Executive Team Heterogeneity and Information Suppression

Xiaohua Fang*
fangx@fau.edu
Florida Atlantic University

Yiwei Li
yiwei.li@essex.ac.uk
University of Essex

Jeffrey A. Pittman
jpittman@mun.ca
Memorial University and Virginia Tech

Yeqin Zeng
yeqin.zeng@durham.ac.uk
Durham University

*Corresponding author. We appreciate constructive comments on an earlier version of this paper from Rebecca Bachmann, Sumon Bhaumik, Jeffrey Callen, John Campbell, Jian Cao, Margaret Fong, Marc Goergen, Chris He, Jo Horton, Wen Jing, Bjørn Jørgensen, Stephannie Larocque, Zheng Liu, Christos Mavis, Danny McGowan, Facundo Mercado, Yuval Millo, Sarmistha Pal, Hari Sankaran, Sahoo Satish, Paparcuri Christian Simon, Byron Song, Sarah Stein, Bin Xu, Colin Zeng, and Yuping Zhao. We also appreciate insights from seminar participants at City University of Hong Kong, Florida Atlantic University, Hong Kong Baptist University, Queen's University Belfast, Surrey University, University of Copenhagen, Warwick University, WHU – Otto Beisheim School of Management, University of Aberdeen, University of Reading, Birmingham University, University of Sheffield, and University of Essex. Our research has also benefited from participants at the 2023 EAA Annual Congress, the 2023 FMA European Conference, and the 2023 CAAA Annual Conference.

Executive Team Heterogeneity and Information Suppression

ABSTRACT

We examine whether the equity incentive heterogeneity of the executive team engenders a positive externality by curtailing stock price crash risk. Supporting this prediction, we find a negative relation between the equity incentive heterogeneity of the executive team and stock price crash risk. Our strong, robust evidence implies that this equity incentive heterogeneity plays a major internal governance role in preempting corporate bad news hoarding activities. In additional analysis, we show that the impact of equity incentive heterogeneity on crash risk is stronger for firms experiencing severe agency conflicts and poor governance. Collectively, our results lend empirical support for the importance of developing a heterogeneous equity incentive structure to deter corporate misbehavior, which, in turn, constrains stock price crash risk.

Keywords: Executive team; equity incentive heterogeneity; crash risk.

Data Availability: Data used in this study are available from the sources identified in the paper.

1. Introduction

Extensive prior theory and evidence stresses that the separation between ownership and control engenders an agency problem (Berle and Means 1932; Jensen and Meckling 1976); i.e., managers as agents maximize their personal utility at the expense of the firm's shareholders. In adopting this single-agent perspective, empirical research documents that managerial characteristics play an integral role in corporate outcomes (Buchholtz and Ribbens 1994; Waldman et al. 2001; Bertrand and Schoar 2003; Bartov et al. 2007; Fan et al. 2007; Malmendier and Tate 2005, 2008; Jiang et al. 2010; Chang et al. 2010; Bamber et al. 2010; Kim et al. 2011a; Malmendier et al. 2011; Lewis et al. 2014; Benmelech and Frydman 2015; Quigley and Hambrick 2015; Kim et al. 2016; Bonsall et al. 2017; Baginski et al. 2018; Campbell et al. 2020; Dikolli et al. 2021). However, given the fact that most public firms are run by a group of executives as a team, rather than a single person (i.e., the CEO), and the paucity of archival evidence on how an executive team affects the agency problem, it is important to examine whether corporate misbehavior—and, in turn, the equity return distribution—is sensitive to executive team characteristics. In this study, we help close this gap in prior work by analyzing the relation between the incentive structure of executive teams (i.e., incentive heterogeneity) and stock price crash risk, which stems from corporate bad news hoarding.

We define incentive heterogeneity as the degree to which incentives are spread unevenly across executives. We focus on the incentive heterogeneity of equity portfolios across an executive team as a proxy for its incentive structure that captures the synergy level of the entire executive team, rather than the sum of each individual member's impact. This specification provides more information beyond the average incentive level of the team. Jensen and Murphy (1990a) recommend that firms award equity-based compensation to managers in striving to align their interests with shareholders. The reliance on stock- and option-based compensation has risen steeply since the 1990s, leading to the large wealth creation enjoyed by U.S. companies. However, multiple crises, including the dot-com bubble in the late 1990s, the 2001–2002 corporate scandals, and the 2007–2009 financial crisis, have cast doubt on whether equity incentives work in aligning managers' and shareholders' interests given that the sensitivity of managerial wealth to stock prices through stock and option holdings motivates managers to pursue short-term behavior that inflates share prices at the expense of long-run firm value (Bebchuk et al. 2011; Kim et al. 2011a; Senbet 2011). In narrowly focusing on CEOs' and CFOs' equity incentives, extant research provides mixed evidence on the incentive alignment argument (Jiang et al. 2010; Kim et al. 2011a; Jayaraman and Milbourn 2015). We focus on exploring whether the incentive structure of executive teams plays a role in aggravating or mitigating the agency problem.

Corporate bad news hoarding evident in stock price crash risk provides an opportune setting for our analysis for several reasons. First, public firms' decision on whether to divulge material information usually encompasses multiple business functions, including operations, financing, investing, and technology, among others. To conceal bad news from the market, most members of an executive team, if not all, need to reach a consensus on suppressing the news by remaining silent. For instance, in the Enron scandal, nearly the full executive team was complicit in exploiting off-balance-sheet devices and complex tax planning to withhold negative information for an extended period until the cumulative losses became unsustainable (Powers et al. 2002).[1] Accordingly, corporate bad news hoarding may reflect the collective action by an executive team, rather than any single executive operating alone. In contrast, extant research on the bad news

[1] According to the investigation by Powers et al. (2002), the executives operating behind the scenes include Kenneth Lay (Founder, Chairman and CEO), Jeffrey Skilling (COO and CEO), Andrew Fastow (Chief Finance Officer), Mark Koenig (Chief Investor Relations Officer), Richard Causey (Chief Accounting Officer), Ben Glisan Jr. (Treasurer), Kenneth Rice (Broadband Unit CEO), Kevin Hannon (Broadbank Unit COO), and Paula Rieker (Corporate Secretary) (https://www.chicagotribune.com/sns-ap-enron-trial-glance-story.html).

hoarding theory of crash risk seldom considers the role that an executive team plays in shaping agency conflicts. Instead, prior work implicitly adopts a single-agent framework in presuming that a CEO or CFO has absolute control and strong incentives to hoard firm-specific bad news (Jin and Myers 2006; Kim et al. 2011a, 2011b; Callen and Fang 2013, 2015a). In short, evidence on the direct impact of executive teams on corporate bad news hoarding remains scarce.

Grounded in research on crash risk (Jin and Myers, 2006; Kim et al., 2011a, 2011b; Callen and Fang, 2013, 2015a), we focus on the market-based risk measure of stock price crash risk as a far more comprehensive metric that should reflect *all* manner of bad news hoarding. First, a firm has multiple information channels (e.g., accrual manipulation, opaque financial statement notes, classification shifting, off-balance-sheet devices, press releases, earnings guidance, and conference calls) to exploit in hiding bad economic news. Although an individual executive may prefer to rely on a specific channel, an executive team is more likely to utilize several channels to convey or delay the sharing of negative information with investors. Consequently, measuring bad news hoarding at the corporate level is challenging. Given that there are so many options for suppressing bad news in ways not captured by a specific channel metric, examining a market-based measure of bad news hoarding improves identification. Second, another potential issue arising from focusing on a specific channel is that channel substitution may undermine reliable inference. For example, if an executive team substitutes accrual manipulation by concealing negative information in other ways, this may not necessarily affect overall bad news hoarding. Accordingly, any analysis based on a specific channel metric would be vulnerable to reaching false conclusions about the impact of the variable of interest on corporate bad news hoarding.[2]

[2] Alternative metrics such as the incidence of financial restatements are problematic because they are rare events, and do not necessarily reflect a general policy of bad news hoarding by a firm (e.g., DeFond and Zhang 2014). Compared to these metrics, our evidence based on a market-based risk measure offers generalizable inferences concerning the impact of executive teams on bad news hoarding for a broad sample of firms.

We explore the empirical implications of prior theory. Acharya et al. (2011) develop a model of internal governance that focuses on how the potential reactions of other executives constrains CEOs' self-dealing behavior. In treating a firm as a composition of diverse agents with different characteristics (e.g., horizons, preferences, and opportunities) that shape misappropriation and growth, they show that this type of internal governance can alleviate the agency problem even without sound external governance. The main takeaway from this theory is that the constraints that members across an executive team impose on each other keep each individual member on a short leash, even when external governance is lax. In analyzing multi-agent optimal contracting with synergy, Edmans et al. (2013) hold that the simultaneous design of equity incentives across an executive team to incorporate synergies leads to the equity incentive of each executive containing a synergy part that is intricately related to the equity incentives of other executives through interactive relations. It follows that the distribution of the equity incentives of an executive team reflects synergy information that cannot be understood by simply examining the equity incentives of individual executives in isolation. Despite their different underlying assumptions and settings, Acharya et al. (2011) and Edmans et al. (2013) both imply that, given the synergy from the interactions among executives, examining an executive team can provide valuable insight into its role in corporate behavior beyond simply separately examining the constituent individual executives.

We expect that the equity incentive heterogeneity of executive teams operates in the following manner to affect stock price crash risk. Consistent with prior research (Larcker 1983; Datta et al. 2001; Devers et al. 2008), executives with high (low) equity incentives are more (less) eager to undertake risky activities to inflate short-term stock prices to the detriment of outside shareholders. It follows that members of an executive team may have divergent opinions or preferences over business actions, including on whether to engage in bad news hoarding, particularly when there is wide variation in their incentive levels. Additionally, group decision-making research suggests that within-group divergent preferences can strengthen the group's scrutiny of issues and make its consensus-reaching process more diligent by intensifying the discussion process, thereby improving decision quality and reducing the likelihood of misjudgments (Eisenhardt and Schoonhoven 1990; Jehn 1995; Amason 1996; Pelled et al. 1999; Simons and Peterson 2000; Moon et al. 2003).[3] Collectively, prior research implies that it would be hard to accept that an executive team would elect to suppress bad news when it possesses high equity incentive heterogeneity. As such, the internal governance synergy stemming from high equity incentive heterogeneity of executive teams reduces bad news hoarding, which, in turn, lowers the likelihood of a stock price crash.

Using a comprehensive panel sample of S&P 1500 firms covered by ExecuComp over the 1992-2017 period, we examine the link between the equity incentive heterogeneity of executive teams and stock price crash risk. We rely on several standard techniques to measure crash risk (Kim et al. 2011a, 2011b; Callen and Fang 2013, 2015a), which enables us to evaluate whether our core evidence persists across multiple constructs of negative skewness, down-to-up volatility, and the balance of weeks between extremely negative and positive returns. We gauge an executive's equity incentive as the share of her total compensation that would come from a one-percentage-point increase in the value of the firm's equity (Core and Guay 2022; Bergstresser and Philippon 2006). Prior work implies that executives' equity incentives are positively related to earnings manipulation (Bergstresser and Philippon 2006) and future crash risk (Kim et al. 2011a).

[3] Recent research suggests that extreme negative outcomes in the equity market play a major role in shareholder welfare (e.g., Xing et al. 2010; Kelly and Jiang 2014). As such, stock price crashes stemming from corporate bad news hoarding undermine shareholder value-maximization and reflect a poor decision-making strategy by the management team in failing to protect the interests of all investors.

Reflecting data availability in ExecuComp, we focus on firms' five highest-paid (top five) executives. For each firm–year observation, we specify the Gini coefficient and the coefficient of variation of the top five executives' equity incentives as the two major proxies for the equity incentive heterogeneity of the executive team. The two proxies complement each other in measuring the variation of executives' equity incentives from the standpoint of an executive team.

Consistent with the narrative that the equity incentive heterogeneity of executive teams is more likely to curb corporate bad news hoarding activities, we find strong, robust evidence that the equity incentive heterogeneity of executive teams is negatively associated with stock price crash risk. Reflecting its first-order economic impact, differences in stock price crash risk corresponding to shifting the equity incentive heterogeneity of executive teams from the 25th to the 75th percentile, on average, translate into at least 31.02% of the sample means across the three alternative measures, after controlling for a variety of firm-level factors known to affect crash risk as well as industry and year fixed effects.

Firms with high versus low equity incentive heterogeneity of their executive teams may differ in unobservable firm characteristics that are related to stock price crash risk. To help dispel potential endogeneity concerns, we implement three techniques designed to sharpen identification. First, we successively apply propensity score matching and entropy balancing approaches to identify firms with high versus low equity incentive heterogeneity, which are indistinguishable on the observed firm characteristics. Afterward, we compare the crash risk between these two groups of firms. Second, we run a two-stage least squares (2SLS) estimation with the industry average of equity incentive heterogeneity as our corresponding instrumental variable. Finally, we estimate our baseline regression using firm and year fixed effects. In all three cases, we continue to find a negative relation between equity incentive heterogeneity and crash risk after confronting the identification threat that endogeneity poses.

Our core results hold in extensive sensitivity analysis. For starters, the evidence is robust to directly controlling for CEOs' and CFOs' equity incentives, age, tenure, and power, as well as tournament incentives. Also, the supportive evidence remains when we measure incentive heterogeneity with the dispersion of the other top four executive equity incentives from CFO or CEO equity incentives and the range of the top five executive incentives. Additionally, our main results persist when we rely on alternative measures of crash risk, such as different models to estimate firm-specific weekly returns and different thresholds to reflect extreme firm-specific weekly returns.

Next, we deepen the analysis by examining the cross-sectional variation in the relation between the equity incentive heterogeneity of executive teams and stock price crash risk. If equity incentive heterogeneity plays a role in internal governance by constraining bad news hoarding, we would expect crash risk to fall more steeply for firms with more severe agency conflicts and poorer governance. Consistent with these conjectures, we document that the observed negative impact of incentive heterogeneity on crash risk is concentrated in firms with less comparable financial reports, lax external monitoring, and worse board governance.

We make four major contributions to prior work. First, we advance recent evidence on the importance of executive team characteristics to economic outcomes. We initiate research on the link between the equity incentive heterogeneity of executive teams and firms' bad news hoarding evident in crash risk. By emphasizing a unique perspective—higher moments of the stock return distribution (i.e., extreme negative returns)—we provide insight on the direct economic implications of executive teams for the capital markets. Our analysis complements Steinbach et al.'s (2017) evidence implying that equity incentive heterogeneity helps investors better evaluate corporate acquisition investments. Distinct from Steinbach et al. (2017), we directly examine the role that the equity incentive structure of executive teams plays in the information disclosure for a broad sample of firms. In particular, we document a positive consequence that executive teams bring to firms and their shareholders. Recent research highlights the importance of shedding light on the determinants of extreme outcomes in the equity market that have a large impact on the welfare of shareholders (Pan 2002; Xing et al. 2010; Yan 2011; Kelly and Jiang 2014). Our empirical evidence helps enrich our understanding of the role that executive teams versus individual executives play in influencing shareholder welfare through the timely disclosure of negative information, rather than its suppression.

Second, we extend research on the empirical relevance of the bad-news hoarding theory of stock price crash risk. A series of recent studies suggest that firm-level characteristics shape bad news hoarding activities evident in crash risk (Kim et al. 2011a, 2011b; Kim and Zhang 2016; Callen and Fang 2013, 2015a, 2015b; Francis et al. 2016; Ertugrul et al. 2017; Li and Zhan 2019; Bauer et al. 2021; Fang et al. 2021; Hasan et al. 2022). However, prior work seldom considers the impact of executive teams on crash risk despite that public firms are typically managed by teams. In analyzing the importance of internal governance synergy, we examine whether bad news hoarding decisions vary with the equity incentive heterogeneity of executive teams. Accordingly, we respond to calls for research isolating the role that the equity incentives of the entire management team play in corporate misbehavior given the routinely wide variation in these incentives across executives in the same firm (e.g., Davidson 2022).[4]

[4] For example, Davidson (2022) finds that firms become more likely to orchestrate fraudulent financial reporting once at least three members of the executive team have relatively strong equity incentives. It is constructive to expand the number of executives under study to more comprehensively examine their impact on economic outcomes given

Third, prior research on team-based compensation usually focuses on the variation in executive pay levels. Although pay-level distributions are important, we extend the team-based compensation literature by examining the governance role that patterns in executive equity incentives play. In behavioral research, Henderson and Fredrickson (2001) find that equal pay levels foster coordination and collaboration among management teams. In contrast, our evidence suggests that incentive heterogeneity leads to prudent managerial decisions by ensuring that the executive team focuses intently on comprehensively weighing issues before reaching a consensus. Kini and Williams (2012) document that stronger tournament incentives result in more risk-taking by senior managers in striving to increase their chance of promotion to the CEO position. Our findings imply that top executives more closely monitor when they have diverse equity incentives, which constrains the suppression of bad news.[5]

Importantly, our analysis contributes beyond Kim et al. (2011a), who examine the impact of CEOs' and CFOs' equity incentives in isolation on stock price crash risk, in three ways. First, while Kim et al. (2011a) focus on the equity incentives of these two executives, we analyze the executive team as a whole to evaluate the governance synergy effect stemming from interactions among individual executives. Second, in documenting its dark side, Kim et al. (2011a) find that stock price crash risk rises in the presence of individual executives' equity incentives, especially options. In contrast, supporting the bright side of equity incentives, our empirical evidence suggests that properly designing equity incentives across the executive team as a whole could

---

extensive prior research implying that even CEOs and CFOs respond differently to equity incentives (e.g., Aggarwal and Samwick 1999; Chava and Purnanandam 2010; Feng et al. 2011; Kim et al. 2011a).

[5] It is important to clarify that the underlying mechanisms of incentive heterogeneity and tournament incentives are fundamentally different. Bebchuk et al. (2011) find that CEO pay slice—the fraction of the total compensation of the top five executives captured by the CEO—engenders agency problems, undermining firm value. Our evidence implies that incentive heterogeneity mitigates individual managers' risk-taking and bad news hoarding activities induced by equity incentives. It follows that incentive heterogeneity and the dispersion of executive pay levels have different implications for managerial decision-making.

alleviate agency problems, reducing the bad news hoarding that is behind stock price crash risk. Additionally, we find that after incorporating CEOs' and CFOs' option incentives into the analysis, the inverse relation between the equity incentive heterogeneity of executive teams and crash risk holds both statistically and economically, reinforcing its governance role. These results are consistent with the intuition that corporate decision-making reflects the collective synergy efforts by executive members as a team, beyond any action taken by individual executives alone. Accordingly, we complement Kim et al.'s (2011a) evidence by providing important insights on the governance role of the executive team's incentive structure.[6]

Finally, our results lend empirical support to Acharya et al.'s (2011) and Edmans et al.'s (2013) theories on the importance of executive teams to corporate behavior. We identify a major channel distinguishing an executive team from individual executives in affecting the agency problem responsible for bad news hoarding. This evidence is consistent with Edmans et al. (2013) in that the optimal contracting response to the synergistic relationships among executives may involve ensuring ample variation in equity incentives across executives.

The paper proceeds as follows. Section 2 reviews prior theory and evidence in motivating our testable prediction. Section 3 describes the sample, variable measurement, and research design. Section 4 reports results from the main regressions, endogeneity tests, and additional sensitivity analyses. We cover the cross-sectional analyses in Sections 5. Section 6 provides further discussion on Kim et al. (2011a) and related tests. Section 7 concludes.

2. Motivation

2.1. Prior research on bad news hoarding and stock price crash risk

[6] It is important to stress that our evidence does not remotely invalidate Kim et al. (2011a). For example, their study is highly relevant for CFO-dominant firms.

