

Beyond Formal Independence: Board Co-Option and Stock Price Crash Risk

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Abstract

Purpose: This study examines whether board co-option—the appointment of directors during the incumbent CEO’s tenure—is associated with future stock price crash risk. It also investigates whether CEO–director appointment ties matter beyond directors’ formal independence status.

Design/methodology/approach: Using a sample of U.S. firms from 1996 to 2019, the study examines the association between board co-option and subsequent crash risk. Additional analyses distinguish directors by co-option and formal independence status and account for CEO tenure, CEO and firm characteristics, and external governance.

Findings: Board co-option is positively associated with the risk of future stock price crashes. Co-opted non-independent directors exhibit a stronger positive association with crash risk than co-opted independent directors, whereas non-co-opted independent directors are associated with lower crash risk. The association between board co-option and crash risk persists after accounting for CEO tenure, additional CEO and firm characteristics, dedicated institutional ownership, and the market for corporate control.

Originality/value: Building on evidence that appointment-based executive–director coalitions predict crash risk in Chinese firms, this study isolates co-option within U.S. boards. Both co-opted independent and co-opted non-independent directors are associated with greater future crash risk, with the latter showing a stronger association. These findings suggest that formal independence may moderate the monitoring implications of CEO–director appointment ties without eliminating them.

Keywords: Board co-option; Director independence; CEO–director appointment ties; Board monitoring; Stock price crash risk; Corporate governance

JEL classification: G34; G14; M41

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1. Introduction

Corporate governance regulation places considerable emphasis on director independence, yet formal independence need not imply effective independence from the chief executive officer (CEO). Directors appointed after an incumbent CEO assumes office may satisfy conventional independence requirements while being less willing or able to challenge the CEO under whose tenure they were appointed. Coles et al. (2014) capture this dimension of board effectiveness through board co-option, measured as the fraction of directors appointed after the incumbent CEO assumes office, and show that greater co-option weakens disciplinary monitoring. Related evidence indicates that CEO–director connections can impair monitoring and delay the detection of managerial misconduct (Khanna et al., 2015). These findings raise an important capital-market question: Does board co-option weaken effective monitoring, facilitate managerial information withholding, and thereby increase the risk of future stock price crashes?

Xu et al. (2020) provide important related evidence from China, showing that appointment-based internal coalitions are associated with a higher risk of stock price crashes. Their measure, however, includes non-CEO top executives and directors appointed during the incumbent CEO's tenure, thereby capturing appointment-based connections throughout senior leadership. We instead isolate board-specific co-option, focusing exclusively on directors—the governance body formally responsible for monitoring management and overseeing financial reporting and disclosure. This distinction allows us to examine whether CEO–director appointment ties within the monitoring body itself are associated with future crash risk. The U.S. setting further allows us to examine

whether such ties remain consequential in an institutional environment with well-developed formal board-independence requirements. Importantly, our within-U.S. evidence directly distinguishes formal independence from appointment independence.

A central explanation for crashes is managerial bad-news hoarding: managers temporarily conceal adverse firm-specific information until its accumulation becomes unsustainable, resulting in an abrupt downward price adjustment when the information is eventually released (Jin and Myers, 2006; Hutton et al., 2009). Effective boards can constrain such behavior by overseeing financial reporting and disclosure and challenging managerial decisions. Co-opted directors, however, may be less willing to challenge the CEO because of appointment-based loyalty, reciprocity, or dependence. Consistent with this possibility, Coles et al. (2014) document weaker disciplinary monitoring by co-opted boards, Khanna et al. (2015) show that CEO–director connections reduce and delay fraud detection, and Cassell et al. (2018) find that greater co-option of audit committee members is associated with a higher likelihood of financial misstatements and greater absolute discretionary accruals. Together, this evidence suggests that appointment-based ties may weaken directors' willingness or ability to constrain managerial reporting choices. Greater board co-option may therefore provide managers with greater scope to withhold adverse information, increasing subsequent crash risk.

The predicted relation, however, is not unambiguous. Directors appointed during an incumbent CEO's tenure may possess greater firm- and CEO-specific knowledge, facilitate information sharing and coordination, and bring expertise aligned with the firm's evolving strategic needs. Consistent with such potential benefits, Nguyen et al. (2020) document greater innovation among firms with more co-opted boards. Board co-option may therefore involve a trade-off

between weaker monitoring independence and stronger advisory and information-sharing benefits. Whether its monitoring costs dominate these potential benefits for an outcome rooted in managerial information withholding is ultimately an empirical question.

We examine this question using publicly listed U.S. firms from 1996 to 2019. Following Coles et al. (2014), we measure board co-option as the fraction of directors appointed after the incumbent CEO assumes office. We find that greater board co-option is positively and significantly associated with future firm-specific stock price crash risk. This association is robust to alternative measures and extensive controls and persists after accounting for CEO power, CEO tenure, CEO involvement in director selection, board inexperience, and internal and external governance mechanisms. Thus, appointment-based CEO–director ties contain information about future extreme downside risk beyond conventional measures of managerial power and governance quality. Importantly, co-opted independent directors remain positively associated with future crash risk, whereas non-co-opted independent directors are associated with lower crash risk. Moreover, the positive association with crash risk is significantly stronger for co-opted non-independent directors than for co-opted independent directors. These findings indicate that, although formal independence matters, it does not necessarily eliminate the monitoring implications of CEO–director appointment ties. More broadly, we extend the appointment-based coalition evidence of Xu et al. (2020) by showing that board-specific appointment ties are associated with future crash risk even in a setting characterized by extensive formal requirements for director independence.

We undertake several analyses to address endogeneity concerns. First, following Coles et al. (2014), we exploit changes in NYSE and NASDAQ listing requirements mandating majority-independent boards, which generated externally induced changes in board composition among

previously non-compliant firms. Second, we exploit exogenous CEO turnover events that disrupt appointment-based ties between incumbent CEOs and existing directors. Third, we estimate firm fixed-effects specifications to absorb time-invariant firm heterogeneity. Across these analyses, the evidence remains consistent with a positive relation between board co-option and future crash risk.

We also examine the mechanisms underlying this relation. Greater board co-option is associated with a higher probability of financial restatements, greater accumulation of adverse private information, less negative earnings guidance, higher director meeting absenteeism, and greater overinvestment. These findings are consistent with co-opted boards providing weaker information monitoring and allowing adverse information to accumulate. The positive association between board co-option and crash risk is also stronger when CEOs have greater equity-based wealth exposure and greater organizational power, consistent with co-option being particularly consequential when managers have stronger incentives or greater ability to influence information flows.

