,059	0.927	0.944	0.094	0.333	0.800	0.889	1	1	1
$BDIND_{t}$	3,059	2.270	2.300	0.274	1.390	1.950	2.080	2.480	2.560	2.830
$CEODELTA_{t}$	3,059	1211	466	2820	10.900	83.900	195	1005	2232	20847
$CEOVEGA_{t}$	3,059	227	140	279	0	0	37.600	304	564	1780
$CFODELTA_{t}$	3,059	150	84.900	199	0.971	13.700	34.400	181	347	1213
$CFOVEGA_{t}$	3,059	56.400	34.100	74.200	0	0	8.290	73.800	137	427
$CEOTENURE_{t}$	3,059	1.720	1.790	0.820	0	0.693	1.100	2.300	2.710	3.890
$CEOCHAIRMAN_{t}$	3,059	0.620	1	0.485	0	0	0	1	1	1
$ANADISP_{t+1}$	5,920	0.024	0.021	0.017	0.001	0.008	0.014	0.028	0.039	0.136
$INTERCONTR_{t+1}$	5,685	0.966	1	0.182	0	1	1	1	1	1

TABLE 3: Correlation Analysis

The table presents pairwise Pearson correlations for all variables used in the empirical analysis. *, **, and *** denote significance at the 10%, 5%, and 1% levels. See Appendix A for full definitions of the variables.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
$NCSKEW_{t+1}$	(1)	1																		
$DUVOL_{t+1}$	(2)	0.894***	1																	
$CRASH_{t+1}$	(3)	0.648***	0.523***	1																
$CRASH2_{t+1}$	(4)	0.653***	0.516***	0.907***	1															
$COUNT_{t+1}$	(5)	0.655***	0.535***	0.978***	0.894***	1														
$COUNT2_{t+1}$	(6)	0.658***	0.526***	0.893***	0.984***	0.909***	1													
$FREQUENCY_{t+1}$	(7)	0.648***	0.523***	0.999***	0.908***	0.979***	0.893***	1												
$FREQUENCY2_{t+1}$	(8)	0.653***	0.516***	0.907***	1.000***	0.894***	0.984***	0.908***	1											
$AC1_t$	(9)	-0.024**	-0.028***	-0.006	-0.009	-0.006	-0.011	-0.007	-0.009	1										
$AC2_t$	(10)	-0.023**	-0.027**	-0.007	-0.009	-0.008	-0.011	-0.008	-0.009	0.983***	1									
RET_t	(11)	-0.068***	-0.076***	-0.028***	-0.022**	-0.026**	-0.019*	-0.027**	-0.022**	0.093***	0.100***	1								
$SIGMA_t$	(12)	0.077***	0.085***	0.034***	0.028***	0.032***	0.026**	0.033***	0.028***	-0.119***	-0.127***	-0.962***	1							
$NCSKEW_t$	(13)	0.030***	0.023**	0.024**	0.027**	0.025**	0.030***	0.023**	0.027**	-0.054***	-0.054***	-0.193***	0.214***	1						
$SIZE_t$	(14)	-0.005	-0.005	-0.017	-0.012	-0.015	-0.011	-0.017	-0.012	0.165***	0.168***	0.476***	-0.533***	-0.082***	1					
ROA_t	(15)	0.020*	0.019*	0.028**	0.031***	0.031***	0.032***	0.029**	0.031***	0.066***	0.070***	0.348***	-0.330***	-0.040***	0.298***	1				
LEV_t	(16)	-0.005	-0.008	-0.026**	-0.025**	-0.024**	-0.021**	-0.027**	-0.025**	-0.044***	-0.038***	0.104***	-0.122***	-0.014	0.056***	-0.271***	1			
MB_t	(17)	0.051***	0.055***	0.028**	0.032***	0.035***	0.034***	0.028**	0.032***	0.087***	0.084***	0.001	-0.008	-0.063***	0.192***	0.220***	0.011	1		
$DTURN_t$	(18)	0.021**	0.018*	0.001	-0.001	0.005	0.002	0.001	-0.001	-0.051***	-0.052***	-0.155***	0.172***	0.096***	-0.066***	0.007	0.060***	0.012	1	
$ACCM_t$	(19)	0.022**	0.019*	0.037***	0.030***	0.037***	0.029***	0.037***	0.030***	0.063***	0.059***	-0.324***	0.328***	0.036***	-0.115***	0.048***	-0.221***	0.223***	-0.043***	1

TABLE 4: AC Equity Incentives and Stock Price Crash Risk

The table reports ordinary least square (OLS) estimation results for regressions of audit committee equity incentives on stock price crash risk. The dependent variable is stock price crash risk, measured as NCSKEW in the column (1)–(3) regressions and as DUVOL in the column (4)–(6) regressions, respectively. The independent variable of our interest is AC1, defined as the ratio of AC equity-based compensation to total compensation. *t* values in parentheses are calculated using robust standard errors clustered by firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Appendix A provides full variable definitions.