Prior research maintains that career and short-term compensation concerns induce managers to delay divulging bad news to the market as long as possible (i.e., bad news hoarding).[7] Indeed, Graham et al.'s (2005) survey evidence implies that managers tend to delay the disclosure of bad news relative to good news. Anecdotal evidence during the past two decades highlights the issue of bad news hoarding in public firms. For example, Enron arranged off-balance-sheet Special Purpose Vehicles to conceal assets that were losing money for a prolonged period until the accumulated losses were no longer sustainable (Powers et al. 2002). In 2007 and 2008, Lehman exploited off-balance sheet devices, known as "Repo 105" transactions, to temporarily remove securities inventory from its balance sheet, thereby reducing its publicly reported net leverage (Valukas 2010).

In their seminal research, Jin and Myers (2006) model from an agency standpoint how bad news hoarding engenders stock price crash risk. They hold that career, compensation, and other concerns motivate managers to hide bad news stemming from temporary poor performance by controlling the disclosure of negative information about firm fundamentals to the market. However, Jin and Myers (2006) theorize that a threshold level exists at which managers will abandon the suppression of bad news. They argue that managers are willing to personally absorb limited downside risk and losses related to temporary bad performance. Jin and Myers (2006: 259) further stress that: "If a sufficiently long run of bad firm-specific news is encountered, insiders give up and all the bad news comes out at once. Giving up means a large negative outlier in the distribution of returns [a crash]."

---

[7] Basu (1997) holds that managers often possess valuable inside information about firm operations and asset values, and that if their compensation hinges on earnings performance, then they are inclined to hide any information that will negatively affect earnings. Ball (2009) argues that empire building and a desire to maintain the esteem of a firm's peers motivate managers to conceal bad news.

Relying on the agency perspective in Jin and Myers (2006), recent empirical research suggests that *ex post* realized stock price crash risk increases with tax avoidance strategies (Kim et al. 2011b), CFO/CEO equity-based compensation (Kim et al. 2011a) and claw back provisions (Bao et al. 2018), transient institutional ownership and short interest (Callen and Fang 2013, 2015b), political incentives (Piotroski et al. 2015), CEO optimism (Kim et al. 2016), accruals and operating accruals (Zhu 2016), the readability of financial reports (Ertugrul et al. 2017; Kim et al. 2019), and stock liquidity (Chang et al. 2017). Other research implies that several formal and informal control mechanisms effectively curb the extreme left-tail risk, including religiosity of the county in which the firm is headquartered (Callen and Fang 2015a), the adoption of International Financial Reporting Standards (DeFond et al. 2015), financial reporting conservatism (Kim and Zhang 2016), external monitoring by professional auditors (Callen and Fang 2017, 2020), and sound internal control systems (Lobo et al. 2020).

Collectively, prior work examines corporate bad news hoarding from a single-agent perspective by presupposing that managers, including CEOs and CFOs, are eager to conceal bad news. However, given the fact that most public firms are managed by an executive team, rather than a single executive on their own, it is crucial to consider the role that dynamic interactions within the executive team play in shaping the incentives and capacity to orchestrate bad news hoarding. We help close this gap in extant research.

2.2. Empirical prediction

We extend prior research by analyzing the empirical link between the equity incentive heterogeneity of executive teams and stock price crash risk. Acharya et al. (2011) develop a model of internal governance where executives in a management team may restrict each other's self-serving actions, even in the absence of rigorous external governance. In proposing a multi-agent optimal contracting model, Edmans et al. (2013) highlight the possibility that heterogeneous executive compensation incentives may exert synergies among management team members. Consistent with the multi-agent framework on management teams, Aggarwal and Samwick (2003) show that the compensation incentives of top executives vary by their job classification and responsibility. Given frictions, such as information asymmetry and adjustment costs, board directors can only infrequently modify top executives' compensation packages in practice. Individual executives may also choose to either accumulate or exercise their incentive pay according to their stage in the career lifecycle. As such, there exists ample cross-sectional variation in executive compensation incentives. We expect that the equity incentive heterogeneity of executive teams may affect stock price crash risk in several ways.

First, prior work implies that executives with high (low) equity incentives are more (less) prone to engage in risky activities in order to boost short-term stock prices at the expense of shareholders' interests (Larcker 1983; Datta et al. 2001; Devers et al. 2008). Benmelech et al. (2010) further show that equity-based compensation motivates managers to hide bad news from investors, potentially leading to an inflated share price that can later culminate in a crash. The empirical evidence in Kim et al. (2011a) lends support to Benmelech et al.'s (2010) theory. We expect that members in an executive team may have divergent preferences or opinions over business actions, including whether to commit bad news hoarding, particularly when their incentive levels exhibit wide variation. From the perspective of individual executives, assuming a fixed cost of hiding bad news (e.g., litigation cost, reputation loss, and emotional dissonance), it is natural that executives with low (high) equity incentives may consider the expected cost of hiding bad news to be higher (lower) than its benefits in the form of raising stock/options values such that they are less (more) likely to hide bad news. Consequently, incentive heterogeneity would make it difficult for individual members belonging to an executive team to reach a consensus on whether to suppress bad news *ex ante*, which, in turn, delays the actual occurrence and lowers the likelihood of corporate bad news hoarding.

Second, studies in psychology and management on team decision-making suggest that compared to homogeneous teams, heterogeneous teams routinely make better decisions (De Dreu and Weingart 2003). Alexiev et al. (2010) find that top management team heterogeneity facilitates firms in utilizing internal advice by gathering different perspectives and developing new strategies and products. As shown in Acharya et al. (2011), other key executives, in contrast to self-serving CEOs, may have strong incentives to refrain from pursuing actions that improve short-term firm performance at the expense of long-term firm value. These executives are also firm insiders who possess valuable operational information and may reveal their private information to the board of directors. Further, group decision-making research implies that within-group divergent preferences can strengthen a group's scrutiny of issues and make its consensus-reaching process more diligent, improving decision quality and reducing misjudgment (Jehn 1995; Amason 1996; Pelled et al. 1999; Simons and Peterson 2000; Moon et al. 2003). Relative to their homogenous counterparts, a heterogeneous group is more apt to raise decision-related issues and debate them vigorously. Correspondingly, such conflicts broaden executives' fields of vision, stimulate effective information sharing and evaluation, and enhance the decision-making process among members of executive teams (Williams et al. 1995; De Dreu and Weingart 2003). Reflecting members' divergent views, executive teams with heterogeneous equity incentives are more likely to participate in group discussions on the merits of disclosure strategies, improving the quality of information released to investors. In short, it would be hard for executive teams with heterogeneous equity incentives to reach an affirmative decision to undertake corporate bad news hoarding for their own benefit to the detriment of shareholders.

Accordingly, we expect to observe that the equity incentive heterogeneity of executive teams would deter corporate bad news stockpiling, translating into lower stock price crash risk. This leads to the prediction that crash risk subsides with the equity incentive heterogeneity of executive teams:

> *HYPOTHESIS 1. The equity incentive heterogeneity of executive teams is negatively related to firm-specific stock price crash risk.*

It is important to stress that wider incentive heterogeneity may undermine executive team integration. Indeed, diversity amounts to a double-edged sword by increasing the opportunity for creativity and synergy as well as the likelihood that group members will become dissatisfied and fail to identify with the group (Milliken and Martins 1996). Given that the work of top executives is interdependent, a homogeneous compensation structure may enhance corporate decision-making by reducing interpersonal competition and facilitating teamwork cooperation (Pfeffer 2005). Incentive heterogeneity can also make decision implementation more difficult (Nemeth and Staw 1989). In the event that individual executives fail to properly coordinate their activities, executive teams may make sub-optimal firm decisions, elevating crash risk. Accordingly, the relation between incentive heterogeneity and crash risk distills to an empirical question.

3. Data and variables

3.1. Sample and data sources

We begin assembling our sample by downloading all firm–year observations in the ExecuComp database between 1992 and 2017.[8] To measure an executive team's equity incentive

[8] The ExecuComp database covers all public firms in the S&P 1500 index and firms that were previously included in the index. Representing 90% of the U.S. stock market capitalization, the S&P 1500 index includes all stocks in the S&P 500, S&P MidCap 400, and S&P SmallCap 600 indexes.

heterogeneity, we require that firms have available data on their five executives with the highest total compensation reported in ExecuComp. After deleting firm–year observations with missing accounting data in COMPUSTAT and stock return data in Center for Research in Security Prices (CRSP), we follow Kim et al. (2011a) and Callen and Fang (2013) by removing firm–year observations with non-positive book values and total assets, fiscal-year-end stock prices less than $1, and fewer than 26 weekly stock return data. After imposing these screens, we are left with a final sample containing 26,992 firm–year observations representing 2,782 unique firms. To address potential outliers, we winsorize all regressors at the 1% and 99% levels, consistent with Jin and Myers (2006).[9] For our empirical tests, we also collect institutional ownership data from the Thomson Reuters 13F database and Fama–French industry return data from Kenneth R. French's website.

3.2. Dependent variables: Stock price crash risk

Consistent with prior research (e.g., Chen et al. 2001; Jin and Myers 2006; Kim et al. 2011a, 2011b; Callen and Fang 2013, 2015a), we construct three *ex post* measures of firm-specific stock price crash risk. Based on weekly stock returns, we first estimate the firm-specific weekly returns from the following expanded market and industry index model regression for each firm and year:

$$r_{j,t} = \alpha_j + \beta_{1,j} r_{m,t-1} + \beta_{2,j} r_{i,t-1} + \beta_{3,j} r_{m,t} + \beta_{4,j} r_{i,t} + \beta_{5,j} r_{m,t+1} + \beta_{6,j} r_{i,t+1} + \varepsilon_{j,t} \quad (1)$$

where j indexes the firm, t indexes the week, i indexes the industry, $r_{j,t}$ is the return on stock j in week t, $r_{m,t}$ is the return on the CRSP value-weighted market index in week t, and $r_{i,t}$ is the return on the value-weighted industry index based on the Fama-French 48 industry classification in week t. We correct for non-synchronous trading by including lead and lag terms for the value-weighted market and industry indexes (Scholes and Williams 1977; Dimson 1979). We define the firm-

[9] Our empirical evidence is almost identical if we do not winsorize regressors or discard the observations outside the 1% and 99% levels.

specific weekly return, $W_{j,t}$, as the natural logarithm of one plus the residual return ($\varepsilon_{j,t}$) in Equation (1). We log transform the raw residual returns to reduce the positive skew in the return distribution, helping to ensure symmetry (Chen et al. 2001).[10] We specify weekly returns instead of daily returns in Equation (1) given that extreme negative returns in a single day may reverse in the next few days, leading to estimation noise in measuring real crash events.

We follow extensive prior research in defining our first measure of firm-specific crash risk (Chen et al. 2001; Kim et al. 2011a, 2011b): the negative coefficient of skewness (*NCSKEW*). Specifically, we calculate *NCSKEW* by taking the negative third moment of *W* and dividing it by the cubed standard deviation. For firm *j* in year *T*, we derive $NCSKEW_{j,T}$ as:

$$NCSKEW_{j,T} = -\left(n_{j,T}(n_{j,T}-1)^{\frac{3}{2}}\sum_{t=1}^{n_{j,T}} W_{j,t}^3\right)\Big/\left((n_{j,T}-1)(n_{j,T}-2)(\sum_{t=1}^{n_{j,T}} W_{j,t}^2)^{\frac{3}{2}}\right) \quad (2)$$

where $n_{j,T}$ is the number of available $W_{j,t}$ for firm *j* during fiscal year *T*. We scale the raw third central moment by the cubed standard deviation in the denominator, which allows for comparison across firm-specific returns with different variance. A higher value of *NCSKEW* indicates that firm *j*'s stock has a more negative-skewed return distribution and is more "crash prone" during fiscal year *T*.

Our second measure of firm-specific crash risk is *DUVOL*; i.e., the asymmetric volatility of negative versus positive returns. Consistent with Chen et al. (2001), Kim et al. (2011a), and Callen and Fang (2015a), we calculate *DUVOL* as the log ratio of downside volatility to upside volatility:

$$DUVOL_{j,T} = ln\{(n_{u,j,T}-1)\sum_{t=1}^{n_{u,j,T}} W_{j,t}^2 / (n_{d,j,T}-1)\sum_{t=1}^{n_{d,j,T}} W_{j,t}^2\} \quad (3)$$

[10] We verify that our core results are robust to estimating the measures of crash risk based on raw residual returns.

where $n_{u,j,T}$, ($n_{d,j,T}$) is the number of up (down) weeks for firm j's stock during fiscal year *T*. For each stock *j* during fiscal year *T*, we denote the up (down) weeks as those when $W_{j,t}$ is above (below) its annual mean. A higher value of *DUVOL* suggests that the downside risks of firm j's stock price are more frequent and/or more severe.

Our third measure, *COUNT*, reflects the number of weeks when *W* exceeds 3.2 standard deviations above or below its mean over a fiscal year, with 3.2 chosen to generate frequencies of 0.1% in the lognormal distribution. *COUNT* is equal to the downside frequencies minus the upside frequencies (Jin and Myers 2006; An and Zhang 2013). The likelihood of one upside or downside frequency during a fiscal year is 5.07% ($= 1 - (1 - 0.1\%)^{52}$). A larger value of *COUNT* implies a higher frequency of stock price crashes.

In our main empirical analyses, the dependent variables are the one-year-ahead crash risk proxy variables: $NCSKEW_{j,T+1}$, $DUVOL_{j,T+1}$, and $COUNT_{j,T+1}$. The independent variables are measured in year *T*.

3.3. Independent variables of interest: Equity incentive heterogeneity of executive teams

Our main measure of the equity incentive heterogeneity of executive teams is based on the equity compensation incentives of the firm's five executives receiving the highest level of total compensation. For each of the top five executives, we first specify an equity-based incentive ratio ($I_{j,i,T}$), consistent with Bergstresser and Philippon (2006):

$$I_{j,i,T} = \frac{Onepct_{j,i,T}}{Onepct_{j,i,T} + Salary_{j,i,T} + Bonus_{j,i,T}} \quad (4)$$

where j indexes the firm, i indexes the executive, T indexes the year, $Onepct_{j,i,T}$ is the dollar change in the value of executive i's stock and option holdings that would accompany a one-percentage-point increase in firm j's stock price, $Salary_{j,i,T}$ is executive i's annual salary, and $Bonus_{j,i,T}$ is executive i's annual salary bonus. $I_{j,i,T}$ captures executive i's incentives stemming from stock holdings and option holdings. The calculation of $Onepct_{j,i,T}$ is based on the implicit assumption that the option delta in the executive's compensation portfolio is one, which holds for deep-in-the-money options. For out-of-the-money options, we follow Bergstresser and Philippon's (2006) approach by estimating the option delta in three categories: options awarded in the current year, options awarded in the past but not yet exercisable, and options that can be exercised in the current year.[11]

We specify $I_{j,i,T}$ as our measure of an individual executive's equity incentive.[12] Kim et al. (2011a) report a positive relation between $I_{j,CFO,T}$ and stock price crash risk. Bergstresser and Philippon (2006) show that CEOs with higher $I_{j,CEO,T}$ are more apt to rely on discretionary accruals in manipulating earnings upward. For each firm-year observation in our sample, we calculate the average incentive ratio among a firm's top five executives as follows:

$$Ave_{j,T} = \frac{\sum_{i=1}^{5} I_{j,i,T}}{5} \quad (5)$$

We construct two proxies to capture the variation in executives' equity incentives in an executive team based on $I_{j,i,T,}$. Our first measure integrates the concept of the Gini coefficient. As a measure of statistical dispersion, the Gini coefficient has been used extensively to gauge the economic inequality of income or wealth distribution among a nation's residents (Donaldson and Weymark 1980). Management and strategy studies also specify the Gini coefficient to estimate pay dispersion across organizations (e.g., Bloom and Michel 2002; Shaw et al. 2002; Brown et al. 2003; Steinbach et al. 2017). The Gini coefficient ranges between zero and one, with zero (one)

[11] Please see Core and Guay (2002) for the detailed calculation procedure for $Onepct_{j,i,T}$ and Bergstresser and Philippon (2006) for a detailed discussion of the incentive ratio $I_{j,i,T}$.

[12] Our results are almost identical when we replace $I_{j,i,T}$ with unscaled $Onepct_{j,i,T}$ (Hall and Liebman 1998), $Onepct_{j,i,T}$ scaled by firm market value (Jensen and Murphy 1990b), or $Onepct_{j,i,T}$ scaled by CEO pay (Edmans et al. 2009).

indicating absolute equality (disparity). Specifically, we calculate the compensation incentive heterogeneity (*Het*$_{j,T}$) as follows:

$$Het_{j,T} = 1 + \frac{1}{5} - \frac{2}{5^2 Ave_{j,T}} \sum_{i=1}^{5} i * I_{j,i,T} \quad (6)$$

where $I_{j,1,T}$ ...... $I_{j,5,T}$ are the equity incentive ratios of firm j's top five executives sorted by descending size order. Firms with a higher $Het_{j,i,T}$ exhibit more equity incentive dispersion at the executive team level. It is important to stress that two firms with different Ave_T may have the same Het_T as long as the equity incentive ratios of the top five executives are distributed similarly within the two firms.

Besides the Gini coefficient, we employ the coefficient of variation, *COE,* of the top five executive incentive ratios as our second proxy for equity incentive heterogeneity, calculated as the standard deviation of $I_{j,1,T}$,......, $I_{j,5,T}$ normalized by the mean of $I_{j,1,T}$,......, $I_{j,5,T}$ (Pfeffer and Langton 1993). The coefficient of variation is unbounded and shows the variability of the incentive ratios in relation to their mean. In contrast to the coefficient of variation, the Gini coefficient is bounded between zero and one. The sensitivity of the Gini coefficient to incentive ratios depends on their ranks rather than their numeric scores. The Gini coefficient is more sensitive to the change in the incentive ratios around the middle of the distribution than the change in the largest and smallest ratios. As a general measure of dispersion, the Gini coefficient enables us to examine both the cross-sectional and time-series variation in equity incentive heterogeneity. In short, the two proxies complement each other in capturing the variation of equity incentives in an executive team.

3.4. Control variables

Consistent with prior work on the determinants of stock price crash risk (e.g., Chen et al. 2001; Kim et al. 2011a, 2011b; Callen and Fang 2013, 2015a), the regressions include a comprehensive set of control variables measured during the current fiscal year *T*. To capture the potential persistence of the third moment of stock returns, we control for the negative skewness of prior firm-specific stock returns (*NCSKEW*). We control for the volatility (*SIGMA*) and mean (*RET*) of past firm-specific weekly stock returns since Chen et al. (2001) document that firms with higher volatility and mean of past stock returns are more crash prone. Chen et al. (2001) and Hong and Stein (2003) find that investor belief heterogeneity is positively associated with the likelihood of stock price crashes. We control for the detrended stock trading volume (*DTURN*), calculated as the average monthly return turnover in year T minus the average monthly share turnover in year *T–1*, to reflect the divergence in investor opinions. Chen et al. (2001) find that large firms and firms with a high growth rate tend to have higher stock price crash risk. Accordingly, we control for firm size (*SIZE*), calculated as the natural logarithm of total assets, and the market-to-book ratio (*MB*), calculated as the ratio of the market value of equity over its book value. We follow prior studies on crash risk by controlling for a firm's profitability with its return on assets (ROA), calculated as the operating earnings divided by the total assets, measured at the end of the fiscal year. We also control for leverage, calculated as the ratio of long-term debt to total assets (*LEV*), the kurtosis of firm-specific weekly returns (*KUR*), and firm age (*AGE*).