Importantly, we distinguish appointment-based ties from formal director independence. Co-opted non-independent directors exhibit a stronger positive association with future crash risk than co-opted independent directors, while non-co-opted independent directors are associated with lower crash risk. The positive association between board co-option and crash risk also persists after we account for dedicated institutional ownership and the market for corporate control. Together, these findings suggest that formal independence classifications do not fully reflect the monitoring implications of CEO–director appointment ties, and that the association persists in the presence of these external governance mechanisms.

Our study makes two principal contributions. First, we contribute to the board-effectiveness literature by showing that board-specific co-option has implications for the board's information-monitoring function and extreme downside risk beyond directors' formal independence status. Prior research shows that co-opted boards provide weaker disciplinary monitoring (Coles et al., 2014) and are associated with financial reporting problems (Cassell et al., 2018). We extend this literature by linking appointment-based CEO–director ties to future crash risk and to several manifestations of weaker information monitoring. Our evidence distinguishing co-opted independent, co-opted non-independent, and non-co-opted independent directors further demonstrates that formal independence and effective independence from incumbent management are distinct dimensions of board effectiveness.

Second, we contribute to the crash-risk literature by isolating the board-specific component of appointment-based CEO influence and establishing its incremental relevance in the U.S. institutional setting. Xu et al. (2020) show that internal coalitions encompassing both non-CEO senior executives and directors predict crash risk in China. By isolating directors, we identify appointment-based ties within the governance body specifically responsible for monitoring management and overseeing corporate disclosure. Evidence that these ties remain consequential in the U.S., where formal board-independence requirements are comparatively well developed, highlights an important distinction between formal and effective board independence.

The remainder of the paper proceeds as follows. Section 2 develops the hypothesis, Section 3 describes the research design, Section 4 presents the baseline and endogeneity analyses; Section 5 examines economic mechanisms; Section 6 examines the composition of co-opted boards; Section 7 considers external governance; and Section 8 examines heterogeneity based on CEO

equity incentives and power. Section 9 presents additional robustness checks, and Section 10 concludes.

2. Related Literature and Hypothesis Development

2.1 Board Co-Option and Effective Board Monitoring

Corporate boards perform both monitoring and advisory functions, and their effectiveness depends partly on directors' ability and willingness to exercise judgment independently of management (Hermalin and Weisbach, 2003). Formal independence, however, may not ensure effective independence from the incumbent CEO. Directors appointed after a CEO assumes office may develop loyalty, familiarity, or reciprocity toward the CEO and consequently be less willing to challenge management even when they satisfy conventional independence requirements.

Coles et al. (2014) capture this dimension of board effectiveness through board co-option, measured as the fraction of directors appointed after the incumbent CEO assumes office. They show that co-opted boards provide weaker disciplinary monitoring. Related evidence indicates that CEO–director connections impair fraud detection (Khanna et al., 2015), while board co-option is associated with financial reporting misstatements (Cassell et al., 2018). These findings suggest that appointment-based CEO–director ties can weaken effective board monitoring despite directors' formal independence.

The implications of board co-option are nevertheless ambiguous because directors also perform an advisory role. Directors appointed during the incumbent CEO's tenure may possess greater firm- and CEO-specific knowledge and facilitate information sharing and coordination. Consistent with potential benefits of co-option, Nguyen et al. (2020) document greater innovation

among firms with more co-opted boards. Board co-option may therefore involve a trade-off between weaker monitoring independence and stronger advisory and information-sharing benefits.

2.2 Board Co-Option, Bad-News Hoarding, and Stock Price Crash Risk

A central explanation for stock price crash risk is managerial bad-news hoarding. Managers may withhold adverse firm-specific information to protect compensation, career prospects, reputation, or private benefits. As undisclosed bad news accumulates, concealment eventually becomes unsustainable, resulting in an abrupt downward price adjustment when the information is released (Jin and Myers, 2006; Hutton et al., 2009; Kim et al., 2011a, 2011b).

Effective boards can constrain such behavior by overseeing financial reporting and disclosure and challenging managerial decisions. Co-opted directors, however, may be less willing to challenge the incumbent CEO's reporting and disclosure choices because of appointment-based ties. Consistent with this argument, CEO–director connections reduce and delay fraud detection (Khanna et al., 2015), while board co-option is associated with financial reporting misstatements (Cassell et al., 2018). Greater board co-option may therefore provide managers with greater scope to withhold adverse information, allowing bad news to accumulate and increasing future crash risk.

Our analysis is closely related to Xu et al. (2020), who show that appointment-based internal coalitions are associated with higher stock price crash risk among Chinese firms. Our study differs in two important respects. First, Xu et al.'s internal-coalition measure encompasses both non-CEO top executives and directors appointed during the incumbent CEO's tenure, thereby capturing appointment-based connections throughout senior leadership. We isolate board-specific co-option,

allowing us to examine appointment-based ties within the governance body specifically responsible for monitoring management and overseeing financial reporting and disclosure. This distinction enables us to identify whether CEO influence over the composition of the monitoring body itself has incremental implications for crash risk.

Second, we examine the relation in the U.S. institutional setting, where formal mechanisms designed to promote board independence are comparatively well developed. Xu et al. (2020) emphasize features of the Chinese setting—including relationship-based connections, substantial state ownership and government influence, and concerns regarding the effectiveness of independent directors—that may strengthen the consequences of appointment-based relationships. In contrast, U.S. exchange listing requirements place substantial emphasis on board independence and independent-director oversight. The U.S. therefore provides a stringent setting in which to examine whether appointment-based CEO–director ties remain consequential even when formal independence mechanisms are well developed.

The relation between board co-option and crash risk is ultimately an empirical question. If formal independence requirements provide effective monitoring, or if the advisory and information-sharing benefits of co-option dominate its monitoring costs, appointment-based ties need not increase crash risk. Conversely, if these ties weaken directors’ willingness to challenge management, co-opted boards may provide managers with greater scope to withhold adverse information. Because bad-news hoarding depends critically on effective internal monitoring, we predict:

H1: Board co-option is positively associated with future stock price crash risk.