	$NCSKEW_{t+1}$			$DUVOL_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$AC1_t$	-0.059*	-0.093***	-0.068**	-0.048**	-0.068***	-0.052**
	(-1.72)	(-2.67)	(-1.96)	(-2.25)	(-3.20)	(-2.44)
RET_t	0.574*	0.518	0.546	0.427**	0.337*	0.392*
	(1.84)	(1.64)	(1.64)	(2.14)	(1.66)	(1.87)
$SIGMA_t$	5.468***	5.613***	5.094**	4.226***	3.923***	3.833***
	(2.80)	(2.86)	(2.35)	(3.44)	(3.16)	(2.88)
$NCSKEW_t$	0.011	0.002	-0.000	0.002	-0.003	-0.004
	(0.74)	(0.11)	(-0.01)	(0.25)	(-0.30)	(-0.47)
$SIZE_t$	0.012	0.016*	0.014	0.010*	0.011**	0.009
	(1.38)	(1.86)	(1.48)	(1.66)	(2.07)	(1.54)
ROA_t	0.369***	0.355***	0.338**	0.262***	0.254***	0.250***
	(2.77)	(2.62)	(2.52)	(3.23)	(3.04)	(3.00)
LEV_t	0.115	0.191**	0.194**	0.059	0.101*	0.096*
	(1.50)	(2.23)	(2.14)	(1.22)	(1.91)	(1.73)
MB_t	0.006**	0.009***	0.007**	0.005***	0.008***	0.006***
	(2.04)	(2.84)	(2.04)	(2.68)	(4.14)	(3.17)
$DTURN_t$	-0.001	-0.031	-0.006	-0.068	-0.079	-0.077
	(-0.01)	(-0.24)	(-0.04)	(-0.77)	(-0.95)	(-0.88)
$ACCM_t$	-0.031	0.029	0.044	-0.059	-0.011	-0.001
	(-0.44)	(0.39)	(0.59)	(-1.35)	(-0.24)	(-0.02)
Constant	0.037	-0.536***	-0.278	-0.037	-0.297***	-0.162
	(0.26)	(-4.89)	(-1.64)	(-0.37)	(-3.09)	(-1.18)
Year FE	Yes	No	Yes	Yes	No	Yes
Industry FE	No	Yes	Yes	No	Yes	Yes
Number of Obs.	6,550	6,550	6,550	6,550	6,550	6,550
Adjusted R^2	0.016	0.012	0.022	0.024	0.015	0.030

TABLE 5: Regression Results for Robustness Checks

The table reports regression results for the robustness checks. The dependent variable for all regressions is stock price crash risk, measured as NCSKEW in the column (1)–(3) regressions and DUVOL in the column (4)–(6) regressions, respectively. The independent variable of the Panel A regressions is AC2, defined as the average ratio of equity-based compensation to total compensation across all AC members. The dependent variables of the Panel B regressions are CRASH, CRASH2, COUNT, COUNT2, FREQUENCY, and FREQUENCY2. CRASH is a dummy variable which is equal to 1 if a firm-year observation experiences one or more firm-specific crash weeks over a year and 0 otherwise, using the Hutton et al. (2009) specification. CRASH2 is a dummy variable, which is equal to 1 if a firm-year observation experiences one or more firm-specific crash weeks over a year and 0 otherwise using the Kim et al. (2011) specification. COUNT is the number of firm-specific weekly returns below the mean by more than 3.09 standard deviations threshold in a given year. COUNT2 is the number of firm-specific weekly returns below the mean by more than 3.20 standard deviations threshold in a given year. FREQUENCY is the percentage of crash weeks among all trading weeks in a given year, where crash weeks are defined as those with firm-specific weekly returns below the mean by over 3.09 standard deviations. FREQUENCY2 is the percentage of crash weeks among all trading weeks in a given year, where crash weeks are defined as those with firm-specific weekly returns below the mean by over 3.20 standard deviations. The addition control variables included in the Panel C regressions are BDSIZE, BDIND, CEODELTA, CEOVEGA, CFODELTA, CFOVEGA, CEOTENTURE, CEOCHAIRMAN. BDSIZE is the natural logarithm of the number of directors on the board. BDIND is the percentage of independent directors on the board. CEODELTA (CEOVEGA) is the dollar change in the CEO's equity holdings for a 1 percent change in stock price (stock return volatility). CFODELTA (CFOVEGA) is the dollar change in the CFO's equity holdings for a 1 percent change in stock price (stock return volatility). CEOTENURE is the natural logarithm of the number of years as CEO of the firm. CEOCHAIRMAN takes the value of 1 if AC chairman is also the company's CEO, and 0 otherwise. *t* values in parentheses are calculated using robust standard errors clustered by firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Appendix A provides full variable definitions.