Additionally, we control for financial reporting opacity (*OPAQUE*), computed as the absolute value of annual performance-adjusted discretionary accruals (Kothari et al. 2005; Kim et al. 2011a; Hanlon et al. 2014) and firm-level tax avoidance (*CASH_ETR*) using cash effective tax rates (Kim et al. 2011b; Hoopes et al. 2012). To control for real earnings management, the regressions include abnormal discretionary expense (*ABN_DISEXP*), abnormal cash flow from operations (*ABN_CF*), and abnormal production costs (*ABN_PROD*) (Francis et al. 2016). We control for external monitoring mechanisms with auditor tenure, *TENURE* (Callen and Fang 2017), the presence of a Big 4 auditor, *BIG4*; analyst coverage, *ANA* (Chen et al. 2001); the presence of dividend payments, *DIV* (Kim et al. 2018); the severity of SEC monitoring, *DISTANCE* (Kedia and Rajgopal 2011); the short interest ratio, *SIR_RATIO* (Callen and Fang 2013, 2015b); and dedicated institutional ownership, *DED* (Callen and Fang, 2013, 2015b). Finally, we control for the average incentive ratio among a firm's top five executives (*AVE*). In Appendix A, we provide detailed definitions of the regression variables.

4. Main empirical results

4.1. Descriptive statistics and univariate analysis

In Table 1, we report some descriptive statistics for all the variables used in our main empirical analyses. The sample period for our three crash risk variables is 1993–2018; it is 1992–2017 for the rest of the variables. The mean values (standard deviations) of $NCSKEW_{j,T+1}$, $DUVOL_{j,T+1}$, and $COUNT_{j,T+1}$ are 0.093 (0.844), -0.002 (0.374), and 0.036 (0.603), respectively. The summary statistics for the crash risk variables closely resemble those reported in prior research (e.g., Kim et al. 2011a, 2011b; An and Zhang 2013; Andreou et al. 2016). The mean of the Gini coefficient for the top five executive equity incentives (Het_T) is 0.296. Its standard deviation, 25th percentile, and 75th percentile are 0.147, 0.185, and 0.384, respectively, suggesting that the top five executive equity incentives span a very wide range for our sample firms. The mean and standard deviation of COE_T are 0.660 and 0.374, respectively. Figure 1 plots yearly averages of our equity incentive heterogeneity proxies over the sample period. The ample time-series variation implies that this testing ground provides sufficient power to identify the role that incentive heterogeneity of executive team plays in shaping crash risk, including when we estimate saturated models that control for time with dummy variables.

In this study, we analyze 26,992 firm-year observations, each comprising the five highest-paid executives. We measure equity incentive heterogeneity based on the equity incentive ratios of these top five executives within each firm. In Appendix C, we tabulate detailed frequency data according to executive job titles.[13] The title of CEO is the most common, appearing 26,197 times, which represents 19.41% of our total number of executives (26,992*5) and involves 5,592 unique individuals. The CFO title follows in frequency, occurring 21,287 times, or 15.77% of the total, constituting 5,912 unique individuals. The President title ranks third, with 20,990 appearances (15.55%) and the highest diversity, involving 8,571 unique individuals. The COO appears 15,390 times (11.40%) with 5,679 unique individuals. The Counsel title occurs 9,812 times (7.27%), involving 2,957 unique individuals. The titles of Executive Vice President and Senior Vice President are also significant, appearing 8,725 times (6.46%) and 7,730 times (5.73%), with 3,764 and 3,585 unique individuals, respectively. Finally, the title of non-CEO Chair occurs 5,143 times, reflecting 3.81% of the total, with 2,355 unique individuals holding this position. In summary, the titles of CEO, CFO, and President are the most frequent among the top executives in our sample, followed in order by COO, Counsel, Executive Vice President, Senior Vice President, and Chair.

4.2. Primary regression analysis

We examine the link between the equity incentive heterogeneity of executive teams and stock price crash risk in a multivariate framework by estimating this panel regression:

$$Crash\ Risk_{j,T+1} = \beta_0 + \beta_1 Het_{j,T}\left(COE_{j,T}\right) + \Gamma' X_{j,T} + \mu_T + \theta_i + \varepsilon_{j,T} \quad (7)$$

where the dependent variable *Crash Risk* is one of the three crash risk proxies, *NCSKEW*, *DUVOL*, or *COUNT*. In successive regressions, our independent variable of interest is either *Het* or *COE*. *X* is a vector of control variables described in Section 3.4. In the regressions, we include year (μ_T) and industry (θ_i) fixed effects to control for the unobserved heterogeneity due to time-specific and industry-specific characteristics. We rely on the White standard errors with firm and year double

[13] To generate the frequencies by executive position, we start by extracting title information for the top five executives of each firm-year observation in our sample from the ExecuComp database. Afterward, we clean and standardize this data by converting all titles to a consistent case format. Next, we analyze the cleaned data to identify common keywords or phrases that represent various executive position, and we compile a list of these keywords for each position. Finally, we match each title with the corresponding keywords from the list and assign each title to one of the predefined categories.

clustering, which are heteroskedasticity-consistent and account for the potential correlation of error terms within each firm and year.[14]

In Table 2, we report the primary regression results. In Columns (1)–(3), we tabulate the results for the regressions with Het_T specified as the independent variable of interest. Across all three models, the coefficients on Het_T are negative and statistically significant at the 1% level, consistent with the prediction in H1 that crash risk subsides as the equity incentive heterogeneity of the executive team rises. Columns (4)–(6) report the results after replacing Het_T with COE_T. In all three models, the coefficients on COE_T enter negatively at the 1% level. The coefficients on the controls are generally significant in the expected directions.

To calibrate the economic impact according to the coefficients, we estimate the change in crash risk measures across the interquartile range in the distribution of Het_T and COE_T, holding all other independent variables at their mean values. Moving Het_T from the 25th to the 75th percentile translates into *NCSKEW*, *DUVOL*, and *COUNT* falling by 0.029, 0.013, and 0.020, respectively. Relative to the mean values of the three crash risk measures, an inter-quartile change in Het_T is associated with at least a 31.02% decrease in stock price crash risk. Reinforcing the economic importance, a shift in COE_T from its 25th to 75th percentile is associated with 0.029, 0.013, and 0.021 decreases in *NCSKEW*, *DUVOL*, and *COUNT*, respectively, which is equivalent to at least a 31.04% fall in stock price crash risk.

Collectively, the results reported in Table 2 suggest that firms with higher equity incentive heterogeneity of executive teams, on average, enjoy lower stock price crash risk. This evidence

[14] Given that some prior research implies that double clustered standard errors are only reliable in data sets with at least 25 firms observed over 25 time periods (our panel spans 26 years) (e.g., Thompson 2011), we verify that all core results are nearly identical when we only cluster standard errors at the firm level.

lends support to the narrative that firms with higher equity incentive heterogeneity are less prone to hoard bad news, which constrains the formation of stock price crashes.

4.3. Endogeneity threats

Our evidence so far implies that the equity incentive heterogeneity of executive teams is negatively associated with future stock price crash risk. However, this analysis is vulnerable to potential endogeneity between the equity incentive heterogeneity and crash risk for several reasons. For starters, although we control for observable firm characteristics in our main regressions, there might exist unobservable heterogeneity when omitted unobservable variables affect both the equity incentive heterogeneity of executive teams and crash risk. Additionally, given that firms usually do not dramatically alter their compensation policies, the equity incentive heterogeneity of executive teams tends to be auto correlated across years.[15] Although we examine the impact of the equity incentive heterogeneity of executive teams on future crash risk in our main analyses, which mechanically mitigates the reverse causality and simultaneity issues, our results could still spuriously reflect potential endogeneity biases. Accordingly, in this section, we apply three econometric approaches to tackle potential endogeneity threats to reliable identification.

4.3.1. Matching

To control for the observed differences between firms with more versus less heterogeneous equity incentives among top executives, we deploy two matching techniques to construct treatment and control groups: propensity score matching (PSM) and entropy balancing. Both aim to ensure that firms in the treatment groups are indistinguishable on firm-level characteristics from those in the control groups. As such, in comparing the treatment samples to the control samples, the equity incentive heterogeneity of executive teams would be the only firm characteristic with a perceptible

[15] The autocorrelation of *Het* (*COE*) is 0.73 (0.74).

difference. Our two matching techniques help alleviate the non-random mutual selection concern and improve causal inference.

First, we apply PSM to assemble a matched sample using nearest-neighbor matching without replacement and with a caliper width of 0.001.[16] The propensity score is calculated as the predicted probabilities from a logit model in which the dependent variable is *Het_Dummy* (*COE_Dummy)*, a dummy variable set to one if a firm's *Het (COE)* exceeds the 75th percentile in a given year, and zero otherwise.[17] We follow Shipman et al.'s (2017) advice by including all the control variables from Equation (7) in the logistic regression to calculate the propensity score of choosing a more heterogeneous equity incentive structure among top executives. This test is constructive for further allaying the concern that our documented effect is driven by the differences in firm-specific characteristics between firms with higher equity incentive heterogeneity of executive teams and those with lower equity incentive heterogeneity.

In Panel A of Appendix B, we report the results from the two logit regressions estimating the propensity scores. The coefficients on *SIGMA*, *RET*, *KUR*, *CASH_ETR*, *DIV*, and *AVE* are positive and statistically significant, while the coefficients of *DTURN*, *SIZE*, *MB*, *ABN_CF*, *BIG4*, and *ANA* enter negatively. In Panel B, we find that the differences in almost all firm characteristics between the treatment and control groups are statistically insignificant, suggesting that our PSM technique is efficient. Afterward, we compare our three measures of stock price crash risk between firms in the treatment and control groups, and report the PSM estimates in Panel A of Table 3. The coefficients on *Het* and *COE* remain negative and statistically significant at the 1% level across all three proxies of crash risk, reinforcing that firms with a more heterogeneous equity incentive

[16] We verify that the PSM results are robust to applying 1: 3 matching to generate more power given the fairly deep pool of potentially close matches and to setting the caliper width to 0.05 or 0.1.
[17] Our results hold when we specify *Het_Dummy* and *COE_Dummy* based on median thresholds.

structure among top executives have lower future crash risk than the matched firms with a less heterogeneous equity incentive structure.

As shown in Panel B of Appendix B, firms in the treatment and control groups continue to exhibit differences in *MB*, *DIV*, and *Ave* after we apply PSM. Accordingly, we evaluate whether our core results hold under entropy balancing (EB), which reweights observations by imposing constraints in adjusting the moments of the covariate distributions to achieve tight covariate balance. This method ensures that the treatment and control groups closely resemble each other in terms of mean, standard deviation, and even higher moments. Compared with PSM, this technique keeps all observations, instead of discarding "unmatched" observations. EB also does not require any specific research design to reach covariate balance, helping to dispel the concern that the results hinge on model specification (DeFond et al. 2016). We adopt two balance conditions: the mean and variance of matching variables (i.e., all the covariates from Equation (7)) must be the same between the treatment and control groups. The treatment and control groups are specified based on *Het_Dummy* and *COE_Dummy*. In Panel C of Appendix B, we report that after applying EB the mean and variance of the firm characteristics are identical between the treatment and control groups.

Since the EB matching algorithm sets the matching weights that best satisfy our two balance conditions, we use these matching weights to re-estimate our primary regression in Equation (7) and compare the treatment and control groups to remove measured confounding between them. [18] Hainmueller (2012) argues that the improved balance achieved by EB can lead

[18] The maximum assigned weight is no more than 6. Only about 3 percent of the control observations have weights exceeding 1. Overall, the extreme weight issue is benign in our analysis. However, we dispel any lingering concern by verifying that the evidence remains almost identical after trimming observations with large weights (above 1 or 3) before re-running the EB program. Additionally, in conducting the EB analysis based on the balancing of the mean, variance, and skewness, we continue to find supportive evidence at the 1% level.

to less approximation bias and reduced model dependency in finite samples. In Panel B of Table 3, the EB-based regression results include that the coefficients on *Het* and *COE* remain negative and statistically significant at the 1% level across all three proxies of crash risk, reinforcing our earlier evidence supporting the prediction in H1.

4.3.2. Two-stage least squares

We rely on two-stage least squares (2SLS) estimation as our second identification method to mitigate potential endogeneity concerns. An ideal instrument should capture the variation in the equity incentive heterogeneity of executive teams but is exogenous to firm-level crash risk. Murphy et al. (1999) find that both managerial compensation levels and structures vary by industry. Moreover, Kale et al. (2009) document that the median industry values for pay gaps are significant determinants of managers' compensation incentives. Consistent with prior work on managerial compensation (e.g., Kini and Williams 2012; Jia et al. 2016), we specify the median of incentive heterogeneity of firms in the same industry classification and size quartiles as our instruments for the corresponding top executive equity incentive variables.[19]

In Table 4, we report the 2SLS regression results. We tabulate the first-stage estimation results for the two potential endogenous variables in Columns (1)–(2). The dependent variables are *Het* and *COE*. We include the same set of control variables as those in Equation (7), year fixed effects, and industry fixed effects. The coefficients on the corresponding industry average variables are positive and statistically significant, suggesting that our instrumental variables are highly correlated with the corresponding incentive variables. The Shea partial R^2 values are 12.4% and 12.0%, and the F-statistics are statistically significant, lending support for the joint relevance of our instruments in the first-stage regressions. In comparing the F-statistics with the critical

[19] Our results are robust to including one-year lagged industry median as an additional instrument.

values of Stock and Yogo (2005) for the weak instrument test, we reject the null hypothesis that our instruments are weak.

The estimated coefficients on other variables in Columns (1)–(2) imply that a series of the firm-level factors are associated with equity incentive heterogeneity. We observe that stock return volatility (*SIGMA*), average stock return (*RET*), cash effective tax rates (*CASH_ETR*), the presence of dividend payments (*DIV*), and the average incentive ratio among the top five executives (*AVE*) are positively related to equity incentive heterogeneity, while the detrended stock trading volume (*DTURN*), firm size (*SIZE*), the market-to-book ratio (*MB*), abnormal cash flow from operations (*ABN_CF*), the presence of a Big 4 auditor (*BIG4*), and analyst coverage (*ANA*) are negatively related to equity incentive heterogeneity.

In Columns (3)–(8), we report the results of the second-stage regressions estimating Equation (7) after replacing the independent variables of interest with their fitted values from the first-stage regressions. The coefficient estimates on instrumented *Het* (*COE*) remain negative and statistically significant in all six cases.

4.3.3. Firm fixed effects

It is possible that our analysis omits from the regressions some unobservable crash risk determinants that are associated with other included variables. Gormley and Matsa (2014) argue that important sources of unobserved heterogeneity are usually across groups of observations. Accordingly, we re-estimate our primary regressions after adding firm fixed effects, which control for any time-invariant firm-specific factors related to both crash risk and the equity incentive heterogeneity of executive teams, and address concerns relating to potentially omitted variables biases. In Table 5, we report the results. We tabulate the regression results with *Het* (*COE*) as the independent variable of interest in Columns (1)–(3) (Columns (4)–(6)). In all estimations, the coefficients on *Het* and *COE* continue to enter negatively, corroborating our earlier evidence.

4.4. Additional analyses

4.4.1. Additional controls

In our main regression, we follow extensive prior research in selecting and specifying controls for other determinants of future stock price crash risk. Recent work suggests that crash risk is also sensitive to CEO and CFO personal characteristics. Kim et al. (2011a) show that the equity incentives of CEOs and CFOs, especially CFOs, are positively related to stock price crash risk. Andreou et al. (2016) document that firms with younger CEOs are more likely to suffer stock price crashes. Similarly, Armstrong and Vashishtha (2012) find that manager tenure is negatively related to firm systematic and idiosyncratic risk. Another dimension of managerial characteristics that may affect both the equity incentive heterogeneity of executive teams and crash risk is the distribution of decision-making power within the team. In the event that a firm's decision-making power is heavily concentrated in the hands of its CEO (or CFO), she would have wider scope to adjust the structure of top executive compensation and to dictate firm risk-taking and bad news hoarding activities. Recent evidence implies that strong CEO/CFO dominance tends to exacerbate shareholder-manager agency costs and undermine firm performance (Peyer et al. 2007; Liu and Jiraporn 2010; Friedman 2014). Accordingly, an alternative interpretation of top executive incentive heterogeneity is merely a manifestation of strong CEO or CFO dominance, which implies higher crash propensity.[20]

In order to further isolate the direct impact of the incentive heterogeneity of executive teams, we confront these potential alternative explanations by explicitly controlling for several

[20] However, this interpretation suggests a positive relation between incentive heterogeneity and crash risk, which would inject bias against our primary findings.

CEO and CFO characteristics: *Incentive* is the total equity-based incentive ratio ($I_{j,i,T}$) of the executive;[21] *Age* is the executive's age; *Tenure* reflects the number of years that the executive has served in their current post; and *Power* is the ratio of the executive's annual compensation to the sum of the top five executives' annual compensation. We focus on the CEO and CFO given that they are known to orchestrate material manipulation activities and their characteristics have been shown to be associated with crash risk in earlier research (Bergstresser and Philippon 2006; Feng et al. 2011; Kim et al. 2011a, 2016; Li and Zeng 2019). In Table 6, we report the results after adding these four CEO (CFO) controls to the regressions in Panel A (B). Although these specifications lead to some sample attrition, we find that the coefficients on *Het* and *COE* remain negative and highly statistically significant.[22]

Next, we control for the tournament incentives widely studied in compensation research (Kale et al. 2009). Both the equity incentive heterogeneity of executive teams and tournament incentives involve the relationships among top executives due to the managerial compensation structure. Importantly, the distinction between these two measures is that equity incentive heterogeneity captures top executives' divergent perspectives in approaching firm decisions induced by heterogeneous equity incentives, while tournament incentives capture the extra managerial risk-taking incentives stemming from a tournament prize. After controlling for *Tournament Incentive*, which is the total compensation pay gap between the CEO's total compensation and the average of the other four highest-paid executives' total compensation, we report in Panel C of Table 6 that the coefficients on *Het* and *COE* still enter negatively at the 1%

[21] In Section 6, we verify that our core evidence is robust to controlling for disaggregate incentive items based on CEO/CFO stock and option holdings, respectively.
[22] In another sensitivity test, we re-estimate regression equation (7) after requiring that that the CFO is among the five highest-paid executives when calculating equity incentive heterogeneity. Despite that this specification leads to considerable attrition (the sample shrinks by 22%), we continue to find supportive evidence at the 1% level.

level. In sharp contrast, the coefficients on *Tournament Incentive* all fail to load, implying that tournament incentives are irrelevant in predicting future crash risk.[23]

Prior work on executive compensation mainly focuses on CEOs and CFOs. However, our evidence highlights the importance of equity incentives across the broader management team. It is likely that our results on equity incentive heterogeneity of the executive team primarily stem from differences in the equity incentive ratios between CEOs and CFOs. To explore this issue, we calculate the equity incentive heterogeneity between CEOs and CFOs, denoted as *Het_CEO&CFO* and *COE_CEO&CFO*, and include these as controls in our baseline regressions. As shown in Panel D of Table 6, the coefficients for *Het* and *COE* remain negative and statistically significant, whereas those for *Het_CEO&CFO* and *COE_CEO&CFO* are insignificant; i.e., our results are robust to controlling for CEO-CFO heterogeneity.

In our main analysis, we control for *AVE*, which represents the average of the top five executives' equity incentive ratios. Next, to further address the concern that the equity incentive ratio of a particular ranked executive might drive our evidence, we modify the baseline regression. Instead of including *AVE* as a control variable, we now control for the equity incentive ratios for each ranked executive. We sort the top five executives by their total compensation and denote the equity incentive ratios at each rank as *I_Exec_i*, where *i* corresponds to the rank based on total compensation. In Panel E of Table 6, the coefficients for *Het* and *COE* continue to enter negatively at the 1% level, reinforcing our core results.

In a study examining different research questions, Li et al. (2022) finds that, in the China setting, management team characteristics (e.g., tenure, and age) play a moderating role in shaping the impact of controlling shareholder equity pledges—where these dominant shareholders provide

[23] Our results on this front run counter to Jia's (2018) evidence implying that promotion-based tournament incentives engender higher future stock price crash risk.

their own equity stakes as collateral to secure loans from financial institutions—on stock crash risk. In Panel F of Table 6, our core evidence holds when we further control for the heterogeneity of age and tenure across the executive team, as well as the ratio of female executives, despite that adding these controls leads to severe sample attrition (exceeding 40%).