3. Research Design

3.1 Measures of Stock Price Crash Risk

We employ two widely used measures of firm-specific stock price crash risk: negative conditional skewness (*NCSKEW*) and down-to-up volatility (*DUVOL*) (Chen et al., 2001; Hutton et al., 2009; Kim et al., 2011a, 2011b). Both measures are constructed using firm-specific weekly returns. Detailed definitions and construction procedures are provided in Section IA1 of the Internet Appendix.

3.2 Measure of Board Co-Option

Following Coles et al. (2014), we measure board co-option (*COOPBD*) as the fraction of directors appointed after the incumbent CEO assumed office. A higher value therefore indicates that a larger proportion of the board was appointed during the current CEO's tenure. This appointment-based measure is distinct from formal director independence: directors may satisfy conventional independence requirements while having been appointed during the incumbent CEO's tenure. In additional analyses, we use a tenure-weighted measure of board co-option (*TENWCOOPBD*) and distinguish among co-opted independent, co-opted non-independent, and non-co-opted independent directors. Detailed variable definitions are provided in the Appendix.

3.3 Sample Selection

We construct the crash-risk measures using CRSP and Compustat data from 1996 to 2019. We require at least 26 weeks of stock-return data, non-negative book equity and total assets, and a fiscal year-end stock price of at least \$1. These criteria yield 128,462 firm-year observations. We then merge crash-risk measures at $t+1$ with board co-option and control variables measured at t

and exclude financial and regulated utility firms, resulting in a final sample of 21,302 firm-year observations.¹

3.4 Baseline Model and Control Variables

We estimate the relation between board co-option and future stock price crash risk using the following model:

$$Crash\ risk_{i,t+1} = \beta_0 + \beta_1 * COOPBD_{i,t} + \gamma' Control\ variables_{i,t} + \varepsilon_{i,t+1}, \quad (1)$$

where the dependent variable is either *NCSKEW* or *DUVOL* measured at $t+1$ and the principal explanatory variable is *COOPBD* measured at t .

Following Coles et al. (2014), we control for CEO tenure and its squared term because board co-option mechanically increases with the opportunity a CEO has to appoint directors. We also control for CEO ownership and its squared term and board size. Following the crash-risk literature (Chen et al., 2001; Hutton et al., 2009; Kim et al., 2011a, 2011b), we include detrended stock turnover (*DTURN*), stock-return volatility (*SIGMA*), past returns (*RET*), firm size (*LMVE*), market-to-book ratio (*MTB*), leverage (*LEV*), and profitability (*ROA*). Additional controls capture financial reporting opacity (*OPAQUE* and *OPAQUESQ*), tax-sheltering likelihood (*PRSHELT*), auditor specialization (*AUDITSPE*), CEO overconfidence (*HOLD100*), and CFO option incentives (*CFOOPIN*). Appendix provides detailed variable definitions and sources.

¹ We thank Coles et al. (2014) for providing the board co-option and related measures. Appendix A.2 of Coles et al. (2014) provides details of the construction and merging of the RiskMetrics, CRSP, Compustat, and ExecuComp data.

Baseline regressions include year and Fama–French 49-industry fixed effects, with standard errors two-way clustered at the firm and year levels.

3.5 Descriptive Statistics

Table 1 reports descriptive statistics. The mean values of *NCSKEW* and *DUVOL* are 0.125 and -0.010 , respectively. The mean *COOPBD* is 0.479, indicating that approximately 48% of directors were appointed during the incumbent CEO's tenure, while the mean tenure-weighted co-option measure (*TENWCOOPBD*) is 0.315. The distributions of the remaining variables are broadly comparable to those reported in prior crash-risk studies.

The Internet Appendix reports the correlation matrix. Both crash-risk measures are positively correlated with *COOPBD*, *TENWCOOPBD*, and co-opted non-independent directors and negatively correlated with non-co-opted independent directors. These univariate associations are consistent with, but do not establish, the predicted relation between board co-option and future crash risk.

[INSERT TABLE 1 HERE]

4. Empirical Results

4.1 Baseline Results

Table 2 presents the baseline regressions using *NCSKEW* and *DUVOL*, measured at $t+1$, as alternative measures of future stock price crash risk. Across all six specifications, the coefficient on *COOPBD* is positive and statistically significant at the 1% level. For *NCSKEW*, the coefficient ranges from 0.1320 ($t = 4.13$) in Column (1) to 0.1496 ($t = 3.45$) in Column (3). For *DUVOL*, it ranges from 0.0486 ($t = 3.63$) in Column (4) to 0.0520 ($t = 3.00$) in Column (6). The positive

association remains significant as we progressively introduce controls for firms' information environments, monitoring mechanisms, and managerial incentives.

The economic magnitude is also meaningful. Based on Columns (3) and (6), a one-standard-deviation increase in *COOPBD* is associated with increases in *NCSKEW* and *DUVOL* equivalent to approximately 4.30% and 3.98% of their respective standard deviations.

Several control variables are associated with future crash risk in directions broadly consistent with prior research. Consistent with Hutton et al. (2009), *OPAQUE* and *OPAQUESQ* indicate a concave relation between financial reporting opacity and crash risk, although the evidence is stronger for *NCSKEW*. *PRSHELT* is positive but insignificant, while auditor industry specialization (*AUDITSPE*) is negative but insignificant. CEO overconfidence (*HOLD100*) is positively and significantly associated with both crash-risk measures, whereas CFO option incentives (*CFOOPIN*) are positive but insignificant.

Overall, the results support H1 and indicate that greater board co-option is associated with higher future stock price crash risk after controlling for established determinants of crash risk.

[INSERT TABLE 2 HERE]

4.2 Addressing Endogeneity and Selection Concerns

The baseline relation may be affected by endogeneity because firms with greater board co-option may differ systematically in observable or unobservable characteristics that also affect crash risk. The results may also reflect time-invariant firm characteristics or endogenous matching among CEOs, directors, and firms. We address these concerns using four complementary

approaches: regulatory-induced changes in board composition, exogenous CEO turnover, firm fixed effects, and propensity score matching (PSM). Table 3 reports the results.

4.2.1 Regulatory-Induced Changes in Board Composition

Our first approach exploits SOX and subsequent NYSE and NASDAQ requirements that listed firms maintain majority-independent boards. Previously non-compliant firms were required to appoint additional independent directors. Because directors appointed during the incumbent CEO's tenure are classified as co-opted, these requirements generated an externally induced increase in board co-option among previously non-compliant firms.