Panel A: Alternative Measure of AC Equity Incentives

	$NCSKEW_{t+1}$			$DUVOL_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$AC2_t$	-0.065*	-0.098***	-0.074**	-0.051**	-0.070***	-0.054**
	(-1.92)	(-2.86)	(-2.16)**	(-2.41)	(-3.35)	(-2.58)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	Yes	No	Yes
Industry FE	No	Yes	Yes	No	Yes	Yes
Number of Obs.	6,550	6,550	6,550	6,550	6,550	6,550
Adjusted R^2	0.016	0.012	0.022	0.024	0.015	0.030

Panel B: Alternative Estimation Methods or Measures for Stock Price Crash Risk

	$CRASH_{t+1}$	$CRASH2_{t+1}$	$COUNT_{t+1}$	$COUNT2_{t+1}$	$FREQUENCY_{t+1}$	$FREQUENCY2_{t+1}$
	(1)	(2)	(3)	(4)	(5)	(6)
$AC1_t$	-0.284**	-0.315**	-0.284**	-0.315**	-0.001*	-0.001*

	(-2.05)	(-2.17)	(-2.05)	(-2.17)	(-1.89)	(-1.95)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of Obs.	5,846	5,719	5,846	5,719	6,489	6,489
Pseudo /Adjusted R^2	0.020	0.024	0.020	0.024	0.036	0.041

Panel C: Controlling for Corporate Governance Mechanisms and CEO/CFO Incentives

	$NCSKEW_{t+1}$			$DUVOL_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$AC1_t$	-0.112*	-0.137**	-0.132**	-0.075*	-0.085**	-0.080**
	(-1.78)	(-2.09)	(-2.00)	(-1.90)	(-2.09)	(-1.97)
BDSIZE	-0.096	-0.119	-0.099	0.024	-0.016	0.003
	(-0.59)	(-0.70)	(-0.58)	(0.22)	(-0.15)	(0.03)
BDIND	-0.061	-0.101	-0.098	-0.039	-0.066	-0.062
	(-0.96)	(-1.54)	(-1.50)	(-0.94)	(-1.54)	(-1.47)
CEODELTA	-0.000**	-0.000**	-0.000**	-0.000***	-0.000***	-0.000***
	(-2.42)	(-2.56)	(-2.52)	(-2.90)	(-3.13)	(-3.12)
CEOVEGA	0.000	0.000	0.000	0.000	0.000	0.000
	(1.11)	(1.11)	(0.95)	(0.58)	(0.62)	(0.47)
CFODELTA	-0.000**	-0.000***	-0.000***	-0.000*	-0.000**	-0.000**
	(-2.51)	(-2.78)	(-2.64)	(-1.96)	(-2.44)	(-2.31)
CFOVEGA	0.000	0.000	0.000	0.000	0.000	0.000
	(0.31)	(0.77)	(0.75)	(0.06)	(0.62)	(0.67)
CEOTENURE	0.015	0.025	0.025	-0.000	0.006	0.007
	(0.81)	(1.32)	(1.31)	(-0.01)	(0.49)	(0.55)
CEOCHAIRMAN	-0.008	-0.026	-0.024	0.018	0.004	0.007
	(-0.25)	(-0.82)	(-0.73)	(0.87)	(0.21)	(0.36)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	Yes	No	Yes
Industry FE	No	Yes	Yes	No	Yes	Yes
Number of Obs.	3,059	3,059	3,059	3,059	3,059	3,059
Adjusted R^2	0.021	0.041	0.046	0.025	0.042	0.049