4.4.2. Alternative measures of equity incentive heterogeneity of executive teams

We primarily measure the equity incentive heterogeneity of executive teams with the Gini coefficient and coefficient of variation metric, which are widely used in economics research in gauging the degree of inequality in income distributions and variation in a group (Donaldson and Weymark 1980). Next, we examine whether our main results are robust to two alternative measures of heterogeneity: the dispersion of equity incentives between CEOs or CFOs and other top executives, and the range of the top five executives' equity incentives.

Prior studies on managerial compensation support that CFO incentives dominate CEO incentives in determining earnings management (Chava and Purnanandam 2010; Jiang et al. 2010). Moreover, Kim et al. (2011a) document that the equity incentives of CFOs, not CEOs, are positively related to crash risk. In the event that the other top executives' equity incentives are lower than the CFO's, they are likely less eager to participate in hiding bad news and, consequently, are in a better position to monitor the CFO's bad news hoarding activities. To capture the difference in the equity incentives between the CFO and the other top four executives, we specify a continuous dispersion measure: $CFO\_Dispersion_T = \{(I_1 - I_{CFO})^2 + (I_2 - I_{CFO})^2 + (I_3 - I_{CFO})^2 + (I_4 - I_{CFO})^2\}/4$, which uses the CFO's equity incentive as the center-point and captures the average gap between the other top four executives' equity incentive ratios and the CFO's. Next, we replace *Het (COE*) with *CFO_Dispersion* in our primary regression. We report the estimation results in Table 7. Corroborating our main evidence, the coefficient on *CFO_Dispersion* is negative and highly significant in Columns (1)–(3), implying that the dispersion from CFO equity incentives mitigates the stock price crash risk. Untabulated statistics indicate that CEOs have the highest equity incentive ratio among the top five executives for about two-thirds of our sample firm–year observations, so we repeat our analyses for CEOs. In Columns (4)–(6), we find that the coefficients on *CEO_Dispersion* are also negative and statistically significant at the 1% level.

Our second alternative measure of heterogeneity is the range of the top five executive incentive ratios; i.e., the difference between the maximum and minimum top five executive incentive ratios. We re-estimate the primary regressions after replacing *Het (COE)* with *Range* as the variable of interest. Reinforcing our earlier evidence supporting Hypothesis 1, we find that the coefficients on *Range* enter negatively at the 1% level in Columns (7)–(9).

4.4.3. Alternative measures of crash risk

In this section, we deepen the analysis by exploring whether our core results hold across several variations of the crash risk measures. Table 8 reports the results of the robustness tests involving alternative crash risk measures. First, we estimate firm-specific weekly returns with the extended market model augmented with Fama-French 30 industry returns. The industry classification affects the estimation of firm-specific weekly returns. We calculate our three crash risk measures using the alternative estimation of firm-specific weekly returns. Afterward, we re-estimate the primary regression with the new crash risk measures and report the regression results in Panel A. Second, we estimate firm-specific weekly returns based on the standard market model augmented with two lead and two lag market returns, further controlling for nonsynchronous trading. We re-specify the three crash risk measures and report the regression results in Panel B. Third, we consider alternative thresholds for the identification of crash weeks to address the possibility that our results based on the *COUNT* measure are materially sensitive to the selection of 3.20 standard deviations as the crash cut-off. To examine this issue, we define crash weeks in fiscal year T for firm j as those weeks during which the firm-specific weekly return $W_{j,T}$ is 3.09 standard deviations below the average firm-specific weekly returns over the fiscal year T. Next, we set a dummy variable $CRASH_{T+1}$ to one if a firm experiences one or more firm-specific weekly returns exceeding 3.09 standard deviations below the mean firm-specific weekly returns over the fiscal year and zero otherwise, and report the regression results in Column (1) of Panel C. The crash indicator variable has also been used in prior research on crash risk (e.g., Kim et al. 2011a, 2011b). Finally, we re-specify a dummy variable $CRASH_{T+1}$ that equals one if a firm experiences one or more firm-specific weekly returns exceeding 3.20 standard deviations below the mean firm-specific weekly returns over the fiscal year and zero otherwise, and report the regression results in Column (2) of Panel C. Our main results are robust to these other measures of crash risk. Neither of these alternative specifications has an economically or statistically material impact on our core evidence.

5. Cross-sectional analyses

If the negative association between the equity incentive heterogeneity of executive teams and future firm-specific stock price crash risk stems from improved information transparency and assuaged agency problems, we should observe a larger reduction in crash risk for firms with more severe *ex ante* agency problems and worse corporate governance. We focus on several governance mechanisms influencing information quality and agency problems: external monitoring, financial reporting comparability, and board governance.

We specify three proxies for a firm's external monitoring, starting with market sentiment since prior work implies that managers are more aggressive in their voluntary disclosure when investor sentiment is high, consistent with the notion that investors are more lax in scrutinizing managerial disclosure in optimistic periods (Brown et al. 2012). Second, we gauge external monitoring with audit quality evident in auditor industry specialization, which is positively associated with accounting transparency (e.g., Balsam et al. 2003). Relevant to our research questions, Robin and Zhang (2015) find that industry specialist auditors, as information intermediaries, are more likely to disclose information in a timely fashion, and, in turn, can mitigate bad news hoarding. Third, we measure external monitoring with dedicated institutional investors known to have stronger incentives to monitor their portfolio firms to constrain managers' diversionary practices (Bushee 1998; Callen and Fang 2013).

We examine financial reporting comparability as a proxy for information quality and corporate governance needs given that prior research finds that financial statement comparability lowers the cost of acquiring information, and increases the overall quantity and quality of publicly available information, narrowing the information gap between insiders and outsiders (De Franco et al. 2011; Kim et al. 2016). Finally, we rely on board co-option to reflect board governance since firms with more co-opted directors impose less active monitoring on CEOs (Coles et al. 2014; Bauer et al. 2021).

Our cross-sectional analysis involves comparing the relation between the equity incentive heterogeneity of executive teams and stock price crash risk across sample partitions based on firms' external monitoring, financial reporting comparability, and internal governance. This analysis is conducive to a more nuanced interpretation of the coefficients and can mitigate measurement problems. The regressions include the same set of control variables as in Table 2, although their estimated coefficients are suppressed to conserve space.

In Table 9, we report the cross-sectional results. First, if the tension arising from the equity incentive heterogeneity of executive teams leads to more due diligence in bad news disclosure, which, in turn, reduces crash risk, then this impact will play a larger role among firms subject to lax external monitoring. We classify firms into strong and weak external monitoring sub-samples using market sentiment, which is the average value of Baker and Wurgler's (2006) sentiment index over a fiscal year (*MKT*);[24] auditor industry specialization, specified as the sum of the total assets of the clients of an auditor in a specific industry divided by the sum of the total assets of the entire clientele of the auditor (*ISPEC*); and dedicated institutional ownership (*DED*), which is the fraction of shares outstanding held by dedicated institutional investors at year end. We treat firms with *ISPEC* and *DED* above (below) the top annual tertile and with *MKT* below (above) the bottom annual tertile as having strong (weak) external monitoring. In Panels A–C, we find that the coefficients on *Het* and *COE* are both statistically significant and negative in the weak external monitoring partitions for all three measures of crash risk, consistent with expectations. In contrast, we do not observe a similar systematic pattern in the strong external monitoring partitions.

Second, we expect to observe more bad news hoarding activities when firms' financial reports lack comparability. Prior research supports that comparable financial statements facilitate information transfer among peers and make it easier for external investors to evaluate firm performance (De Franco et al. 2011; Fang et al. 2016). Firms with less comparable financial reports tend to have lower information transparency and are more likely to hoard bad news (Kim et al. 2016). If executive incentive heterogeneity plays an internal governance role in curbing managerial bad news hoarding activities, then the moderating impact of equity incentive heterogeneity on crash risk will be stronger for firms with less comparable financial reports. We follow De Franco et al. (2011) by constructing a firm–year comparability measure based on the mapping between stock returns and corporate earnings. After classifying financial report comparability in the top

[24] Professor Wurgler generously makes this data available at: http://people.stern.nyu.edu/jwurgler/.

tercile of the distribution as high and the bottom tercile as low, we successively estimate Equation (7) for firms with low and high values of comparability. Panel D of Table 9 reports the relation between stock price crash risk and *Het (COE)* for the two sub-samples. We find that the estimated coefficients on *Het (COE)* are negative and statistically significant when we isolate firms with low financial report comparability, although they fail to load in the sub-sample of firms with high financial report comparability. This evidence suggests that the negative influence of *Het (COE)* on stock price crash risk is concentrated in firms with less comparable financial reports.

Third, we follow prior research by relying on the ratio of co-opted directors to the total number of board directors to measure a firm's internal monitoring intensity (Coles et al. 2014). Co-opted directors are those who are appointed after the current CEO takes office. We classify firms whose fraction of co-opted directors fall into the top (bottom) annual tertile as having lax (strict) internal monitoring. In Table 9, we report in Panel E that the coefficients on *Het (COE)* generally only enter negatively for firms with a heavier concentration of co-opted directors. Further, the coefficients on *Het (COE)* are much larger in absolute value for the sub-sample exhibiting a more co-opted board than for those with low board co-option.

To evaluate the difference in the coefficients for *Het* (*COE*) across the corresponding two subsamples, we interact *Het* (*COE*) with each specific partitioning variable based on the market sentiment, industry specialist auditor, dedicated institutional holdings, financial reporting comparability and co-opted board, respectively. We find that, in 25 out of 30 estimations, the interaction coefficients are statistically significant.

Collectively, the evidence in Table 9 lends support to the conjecture that the negative link between the equity incentive heterogeneity of executive teams and stock price crash risk intensifies for firms with poorer external monitoring, less comparable financial reports, and worse board governance. These cross-sectional results help validate the agency explanation underlying our main analyses; i.e., the equity incentive heterogeneity of executive teams plays an internal governance role in mitigating opportunistic bad news hoarding activities.

6. Comparison to related research

In this section, we more fully distinguish our research from Kim et al. (2011a), who examine the importance of individual executives' equity incentives to future firm-specific stock price crash risk. In analyzing the 1993-2009 sample period, they find that, compared with the CEO's option sensitivity, the sensitivity of the CFO's option portfolio value to the firm's stock price is positively related to its stock price crash risk. In contrast, their evidence implies that CEO and CFO stock incentives are irrelevant to crash risk. Conceptually, our study is distinct from Kim et al. (2011a) in that whereas they focus on the individual equity incentives of CEOs and CFOs, we examine the executive team's compensation structure as a whole by considering equity incentive heterogeneity across the entire team to evaluate the role that its governance synergy plays in constraining bad news hoarding. It follows that it is unlikely that the relations under study in Kim et al. (2011a) are responsible for our evidence. Importantly, set against Kim et al. (2011a) exploring the dark side of equity incentives by reporting that stock price crash risk rises in the presence of individual executives' equity incentives, especially options, our analysis provides insight on the bright side by documenting the welfare benefits of the executive team's compensation structure to investors; i.e., equity incentive heterogeneity constrains the suppression of negative information that is behind stock price crash risk. In short, by taking a broader focus on the equity incentives across the entire executive team, our evidence complements Kim et al.'s (2011a).

Given that CEO and CFO option incentives are part of the executive team's compensation structure, we explore whether our inferences are sensitive to considering Kim et al.'s (2011a) evidence on the relation between CEO and CFO option incentives and crash risk. We begin by replicating Kim et al.'s (2011a) main findings (in their Table 3) by using the same sample period and regression variables. To estimate firm-specific weekly returns, Kim et al. (2011a) adopt an expanded market model incorporating two lead and two lag terms for the market index returns besides the contemporaneous market index returns. Based on the firm-specific weekly returns, Kim et al. (2011a) specify three proxies for crash risk: *NCSKEW, DUVOL*, and *CRASH*. The estimation for the first two proxies are the same as ours, while the third proxy, *CRASH*, is an indicator variable that is equal to one for a firm–year that experiences one or more firm-specific weekly returns falling 3.2 standard deviations below the annual sample mean. The key independent variables of interest in Kim et al. (2011a) are the CEO/CFO option incentives, *INCENTIVE_OPT_CEO* and *INCENTIVE_OPT_CFO*, which they measure with *Onepct_Opt/(Onepct_Opt+Salary+Bonus)* for the CEO and CFO, respectively. The variable *Onepct_Opt* is the dollar change in the value of a CEO's option holdings stemming from a 1% increase in the firm's stock price. The variables *Salary* and *Bonus* are the same as those included in Equation (4) of our analysis. We also follow Kim et al. (2011a) by controlling for CEO and CFO stock incentives (*INCENTIVE_STK_CEO* and *INCENTIVE_STK_CFO*) and bonus incentives (*BONUS_CEO* and *BONUS_CFO*).

In Table 10, we report the replication results in Columns (1)–(3). Across all three crash risk specifications, the coefficients on $INCENTIVE\_OPT\_CFO_T$ are positive and statistically significant, while the coefficients on $INCENTIVE\_OPT\_CEO_T$ are insignificant. This evidence reconciles with Kim et al.'s (2011a) finding that CFO option incentives dominate CEO option incentives in shaping future stock price crash risk.

Next, we augment their analysis by integrating into the model the two proxies for the equity incentive heterogeneity of the executive team, Het_T and COE_T, in successive regressions. In Columns (4)–(9), the coefficients on $INCENTIVE\_OPT\_CFO_T$ remain positive and statistically significant in four of the six model specifications. Additionally, reinforcing our core results, we find that the coefficients on Het_T and COE_T continue to enter negatively in all six estimations. Altogether, this analysis suggests that the significant impacts of the executive team's compensation structure on crash risk extend beyond those from the individual executives' incentives, implying that corporate decision-making reflects the collective synergy efforts by executive members as a team, in addition to any action taken by individual executives. Accordingly, in complementing Kim et al.'s (2011a) evidence, our study sheds light on the importance of contractual design to the governance role of the executive team's incentive structure beyond individual executives. It is also important to stress that CFO option incentives may play a significant adverse role in aggravating stock price crash risk in CFO-dominant firms or in offsetting the positive impact of the equity incentive heterogeneity of executive teams on curtailing stock price crash risk.

7. Conclusions

A public firm's top executives typically work together as a team. One executive's contribution to the team may affect the marginal private benefits that the other executives can derive from their work. Although extensive prior research examines the role of individual executives in an agency framework, there remains hardly any evidence on how an executive team affects the agency problem. In adopting a multi-agent view of management teams, we explore how the equity incentive structure of an executive team shapes stock price crash risk, an economic consequence of bad news hoarding. In analyzing a comprehensive sample of S&P 1500 firms between 1992 and 2017, we find that equity incentive heterogeneity of an executive team is negatively related to future stock price crash risk. Our evidence implies that, as an important internal governance mechanism, the equity incentive heterogeneity of an executive team plays a major role in curbing corporate bad news hoarding activities. Our results are robust to applying PSM and EB matching, 2SLS, and fixed effects identification methods to confront potential endogeneity, adding controls for managerial characteristics and tournament incentives, and relying on alternative measures of crash risk and the equity incentive heterogeneity of executive teams.

Additionally, we evaluate whether this relation intensifies when firms experience more severe agency problems and worse corporate governance. Consistent with expectations, we generally find that the impact of equity incentive heterogeneity of executive teams on crash risk is stronger for firms with less comparable financial reporting, weaker external monitoring, and poorer board governance.

Collectively, our findings validate the importance of not treating executive team members as isolated individuals. Complementing the evidence in Kim et al. (2011a), our results may alert corporate board remuneration committees and regulators by highlighting that heterogeneous equity incentives play a valuable internal governance role in pre-empting the suppression of negative information that engenders stock price crash risk.

An important empirical question this study invites for future research is whether a heterogeneous equity incentive structure among executive team members is optimal for firm value. Although we show that equity incentive heterogeneity of executive teams moderates one major type of corporate misbehavior; i.e., bad news hoarding, the incentive structure of executive team could have long-term implications for firm value by affecting other corporate activities or policies as well.

Appendix A: Variable definitions

Variable	Description
NCSKEW	The negative coefficient of skewness of firm-specific weekly returns over the fiscal year (Chen et al., 2001).
DUVOL	The natural logarithm of the ratio of the standard deviation of firm-specific weekly returns for the "down-week" sample to the standard deviation of firm-specific weekly returns for the "up week" sample over the fiscal year (Chen et al., 2001).
COUNT	The difference between the number of crash weeks and the number of jump weeks over the fiscal year. A stock price crash (jump) week is defined as a week in which the firm-specific weekly return exceeds 3.2 standard deviations below (above) the mean firm-specific weekly returns over the fiscal year, with 3.2 chosen to generate frequencies of 0.1% in a normal distribution (Kim et al., 2011a).
Het	The incentive heterogeneity among top five executives, defined as the Gini coefficient of top five executives' incentive ratios.
COE	The coefficient of variation of the top five executive incentive ratios.
SIGMA	The standard deviation of firm-specific weekly returns over the fiscal year (Kim et al., 2011a).
RET	The mean of firm-specific weekly returns over the fiscal year, times 100 (Kim et al., 2011a).
DTURN	The difference between the average monthly share turnover over fiscal year T – 1 and the average monthly share turnover over fiscal year T , where monthly share turnover is calculated as the monthly trading volume divided by the total number of shares outstanding over the month (Kim et al., 2011a).
SIZE	The natural logarithm of total assets at the end of the fiscal year (Kim et al., 2014).
MB	The ratio of the market value of equity to the book value of equity measured at the end of the fiscal year (Kim et al., 2011a).
LEV	The ratio of long-term debt to total assets measured at the end of the fiscal year (Kim et al., 2011a).
ROA	The operating earnings divided by the total assets, measured at the end of the fiscal year.
OPAQUE	The absolute value of annual performance-adjusted discretionary accruals developed by Kothari et al. (2005).
CASH_ETR	The cash taxes paid scaled by pre-tax book income after removing the effects of special items, set as missing when the denominator is zero or negative.

KUR	The kurtosis of firm-specific weekly returns over the fiscal year.
TENURE	An indicator variable that equals one if the number of consecutive years that an auditor has been employed by a firm in a fiscal year is greater than five, and zero otherwise.
AGE	The log value of the number of years that the firm has been listed on Compustat since 1950.
DIV	An indicator equals to one if a firm has dividend payout for the year, and zero otherwise.
BIG4	An indicator equals to one if a firm is audited by a Big-4 auditor (or its predecessor), and zero otherwise.
ANA	The log value of one plus the number of analysts that issue earnings forecasts for a given firm during the fiscal year.
SIR_RATIO	The number of shares sold short divided by total shares outstanding from the last month of fiscal year, with a range from zero to one.
DED	The percentage of a specific firm's equity held by dedicated institutional investors at the end of the fiscal year.
BIG4	An indicator equals to one if a firm is audited by a Big-4 auditor (or its predecessor), and zero otherwise.
DISTANCE	An indicator equals to one if the distance between the county where a firm is headquartered and the closest SEC regional or national office is within 100 km, and zero otherwise.
ABN_DISEXP	The abnormal level of discretionary expenditures developed by Roychowdhury (2006).
ABN_CFO	The abnormal level of cash flow from operations developed by Roychowdhury (2006).
ABN_PROD	The abnormal level of production costs developed by Roychowdhury (2006).
AVE	The average of incentive ratios (from stock and option holdings) of top five executives.