A simple pre-post comparison is problematic because SOX introduced other governance and financial-reporting reforms that could independently affect crash risk. We therefore follow the modified difference-in-differences approach of Coles et al. (2014), which allows the post-SOX environment to affect crash risk directly while identifying the incremental association arising from regulatory-induced increases in board co-option among previously non-compliant firms.

We define *PSOX* as an indicator equal to one for 2002 and subsequent years and *NONCOMD* as an indicator for firms that were not compliant with the majority-independent-board requirement before the regulatory change. The variable of interest is $COOPBD \times PSOX \times NONCOMD$. The regressions include the full set of baseline controls and year and Fama–French 49-industry fixed effects.

Panel A of Table 3 shows that the coefficient on $COOPBD \times PSOX \times NONCOMD$ is 0.1131 ($t = 1.92$) for *NCSKEW* and 0.0456 ($t = 2.57$) for *DUVOL*, significant at the 10% and 5% levels, respectively. In contrast, $COOPBD \times PSOX$ is insignificant in both Columns. Thus, the positive

relation between board co-option and crash risk becomes incrementally stronger following the regulatory change among firms required to adjust their board composition. Because SOX and the associated exchange reforms affected multiple dimensions of governance and financial reporting, we interpret this analysis as mitigating rather than eliminating endogeneity concerns.

4.2.2 Exogenous CEO Turnover and Changes in Board Co-Option

Our second approach exploits exogenous CEO turnover. Because board co-option is defined relative to the incumbent CEO's tenure, an unexpected CEO departure mechanically reduces measured co-option: directors appointed during the departing CEO's tenure are no longer classified as co-opted by the incoming CEO. Such departures therefore generate variation in board co-option that is less likely to originate from the firm's contemporaneous crash-risk environment.

We identify exogenous CEO turnover using Eisfeldt and Kuhnen (2013) and extend their series through 2019 by manually identifying sudden CEO deaths using Factiva. We identify 797 exogenous turnovers during 1996–2019, of which 342 match our sample. To limit contamination from subsequent board changes, we restrict the event window to a maximum of two firm-year observations before and after each turnover. Panel B shows that mean *COOPBD* declines from 0.538 before turnover to 0.246 afterward, a decrease of 0.292 ($t = -18.95$). Mean *NCSKEW* declines from 0.168 to 0.033 and *DUVOL* from 0.012 to -0.001 , with both changes significant at the 1% level.

To account for contemporaneous changes among comparable firms, we construct a matched control sample and estimate a difference-in-differences specification. Treatment firms experience an exogenous CEO turnover, while control firms are selected from the same Fama–French 49

industry and year based on pre-turnover characteristics corresponding to the determinants of crash risk in our comprehensive baseline specifications.

We define *CHANGE* as one for observations following the turnover and zero before the turnover and *TREAT* as one for treatment firms. The coefficient on $TREAT \times CHANGE$ therefore captures the change in crash risk for turnover firms relative to matched controls. Panel C shows that this coefficient is -0.2267 ($t = -2.28$) for *NCSKEW* and -0.0642 ($t = -2.10$) for *DUVOL*, both significant at the 5% level. Thus, exogenous CEO turnover is accompanied by a substantial decline in board co-option and a reduction in subsequent crash risk relative to matched control firms.

Although the departing CEO's exit is plausibly exogenous, successor selection and subsequent governance changes may not be. We therefore interpret these results as substantially reducing concerns about endogenous CEO departure rather than establishing a fully causal relation.

4.2.3 Controlling for Time-Invariant Firm Heterogeneity

Persistent unobservable firm characteristics may jointly affect board co-option and crash risk. We therefore re-estimate the baseline models with firm and year fixed effects, which absorb time-invariant observed and unobserved firm characteristics and identify the relation from within-firm changes in board co-option. Panel D of Table 3 shows that *COOPBD* remains positively associated with *NCSKEW* (0.1631 , $t = 2.39$) and *DUVOL* (0.0631 , $t = 2.45$), with both coefficients significant at the 5% level. Thus, the baseline association is not explained solely by persistent differences across firms.

4.2.4 Addressing Selection on Observable Characteristics

Finally, we use PSM following Rosenbaum and Rubin (1983) to address selection on observable characteristics. Firms with *COOPBD* at or above the sample median are classified as the high-co-option group and those below the median as the low-co-option group. Propensity scores are estimated using *RET*, *DTURN*, *SIGMA*, *LEV*, *ROA*, *LMVE*, *MTB*, *TENURE*, and *CEOOWN*. We conduct one-to-one nearest-neighbour matching with replacement within each fiscal year using a caliper of 0.005. The covariate-balance tests reported in the Internet Appendix show no significant differences in the matching variables after matching.

Panel E of Table 3 shows that *COOPBD* remains positively associated with future crash risk in the matched sample. The coefficient is 0.2042 ($t = 1.93$) for *NCSKEW*, significant at the 10% level, and 0.0931 ($t = 2.41$) for *DUVOL*, significant at the 5% level. Thus, the baseline association persists among firms that are more comparable on observable characteristics. Because PSM does not address selection on unobservables, we do not interpret this analysis as establishing causality.

4.2.5 Overall Assessment

Taken together, the analyses in Table 3 address distinct sources of endogeneity and selection. Regulatory-induced increases in board co-option among previously non-compliant firms are associated with higher subsequent crash risk, while exogenous CEO turnovers that mechanically reduce co-option are followed by lower crash risk relative to matched controls. The positive association also persists in firm fixed-effects specifications and the PSM sample. Collectively, these results mitigate concerns that the baseline relation is driven solely by observable selection,

persistent firm characteristics, or endogenous board composition, while stopping short of establishing an unequivocal causal effect.

5. Economic Mechanisms

This section examines three mechanisms that may explain the positive association between co-opted boards and future stock price crash risk: (1) concealment of adverse information; (2) weaker director monitoring effort, reflected in board-meeting absence; and (3) greater corporate overinvestment. These analyses provide evidence consistent with the proposed mechanisms but do not constitute formal causal mediation tests.

5.1 Concealment of Adverse Information

Stock price crashes can arise when managers accumulate adverse firm-specific information and delay its incorporation into stock prices. Co-opted directors may be less willing or able to challenge managers' disclosure decisions, thereby permitting the withholding or selective release of adverse information. We examine this possibility using financial restatements (*REST*), residual short interest (*RSI*), and the number of negative earnings guidance events relative to positive ones (*NTPEG*).