Panel D: Excluding Firm-year Observations without AC Equity Incentives

	$NCSKEW_{t+1}$			$DUVOL_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$AC1_t$	-0.072**	-0.100***	-0.082**	-0.055**	-0.071***	-0.059***
	(-2.06)	(-2.83)	(-2.32)	(-2.50)	(-3.25)	(-2.70)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	Yes	No	Yes
Industry FE	No	Yes	Yes	No	Yes	Yes
Number of Obs.	5,055	5,055	5,055	5,055	5,055	5,055
Adjusted R^2	0.019	0.021	0.033	0.027	0.024	0.042

TABLE 6: Regression Results for Tests Addressing Endogeneity Concerns

The table reports regression results for tests addressing potential endogeneity concerns. The dependent variable is stock price crash risk, measured as NCSKEW in the column (1)–(3) regressions and DUVOL in the column (4)–(6) regressions, respectively. The independent variable of interest is AC1, defined as the ratio of AC equity-based compensation to total compensation. *t* values in parentheses are calculated using robust standard errors clustered by firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Appendix A provides full variable definitions.

Panel A: High Dimensions of Fixed Effects

	$NCSKEW_{t+1}$			$DUVOL_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$AC1_t$	-0.082**	-0.068**	-0.118**	-0.063***	-0.052**	-0.068**
	(-2.42)	(-1.96)	(-2.30)	(-2.99)	(-2.44)	(-2.16)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	No	Yes	No
Industry FE	No	Yes	No	No	Yes	No
Year*Industry FE	No	No	Yes	No	No	Yes
Number of Obs.	6,550	6,550	6,550	6,550	6,550	6,550
Adjusted R^2	0.007	0.021	0.269	0.009	0.030	0.285

Panel B: Panel Data Regression with Firm Fixed Effects

	$NCSKEW_{t+1}$			$DUVOL_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$AC1_t$	-0.059*	-0.159***	-0.107**	-0.048**	-0.103***	-0.064**
	(-1.72)	(-3.49)	(-2.29)	(-2.25)	(-3.63)	(-2.23)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	Yes	No	Yes
Firm FE	No	Yes	Yes	No	Yes	Yes
Number of Obs.	6,550	6,550	6,550	6,550	6,550	6,550
Adjusted R^2	0.016	0.154	0.169	0.024	0.154	0.176

TABLE 7: Estimation Results for the Difference-in-Differences Analysis

The table reports the OLS estimation results using matched samples. For each treatment firm with an increase in AC1 by 30% in a particular event year, we identify its most comparable firm in terms of the propensity score to increase AC equity holdings. We compare stock price crash risk before and after for treatment firms that experience such an increase in equity holdings, benchmarked against control firms that do not in the same year. TREATED is a dummy equal to 1 for the treatment firms and 0 otherwise. POST is a dummy equal to 1 for the years after the event of increasing AC equity incentives. Before1, Before2, and Before3 are all dummy variables, equal to 1 when the year is 1, 2, and 3 years, respectively, before the event year (t = 0) with an increase in AC1 by 30%. After1, After2, and After3 are dummy variables as well, equal to 1 when the year is 1, 2, and 3 years, respectively, after the event year (t = 0) with an increase in AC1 by 30%. Robust standard errors clustered by firm are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Appendix A provides full variable definitions.

	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
	(1)	(2)	(3)	(4)
TREATED*POST	-0.196***	-0.120***		
	(-3.03)	(-3.03)		
TREATED	0.116**	0.065**		
	(2.45)	(2.12)		
POST	0.028	0.020		
	(0.59)	(0.68)		
TREATED*Before3			0.017	-0.004
			(0.13)	(-0.06)
TREATED*Before2			0.009	0.039
			(0.08)	(0.57)
TREATED*Before1			-0.050	-0.039
			(-0.47)	(-0.61)
TREATED*After1			-0.106	-0.051
			(-0.90)	(-0.70)
TREATED*After2			-0.280**	-0.231***
			(-2.34)	(-3.28)
TREATED*After3			-0.227**	-0.127*
			(-2.11)	(-1.95)
Baseline Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Number of Obs.	2,503	2,503	2,503	2,503
Adjusted R^2	0.056	0.067	0.055	0.069

TABLE 8: AC Equity Incentives and Financial Reporting Quality

The table reports ordinary least square (OLS) estimation results for regressions of audit committee equity incentives on financial reporting quality. The dependent variable financial reporting quality, is measured as ANADISP for the column (1)-(3) regressions and as INTERCONTR for the column (4)-(6) regressions, respectively. ANADISP is defined as the log of the standard deviation of analyst's forecasts based on the last forecast issued by analysts over the 90-day period ending on the fiscal year-end date, divided by the stock price at the beginning of the fiscal year. INTERCONTR takes the value of 1 if a company's internal control is effective and 0 otherwise. The independent variable of our interest is AC1, defined as the ratio of AC equity-based compensation to total compensation. *t* values in parentheses are calculated using robust standard errors clustered by firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Appendix A provides full variable definitions.