Appendix B: First-stage regression of PSM and matching efficiency of PSM and EB matching

Panel A presents the first-stage regression results of PSM. Panel B presents the matching efficiency of PSM. Panel C presents the matching efficiency of EB matching. All variables are defined in Appendix A. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: First-stage regression of PSM

Variables	(1) Het_DUMMY_T	(2) COE_DUMMY_T
$NCSKEW_T$	-0.024	-0.018
	(-1.277)	(-0.971)
$SIGMA_T$	13.780***	14.248***
	(3.782)	(3.797)
RET_T	119.289***	128.258***
	(2.678)	(2.746)
$DTURN_T$	-0.417**	-0.362**
	(-2.484)	(-2.158)
$SIZE_T$	-0.225***	-0.234***
	(-7.504)	(-7.663)
MB_T	-0.082***	-0.077***
	(-5.901)	(-5.736)
LEV_T	0.030	0.002
	(0.149)	(0.012)
ROA_T	0.118	0.098
	(0.319)	(0.263)
KUR_T	0.012*	0.012*
	(1.677)	(1.666)
AGE_T	-0.081*	-0.076
	(-1.718)	(-1.592)
$OPAQUE_T$	-0.013	-0.040
	(-0.051)	(-0.149)
$CASH\_ETR_T$	0.156**	0.149**
	(2.395)	(2.274)
ABN_DISEXP_T	-0.194	-0.125
	(-1.610)	(-1.002)
ABN_CF_T	-0.854***	-0.843***
	(-3.991)	(-3.926)
ABN_PROD_T	0.007	0.030
	(0.036)	(0.165)
$TENURE_T$	-0.031	-0.046

	(-0.567)	(-0.838)
$BIG4_T$	-0.163**	-0.199**
	(-2.042)	(-2.466)
ANA_T	-0.077**	-0.054*
	(-2.532)	(-1.706)
DIV_T	0.229***	0.203***
	(3.207)	(2.811)
$DISTANCE_T$	0.033	0.046
	(0.464)	(0.626)
SIR_RATIO_T	0.133	0.013
	(0.258)	(0.025)
DED_T	0.183	0.143
	(0.638)	(0.491)
Ave_T	1.885***	1.834***
	(6.301)	(6.166)
Intercept	0.942	1.146
	(1.359)	(1.579)
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	26,974	26,974
Adjusted R^2	0.060	0.060

Panel B: Post-match differences

	(1) Firm-years with low *Het*	(2) Firm-years with high *Het*	(3) Differences	(4) Firm-years with low *COE*	(5) Firm-years With high COE	(6) Differences
$NCSKEW_t$	0.110	0.113	-0.003	0.109	0.113	-0.004
$SIGMA_t$	0.045	0.045	0.000	0.045	0.045	0.001
RET_t	-0.001	-0.001	-0.000	-0.001	-0.001	-0.000
$DTURN_t$	0.004	0.003	0.000	0.003	0.003	-0.000
$SIZE_t$	7.224	7.216	0.008	7.195	7.217	-0.021
MB_t	3.025	2.940	0.085*	3.078	2.935	0.143***
LEV_t	0.174	0.174	0.001	0.174	0.174	0.001

ROA_t	0.134	0.134	-0.001	0.133	0.134	-0.001
KUR_t	4.619	4.611	0.008	4.618	4.629	-0.011
AGE_t	2.942	2.947	-0.005	2.930	2.945	-0.015
$OPAQUE_t$	0.063	0.063	0.000	0.063	0.063	-0.000
$CASH\_ETR_t$	0.409	0.407	0.003	0.410	0.408	0.003
ABN_DISEXP_T	-0.101	-0.101	0.001	-0.101	-0.101	0.001
ABN_CF_T	0.085	0.087	-0.001	-1.000	-1.101	0.001
ABN_PROD_T	-0.038	-0.038	0.001	-0.039	-0.039	-0.001
$TENURE_T$	0.805	0.803	0.001	0.802	0.804	-0.003
$BIG4_T$	0.839	0.842	-0.003	0.839	0.842	-0.003
ANA_T	1.772	1.775	0.003	1.797	1.774	0.023
DIV_T	0.525	0.531	-0.005	0.511	0.530	-0.019**
$DISTANCE_T$	0.301	0.299	0.002	0.302	0.298	0.004
SIR_RATIO_T	0.041	0.041	-0.000	0.042	0.041	0.001
DED_T	0.047	0.048	-0.001	0.047	0.048	-0.001
Ave_T	0.143	0.146	–0.004*	0.146	0.146	–0.000

Panel C: Matching efficiency of EB matching

Variables	Het (after-matching) Treatment Mean (1)	Het Treatment Variance (2)	Het Control Mean (3)	Het Control Variance (4)	COE (after-matching) Treatment Mean (5)	COE Treatment Variance (6)	COE Control Mean (7)	COE Control Variance (8)
$NCSKEW_t$	0.112	0.719	0.112	0.719	0.115	0.715	0.115	0.715
$SIGMA_t$	0.045	0.001	0.045	0.001	0.045	0.001	0.045	0.001
RET_t	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000
$DTURN_t$	0.002	0.007	0.003	0.007	0.003	0.007	0.003	0.007

$SIZE_t$	7.181	2.535	7.180	2.535	7.166	2.523	7.166	2.523
MB_t	2.915	8.879	2.915	8.879	2.934	9.039	2.934	9.039
LEV_t	0.172	0.026	0.172	0.026	0.171	0.026	0.171	0.026
ROA_t	0.134	0.008	0.134	0.008	0.134	0.008	0.134	0.008
KUR_t	4.642	6.178	4.642	6.178	4.640	6.153	4.640	6.153
AGE_t	2.934	0.525	2.934	0.525	2.931	0.526	2.931	0.526
$OPAQUE_t$	0.063	0.004	0.064	0.004	0.064	0.004	0.064	0.004
$CASH\_ETR_t$	0.412	0.105	0.412	0.105	0.411	0.105	0.411	0.105
ABN_DISEXP_T	-0.100	0.066	-0.099	0.066	-0.097	0.065	-0.097	0.065
ABN_CF_T	0.084	0.020	0.084	0.020	0.084	0.020	0.084	0.020
ABN_PROD_T	-0.037	0.037	-0.037	0.037	-0.039	0.037	-0.039	0.037
$TENURE_T$	0.801	0.160	0.801	0.160	0.799	0.161	0.799	0.161
$BIG4_T$	0.835	0.138	0.835	0.138	0.832	0.140	0.832	0.140
ANA_T	1.761	1.000	1.761	1.000	1.73	0.992	1.73	0.992
DIV_T	0.530	0.249	0.530	0.249	0.526	0.249	0.526	0.249
$DISTANCE_T$	0.300	0.210	0.300	0.210	0.300	0.210	0.300	0.210
SIR_RATIO_T	0.041	0.003	0.041	0.003	0.041	0.003	0.041	0.003
DED_T	0.048	0.007	0.048	0.007	0.048	0.006	0.048	0.006
Ave_T	0.147	0.010	0.147	0.010	0.147	0.009	0.147	0.009

Appendix C: Distribution of executive titles among top five executives

This table presents the frequency of executive titles among the top 5 highest-paid executives in our sample. We report the executive titles, the number frequency of executive titles, the percentage frequency of titles, and the number of unique executives for each title.

Titles	Count	Percentage	Number of unique executives
CEO	26,197	19.41%	5,592
CFO	21,287	15.77%	5,912
President	20,990	15.55%	8,571
COO	15,390	11.40%	5,679
Counsel	9,812	7.27%	2,957
Executive Vice President	8,725	6.46%	3,764
Senior Vice President	7,730	5.73%	3,585
Chair	5,143	3.81%	2,355

References

Acharya, V. V., Myers, S. C., Rajan, R. G., 2011. The internal governance of firms. Journal of Finance 66, 689–720.

Aggarwal, R. K., Samwick, A. A., 1999. The other side of the trade-off: The impact of risk on executive compensation. Journal of Political Economy 107, 65–105.

Aggarwal, R. K., Samwick, A. A., 2003. Performance incentives within firms: The effect of managerial responsibility. Journal of Finance 58, 1613–1650.

Alexiev, A. S., Jansen, J. J., Van den Bosch, F. A., Volberda, H. W., 2010. Top management team advice seeking and exploratory innovation: The moderating role of TMT heterogeneity. Journal of Management Studies 47, 1343–1364.

Amason, A. C., 1996. Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management teams. Academy of Management Journal 39, 123–148.

An, H., Zhang, T., 2013. Stock price synchronicity, crash risk, and institutional investors. Journal of Corporate Finance 21, 1–15.

Andreou, P. C., Louca, C., Petrou, A. P., 2016. CEO age and stock price crash risk. Review of Finance 21, 1287–1325.

Armstrong, C. S., Vashishtha, R., 2012. Executive stock options, differential risk-taking incentives, and firm value. Journal of Financial Economics 104, 70–88.

Baginski, S., Campbell, J., Hinson, L., Koo, D., 2018. Do career concerns affect the delay of bad news disclosure? The Accounting Review 93, 61–95.

Ball, R. 2009. Market and political/regulatory perspectives on the recent accounting scandals. Journal of Accounting Research 47, 277–323.

Balsam, S., Krishnan, J., Yang, J.S., 2003. Auditor industry specialization and earnings quality. Auditing: A Journal of Practice & Theory 22, 71–97.

Bamber, L. S., Jiang, J. X., Wang, I. Y., 2010. What's my style? The influence of top managers on voluntary corporate financial disclosure. The Accounting Review 85, 1131–1162.

Bao, D., Fung, S. Y. K., Su, L., 2018. Can shareholders be at rest after adopting clawback provisions? Evidence from stock price crash risk. Contemporary Accounting Research 35, 1578–1615.

Basu, S., 1997. The conservatism principle and the asymmetric timeliness of earnings1. Journal of accounting and economics 24, 3–37.

Bartov, E., Mohanram, P., Nissim, D., 2007. Managerial discretion and the economic determinants of the disclosed volatility parameter for valuing ESOs. Review of Accounting Studies 12, 155–179.

Bauer, A. M., Fang, X., Pittman, J. A., 2021. The importance of IRS enforcement to stock price crash risk: The role of CEO power and incentives. The Accounting Review 96, 81–109.

Bebchuk, L. A., Cremers, K. M., Peyer, U. C., 2011. The CEO pay slice. Journal of Financial Economics 102, 199–221.

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

Benmelech, E., Frydman, C., 2015. Military CEOs. Journal of Financial Economics 117, 43–59.

Bergstresser, D., Philippon, T., 2006. CEO incentives and earnings management. Journal of Financial

Economics 80, 511–529.

Berle, A., Means, G., 1932. The Modern Corporation and Private Property. Commerce Clearing House, New York.

Bloom, M., Michel, J. G., 2002. The relationships among organizational context, pay dispersion, and among managerial turnover. Academy of Management Journal 45, 33–42.

Bertrand, M., Schoar, A., 2003. Managing with style: The effect of managers on firm policies. The Quarterly Journal of Economics 118, 1169–1208.

Bonsall, S., Holzman, E., Miller, B. P., 2017. Managerial ability and credit risk assessment. Management Science 63, 1425–1449.

Brown, M. P., Sturman, M. C., Simmering, M. J., 2003. Compensation policy and organizational performance: The efficiency, operational, and financial implications of pay levels and pay structure. Academy of Management Journal 46, 752–762.

Brown, N. C., Christensen, T. E., Elliott, W. B. and Mergenthaler, R. D., 2012. Investor sentiment and pro forma earnings disclosures. Journal of Accounting Research 50, 1–40.

Buchholtz, A. K.,Ribbens, B. A., 1994. Role of chief executive officers in takeover resistance: Effects of CEO incentives and individual characteristics. Academy of Management Journal 37, 554–579.

Bushee, B. J., 1998. The influence of institutional investors on myopic R&D investment behavior. The Accounting Review 73, 305–333.

Bushman, R. M., Dai, Z., Zhang, W., 2015. Management team incentive: Dispersion and firm performance. The Accounting Review 91, 21–45.

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

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

Callen, J., Fang, X., 2015b. Short interest and stock price crash risk. Journal of Banking and Finance 60, 181–94.

Callen, J. L., Fang, X., 2017. Crash risk and the auditor–client relationship. Contemporary Accounting Research 34, 1715–1750.

Callen, J. L.,Fang, X., 2020. Local gambling norms and audit pricing. Journal of Business Ethics 164, 151–173.

Campbell, J., Lee, H., Lu, H., Steele, L., 2020. Express yourself: Why managers' disclosure tone varies across time and what investors learn from it. Contemporary Accounting Research 37, 1140–1171.

Chang, X., Chen, Y., Zolotoy, L., 2017. Stock liquidity and stock price crash risk. Journal of Financial and Quantitative Analysis 52, 1605–1637.

Chang, Y. Y., Dasgupta, S., Hilary, G., 2010. CEO ability, pay, and firm performance. Management Science 56, 1633–1652.

Chava, S., Purnanandam, A., 2010. CEOs versus CFOs: Incentives and corporate policies. Journal of Financial Economics 97, 263–278.

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

Coles, J. L., Daniel, N. D.,Naveen, L., 2014. Co-opted boards. Review of Financial Studies 27, 1751–1796.

Core, J., Guay, W., 2002. Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. Journal of Accounting Research 40, 613–630.

Datta, S., Iskandar-Datta, M., Raman, K., 2001. Executive compensation and corporate acquisition decisions. Journal of Finance 56, 2299–2336.

Davidson, R. H., 2022. Who did it matters: Executive equity compensation and financial reporting fraud? Journal of Accounting and Economics, forthcoming.

De Dreu, C. K., Weingart, L. R., 2003. Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis. Journal of Applied Psychology 88, 741–749.

DeFond, M. L., Hung, M., Li, S., Li, Y., 2015. Does mandatory IFRS adoption affect crash risk? The Accounting Review 90, 265–299.

DeFond, M., Erkens, D., Zhang, J., 2016. Do client characteristics really drive the big N audit quality effect? New evidence from propensity score matching. Management Science. 63, 3531–3997.

DeFond, M., Zhang, J., 2014. A review of archival auditing research. Journal of Accounting and Economics 58, 275–326.

De Franco, G., Kothari, S. P., Verdi, R. S., 2011. The benefits of financial statement comparability. Journal of Accounting Research 49, 895–931.

Devers, C. E., McNamara, G., Wiseman, R. M., Arrfelt, M., 2008. Moving closer to the action: Examining compensation design effects on firm risk. Organization Science 19, 548–566.

Diamond, D. W., Verrecchia, R. E., 1991. Disclosure, liquidity, and the cost of capital. Journal of Finance 46, 1325–1359.

Dikolli, S. S., Heater, J. C., Mayew, W. J., Sethuraman, M., 2021. Chief Financial Officer co-option and Chief Executive Officer compensation. Management Science 67, 1939–1955.

Dimson, E., 1979. Risk measurement when shares are subject to infrequent trading. Journal of Financial Economics 7, 197–226.

Donaldson, D., Weymark, J. A., 1980. A single-parameter generalization of the Gini indices of inequality. Journal of Economic Theory 22, 67–86.

Edmans, A., Gabaix, X., Landier, A., 2009. A multiplicative model of optimal CEO incentives in market equilibrium. Review of Financial Studies 22, 4881–4917.

Edmans, A., Goldstein, I., Zhu, J. Y., 2013. Contracting with synergies. Unpublished working paper.

Eisenhardt, K. M., Schoonhoven, C. B., 1990. Organizational growth: Linking founding team, strategy, environment, and growth among US semiconductor ventures, 1978–1988. Administrative Science Quarterly 35, 504–529.

Ertugrul, M., Lei, J., Qiu, J., Wan, C., 2017. Annual report readability, tone ambiguity, and the cost of borrowing. Journal of Financial and Quantitative Analysis 52, 811–836.

Fang, X., Li, Y., Xin, B., Zhang, W., 2016. Financial statement comparability and debt contracting: Evidence from the syndicated loan market. Accounting Horizons, 30, 277–303.

Fan, J. P. H., Wong, T. J., Zhang, T., 2007. Politically connected CEOs, corporate governance, and post-IPO performance of China's newly partially privatized firms. Journal of Financial Economics 84, 330–357.

Fang, X., Pittman, J., Zhao, Y., 2021. The importance of director external social networks to stock price crash risk. Contemporary Accounting Research 38, 903–941.

Feng, M., Ge, W., Luo, S., Shevlin, T., 2011. Why do CFOs become involved in material accounting manipulations? Journal of Accounting and Economics 51, 21–36.

Francis, B., Hasan, I. and Li, L., 2016. Abnormal real operations, real earnings management, and subsequent crashes in stock prices. Review of Quantitative Finance and Accounting 46, 217–260.

Friedman, H. L., 2014. Implications of power: When the CEO can pressure the CFO to bias reports. Journal of Accounting and Economics 58, 117–141.

Graham, J. R., Harvey, C. R., Rajgopal, S., 2005. The economic implications of corporate financial reporting. Journal of Accounting and Economics 40, 3–73.

Hainmueller, J., 2012. Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies. Political analysis 20, 25–46.

Hall, B. J., Liebman, J. B., 1998. Are CEOs really paid like bureaucrats? Quarterly Journal of Economics 113, 653–691.

Hanlon, M., Hoopes, J. L., Shroff, N., 2014. The effect of tax authority monitoring and enforcement on financial reporting quality. Journal of the American Taxation Association 36, 137–170.

Hasan, M. M., Taylor, G., Richardson, G., 2022. Brand capital and stock price crash risk. Management Science 68, 7221–7247.

Henderson, A. D., Fredrickson, J. W., 2001. Top management team coordination needs and the CEO pay gap: A competitive test of economic and behavioral views. Academy of Management Journal 44, 96–117.

Hoopes, J. L., Mescall, D., Pittman, J. A., 2012. Do IRS audits deter corporate tax avoidance? The Accounting Review 87, 1603–1639.

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

Jayaraman, S., Milbourn, T., 2015. CEO equity incentives and financial misreporting: The role of auditor expertise. Accounting Review 90, 321–350.

Jehn, K. A., 1995. A multimethod examination of the benefits and detriments of intragroup conflict. Administrative Science Quarterly 40, 256–282.

Jensen, M. C., Meckling, W. H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics 3, 305–360.

Jensen, M. C., Murphy, K. J., 1990a. CEO incentives–It's not how much you pay, but how. Journal of Applied Corporate Finance 3, 36–49.

Jensen, M. C., Murphy, K. J., 1990b. Performance pay and top-management incentives. Journal of Political Economy 98, 225–264.

Jia, N., 2018. Tournament incentives and stock price crash risk. Accounting Horizons 32, 101-21.

Jia, N., Tian, X., Zhang, W., 2016. The real effects of tournament incentives: The case of firm innovation. Kelley School of Business Research Paper, 16–21.

Jiang, J. X., Petroni, K. R., Wang, I. Y., 2010. CFOs and CEOs: Who have the most influence on earnings management? Journal of Financial Economics 96, 513–526.

Jin, L., Myers, S. C., 2006. R2 around the world: New theory and new tests. Journal of Financial Economics 79, 257–292.

Jin, Y., Jorion, P., 2006. Firm value and hedging: Evidence from U.S. oil and gas producers. Journal of Finance 61, 893–919.

Kale, J. R., Reis, E., Venkateswaran, A., 2009. Rank-order tournaments and incentive alignment: The effect on firm performance. Journal of Finance 64, 1479–1512.

Kelly, B., Jiang, H., 2014. Tail risk and asset prices. Review of Financial Studies 27, 2841–2871.

Kedia, S., Rajgopal, S., 2011. Do the SEC's enforcement preferences affect corporate misconduct?. Journal of Accounting and Economics 51, 259–278.

Kim, C. F., Wang, K., Zhang, L., 2019. Readability of 10-K reports and stock price crash risk. Contemporary Accounting Research 36, 1184–1216.

Kim, J.-B., Li, L., Lu, L. Y., Yu, Y., 2016. Financial statement comparability and expected crash risk. Journal of Accounting and Economics 61, 294–312.

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

Kim, J.-B., Li, Y., Zhang, L., 2011b. Corporate tax avoidance and stock price crash risk: Firm-level analysis. Journal of Financial Economics 100, 639–662.

Kim, J.-B., L. Luo, H. Xie. 2018. The bright side of paying dividends: Evidence from stock price crashrisk. Working paper, City University of Hong Kong and University of Kentucky

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

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

Kim, Y., Li, H., Li, S., 2014. Corporate social responsibility and stock price crash risk. Journal of Banking and Finance 43, 1–13.