REST is an indicator equal to one when the firm announces a financial restatement and zero otherwise. Restatements indicate that previously issued financial statements contained material errors or irregularities and are consistent with deficiencies in financial reporting and board oversight. Importantly, Cassell et al. (2018) show that greater co-option of audit committee members is associated with a higher likelihood of financial misstatements and greater absolute discretionary accruals, suggesting that appointment-based ties may weaken financial reporting

oversight. Prior research also shows that restatements increase investors' assessments of information risk (Kravet and Shevlin, 2010) and are associated with greater future crash risk (Al Mamun et al., 2020a). We obtain restatement data from the General Accounting Office.

Our second measure, *RSI*, is residual short interest constructed following Bao et al. (2018). It captures abnormal short-selling activity unexplained by publicly observable firm characteristics. Bao et al. (2018) show that higher residual short interest reflects negative private information held by informed short sellers and is associated with less frequent managerial disclosure of adverse news. We therefore expect *COOPBD* to be positively associated with subsequent *RSI*.

Our third measure, *NTPEG*, captures the relative frequency of negative versus positive earnings guidance. Managers exercise discretion over the content and timing of voluntary disclosures (Edmans et al., 2018; Hamm et al., 2018). *NTPEG* is the ratio of negative to positive earnings-guidance events obtained from RavenPack News Analytics; observations with neither negative nor positive guidance are excluded. A lower *NTPEG* indicates less negative guidance relative to positive guidance. We therefore expect *COOPBD* to be negatively associated with *NTPEG*. The regressions control for firm performance, leverage, firm size, acquisition activity, ownership structure, auditor quality, board size, board independence, firm age, CEO ownership, and CEO tenure. Explanatory variables are measured at t and the three outcomes at $t+1$.

Panel A of Table 4 reports the results. *COOPBD* is positively associated with subsequent *REST* (0.713, $t = 3.01$) and *RSI* (0.008, $t = 3.35$), and negatively associated with *NTPEG* (-0.082 , $t = -1.97$). Thus, firms with more co-opted boards are more likely to experience subsequent restatements, accumulate more adverse private information, and issue less negative guidance relative to positive guidance. The restatement result complements Cassell et al. (2018), who

document weaker financial reporting outcomes when audit committee members are co-opted, and extends this evidence to board-wide co-option. Collectively, the results are consistent with weaker oversight of managers' financial reporting and disclosure decisions and with greater scope for adverse information to remain outside public information channels.

[INSERT TABLE 4 HERE]

5.2 Director Monitoring Effort

We next examine whether co-opted boards are associated with weaker director monitoring effort. Board meetings enable directors to obtain firm-specific information, discuss corporate decisions, and monitor senior management. Meeting attendance therefore provides an observable indication of directors' monitoring engagement (Adams and Ferreira, 2008; Chou et al., 2010), and stronger attendance is associated with better firm performance (Chou et al., 2013). Because co-opted directors are appointed during the incumbent CEO's tenure, they may have weaker incentives to challenge the CEO or devote substantial effort to monitoring. Greater board co-option may therefore be associated with higher director absence, weakening directors' ability to obtain information and oversee management.

We measure meeting absence as the proportion of directors who fail to satisfy the required board-meeting attendance threshold during the year. The regressions control for board independence (*BOIND*), board size (*BSIZE*), the proportion of directors holding at least four outside directorships (*DIRO4BD*), the proportion aged above 70 (*DIRO70AGE*), and the proportion with more than 15 years of firm-specific tenure (*DIRO15TEN*). The expanded

specification also controls for firm risk, stock returns, leverage, firm size, profitability, growth opportunities, CEO ownership, and CEO tenure.

Panel B of Table 4 shows that *COOPBD* is positively and significantly associated with subsequent meeting absence in both specifications, with coefficients of 0.0155 ($t = 2.54$) and 0.0279 ($t = 2.44$). These results are consistent with co-opted boards exhibiting weaker monitoring effort, which may reduce directors' ability to acquire information, challenge management, and identify accumulating adverse information.

5.3 Overinvestment

Our third mechanism concerns corporate overinvestment. Managers may continue poorly performing projects because terminating them could reveal unfavorable information about earlier investment decisions and reduce private benefits associated with controlling corporate resources. Greater opacity can allow managers to mask deteriorating economic performance (Bleck and Liu, 2007), while equity-based incentives can induce managers to conceal worsening investment opportunities and undertake suboptimal investments to sustain inflated valuations (Benmelech et al., 2010). Overinvestment may contribute to future crash risk when deteriorating project performance remains concealed until accumulated adverse information is incorporated into stock prices (Kim et al., 2016). Effective boards should constrain such behavior, whereas co-opted boards may be less willing to challenge managerial investment decisions, allowing managers greater discretion to pursue or continue inefficient projects (Khurana et al., 2018).

Following Richardson (2006) and Khurana et al. (2018), we define *OVERINVEST* as the positive component of unexpected investment. Firm-years with positive unexpected investment

are assigned the estimated residual, while other observations are assigned zero. The baseline model controls for sales, cash holdings, growth opportunities, profitability, sales growth, leverage, acquisition activity, firm size, stock returns, financial reporting opacity, auditor specialization, ownership concentration, and CEO and CFO option incentives. The expanded specification additionally controls for board independence, board size, dedicated institutional ownership (*IODED*), internal governance by key subordinate executives (*INTGOV*), and the hostile takeover index (*TOIND*).

Panel C of Table 4 shows that *COOPBD* is positively and significantly associated with subsequent overinvestment, with coefficients of 0.0319 ($t = 2.66$) and 0.0293 ($t = 2.43$). The association therefore persists after controlling for additional internal and external governance mechanisms. These findings are consistent with co-opted boards providing weaker oversight of managerial investment decisions, offering a further mechanism linking board co-option to future crash risk.

6. Co-Opted Boards and Crash Risk: Additional Governance Analyses

Our main analysis measures board co-option as the proportion of directors appointed after the incumbent CEO assumed office but does not distinguish directors by independence status. Because independent and non-independent directors may differ in their susceptibility to CEO influence and ability to constrain bad-news hoarding, we: (1) disaggregate the board into co-opted and non-co-opted independent and non-independent directors; (2) compare co-opted independent and non-independent directors; and (3) examine whether the association between board co-option and crash risk persists after accounting for external governance mechanisms.