	ANADISP			INTERCONTR		
	(1)	(2)	(3)	(4)	(5)	(6)
$AC1_t$	-0.003**	0.000	-0.002**	0.018	0.018	0.024*
	(-2.32)	(0.25)	(-2.23)	(1.33)	(1.29)	(1.67)
RET_t	-0.044***	-0.068***	-0.063***	0.039	0.013	0.002
	(-3.27)	(-5.55)	(-4.96)	(0.24)	(0.08)	(0.01)
$SIGMA_t$	0.099	-0.145**	-0.064	-0.799	-0.586	-1.199
	(1.25)	(-2.30)	(-0.89)	(-1.16)	(-0.78)	(-1.57)
$NCSKEW_t$	0.001***	0.001***	0.001***	-0.016***	-0.015***	-0.015***
	(2.74)	(4.02)	(4.34)	(-3.82)	(-3.76)	(-3.68)
$SIZE_t$	0.001	0.000	-0.000	0.009***	0.018***	0.009***
	(0.96)	(1.02)	(-0.32)	(3.17)	(5.96)	(2.86)
ROA_t	-0.032***	-0.029***	-0.028***	0.198***	0.194***	0.196***
	(-4.61)	(-4.95)	(-4.92)	(3.94)	(3.76)	(3.86)
LEV_t	0.021***	0.026***	0.025***	0.006	0.000	-0.017
	(5.90)	(7.41)	(7.09)	(0.25)	(0.01)	(-0.61)
MB_t	-0.001***	-0.001***	-0.001***	0.000	0.000	0.001
	(-6.45)	(-7.25)	(-6.18)	(0.31)	(0.48)	(1.38)
$DTURN_t$	0.012***	0.017***	0.010***	0.099**	0.086**	0.100**
	(3.34)	(4.68)	(2.96)	(2.17)	(2.10)	(2.24)
$ACCM_t$	0.001	-0.000	0.001	-0.039*	-0.049*	-0.041
	(0.37)	(-0.05)	(0.35)	(-1.69)	(-1.70)	(-1.46)
Constant	0.000	0.021***	0.012*	0.889***	0.808***	0.907***
	(0.04)	(4.87)	(1.95)	(26.00)	(22.01)	(24.75)
Year FE	Yes	No	Yes	Yes	No	Yes
Industry FE	No	Yes	Yes	No	Yes	Yes
Number of Obs.	5,920	5,920	5,920	5,685	5,685	5,685
Adjusted R^2	0.260	0.355	0.411	0.080	0.072	0.099

TABLE 9: Estimation Results Using Cross-sectional Variation in External Governance

The table reports the OLS estimation results using cross-sectional variation in external governance. The dependent variable is stock price crash risk, measured as NCSKEW or DUVOL. The independent variable AC1, defined as the ratio of AC equity-based compensation to total compensation. INSTITUTIONAL_OWN is the sum of all ownership positions greater than 5% held by institutional investors. LEVERAGE is book leverage defined as total liabilities over total assets. Robust standard errors clustered by firm are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Appendix A provides full variable definitions.