Kini, O., Williams, R., 2012. Tournament incentives, firm risk, and corporate policies. Journal of Financial Economics 103, 350–376.

Kothari, S. P., Leone, A. J., Wasley, C. E., 2005. Performance matched discretionary accrual measures. Journal of Accounting and Economics 39, 163–197.

Krishnaswami, S., Subramaniam, V., 1999. Information asymmetry, valuation, and the corporate spin-off decision. Journal of Financial Economics 53, 73–112.

Larcker, D. F., 1983. The association between performance plan adoption and corporate capital investment. Journal of Accounting and Economics 5, 3–30.

Lewis, B. W., Walls, J. L., Dowell, G. W., 2014. Difference in degrees: CEO characteristics and firm environmental disclosure. Strategic Management Journal 35, 712–722.

Li, S., Zhan, X., 2019. Product market threats and stock crash risk. Management Science 65, 4011–4031.

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

Li, Z., Han, N., Zeng, and Q., Li, Y. 2022. Executive team heterogeneity, equity pledges, and stock Price crash risk: Evidence from China. International Review of Financial Analysis 84, 102420: 1–15.

Liu, Y., Jiraporn, P., 2010. The effect of CEO power on bond ratings and yields. Journal of Empirical Finance 17, 744–762.

Lobo, G., Wang, C., Yu, X., Zhao, Y., 2020. Material weakness in internal controls and stock price crash risk. Journal of Accounting, Auditing & Finance 35, 106–138.

Malmendier, U., Tate, G., 2005. CEO overconfidence and corporate investment. Journal of Finance 60, 2661–2700.

Malmendier, U.,Tate, G., 2008. Who makes acquisitions? CEO overconfidence and the market's reaction. Journal of Financial Economics 89, 20–43.

Malmendier, U., Tate, G., Yan, J., 2011. Overconfidence and early-life experiences: the effect of managerial traits on corporate financial policies. Journal of Finance 66, 1687–1733.

Milliken, F. J., Martins, L. L., 1996. Searching for common threads: Understanding the multiple effects of diversity in organizational groups. Academy of Management Review 21, 402–433.

Moon, H., Conlon, D. E., Humphrey, S. E., Quigley, N., Devers, C. E. and Nowakowski, J. M., 2003. Group decision process and incrementalism in organizational decision making. Organizational Behavior and Human Decision Processes 92, 67–79.

Murphy, K. J., Ashenfelter, O., Card, D., 1999. Handbook of labor economics. Vol. 3. North-Holland Amsterdam.

Nemeth, C. J., Staw, B. M., 1989. The tradeoffs of social control and innovation in groups and organizations. Advances in Experimental Social Psychology 22, 175–210.

Pan, J., 2002. The jump-risk premia implicit in options: Evidence from an integrated time-series study. Journal of Financial Economics 63, 3–50.

Pelled, L. H., Eisenhardt, K. M., Xin, K. R., 1999. Exploring the black box: An analysis of work group diversity, conflict and performance. Administrative Science Quarterly 44, 1–28.

Peyer, U. C., Cremers, K., Bebchuk, L. A., 2007. 'Pay distribution in the top executive team'. Unpublished working paper.

Pfeffer, J., 2005. Producing sustainable competitive advantage through the effective man- agement of people. Academy of Management Perspectives 19, 95–106.

Pfeffer, J., Langton, N., 1993. The effect of wage dispersion on satisfaction, productivity, and working collaboratively: Evidence from college and university faculty. Administrative Science Quarterly 38, 382–407.

Piotroski, J., Wong, T. J., Zhang, T., 2015. Political incentives to suppress negative information: Evidence from Chinese listed firms. *Journal of Accounting Research* 53: 405–459.

Powers, W. C., Jr.; R. S. Troubh; H. S. Winokur, Jr. "Report of Investigation by the Special Investigative Committee of the Board of Directors of Enron Corp." Available at http://www.sec.gov/Archives/edgar/data/1024401/000090951802000089/big.txt (Feb. 2002).

Quigley, T. J., Hambrick, D. C., 2015. Has the "CEO effect" increased in recent decades? A new explanation for the great rise in America's attention to corporate leaders. Strategic Management Journal 36, 821–830.

Scholes, M., Williams, J., 1977. Estimating betas from nonsynchronous data. Journal of Financial Economics 5, 309–327.

Senbet, L., 2011. The Rise of Equity-Based Compensation: The Bright and The Dark. 25 for 25: Observations on the Past, Present, and Future of Corporate Governance.

Shaw, J. D., Gupta, N., Delery, J. E., 2002. Pay dispersion and workforce performance: Moderating effects of incentives and interdependence. Strategic Management Journal 23, 491–512.

Shipman, J. E., Swanquist, Q. T., Whited, R. L., 2017. Propensity score matching in accounting research.

The Accounting Review 92: 213–244.

Simons, T. L.,Peterson, R. S., 2000. Task conflict and relationship conflict in top management teams: the pivotal role of intragroup trust. Journal of Applied Psychology 85, 102–111.

Smith, A., 1937. The wealth of nations [1776] (Vol. 11937).

Steinbach, A. L., Holcomb, T. R., Holmes Jr, R. M., Devers, C. E., Cannella Jr, A. A., 2017. Top management team incentive heterogeneity, strategic investment behavior, and performance: A contingency theory of incentive alignment. Strategic Management Journal 38, 1701–1720.

Stock, J. H., Yogo, M., 2005. Testing for weak instruments in linear IV regression. In: Stock,

Valukas, A. R., 2010. White-collar crime and economic recession. U. Chi. Legal F., p.1.

Thompson, S. B. 2011. Simple formulas for standard errors that cluster by both firm and time. Journal of Financial Economics 99, 1–10.

Waldman, D. A., Ramirez, G. G., House, R. J.,Puranam, P., 2001. Does leadership matter? CEO leadership attributes and profitability under conditions of perceived environmental uncertainty. Academy of Management Journal 44, 134–143.

Williams, R. J., Hoffman, J. J., Lamont, B.T., 1995. The influence of top management team characteristics on M-form implementation time. Journal of Managerial Issues 7, 466–480.

Xing, Y., Zhang, X., Zhao, R., 2010. What does the individual option volatility smirk tell us about future equity returns?. Journal of Financial and Quantitative Analysis 45, 641–662.

Yan, S., 2011. Jump risk, stock returns, and slope of implied volatility smile. Journal of Financial Economics 99, 216–233.

Zhu, W., 2016. Accruals and price crashes. Review of Accounting Studies, 21, 349–399.

Figure 1. Time trend of equity incentive heterogeneity measures

This figure plots the time-series of annual averages of *Het* and *COE* from 1993 to 2018.

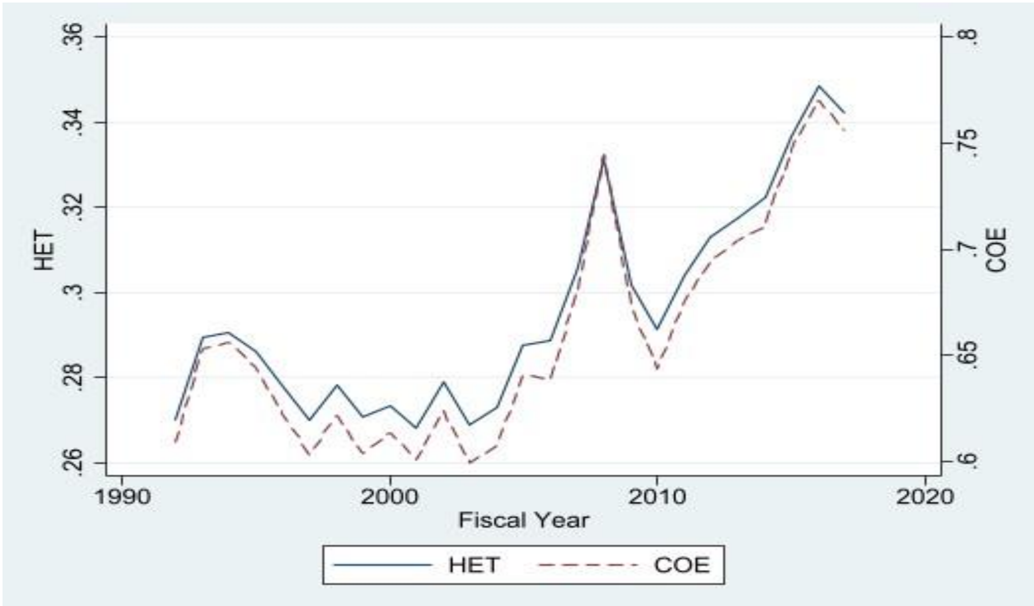

Table 1. Descriptive statistics

This table reports the summary statistics of stock price crash risk variables, managerial incentive variables, and the other variables used in our main empirical tests. Our sample consists of 26,992 firm–year observations covered by ExecuComp with the available information on the top five executive compensation and the other variables. The sample period for crash risk variables is 1993–2018 and the sample period for managerial incentives and other variables is 1992–2017. Detailed definitions of all variables are described in Appendix A.

	N	Mean	Std	P25	Median	P75
$NCSKEW_{T+1}$	26,992	0.093	0.844	-0.359	0.037	0.476
$DUVOL_{T+1}$	26,992	-0.002	0.374	-0.245	-0.015	0.227
$COUNT_{T+1}$	26,992	0.036	0.603	0.000	0.000	0.000
Het_T	26,992	0.296	0.147	0.185	0.271	0.384
COE_T	26,992	0.660	0.374	0.391	0.578	0.842
$NCSKEW_T$	26,992	0.094	0.811	-0.350	0.035	0.460
$SIGMA_T$	26,992	0.041	0.024	0.025	0.036	0.051
RET_T	26,992	-0.001	0.002	-0.001	-0.001	0.000
$DTURN_T$	26,992	0.004	0.079	-0.023	0.002	0.029
$SIZE_T$	26,992	7.591	1.649	6.385	7.449	8.657
MB_T	26,992	3.318	3.420	1.550	2.331	3.763
LEV_T	26,992	0.188	0.155	0.040	0.177	0.296
ROA_T	26,992	0.138	0.087	0.089	0.132	0.183
$KURT$	26,992	4.480	2.376	3.026	3.713	4.993
AGE_T	26,992	3.051	0.772	2.485	3.135	3.738
$OPAQUE_T$	26,992	0.061	0.064	0.018	0.041	0.080
$CASH\_ETR_T$	26,992	0.381	0.315	0.169	0.295	0.439
ABN_DISEXP_T	26,992	-0.110	0.256	-0.214	-0.061	0.000
ABN_CF_T	26,992	0.099	0.150	0.004	0.070	0.160
ABN_PROD_T	26,992	-0.045	0.185	-0.134	-0.027	0.043
$TENURE_T$	26,992	0.813	0.390	1.000	1.000	1.000
$BIG4_T$	26,992	0.860	0.347	1.000	1.000	1.000
ANA_T	26,992	1.917	1.034	1.386	2.130	2.714
DIV_T	26,992	0.571	0.495	0.000	1.000	1.000
$DISTANCE_T$	26,992	0.300	0.458	0.000	0.000	1.000
SIR_RATIO_T	26,992	0.039	0.048	0.008	0.023	0.051
DED_T	26,992	0.052	0.084	0.000	0.008	0.075
AVE_T	26,992	0.147	0.118	0.062	0.116	0.201

Table 2. Equity incentive heterogeneity of executive teams and stock price crash risk

This table reports the panel regression results of the impact of management team incentive structure on future stock price crash risk. The sample covers 26,992 firm–year observations with non-missing values for the regression variables during 1992–2017. The dependent variables are the three measures of stock price crash risk. The independent variables of interest are equity incentive heterogeneity of executive teams proxy variables: $Het_T, and\ COE_T$. All models include industry and year fixed effects. All variables are defined in Appendix A. The t-values reported in parentheses are based on standard errors clustered by firm and year. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) $NCSKEW_{T+1}$	(2) $DUVOL_{T+1}$	(3) $COUNT_{T+1}$	(4) $NCSKEW_{T+1}$	(5) $DUVOL_{T+1}$	(6) $COUNT_{T+1}$
Het_T	-0.145***	-0.067***	-0.102***			
	(-4.051)	(-4.352)	(-3.964)			
COE_T				-0.064***	-0.029***	-0.046***
				(-4.744)	(-4.813)	(-4.701)
$NCSKEW_T$	0.005	0.001	0.011**	0.004	0.001	0.010**
	(0.701)	(0.318)	(2.251)	(0.688)	(0.304)	(2.239)
$SIGMA_T$	2.256**	0.390	1.199*	2.271**	0.394	1.211*
	(2.369)	(0.896)	(1.938)	(2.393)	(0.910)	(1.964)
RET_T	16.193	3.717	12.377*	16.299	3.750	12.472*
	(1.556)	(0.704)	(1.734)	(1.570)	(0.712)	(1.749)
$DTURN_T$	0.142*	0.064*	0.114**	0.142*	0.064*	0.114**
	(1.927)	(1.871)	(2.374)	(1.923)	(1.867)	(2.363)
$SIZE_T$	0.003	0.003	0.004	0.003	0.003	0.003
	(0.513)	(1.215)	(0.943)	(0.465)	(1.175)	(0.877)
MB_T	-0.000	0.000	-0.001	-0.000	0.000	-0.001
	(-0.066)	(0.508)	(-0.764)	(-0.096)	(0.482)	(-0.805)
LEV_T	-0.058	-0.036*	-0.016	-0.059	-0.037*	-0.017
	(-1.281)	(-1.746)	(-0.542)	(-1.305)	(-1.770)	(-0.566)
ROA_T	0.418***	0.224***	0.275***	0.416***	0.223***	0.273***
	(6.070)	(7.181)	(5.085)	(6.014)	(7.127)	(5.041)
$KURT$	0.004	0.002	0.002	0.004	0.002	0.002
	(1.387)	(1.611)	(0.800)	(1.388)	(1.611)	(0.802)
AGE_T	-0.030***	-0.012***	-0.011	-0.030***	-0.012***	-0.011
	(-2.920)	(-2.877)	(-1.304)	(-2.919)	(-2.876)	(-1.306)
$OPAQUE_T$	0.068	0.012	0.067	0.068	0.012	0.067
	(0.617)	(0.252)	(1.128)	(0.613)	(0.247)	(1.121)
$CASH\_ETR_T$	-0.061***	-0.034***	-0.038**	-0.061***	-0.034***	-0.038**
	(-2.995)	(-3.843)	(-2.782)	(-2.984)	(-3.833)	(-2.769)
ABN_DISEXP_T	-0.018	-0.008	-0.007	-0.018	-0.008	-0.007
	(-0.553)	(-0.550)	(-0.342)	(-0.557)	(-0.552)	(-0.347)
ABN_CF_T	0.124*	0.058**	0.084*	0.123*	0.058**	0.083
	(1.929)	(2.377)	(1.714)	(1.907)	(2.355)	(1.691)
ABN_PROD_T	0.056	0.032	0.043	0.055	0.031	0.042
	(1.089)	(1.432)	(1.319)	(1.069)	(1.411)	(1.297)
$TENURE_T$	-0.012	-0.006	-0.005	-0.012	-0.006	-0.005
	(-0.846)	(-0.911)	(-0.612)	(-0.854)	(-0.918)	(-0.621)
$BIG4_T$	-0.017	-0.004	-0.008	-0.017	-0.004	-0.008
	(-0.893)	(-0.568)	(-0.684)	(-0.901)	(-0.575)	(-0.696)
ANA_T	0.000	-0.000	0.000	0.000	-0.000	0.000
	(0.013)	(-0.029)	(0.032)	(0.013)	(-0.025)	(0.028)
DIV_T	-0.000	0.000	0.007	-0.000	0.000	0.008
	(-0.024)	(0.023)	(0.665)	(-0.004)	(0.040)	(0.691)
$DISTANCE_T$	0.017	0.006	0.006	0.017	0.006	0.006
	(1.522)	(1.020)	(0.674)	(1.523)	(1.021)	(0.677)
SIR_RATIO_T	0.541***	0.235***	0.162	0.541***	0.235***	0.161
	(3.119)	(2.825)	(1.154)	(3.120)	(2.825)	(1.153)
DED_T	-0.025	-0.011	-0.015	-0.025	-0.011	-0.015
	(-0.328)	(-0.307)	(-0.282)	(-0.324)	(-0.304)	(-0.278)
AVE_T	0.109*	0.056**	0.028	0.112*	0.057**	0.030
	(1.959)	(2.101)	(0.755)	(2.001)	(2.135)	(0.814)
Intercept	0.053	-0.020	-0.006	0.055	-0.020	-0.004
	(0.836)	(-0.710)	(-0.121)	(0.857)	(-0.710)	(-0.078)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	26,992	26,992	26,992	26,992	26,992	26,992
Adjusted R^2	0.021	0.023	0.010	0.022	0.023	0.010

Table 3. Propensity score matching and entropy balancing matching

This table reports the results of our primary regressions in the samples generated by propensity score matching (PSM) and entropy balancing (EB) matching. In Panel A, the sample is constructed using a nearest-neighbor PSM with a caliper width of 0.001 and without replacement. The propensity scores are calculated by a logit model in which the dependent variables are high equity incentive heterogeneity of executive teams indicators: *Het_Dummy* (Columns (1)–(3)) and *COE_Dummy* (Columns (4)–(6)). Panel B presents the regression results of the balanced sample generated by EB matching. See Appendix B for the first-stage regression results of PSM and the matching efficiency of PSM and EB matching. The sample covers firm–year observations with non-missing values for all variables during 1992–2017. All models include industry and year fixed effects. All variables are defined in Appendix A. The t-values reported in parentheses are based on standard errors clustered by firm and year. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Propensity score matching