6.1 Co-Opted and Non-Co-Opted Independent and Non-Independent Directors

Independent directors are expected to monitor management and protect shareholders from managerial opportunism. However, formal independence may not guarantee effective monitoring when an independent director is appointed after the incumbent CEO assumes office. The CEO may influence director selection or develop social and professional ties with subsequently appointed directors. Accordingly, co-opted independent directors may be less willing to challenge managerial disclosure decisions than independent directors appointed before the incumbent CEO. Co-opted non-independent directors may be even more susceptible to managerial influence because they lack both formal and appointment independence. We therefore expect their association with future crash risk to be strongest.

We disaggregate board composition into four categories: co-opted independent, non-co-opted independent, co-opted non-independent, and non-co-opted non-independent directors. Panel A of Table 5 reports the results.

Co-opted independent directors are positively associated with future crash risk, although the evidence is relatively weak: the coefficient is 0.0946 ($t = 1.91$) for *NCSKEW* and 0.0320 ($t = 1.53$) for *DUVOL*, and is significant only for *NCSKEW* at the 10% level. In contrast, non-co-opted independent directors are negatively associated with both *NCSKEW* (-0.1446 , $t = -4.39$) and *DUVOL* (-0.0393 , $t = -2.55$). Co-opted non-independent directors exhibit strong positive associations with *NCSKEW* (0.2206 , $t = 4.22$) and *DUVOL* (0.0778 , $t = 4.08$), while non-co-opted non-independent directors are negatively but insignificantly associated with crash risk.

Overall, non-co-opted independent directors are associated with lower future crash risk, whereas co-opted non-independent directors exhibit the strongest positive association. These findings indicate that formal and appointment independence represent distinct dimensions of board monitoring effectiveness.

6.2 Co-Opted Independent versus Co-Opted Non-Independent Directors

We next compare co-opted independent and non-independent directors directly. We construct *COOPBDIND*, representing co-opted independent directors, and *COOPBDNONIND*, representing co-opted non-independent directors, and include both in the same regression. Panel B of Table 5 shows that *COOPBDIND* is positively associated with both *NCSKEW* (0.1125, $t = 2.60$) and *DUVOL* (0.0364, $t = 1.99$). The coefficients on *COOPBDNONIND* are substantially larger: 0.2189 ($t = 4.85$) and 0.0740 ($t = 4.69$), respectively. Formal tests reject equality of the coefficients for both *NCSKEW* ($F = 6.08$) and *DUVOL* ($F = 5.71$), with p -values below 0.01.

Thus, both co-opted independent and non-independent directors are associated with greater future crash risk, but the association is significantly stronger for co-opted non-independent directors. Formal independence, therefore, appears to mitigate, but not eliminate, the governance implications of appointment-based CEO–director ties.

6.3 External Governance Mechanisms

The positive association between board co-option and crash risk may reflect broader weaknesses in firms' governance environments. We therefore examine whether it persists after controlling for dedicated institutional ownership and the market for corporate control. Dedicated institutional investors have strong monitoring incentives because they maintain concentrated and

relatively long-term holdings. We measure dedicated institutional ownership using *IODED*, following Bushee (1998), and external takeover discipline using the hostile takeover index (*TOIND*) of Cain et al. (2017).

Panel C of Table 5 shows that *COOPBD* remains positively associated with *NCSKEW* (0.1284, $t = 2.87$) and *DUVOL* (0.0504, $t = 2.87$). *IODED* is negatively associated with *NCSKEW* (-0.3985 , $t = -3.21$) but is insignificant for *DUVOL*, while *TOIND* is negative but insignificant in both specifications. Thus, the association between board co-option and crash risk is not subsumed by institutional monitoring or takeover-market discipline. Taken together, Table 5 shows that non-co-opted independent directors are associated with lower crash risk, co-opted directors, particularly non-independent directors, are associated with greater crash risk, and the aggregate board co-option relation persists after controlling for external governance mechanisms.

[INSERT TABLE 5 HERE]

7. When Are Co-Opted Boards More Consequential for Crash Risk?

Having established that co-opted boards are associated with higher future crash risk, we examine whether this association varies with two CEO characteristics that may increase the consequences of weakened board monitoring: equity-based wealth exposure and organizational power. CEO equity incentives can strengthen managers' incentives to delay adverse disclosure when doing so protects the value of their equity-based wealth, while greater CEO power may increase managers' ability to influence information flows and board oversight. We therefore

examine whether the association between board co-option and future crash risk is stronger when CEO delta and CEO power are high. Table 6 reports the results.²

7.1 CEO Equity Incentives

Managers have incentives to withhold adverse information when its disclosure could reduce the value of their equity-based wealth (Kothari et al., 2009). CEO delta captures the sensitivity of CEO wealth to stock-price changes (Core and Guay, 2002; Coles et al., 2006). When CEO delta is high, unfavorable disclosure imposes a greater personal wealth loss, potentially strengthening incentives to delay such disclosure. If co-opted boards are less effective in constraining this behavior, their association with crash risk should be stronger when CEO delta is high.

Panel A of Table 6 supports this prediction. For *NCSKEW*, the coefficient on *COOPBD* is 0.2736 ($t = 4.22$) in the high-delta subsample compared with 0.1197 ($t = 1.96$) in the low-delta subsample, with the difference significant at the 10% level ($p = 0.06$). For *DUVOL*, the corresponding coefficients are 0.0941 ($t = 3.62$) and 0.0248 ($t = 1.01$), with the difference significant at the 5% level ($p = 0.05$). Thus, the association between board co-option and future crash risk is more pronounced when CEOs have greater equity-based wealth exposure, consistent with co-option being more consequential when managers have stronger incentives to protect the value of their equity holdings.

7.2 CEO Power

² We also examine whether the relation between board co-option and crash risk varies with CEO general managerial skills, director compensation, and directors' equity-wealth sensitivity. The results provide limited and inconsistent evidence of moderating effects. The coefficient differences between the relevant subsamples are statistically insignificant for CEO general managerial skills and director compensation. For directors' equity-wealth sensitivity, the coefficient difference is significant for *NCSKEW* but not for *DUVOL*. For brevity, these results are not tabulated but are available upon request.