Panel A: Subsample analysis by institutional ownership

	High INSTITUTIONAL_OWN				Low INSTITUTIONAL_OWN			
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$AC1_t$	-0.064	-0.032	-0.096	-0.026	-0.097	-0.070*	-0.141	-0.096*
	(-1.17)	(-0.92)	(-1.30)	(-0.54)	(-1.60)	(-1.81)	(-1.60)	(-1.73)
RET_t	-0.217	-0.029	-1.403	-0.913	0.861*	0.433	0.722	0.399
	(-0.32)	(-0.07)	(-1.56)	(-1.58)	(1.85)	(1.44)	(1.05)	(0.92)
$SIGMA_t$	-1.313	0.604	-10.941*	-6.643*	7.371**	4.088**	5.228	2.847
	(-0.32)	(0.23)	(-1.92)	(-1.85)	(2.37)	(2.08)	(1.10)	(0.93)
$NCSKEW_t$	-0.014	-0.019	-0.136***	-0.090***	-0.000	0.005	-0.116***	-0.065***
	(-0.52)	(-1.19)	(-4.75)	(-5.39)	(-0.01)	(0.34)	(-4.19)	(-3.52)
$SIZE_t$	0.004	0.013	0.238***	0.166***	0.002	-0.002	0.237***	0.163***
	(0.20)	(0.97)	(4.96)	(5.21)	(0.18)	(-0.23)	(3.97)	(4.31)
ROA_t	0.354	0.355**	-0.149	0.110	0.190	0.221	-0.043	0.007
	(1.58)	(2.45)	(-0.41)	(0.52)	(0.83)	(1.63)	(-0.13)	(0.03)
LEV_t	0.231	0.111	-0.140	-0.093	0.071	0.112	0.381	0.311*
	(1.30)	(1.01)	(-0.54)	(-0.61)	(0.44)	(1.12)	(1.26)	(1.71)
MB_t	0.008	0.008**	0.005	0.006	0.018***	0.010**	0.012	0.002
	(1.40)	(2.19)	(0.50)	(0.90)	(2.95)	(2.50)	(1.00)	(0.36)
$DTURN_t$	-0.005	-0.142	0.455*	0.170	0.229	0.129	0.315	0.148
	(-0.02)	(-0.94)	(1.68)	(0.97)	(1.08)	(1.00)	(1.21)	(0.92)
$ACCM_t$	0.164	0.018	-0.051	-0.124	0.002	0.014	0.024	0.012
	(1.19)	(0.21)	(-0.23)	(-0.91)	(0.02)	(0.18)	(0.11)	(0.09)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed	Yes	Yes	No	No	Yes	Yes	No	No
Firm Fixed	No	No	Yes	Yes	No	No	Yes	Yes

Number of Obs.	2,218	2,218	2,141	2,141	2,216	2,216	2,110	2,110
Adjusted R^2	0.027	0.036	0.249	0.257	0.020	0.034	0.235	0.243

Panel B: Subsample analysis by leverage

	High LEVERAGE				Low LEVERAGE			
	NCSKEW $_{t+1}$	DUVOL $_{t+1}$	NCSKEW $_{t+1}$	DUVOL $_{t+1}$	NCSKEW $_{t+1}$	DUVOL $_{t+1}$	NCSKEW $_{t+1}$	DUVOL $_{t+1}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$AC1_t$	-0.040	-0.064**	-0.045	-0.043	-0.112**	-0.059**	-0.156**	-0.091**
	(-0.80)	(-2.00)	(-0.63)	(-0.98)	(-2.41)	(-2.08)	(-2.32)	(-2.18)
RET_t	0.675	0.344	-0.359	-0.362	0.365	0.362	0.752	0.614
	(1.61)	(1.24)	(-0.57)	(-0.93)	(0.83)	(1.27)	(1.11)	(1.40)
$SIGMA_t$	6.103**	3.860**	-1.064	-1.856	5.087*	4.234**	4.483	3.710
	(2.45)	(2.39)	(-0.25)	(-0.69)	(1.89)	(2.45)	(0.99)	(1.31)
$NCSKEW_t$	0.035	0.017	-0.100***	-0.064***	-0.007	-0.008	-0.124***	-0.074
	(1.59)	(1.26)	(-4.26)	(-4.41)	(-0.35)	(-0.63)	(-5.49)	(-5.32)
$SIZE_t$	0.011	0.009	0.195***	0.142***	0.017	0.012*	0.253***	0.146***
	(0.85)	(1.05)	(5.40)	(5.65)	(1.53)	(1.72)	(5.71)	(5.09)
ROA_t	0.224	0.162	-0.069	-0.049	0.467**	0.323***	0.210	0.201
	(1.25)	(1.42)	(-0.25)	(-0.29)	(2.38)	(2.70)	(0.78)	(1.19)
LEV_t	0.154	0.076	-0.238	-0.097	0.033	0.059	0.130	0.018
	(1.04)	(0.81)	(-0.81)	(-0.53)	(0.14)	(0.43)	(0.33)	(0.08)
MB_t	0.009**	0.006***	0.003	0.002	0.009	0.008**	0.013	0.012*
	(2.28)	(2.76)	(0.37)	(0.57)	(1.58)	(2.50)	(1.29)	(1.95)
$DTURN_t$	-0.060	-0.053	-0.049	-0.003	0.006	-0.079	0.398*	0.133
	(-0.32)	(-0.43)	(-0.22)	(-0.02)	(0.03)	(-0.68)	(1.76)	(0.93)
$ACCM_t$	-0.157	-0.180**	-0.339*	-0.298***	0.033	0.013	0.231	0.150*
	(-1.29)	(-2.49)	(-1.87)	(-2.73)	(0.39)	(0.23)	(1.59)	(1.68)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed	Yes	Yes	No	No	Yes	Yes	No	No
Firm Fixed	No	No	Yes	Yes	No	No	Yes	Yes
Number of Obs.	3,288	3,288	3,197	3,197	3,262	3,262	3,167	3,167
Adjusted R^2	0.005	0.008	0.221	0.231	0.008	0.011	0.218	0.217