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	$NCSKEW_{T+1}$	$DUVOL_{T+1}$	$COUNT_{T+1}$	$NCSKEW_{T+1}$	$DUVOL_{T+1}$	$COUNT_{T+1}$
Het_T	-0.156***	-0.078***	-0.138***			
	(-3.897)	(-4.283)	(-4.354)			
COE_T				-0.068***	-0.030***	-0.056***
				(-3.917)	(-3.667)	(-4.884)
$NCSKEW_T$	0.005	0.002	0.010	0.002	0.000	0.011
	(0.553)	(0.486)	(1.527)	(0.163)	(0.047)	(1.142)
$SIGMA_T$	0.892	-0.105	0.343	1.178	0.027	0.333
	(0.849)	(-0.226)	(0.509)	(1.307)	(0.063)	(0.486)
RET_T	2.242	-1.342	0.979	4.130	0.699	0.181
	(0.223)	(-0.272)	(0.146)	(0.525)	(0.161)	(0.026)
$DTURN_T$	0.142	0.067	0.093	0.029	0.024	0.014
	(1.379)	(1.506)	(1.198)	(0.290)	(0.485)	(0.221)
$SIZE_T$	0.002	0.002	0.004	-0.008	-0.001	0.001
	(0.265)	(0.485)	(0.877)	(-1.072)	(-0.408)	(0.153)
MB_T	0.002	0.002	0.001	0.002	0.002*	0.001
	(0.719)	(1.096)	(0.545)	(0.667)	(1.760)	(0.585)
LEV_T	-0.077	-0.046	-0.056	-0.065	-0.040	-0.068
	(-1.121)	(-1.414)	(-1.141)	(-0.950)	(-1.222)	(-1.477)
ROA_T	0.409***	0.211***	0.310***	0.407***	0.207***	0.222**
	(3.869)	(4.425)	(3.581)	(3.883)	(4.650)	(2.686)
$KURT$	0.007	0.003*	0.003	0.004	0.002	0.001
	(1.614)	(1.837)	(0.870)	(0.798)	(1.163)	(0.354)
AGE_T	-0.030**	-0.012**	-0.017*	-0.031**	-0.013**	-0.013
	(-2.531)	(-2.483)	(-1.808)	(-2.677)	(-2.513)	(-1.386)
$OPAQUE_T$	-0.013	-0.045	0.086	0.039	-0.008	0.057
	(-0.087)	(-0.692)	(0.949)	(0.310)	(-0.141)	(0.675)
$CASH\_ETR_T$	-0.056*	-0.030**	-0.028	-0.057**	-0.034***	-0.033*
	(-1.932)	(-2.278)	(-1.425)	(-2.614)	(-3.534)	(-2.016)
ABN_DISEXP_T	-0.065	-0.026	-0.040	-0.061	-0.021	-0.024
	(-1.363)	(-1.230)	(-1.063)	(-1.349)	(-1.042)	(-0.781)
ABN_CF_T	0.081	0.044	0.039	0.063	0.041	0.091
	(0.996)	(1.430)	(0.735)	(0.763)	(1.318)	(1.530)
ABN_PROD_T	-0.028	0.003	-0.000	-0.008	0.011	0.019
	(-0.530)	(0.108)	(-0.004)	(-0.139)	(0.474)	(0.489)
$TENURE_T$	-0.002	-0.000	0.014	-0.006	-0.000	0.005
	(-0.107)	(-0.036)	(0.994)	(-0.378)	(-0.001)	(0.633)
$BIG4_T$	-0.034	-0.013	-0.013	-0.024	-0.007	-0.024
	(-1.447)	(-1.313)	(-0.901)	(-0.836)	(-0.593)	(-1.295)
ANA_T	0.010	0.005	0.010	0.016	0.006	0.009
	(0.927)	(1.020)	(1.612)	(1.467)	(1.378)	(1.456)
DIV_T	-0.001	0.002	0.007	0.009	0.003	0.010
	(-0.042)	(0.191)	(0.578)	(0.309)	(0.230)	(0.560)
$DISTANCE_T$	0.036**	0.015*	0.008	0.046**	0.020**	0.018
	(2.133)	(1.838)	(0.826)	(2.264)	(2.101)	(1.406)
SIR_RATIO_T	0.362	0.169	0.034	0.479*	0.190	0.149
	(1.559)	(1.604)	(0.169)	(1.779)	(1.623)	(0.766)

DED_T	0.005	0.009	-0.027	-0.010	-0.009	-0.035
	(0.055)	(0.189)	(-0.472)	(-0.108)	(-0.190)	(-0.584)
AVE_T	0.073	0.053	-0.016	0.134*	0.054	0.033
	(0.876)	(1.429)	(-0.320)	(1.801)	(1.436)	(0.729)
	0.092	0.000	0.010	0.131*	0.008	0.045
Intercept	(1.263)	(0.013)	(0.165)	(1.869)	(0.269)	(0.846)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	13,062	13,062	13,062	13,126	13,126	13,126
Adjusted R^2	0.020	0.023	0.010	0.020	0.023	0.009

Panel B: Entropy balancing matching

Variables	(1) $NCSKEW_{T+1}$	(2) $DUVOL_{T+1}$	(3) $COUNT_{T+1}$	(4) $NCSKEW_{T+1}$	(5) $DUVOL_{T+1}$	(6) $COUNT_{T+1}$
Het_T	-0.185***	-0.082***	-0.151***			
	(-4.580)	(-4.609)	(-5.168)			
COE_T				-0.078***	-0.034***	-0.062***
				(-4.937)	(-4.888)	(-5.497)
$NCSKEW_T$	0.003	0.001	0.012*	0.003	0.001	0.013**
	(0.343)	(0.302)	(1.846)	(0.286)	(0.280)	(1.962)
$SIGMA_T$	1.875**	0.219	1.065*	1.973**	0.270	1.076*
	(2.282)	(0.573)	(1.841)	(2.413)	(0.713)	(1.870)
RET_T	10.272	0.952	9.447*	11.949	1.793	9.967*
	(1.215)	(0.222)	(1.672)	(1.451)	(0.431)	(1.806)
$DTURN_T$	0.122	0.055	0.092	0.128	0.059*	0.087
	(1.479)	(1.524)	(1.542)	(1.557)	(1.651)	(1.459)
$SIZE_T$	0.004	0.004	0.005	0.005	0.004	0.007
	(0.660)	(1.398)	(1.222)	(0.750)	(1.301)	(1.600)
MB_T	0.001	0.001	-0.000	-0.002	-0.000	-0.002
	(0.161)	(0.739)	(-0.181)	(-0.725)	(-0.118)	(-1.055)
LEV_T	-0.006	-0.015	0.006	-0.013	-0.017	0.000
	(-0.126)	(-0.698)	(0.179)	(-0.264)	(-0.754)	(0.001)
ROA_T	0.427***	0.224***	0.266***	0.425***	0.223***	0.259***
	(4.235)	(5.141)	(3.616)	(4.223)	(5.121)	(3.543)
KURT	0.003	0.002	0.002	0.004	0.002	0.002
	(0.967)	(1.218)	(0.705)	(1.257)	(1.541)	(0.784)
AGE_T	-0.034***	-0.014***	-0.016*	-0.031***	-0.012**	-0.015*
	(-3.184)	(-2.807)	(-1.959)	(-2.933)	(-2.434)	(-1.910)
$OPAQUE_T$	0.099	0.012	0.150*	0.096	0.012	0.155**
	(0.926)	(0.259)	(1.934)	(0.899)	(0.252)	(1.997)
$CASH\_ETR_T$	-0.056**	-0.031***	-0.030*	-0.059***	-0.033***	-0.031*
	(-2.470)	(-3.162)	(-1.860)	(-2.589)	(-3.328)	(-1.894)
ABN_DISEXP_T	-0.092**	-0.039**	-0.043*	-0.078**	-0.033**	-0.033
	(-2.336)	(-2.260)	(-1.650)	(-2.008)	(-1.982)	(-1.263)
ABN_CF_T	0.143*	0.061*	0.112**	0.157**	0.066**	0.123**
	(1.908)	(1.896)	(2.161)	(2.103)	(2.072)	(2.393)
ABN_PROD_T	-0.004	0.008	0.012	-0.002	0.008	0.010
	(-0.082)	(0.386)	(0.356)	(-0.046)	(0.367)	(0.296)
$TENURE_T$	-0.012	-0.005	-0.001	-0.013	-0.005	-0.002
	(-0.730)	(-0.738)	(-0.045)	(-0.788)	(-0.716)	(-0.153)
$BIG4_T$	-0.028	-0.008	-0.012	-0.027	-0.008	-0.015
	(-1.490)	(-1.004)	(-0.927)	(-1.465)	(-0.916)	(-1.148)
ANA_T	0.007	0.003	0.007	0.008	0.004	0.007
	(1.043)	(0.974)	(1.500)	(1.147)	(1.177)	(1.300)
DIV_T	-0.004	-0.002	0.003	-0.004	-0.002	0.002
	(-0.268)	(-0.288)	(0.261)	(-0.246)	(-0.208)	(0.167)
$DISTANCE_T$	0.032**	0.012*	0.015	0.027*	0.010	0.011
	(2.145)	(1.899)	(1.381)	(1.818)	(1.564)	(1.077)
SIR_RATIO_T	0.496***	0.223***	0.080	0.490***	0.218***	0.074
	(3.025)	(3.178)	(0.705)	(2.988)	(3.100)	(0.652)
DED_T	0.027	0.021	0.011	0.058	0.029	0.036
	(0.328)	(0.585)	(0.187)	(0.704)	(0.805)	(0.611)
AVE_T	0.078	0.033	0.029	0.083	0.039	0.042
	(1.024)	(0.977)	(0.535)	(1.074)	(1.128)	(0.745)
	0.061	0.008	-0.178	-0.080	-0.038	-0.122
Intercept	(0.216)	(0.070)	(-0.854)	(-0.291)	(-0.296)	(-0.751)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	26,992	26,992	26,992	26,992	26,992	26,992
Adjusted R^2	0.028	0.030	0.018	0.028	0.029	0.018

Table 4. Managerial incentive heterogeneity and stock price crash risk: 2SLS

This table reports the 2SLS regression results of the impact of managerial incentive heterogeneity on future stock price crash risk. The sample covers firm–year observations with non-missing values for the regression variables during 1992–2017. Columns (1)–(2) report the results of the first-stage regressions in which the instrumental variables are the median of $Het_T, and\ COE_T$ of firms in the same industry and size quartile: $Mean\_Het_T$ and $Mean\_COE_T$. Columns (3)–(8) report the results of the second-stage regressions in which the independent variables of interest are the predicted value in the first-stage regressions: $Predicted\_Het_T$ and $Predicted\_COE_T$. All models include industry and year fixed effects. All variables are defined in Appendix A. The t-values reported in parentheses are based on standard errors clustered by firm and year. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) Het_T	(2) COE_T	(3) $NCSKEW_{T+1}$	(4) $DUVOL_{T+1}$	(5) $COUNT_{T+1}$	(6) $NCSKEW_{T+1}$	(7) $DUVOL_{T+1}$	(8) $COUNT_{T+1}$
$Predicted\_Het_T$			-0.227**	-0.117**	-0.199***			
			(-2.190)	(-2.526)	(-2.699)			
$Predicted\_COE_T$						-0.227**	-0.117**	-0.199***
						(-2.190)	(-2.526)	(-2.699)
Instrumental variables								
$Median\_Het_T$	0.753***							
	(38.369)							
$Median\_COE_T$		0.780***						
		(34.255)						
$NCSKEW_T$	-0.000	-0.002	0.008	0.002	0.012**	0.008	0.002	0.012**
	(-0.339)	(-0.854)	(1.058)	(0.769)	(2.330)	(1.058)	(0.769)	(2.330)
$SIGMA_T$	0.784***	1.975***	2.340***	0.448	1.261**	2.340***	0.448	1.261**
	(4.258)	(4.220)	(3.203)	(1.314)	(2.409)	(3.203)	(1.314)	(2.409)
RET_T	6.815***	16.724***	17.517**	4.470	13.355**	17.517**	4.470	13.355**
	(3.307)	(3.242)	(2.213)	(1.147)	(2.355)	(2.213)	(1.147)	(2.355)
$DTURN_T$	-0.029***	-0.076***	0.138**	0.062**	0.110**	0.138**	0.062**	0.110**
	(-3.087)	(-3.196)	(2.041)	(2.092)	(2.269)	(2.041)	(2.092)	(2.269)
$SIZE_T$	-0.003**	-0.010**	0.002	0.003	0.002	0.002	0.003	0.002
	(-2.019)	(-2.372)	(0.385)	(1.142)	(0.582)	(0.385)	(1.142)	(0.582)
MB_T	-0.003***	-0.009***	-0.000	0.000	-0.001	-0.000	0.000	-0.001
	(-7.164)	(-7.346)	(-0.237)	(0.331)	(-1.045)	(-0.237)	(0.331)	(-1.045)
LEV_T	0.001	-0.011	-0.060	-0.037**	-0.017	-0.060	-0.037**	-0.017
	(0.109)	(-0.372)	(-1.399)	(-1.984)	(-0.579)	(-1.399)	(-1.984)	(-0.579)
ROA_T	-0.014	-0.059	0.416***	0.223***	0.272***	0.416***	0.223***	0.272***
	(-0.654)	(-1.068)	(5.075)	(6.188)	(4.643)	(5.075)	(6.188)	(4.643)
$KURT$	0.000	0.001	0.005*	0.002*	0.003	0.005*	0.002*	0.003
	(0.609)	(0.557)	(1.737)	(1.851)	(1.308)	(1.737)	(1.851)	(1.308)
AGE_T	-0.002	-0.005	-0.030***	-0.012***	-0.011*	-0.030***	-0.012***	-0.011*

	(-0.714)	(-0.626)	(-3.332)	(-3.093)	(-1.742)	(-3.332)	(-3.093)	(-1.742)
$OPAQUE_T$	-0.002	-0.009	0.068	0.012	0.068	0.068	0.012	0.068
	(-0.108)	(-0.236)	(0.774)	(0.312)	(1.079)	(0.774)	(0.312)	(1.079)
$CASH\_ETR_T$	0.008**	0.024**	-0.060***	-0.034***	-0.037***	-0.060***	-0.034***	-0.037***
	(2.253)	(2.511)	(-3.050)	(-3.965)	(-2.743)	(-3.050)	(-3.965)	(-2.743)
ABN_DISEXP_T	-0.011	-0.027	-0.019	-0.008	-0.008	-0.019	-0.008	-0.008
	(-1.636)	(-1.529)	(-0.631)	(-0.642)	(-0.380)	(-0.631)	(-0.642)	(-0.380)
ABN_CF_T	-0.040***	-0.111***	0.120*	0.055**	0.079**	0.120*	0.055**	0.079**
	(-3.334)	(-3.631)	(1.931)	(2.120)	(1.989)	(1.931)	(2.120)	(1.989)
ABN_PROD_T	0.003	-0.008	0.055	0.031*	0.042	0.055	0.031*	0.042
	(0.239)	(-0.286)	(1.326)	(1.780)	(1.511)	(1.326)	(1.780)	(1.511)
$TENURE_T$	-0.004	-0.010	-0.012	-0.006	-0.005	-0.012	-0.006	-0.005
	(-1.188)	(-1.153)	(-0.834)	(-0.898)	(-0.514)	(-0.834)	(-0.898)	(-0.514)
$BIG4_T$	-0.012**	-0.027**	-0.018	-0.005	-0.009	-0.018	-0.005	-0.009
	(-2.403)	(-2.167)	(-1.103)	(-0.696)	(-0.799)	(-1.103)	(-0.696)	(-0.799)
ANA_T	-0.004**	-0.009*	-0.001	-0.000	-0.001	-0.001	-0.000	-0.001
	(-2.214)	(-1.881)	(-0.101)	(-0.177)	(-0.178)	(-0.101)	(-0.177)	(-0.178)
DIV_T	0.011**	0.029***	0.001	0.001	0.008	0.001	0.001	0.008
	(2.469)	(2.588)	(0.049)	(0.147)	(0.851)	(0.049)	(0.147)	(0.851)
$DISTANCE_T$	0.003	0.008	0.017	0.006	0.006	0.017	0.006	0.006
	(0.822)	(0.731)	(1.420)	(1.065)	(0.703)	(1.420)	(1.065)	(0.703)
SIR_RATIO_T	0.023	0.050	0.541***	0.235***	0.163	0.541***	0.235***	0.163
	(0.701)	(0.586)	(3.905)	(3.909)	(1.614)	(3.905)	(3.909)	(1.614)
DED_T	0.004	0.018	-0.012	-0.005	0.003	-0.012	-0.005	0.003
	(0.260)	(0.412)	(-0.181)	(-0.182)	(0.061)	(-0.181)	(-0.182)	(0.061)
AVE_T	0.048***	0.142***	0.115**	0.060**	0.035	0.115**	0.060**	0.035
	(2.669)	(3.246)	(2.109)	(2.492)	(0.884)	(2.109)	(2.492)	(0.884)
Intercept	0.089***	0.189**	0.134	0.027	0.014	0.134	0.027	0.014
	(2.984)	(2.415)	(1.097)	(0.462)	(0.131)	(1.097)	(0.462)	(0.131)
Shea Partial R^2	0.124	0.120						
F-statistic	1472.184	1173.422						
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	26,992	26,992	26,992	26,992	26,992	26,992	26,992	26,992
Adjusted R^2	0.226	0.214	0.021	0.023	0.010	0.021	0.023	0.010

Table 5. Firm fixed effects

This table reports firm fixed effects model estimation results of the impact of equity incentive heterogeneity of executive teams on future firm-specific stock price crash risk. Columns (1)–(3) report the analyses when we use Het_T as test variable and columns (4)–(6) report the analyses when we use COE_T as test variable. To economize on space, all of the control variables (see Table 2) are suppressed. All models include firm and year fixed effects. All variables are defined in Appendix A. The t-values reported in parentheses are based on standard errors clustered by firm and year. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) $NCSKEW_{T+1}$	(2) $DUVOL_{T+1}$	(3) $COUNT_{T+1}$	(4) $NCSKEW_{T+1}$	(5) $DUVOL_{T+1}$	(6) $COUNT_{T+1}$
Het_T	-0.114**	-0.056**	-0.077**			
	(-2.194)	(-2.427)	(-2.147)			
COE_T				-0.058***	-0.027***	-0.042***
				(-2.815)	(-3.016)	(-2.947)
Year and Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
N	26,992	26,992	26,992	26,992	26,992	26,992
Adjusted R^2	0.028	0.032	0.014	0.029	0.032	0.014

Table 6. Managerial characteristics and tournament incentives

This table reports the regression results of the impact of managerial incentive heterogeneity on future stock price crash risk, controlling for managerial characteristics and tournament incentives. The sample covers firm–year observations with non-missing values for the regression variables during 1992–2017. The dependent variables are three measures of stock price crash risk. The independent variables of interests are managerial incentive proxy variables: Het_T and COE_T. In Panel A, we control for CEO characteristics: *CEO_Age*, *CEO_Tenure*, *CEO_Power* and *CEO_Incentives*. In Panel B, we control for CFO characteristics: *CFO_Age*, *CFO_Tenure*, *CFO_Power*, and *CFO_Incentives*. In Panel C, we control for *Pay_Gap*, which is a proxy for the tournament incentives among top executives. In Panel D, we control for the equity incentive heterogeneity between CEOs and CFOs: *Het_CEO&CFO* and *COE_CEO&CFO*. In Panel E, we control for the equity inventive ratios of each ranked top five executives: *I_Exec_i*, where *i* is equal to 1, 2, 3, 4, and 5. To economize on space, all of the control variables (see Table 2) are suppressed. All models include industry and year fixed effects. In Panel F, we control for the age heterogeneity of executives, the tenure heterogeneity of executives, and the executive female ratio. All variables are defined in Appendix A. The t-values reported in parentheses are based on standard errors clustered by firm and year. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: CEO characteristics

Variables	(1) $NCSKEW_{T+1}$	(2) $DUVOL_{T+1}$	(3) $COUNT_{T+1}$	(4) $NCSKEW_{T+1}$	(5) $DUVOL_{T+1}$	(6) $COUNT_{T+1}$
Het_T	-0.126***	-0.064***	-0.080***			
	(-3.168)	(-4.256)	(-2.813)			
COE_T				-0.060***	-0.029***	-0.040***
				(-3.917)	(-4.880)	(-3.654)
$CEO\_Incentives_T$	0.021	0.022	-0.004	0.036	0.028	0.007
	(0.499)	(1.227)	(-0.134)	(0.834)	(1.534)	(0.231)
CEO_Age_T	0.000	0.000	0.000	0.000	0.000	0.000
	(0.337)	(0.455)	(0.332)	(0.339)	(0.457)	(0.335)
CEO_Tenure_T,	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(-1.579)	(-1.627)	(-1.443)	(-1.567)	(-1.616)	(-1.430)
CEO_Power_T	-0.010	-0.007	-0.001	-0.010	-0.007	-0.001
	(-1.249)	(-1.698)	(-0.182)	(-1.258)	(-1.707)	(-0.190)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	25,083	25,083	25,083	25,083	25,083	25,083
Adjusted R^2	0.021	0.022	0.010	0.021	0.022	0.010

Panel B: CFO characteristics

Variables	(1) $NCSKEW_{T+1}$	(2) $DUVOL_{T+1}$	(3) $COUNT_{T+1}$	(4) $NCSKEW_{T+1}$	(5) $DUVOL_{T+1}$	(6) $COUNT_{T+1}$
Het_T	-0.119**	-0.056***	-0.071**			
	(-2.598)	(-3.205)	(-2.545)			
COE_T				-0.059***	-0.027***	-0.037***
				(-3.595)	(-4.156)	(-3.560)
$CFO\_Incentives_T$	-0.031	0.006	-0.046	-0.048	-0.001	-0.058
	(-0.497)	(0.218)	(-0.844)	(-0.748)	(-0.043)	(-1.054)
CFO_Age_T	0.001	0.000	0.001	0.001	0.000	0.001
	(0.819)	(0.332)	(1.178)	(0.843)	(0.356)	(1.206)
CFO_Tenure_T,	0.001	0.000	0.001	0.001	0.000	0.001
	(0.460)	(0.130)	(0.443)	(0.459)	(0.131)	(0.440)
CFO_Power_T	-0.069	-0.030	-0.051	-0.067	-0.030	-0.050