Board co-option may also be particularly consequential when CEOs possess greater organizational power. Powerful CEOs may exert greater influence over corporate decisions, information flows, and board oversight, increasing their ability to resist director scrutiny or delay the disclosure of adverse information. When directors are also co-opted, the combination of greater CEO influence and weaker effective board independence may further constrain the board's ability to challenge management. We therefore expect the association between board co-option and future crash risk to be stronger when CEO power is high.

We follow Al Mamun et al. (2020a) and treat the founder-CEO as a powerful CEO. Panel B of Table 6 supports this prediction. For *NCSKEW*, the coefficient on *COOPBD* is 0.4896 ($t = 3.46$) for powerful CEOs compared with 0.0859 ($t = 1.65$) for non-powerful CEOs; the difference is significant at the 5% level ($p = 0.02$). For *DUVOL*, the corresponding coefficients are 0.1494 ($t = 2.88$) and 0.0298 ($t = 1.40$), with the difference also significant at the 5% level ($p = 0.05$). These findings indicate that the association between board co-option and future crash risk is stronger when CEOs possess greater organizational power, consistent with CEO influence amplifying the monitoring consequences of board co-option.

Overall, the cross-sectional evidence indicates that board co-option is more strongly associated with future crash risk when CEOs have greater equity-based wealth exposure and greater organizational power. These findings complement our earlier evidence by showing that the consequences of appointment-based CEO–director ties are particularly pronounced when managers have stronger incentives or greater ability to influence the disclosure and oversight processes.

[INSERT TABLE 6 HERE]

8. Additional Robustness Checks

8.1 Ruling Out Alternative Explanations

Our board co-option measure may reflect other characteristics associated with weak monitoring, particularly CEO involvement in director selection and board inexperience. Shivdasani and Yermack (1999) show that CEO involvement in director selection is associated with the appointment of directors less likely to monitor management aggressively. Following their approach, *INVOLVEDCEO* equals one when the firm has a separate nominating committee and the CEO serves on it, or when no separate committee exists and directors are selected by the entire board, and zero otherwise.

Because co-opted directors are appointed after the incumbent CEO assumes office, boards with greater co-option may also have shorter-tenured directors. We therefore construct *INEXBOARD*, which equals one when average director tenure is below the sample median and zero otherwise.

Panel A of Table 7 shows that after controlling simultaneously for *INVOLVEDCEO* and *INEXBOARD*, *COOPBD* remains positively associated with *NCSKEW* (0.1548, $t = 3.26$) and *DUVOL* (0.0534, $t = 2.82$). *INVOLVEDCEO* is itself positively associated with both crash-risk measures, whereas *INEXBOARD* is insignificant. Thus, CEO involvement in director selection and shorter board tenure do not explain the main association.

8.2 Alternative Measure of Co-Opted Boards

As an alternative to *COOPBD*, we follow Coles et al. (2014) and employ a tenure-weighted measure (*TENWCOOPBD*), calculated as the sum of the board tenure of co-opted directors divided

by the total tenure of all directors. This measure incorporates the relative tenure of co-opted directors rather than assigning equal weight to each director. Panel B shows that *TENWCOOPBD* is positively associated with both *NCSKEW* (0.1173, $t = 2.67$) and *DUVOL* (0.0342, $t = 1.98$). Thus, the main finding is robust to a tenure-weighted measure of board co-option.

8.3 Alternative Measure of Stock Price Crash Risk

Following Kim et al. (2011a, 2011b), we construct *CRASHD*, which equals one if the firm experiences at least one firm-specific weekly return 3.2 standard deviations below its mean firm-specific weekly return during the fiscal year, and zero otherwise. Panel C shows that *COOPBD* is positively and significantly associated with *CRASHD* (0.4031, $t = 3.87$). Thus, the main finding is robust to an alternative measure of stock price crash risk. Taken together, Table 7 shows that our findings are robust to alternative dimensions of CEO influence and board experience, as well as to alternative measures of board co-option and crash risk.

[INSERT TABLE 7 HERE]

9. Conclusion

This study examines whether board-specific co-option is associated with future stock price crash risk in U.S. firms. We find that firms with a greater proportion of directors appointed during the incumbent CEO's tenure experience significantly higher future crash risk. This relation is robust to alternative measures of board co-option and crash risk, extensive controls, and analyses addressing endogeneity and selection concerns. It is also not explained by CEO involvement in director selection, board inexperience, or internal and external governance mechanisms.

Our study identifies board-specific co-option as a distinct dimension of internal governance associated with extreme downside risk. Whereas Xu et al. (2020) examine appointment-based internal coalitions comprising non-CEO senior executives and directors in China, we isolate appointment ties within the board—the governance body formally responsible for monitoring management and overseeing financial reporting and disclosure. Our U.S. evidence further shows that such ties remain consequential in an institutional setting with well-developed formal board-independence requirements. Importantly, co-opted independent directors are associated with greater future crash risk, whereas non-co-opted independent directors are associated with lower crash risk, and the positive association is stronger for co-opted non-independent directors than for co-opted independent directors. These findings highlight an important distinction between formal director independence and effective independence from incumbent management.

We also provide evidence consistent with information withholding as an underlying mechanism. Firms with greater board co-option are more likely to experience subsequent financial restatements, exhibit greater residual short interest and relatively less negative earnings guidance, and display weaker director monitoring engagement and greater overinvestment. Collectively, these findings are consistent with an information and monitoring environment in which adverse information is less effectively brought into public information channels and inefficient investment decisions are less effectively constrained.

Finally, the association between board co-option and future crash risk is more pronounced when CEOs have greater equity-based wealth exposure and greater organizational power. Overall, our findings show that CEO–director appointment ties contain information about board monitoring

effectiveness beyond conventional measures of formal independence and are relevant to understanding firms' exposure to extreme downside risk.