TABLE 10: Estimation Results Using Cross-sectional Variation in Financial Expertise

The table reports the OLS estimation results using cross-sectional variation in external governance. The dependent variable is stock price crash risk, measured as NCSKEW or DUVOL. The independent variable is AC1, defined as the ratio of AC equity-based compensation to total compensation. AC_CHAIR is a dummy variable equal to 1 if the chairperson of an AC has accounting expertise and 0 otherwise. AC_EXPERTISE is defined as the ratio of the number of AC members with accounting expertise to the total number of AC members. Robust standard errors clustered by firm are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Appendix A provides full variable definitions.

Panel A: Subsample analysis by AC chair with and without financial expertise

	AC_CHAIR = 1				AC_CHAIR = 0			
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$AC1_t$	-0.119*	-0.095***	-0.217***	-0.134***	-0.046	-0.032	-0.094	-0.057
	(-1.93)	(-2.60)	(-2.70)	(-2.66)	(-1.11)	(-1.22)	(-1.54)	(-1.49)
RET_t	0.405	0.433	-0.102	0.238	0.640*	0.374	-0.177	-0.124
	(0.57)	(1.03)	(-0.09)	(0.34)	(1.72)	(1.57)	(-0.34)	(-0.37)
$SIGMA_t$	3.619	3.735	-2.696	0.093	6.037**	3.903**	-0.441	-0.337
	(0.89)	(1.55)	(-0.44)	(0.02)	(2.41)	(2.48)	(-0.12)	(-0.15)
$NCSKEW_t$	-0.001	-0.004	-0.122***	-0.074***	-0.012	-0.011	-0.120***	-0.073***
	(-0.04)	(-0.32)	(-5.17)	(-5.34)	(-0.63)	(-0.90)	(-5.83)	(-5.32)
$SIZE_t$	0.010	0.014	0.342***	0.222***	0.017	0.008	0.174***	0.116***
	(0.64)	(1.34)	(6.60)	(6.64)	(1.52)	(1.03)	(4.74)	(4.75)
ROA_t	0.373*	0.254**	-0.292	-0.172	0.282	0.207*	0.528**	0.259
	(1.91)	(2.11)	(-0.90)	(-0.96)	(1.51)	(1.81)	(2.04)	(1.52)
LEV_t	0.273**	0.116	0.230	0.105	0.146	0.084	0.290	0.147
	(1.98)	(1.38)	(1.02)	(0.76)	(1.26)	(1.16)	(1.28)	(1.04)
MB_t	0.004	0.004	-0.002	-0.001	0.010**	0.009***	0.007	0.008*
	(0.93)	(1.57)	(-0.29)	(-0.20)	(2.17)	(3.10)	(0.98)	(1.85)
$DTURN_t$	-0.200	-0.177	0.189	0.045	0.159	0.008	0.524***	0.229*
	(-0.99)	(-1.38)	(0.83)	(0.31)	(0.84)	(0.071)	(2.65)	(1.81)
$ACCM_t$	0.109	0.018	-0.121	-0.136	0.007	-0.019	-0.061	-0.067
	(0.88)	(0.25)	(-0.61)	(-1.07)	(0.08)	(-0.32)	(-0.34)	(-0.65)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed	Yes	Yes	No	No	Yes	Yes	No	No
Firm Fixed	No	No	Yes	Yes	No	No	Yes	Yes

Number of Obs.	2,863	2,863	2,787	2,787	3,687	3,687	3,598	3,598
Adjusted R^2	0.016	0.021	0.241	0.235	0.027	0.041	0.200	0.210