	(-1.040)	(-1.027)	(-0.943)	(-1.017)	(-1.003)	(-0.925)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	15,113	15,113	15,113	15,113	15,113	15,113
Adjusted R^2	0.019	0.021	0.010	0.019	0.022	0.011

Panel C: Tournament incentives

Variables	(1) $NCSKEW_{T+1}$	(2) $DUVOL_{T+1}$	(3) $COUNT_{T+1}$	(4) $NCSKEW_{T+1}$	(5) $DUVOL_{T+1}$	(6) $COUNT_{T+1}$
Het_T	-0.144***	-0.067***	-0.098***			
	(-3.677)	(-4.090)	(-3.449)			
COE_T				-0.066***	-0.030***	-0.045***
				(-4.406)	(-4.633)	(-4.225)
Pay_Gap_T	0.004	0.000	0.003	0.004	0.000	0.002
	(0.728)	(0.109)	(0.576)	(0.657)	(0.057)	(0.511)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	24,727	24,727	24,727	24,727	24,727	24,727
Adjusted R^2	0.021	0.022	0.010	0.021	0.022	0.010

Panel D: Equity incentive heterogeneity between CEOs and CFOs

Variables	(1) $NCSKEW_{T+1}$	(2) $DUVOL_{T+1}$	(3) $COUNT_{T+1}$	(4) $NCSKEW_{T+1}$	(5) $DUVOL_{T+1}$	(6) $COUNT_{T+1}$
Het_T	-0.120***	-0.051***	-0.079***			
	(-2.903)	(-2.962)	(-2.962)			
$Het\_CEO\&CFO_T$	-0.131	-0.064	-0.106			
	(-1.501)	(-1.618)	(-1.534)			
COE_T				-0.054**	-0.025**	-0.044***
				(-2.428)	(-2.614)	(-3.643)
$COE\_CEO\&CFO_T$				-0.025	-0.005	0.010
				(-0.522)	(-0.256)	(0.294)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	20,428	20,428	20,428	20,428	20,428	20,428
Adjusted R^2	0.022	0.024	0.011	0.022	0.023	0.011

Panel E: Top 5 executives' equity incentive ratios

Variables	(1) $NCSKEW_{T+1}$	(2) $DUVOL_{T+1}$	(3) $COUNT_{T+1}$	(4) $NCSKEW_{T+1}$	(5) $DUVOL_{T+1}$	(6) $COUNT_{T+1}$
Het_T	-0.144***	-0.068***	-0.102***			
	(-3.679)	(-4.145)	(-3.330)			
COE_T				-0.065***	-0.030***	-0.047***
				(-4.376)	(-4.664)	(-3.930)
I_Exec_1	0.022	0.001	0.012	0.024	0.002	0.013
	(0.575)	(0.089)	(0.583)	(0.637)	(0.156)	(0.662)
I_Exec_2	-0.027	-0.014	-0.014	-0.032	-0.016	-0.018
	(-0.440)	(-0.551)	(-0.401)	(-0.510)	(-0.613)	(-0.501)
I_Exec_3	0.028	0.026	-0.011	0.023	0.024	-0.015
	(0.507)	(0.997)	(-0.270)	(0.418)	(0.922)	(-0.363)
I_Exec_4	0.087*	0.029	0.042	0.087*	0.029	0.042
	(1.788)	(1.326)	(1.176)	(1.785)	(1.320)	(1.177)
I_Exec_5	-0.003	0.010	-0.006	0.003	0.012	-0.000
	(-0.112)	(0.731)	(-0.225)	(0.110)	(0.922)	(-0.003)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	26,992	26,992	26,992	26,992	26,992	26,992

Adjusted R^2	0.021	0.023	0.010	0.022	0.023	0.010

Panel F: Top 5 executives' biographical characteristics heterogeneity

Variables	(1) *$NCSKEW_{T+1}$*	(2) *$DUVOL_{T+1}$*	(3) *$COUNT_{T+1}$*	(4) *$NCSKEW_{T+1}$*	(5) *$DUVOL_{T+1}$*	(6) *$COUNT_{T+1}$*
Het_T	-0.128**	-0.068***	-0.068*			
	(-2.334)	(-3.100)	(-1.817)			
COE_T				-0.056***	-0.029***	-0.034**
				(-2.940)	(-3.701)	(-2.553)
Age_Het_T	-0.611	-0.238	-0.413			
	(-1.505)	(-1.368)	(-1.494)			
$Tenure\_Het_T$	0.060	0.039*	-0.041			
	(1.077)	(1.713)	(-0.828)			
Female_ratio	0.015	0.012	-0.006	0.016	0.013	-0.010
	(0.266)	(0.579)	(-0.154)	(0.272)	(0.609)	(-0.236)
Age_COE_T				-0.005	-0.002	-0.004*
				(-1.493)	(-1.423)	(-1.757)
$Tenure\_COE_T$				-0.001	0.001	-0.004
				(-0.246)	(0.527)	(-1.480)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	14,686	14,686	14,686	14,686	14,686	14,686
Adjusted R^2	0.019	0.021	0.011	0.019	0.022	0.011

Table 7. Alternative measures of equity incentive heterogeneity

This table reports the panel regression results of the impact of managerial incentive heterogeneity on future stock price crash risk, using three alternative heterogeneity measures: CFO_*DISPERSION*, *CEO_DISPERSION* and *RANGE.* The sample covers firm–year observations with non-missing values for the regression variables during 1992–2017. To economize on space, all of the control variables (see Table 2) are suppressed. All models include industry and year fixed effects. All variables are defined in Appendix A. The t-values reported in parentheses are based on standard errors clustered by firm and year. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	$NCSKEW_{T+}$	$DUVOL_{T+1}$	$COUNT_{T+1}$	$NCSKEW_{T\cdot}$	$DUVOL_{T+1}$	$COUNT_{T+1}$	$NCSKEW_{T}$	$DUVOL_{T+1}$	$COUNT_{T+1}$
$CFO\_DISPERSION_T$	-0.065***	-0.029***	-0.045***						
	(-4.615)	(-4.755)	(-4.300)						
$CEO\_DISPERSION_T$				-0.177***	-0.077***	-0.136***			
				(-5.414)	(-4.352)	(-3.934)			
$RANGE_T$							-0.138***	-0.065***	-0.084***
							(-4.659)	(-4.670)	(-3.353)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	26,091	26,091	26,091	26,452	26,452	26,452	26,091	26,091	26,091
Adjusted R^2	0.021	0.022	0.010	0.021	0.023	0.010	0.021	0.022	0.010

Table 8. Alternative crash risk measures

This table reports the OLS regression results of the impact of managerial incentive heterogeneity on alternative measures of future stock price crash risk. The sample covers firm–year observations with non-missing values for the regression variables during 1992–2017. The dependent variables are alternative measures of future stock price crash risk. In Panel A, firm-specific weekly returns are estimated by a market model augmented by one lead market return, one lag market return, and Fama–French 30 industry returns. In Panel B, firm-specific weekly returns are estimated by a market model augmented by two lead market return, and two lag market return. In column (1) of Panel C, crash weeks are defined as weeks when firm-specific weekly returns exceed 3.09 standard deviations below the mean. In column (2) of Panel C, crash weeks are defined as weeks when firm-specific weekly returns exceed 3.20 standard deviations below the mean. The independent variables of interests are managerial incentive proxy variables: Het_T and COE_T. To economize on space, all of the control variables (see Table 2) are suppressed. All models include industry and year fixed effects. All variables are defined in Appendix A. The t-values reported in parentheses are based on standard errors clustered by firm. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: One lead and lag with FF30

	One lead and lag with FF30					
	(1)	(2)	(3)	(4)	(5)	(6)
	$NCSKEW_{T+1}$	$DUVOL_{T+1}$	$COUNT_{T+1}$	$NCSKEW_{T+1}$	$DUVOL_{T+1}$	$COUNT_{T+1}$
Het_T	-0.123***	-0.057***	-0.081***			
	(-4.054)	(-4.438)	(-3.883)			
COE_T				-0.056***	-0.025***	-0.040***
				(-4.754)	(-4.946)	(-4.787)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	26,992	26,992	26,992	26,992	26,992	26,992
Adjusted R^2	0.020	0.020	0.008	0.020	0.020	0.008

Panel B: Two leads and lags

	Two leads and lags					
	(1)	(2)	(3)	(4)	(5)	(6)
	$NCSKEW_{T+1}$	$DUVOL_{T+1}$	$COUNT_{T+1}$	$NCSKEW_{T+1}$	$DUVOL_{T+1}$	$COUNT_{T+1}$
Het_T	-0.150***	-0.068***	-0.108***			
	(-4.111)	(-4.282)	(-4.503)			
COE_T				-0.068***	-0.030***	-0.049***
				(-4.849)	(-4.766)	(-5.289)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	26,992	26,992	26,992	26,992	26,992	26,992
Adjusted R^2	0.025	0.030	0.011	0.025	0.030	0.011

Panel C: Crash

	3.09		3.20	
	(1)	(2)	(3)	(4)
	$CRASH_{T+1}$	$CRASH_{T+1}$	$CRASH_{T+1}$	$CRASH_{T+1}$
Het_T	-0.253**		-0.297***	
	(-2.329)		(-2.583)	
COE_T		-0.119**		-0.138***
		(-2.750)		(-3.011)
Controls	Yes	Yes	Yes	Yes
Year and Industry FE	Yes	Yes	Yes	Yes
N	26,992	26,992	26,992	26,992
Pseudo R^2	0.033	0.033	0.035	0.035

Table 9. Differential impact of managerial incentive heterogeneity on crash risk: Sub-sample analyses

This table reports the results of sub-sample analyses. In Panels A–E, we classify firms into high and low sub-samples based on the top and bottom annual tertiles of market sentiment, industry specialist auditors, dedicated institutional ownership, financial reporting comparability, and co-opted board, respectively. To economize on space, all of the control variables (see Table 2) are suppressed. All models include industry and year fixed effects. All variables are defined in Appendix A. The t-values reported in parentheses are based on standard errors clustered by firm and year. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variables	$NCSKEW_{T+1}$		$DUVOL_{T+1}$		$COUNT_{T+1}$	
Panel A: Market sentiment (Nhigh= 8,833; Nlow = 9,049)						
	High	Low	High	Low	High	Low
Het_T	-0.244***	-0.079	-0.101***	-0.041	-0.172***	-0.080
	(-3.944)	(-1.138)	(-3.325)	(-1.442)	(-3.177)	(-1.646)
Interaction: $Het \times MKT\_Dummy$	(-2.59)		(-2.22)		(-2.27)	
COE_T	-0.094***	-0.045	-0.039***	-0.022*	-0.070***	-0.040**
	(-4.026)	(-1.625)	(-3.313)	(-1.855)	(-3.417)	(-2.227)
Interaction: $COE \times MKT\_Dummy$	(-2.28)		(-1.89)		(-2.16)	
Panel B: Industry specialist auditor (NYes= 9,094; NNo = 8,760)						
	High	Low	High	Low	High	Low
Het_T	-0.039	-0.134*	-0.023	-0.053*	-0.012	-0.098*
	(-0.556)	(-1.746)	(-0.814)	(-1.687)	(-0.340)	(-1.741)
Interaction: $Het \times Specialist\_Dummy$	(1.83)		(1.72)		(2.47)	
COE_T	-0.015	-0.067**	-0.009	-0.026**	-0.005	-0.049**
	(-0.570)	(-2.305)	(-0.812)	(-2.215)	(-0.406)	(-2.337)
Interaction: $COE \times Specialist\_Dummy$	(2.15)		(1.95)		(2.77)	

Panel C: Dedicated institutional ownership (N_{high}= 8,990; N_{low} = 10,472)

	High	Low	High	Low	High	Low
Het_T	-0.013	-0.158***	-0.001	-0.080***	-0.012	-0.128***
	(-0.197)	(-2.985)	(-0.033)	(-3.327)	(-0.263)	(-3.127)
Interaction: $Het \times DED\_Dummy$	(-2.52)		(-2.99)		(-1.47)	
COE_T	-0.014	-0.074***	-0.004	-0.037***	-0.011	-0.059***
	(-0.535)	(-3.906)	(-0.346)	(-4.057)	(-0.604)	(-3.557)
Interaction: $Het \times DED\_Dummy$	(-2.12)		(-2.64)		(-1.22)	

Panel D: Financial reporting comparability (Nhigh = 5,903; Nlow = 5,981)

	High	Low	High	Low	High	Low
Het_T	-0.070	-0.240***	-0.025	-0.122***	-0.075	-0.152**
	(-0.938)	(-2.903)	(-0.744)	(-3.158)	(-1.072)	(-2.667)
Interaction: $Het \times COM\_Dummy$	(-2.20)		(-2.57)		(-1.11)	
COE_T	-0.035	-0.092***	-0.013	-0.047***	-0.036	-0.057**
	(-1.234)	(-2.830)	(-0.992)	(-3.055)	(-1.317)	(-2.560)
Interaction: $Het \times COM\_Dummy$	(-1.87)		(-2.30)		(-0.79)	

Panel E: Co-opted board (N_{high} = 5,935; N_{low} = 6,249)

	High	Low	High	Low	High	Low
Het_T	-0.166**	0.009	-0.074*	-0.007	-0.130**	-0.003
	(-2.099)	(0.100)	(-2.020)	(-0.179)	(-2.823)	(-0.061)
Interaction: $Het \times Co-opted\_Dummy$	(-2.09)		(-1.55)		(-2.26)	
COE_T	-0.082**	0.001	-0.035**	-0.004	-0.055***	-0.006
	(-2.744)	(0.021)	(-2.537)	(-0.280)	(-3.057)	(-0.276)
Interaction: $Het \times Co-opted\_Dummy$	(-2.63)		(-1.85)		(-2.32)	

Table 10. Replication of Kim et al. (2011a)'s tests

This table reports the replication of Kim et al. (2011a)'s tests using the same control variables and sample period (1993–2009). The dependent variables are three measures of stock price crash risk. The independent variables of interest are the managerial option and stock incentive proxy variables ($INCENTIVE\_OPT$ and $INCENTIVE\_STK$), and equity incentive heterogeneity of executive teams proxy variables (Het_T and COE_T). To economize on space, all of the control variables (see Table 2) are suppressed. All models include industry and year fixed effects. All variables are defined in Appendix A. The t-values reported in parentheses are based on standard errors clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) $NCSKEW_{T+1}$	(2) $DUVOL_{T+1}$	(3) $CRASH_{T+1}$	(4) $NCSKEW_{T+}$	(5) $DUVOL_{T+1}$	(6) $CRASH_{T+1}$	(7) $NCSKEW_{T+1}$	(8) $DUVOL_{T+1}$	(9) $CRASH_{T+1}$
$INCENTIVE\_OPT\_CEO_T$	-0.016	-0.013	-0.019	0.038	0.006	0.026	0.040	0.007	0.028
	(-0.262)	(-0.474)	(-0.099)	(0.586)	(0.216)	(0.128)	(0.609)	(0.235)	(0.137)
$INCENTIVE\_STK\_CEO_T$	-0.002	0.000	-0.050	0.003	0.004	0.011	0.016	0.009	0.028
	(-0.073)	(0.028)	(-0.461)	(0.079)	(0.242)	(0.088)	(0.400)	(0.535)	(0.223)
$BONUS\_CEO_T$	0.000	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000	-0.000
	(0.354)	(0.437)	(-0.679)	(0.319)	(0.488)	(-0.742)	(0.328)	(0.494)	(-0.740)
$INCENTIVE\_OPT\_CFO_T$	0.478***	0.217***	0.902***	0.322**	0.137**	0.500	0.307**	0.132**	0.484
	(4.293)	(4.293)	(2.894)	(2.572)	(2.441)	(1.425)	(2.467)	(2.353)	(1.382)
$INCENTIVE\_STK\_CFO_T$	-0.067	-0.020	-0.183	-0.087	-0.035	-0.356	-0.099	-0.039	-0.374
	(-0.683)	(-0.454)	(-0.551)	(-0.866)	(-0.731)	(-1.004)	(-0.979)	(-0.834)	(-1.054)
$BONUS\_CFO_T$	0.000	0.000	0.000	0.000	-0.000	-0.000	0.000	-0.000	-0.000
	(0.613)	(0.349)	(0.116)	(0.217)	(-0.209)	(-0.108)	(0.237)	(-0.193)	(-0.105)
Het_T				-0.170***	-0.078***	-0.350*			
				(-2.950)	(-3.009)	(-1.850)			
COE_T							-0.080***	-0.036***	-0.154**
							(-3.537)	(-3.545)	(-2.066)
$NCSKEW_T$	0.008	0.001	0.057**	0.005	-0.001	0.059**	0.005	-0.001	0.059**
	(0.884)	(0.273)	(2.107)	(0.509)	(-0.209)	(2.021)	(0.498)	(-0.221)	(2.014)
$SIGMA_T$	2.278***	0.432**	9.802***	3.550***	0.961***	8.525**	3.554***	0.962***	8.516**
	(4.928)	(2.018)	(2.907)	(4.639)	(2.691)	(2.431)	(4.649)	(2.697)	(2.429)
RET_T	14.439***	4.109***	119.028***	30.340***	10.495***	115.548**	30.342***	10.490***	115.368**
	(5.218)	(3.033)	(2.724)	(4.072)	(2.913)	(2.522)	(4.078)	(2.916)	(2.519)
$DTURN_T$	0.160**	0.063*	0.257	0.080	0.026	0.075	0.079	0.026	0.074
	(2.138)	(1.867)	(1.069)	(0.995)	(0.714)	(0.291)	(0.983)	(0.703)	(0.287)
$SIZE_T$	0.002	0.004	-0.021	-0.000	0.003	-0.030	-0.001	0.003	-0.030

	(0.354)	(1.542)	(-1.070)	(-0.075)	(1.208)	(-1.355)	(-0.138)	(1.159)	(-1.374)
MB_T	0.001	0.000	-0.006	0.000	0.000	-0.004	0.000	0.000	-0.004
	(0.282)	(0.250)	(-0.734)	(0.175)	(0.343)	(-0.401)	(0.145)	(0.319)	(-0.407)
LEV_T	-0.058	-0.038*	-0.063	-0.071	-0.046*	0.084	-0.071	-0.046*	0.083
	(-1.103)	(-1.684)	(-0.395)	(-1.272)	(-1.891)	(0.477)	(-1.275)	(-1.896)	(0.472)
ROA_T	0.599***	0.329***	1.202***	0.562***	0.308***	1.131***	0.558***	0.307***	1.125***
	(7.381)	(8.839)	(4.614)	(6.346)	(7.511)	(3.918)	(6.296)	(7.463)	(3.895)
$OPAQUE_T$	0.003	-0.026	-0.070	0.037	-0.008	0.170	0.037	-0.008	0.169
	(0.038)	(-0.615)	(-0.238)	(0.384)	(-0.181)	(0.534)	(0.382)	(-0.185)	(0.531)
Intercept	-0.117**	-0.105***	-2.484***	-0.078	-0.088***	-1.975***	-0.073	-0.086***	-1.965***
	(-2.292)	(-4.412)	(-2.839)	(-1.209)	(-2.924)	(-2.855)	(-1.141)	(-2.901)	(-2.831)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15,490	15,490	15,490	13,861	13,861	13,861	13,861	13,861	13,861
Adjusted or Pseudo R^2	0.043	0.046	0.031	0.040	0.042	0.031	0.040	0.042	0.031