Panel B: Subsample analysis by the level of accounting expertise in an AC

	High AC_EXPERTISE				Low AC_EXPERTISE			
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$AC1_t$	-0.101*	-0.073**	-0.152**	-0.084*	-0.054	-0.039	0.074	-0.047
	(-1.88)	(-2.19)	(-2.11)	(-1.91)	(-1.22)	(-1.42)	(-1.18)	(-1.20)
RET_t	0.528	0.452	0.272	0.473	0.548	0.331	-0.219	-0.281
	(0.88)	(1.21)	(0.33)	(0.91)	(1.39)	(1.32)	(-0.40)	(-0.81)
$SIGMA_t$	5.562	4.657**	2.546	2.487	4.729*	3.159*	-2.046	-1.840
	(1.49)	(2.03)	(0.47)	(0.74)	(1.80)	(1.91)	(-0.53)	(-0.76)
$NCSKEW_t$	-0.021	-0.020	-0.140***	-0.088***	0.008	0.002	-0.100***	-0.057***
	(-0.87)	(-1.47)	(-5.71)	(-5.98)	(0.41)	(0.19)	(-4.89)	(-4.26)
$SIZE_t$	0.015	0.019*	0.276***	0.188***	0.012	0.003	0.193***	0.123***
	(0.97)	(1.95)	(5.81)	(6.11)	(0.99)	(0.40)	(5.00)	(4.70)
ROA_t	0.439**	0.327***	0.111	0.081	0.259	0.169	0.155	0.032
	(2.33)	(2.59)	(0.41)	(0.47)	(1.36)	(1.52)	(0.56)	(0.19)
LEV_t	0.216*	0.102	0.438**	0.224	0.203	0.097	0.068	-0.015
	(1.77)	(1.36)	(2.01)	(1.62)	(1.55)	(1.28)	(0.31)	(-0.11)
MB_t	0.008*	0.006**	-0.001	-0.002	0.006	0.007**	0.011	0.012**
	(1.74)	(2.21)	(-0.15)	(-0.59)	(1.30)	(2.38)	(1.48)	(2.45)
$DTURN_t$	-0.158	-0.134	0.033	-0.001	0.110	-0.049	0.437**	0.139
	(-0.78)	(-1.03)	(0.15)	(-0.00)	(0.61)	(-0.43)	(2.40)	(1.17)
$ACCM_t$	0.050	0.008	-0.031	-0.044	0.053	-0.016	-0.058	-0.066
	(0.44)	(0.11)	(-0.18)	(-0.41)	(0.52)	(-0.25)	(-0.34)	(-0.64)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed	Yes	Yes	No	No	Yes	Yes	No	No
Firm Fixed	No	No	Yes	Yes	No	No	Yes	Yes
Number of Obs.	2,701	2,701	2,611	2,611	3,849	3,849	3,748	3,748
Adjusted R^2	0.018	0.026	0.242	0.245	0.023	0.032	0.215	0.215

TABLE 11: Stock-based Versus Option-based Equity Incentives

The table reports regression results for distinguishing AC equity incentives into option awards and stock awards. The dependent variable is stock price crash risk, measured as NCSKEW in the column (1)-(3) regressions and DUVOL in the column (4)-(6) regressions, respectively. We follow Campbell et al. (2013) and separate AC equity compensation into option-based compensation and non-option equity compensation. OPTIONAWD is defined as the natural logarithm of the value of annual option awards provided to the audit committee. STOCKAWD is defined as the natural logarithm of the value of annual stock awards provided to the audit committee. *t* values in parentheses are calculated using robust standard errors clustered by firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels. Appendix A provides full variable definitions.

Panel A: Option Awards

	$NCSKEW_{t+1}$			$DUVOL_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
OPTIONAWD	-0.004**	-0.005**	-0.004**	-0.003**	-0.003**	-0.003**
	(-2.10)	(-2.30)	(-2.02)	(-2.21)	(-2.42)	(-2.01)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	Yes	No	Yes
Industry FE	No	Yes	Yes	No	Yes	Yes
Number of Obs.	6,550	6,550	6,550	6,550	6,550	6,550
Adjusted R^2	0.019	0.021	0.033	0.027	0.023	0.042

Panel B: Stock Awards

	$NCSKEW_{t+1}$			$DUVOL_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
STOCKAWD	0.002	0.003	0.001	0.001	0.002	0.001
	(0.62)	(0.89)	(0.51)	(0.68)	(0.92)	(0.48)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	Yes	No	Yes
Industry FE	No	Yes	Yes	No	Yes	Yes
Number of Obs.	6,550	6,550	6,550	6,550	6,550	6,550
Adjusted R^2	0.019	0.020	0.033	0.026	0.023	0.041

Conflict of Interest Statement

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