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Appendix: Variables Definitions

<i>Coopted boards measure at t</i>	
<i>COOPBD</i>	Percentage of directors joining the board after the CEO assumed office.
<i>TENWCOOPBD</i>	The sum of the tenure of Co-Opted directors is divided by the sum of the tenure of all directors.
<i>RCOOPBD</i>	Residual from a regression of Co-Opted boards on CEO tenure, including year and industry effects.
<i>ICIECOOPBD</i>	Involved CEO and inexperienced board adjusted Co-Opted boards. This is measured as a residual from a regression of Co-Opted boards on involved CEOs and inexperienced boards, including year and industry effects. The involved CEO is a dummy variable equal to 1 if the firm has a nominating committee and the CEO is a part of the committee or if the firm has no nominating committee, zero otherwise. The inexperienced board is a dummy variable equal to 1 if the average tenure of the board is lower than the sample median.
<i>COOPBDIND</i>	Percentage of independent directors who joined the board after the CEO assumed office.
<i>COOPBDNONIND</i>	Percentage of non-independent directors who joined the board after the CEO assumed office.
<i>Crash risk variables at t+1</i>	
<i>CRASHD</i>	The crash dummy is an indicator variable taking the value of 1 for a firm-year that experiences one or more firm-specific weekly returns falling 3.2 standard deviations below the mean firm-specific weekly returns over the fiscal year. We follow Kim et al. (2011a, 2011b) to calculate this variable.
<i>DUVOL</i>	The logarithm of the ratio of the standard deviation of firm-specific down weekly returns to the standard deviation of up weekly returns during the fiscal year. We follow Kim et al. (2011a) to calculate DUVOL.
<i>NCSKEW</i>	NCSKEW is the negative conditional skewness of firm-specific weekly returns over the fiscal year period. We follow Kim et al. (2011a, 2011b) to estimate this variable.
<i>Variables for endogeneity test at t - 1 or t</i>	
<i>AVGDIRAGE</i>	Natural logarithm of the average age of the directors on the board.
<i>CEOFO</i>	The CEO is also the founder of the firm.
<i>CEOOWN</i>	Percentage of shares owned by the CEO excluding options and including restricted stock as well as stock acquired through vesting.
<i>CEORETD</i>	Takes the value of 1 if the CEO leaves the office at year t-1 and the age of the CEO is more than 65 years.
<i>CEOTENURE</i>	The number of years the CEO is in position.
<i>FAGE</i>	Natural logarithm of 1 plus firm age, in years. We manually collect the founding year of the firm or its ancestor to determine its age.
<i>NASDAQ</i>	A binary variable equal to one if the firm is listed on the NASDAQ and zero otherwise.
<i>SP500 Dummy</i>	A binary variable is equal to one if the firm is one of the S&P500 firms and zero otherwise.

<i>LAT</i>	Natural logarithm of 1 plus total asset.
<i>NONCOMD</i>	Takes the value one if the firm does not have more than 50% of independent directors after the enactment of NYSE and NASDAQ listing requirements.
<i>PSOX</i>	A binary variable equal to one if the observation year is from PSOX period and zero otherwise.
<i>Other variables at t-1</i>	
<i>ACQ</i>	A binary variable is equal to one if the firm reports acquisition activity in the fiscal year and zero otherwise.
<i>AUDITSPE</i>	Auditor industry specialization, an indicator variable that takes a value of one if the client's audit firm audits at least 20% of the assets in the client's two-digit SIC-code industry and 0 otherwise
<i>BLOCK</i>	Block shareholding (BLOCK), measured as the aggregate percentage of shares held by institutional investors that individually own at least 5% of the firm's outstanding shares.
<i>BIG4</i>	A binary variable equal to one if the firm's auditor is one of the big four auditors and zero otherwise.
<i>BSIZE</i>	Natural logarithm of one plus the number of directors on the board.
<i>BOIND</i>	Percentage of independent directors on the board. We classify a director as independent based on the variable classification of institutional shareholder services (ISS).
<i>CEOAGE</i>	Natural log of one plus the age of the CEO.
<i>CEOPRCH</i>	A binary variable equal to one if the CEO is the president and chairman of the board and zero otherwise.
<i>CEOOPIN</i>	The incentive ratio for CEO option holdings is measured as $\text{OPTSEN}/(\text{OPTSEN} + \text{SALARY} + \text{BONUS})$. The variable OPTSEN (option sensitivity) is the dollar change in the value of executive option holdings resulting from a 1% increase in the firm's stock price.
<i>CFOOPIN</i>	The incentive ratio for CFO option holdings is measured as $\text{OPTSEN}/(\text{OPTSEN} + \text{SALARY} + \text{BONUS})$. The variable OPTSEN (option sensitivity) is the dollar change in the value of executive option holdings resulting from a 1% increase in the firm's stock price.
<i>DTURN</i>	The average monthly share turnover over the fiscal year minus the average monthly share turnover over the last fiscal year. The monthly share turnover is the ratio of the monthly trading volume of total shares outstanding during the month.
<i>DIRO4BD</i>	Fraction of directors who sits on more than 4 public company's boards.
<i>DIRO70AGE</i>	Fraction of directors who is in retirement age, i.e., age more than 70.
<i>IRO15TEN</i>	Fraction of directors whose tenure is more than 15 years in the firm.
<i>HOLD100</i>	A measure of CEO overconfidence. We classify a CEO as overconfident if the CEO holds stock options that are more than 100% in the money at least twice during the sample period. We follow Campbell et al. (2011) to estimate the average CEO stock option moneyness for each year. Then we assign an indicator value of one for an overconfident CEO, beginning with the second time the CEO exhibits optimistic behavior.
<i>IODDED</i>	Percentage of dedicated institutional investors based on Bushee (1998). The data are from the Thomson Reuters Institutional Holdings (13F) database.
<i>LEV</i>	Leverage, that is, total long-term debt scaled by total assets.

<i>MTB</i>	The market value of equity divided by the book value of equity
<i>LMVE</i>	Natural logarithm of 1 plus the market value of equity on the balance sheet date.
<i>OPAQUE</i>	The moving sum of the absolute value of discretionary accruals over the three-year period from $t - 1$ to $t - 3$, where discretionary accruals are calculated based on the modified Jones model (Dechow et al., 1995).
<i>OPAQUESQ</i>	Square of <i>OPAQUE</i> .
<i>OVERINVEST</i>	<i>OVERINVEST</i> is the amount of unexpected investment for firm-years that have positive values of unexpected investment and zero otherwise (Khurana et al., 2018). The unexpected investment is the residual estimated from the model: $INVEST_{t+1} = \alpha_0 + \beta_1 MTB_t + \beta_2 ROA_t + \beta_3 CASH_t + \beta_4 FAGE_t + \beta_5 LEV_t + \beta_6 LNASSETS_t + \beta_7 INVEST_t + \sum Industry + \sum Year + \varepsilon_{t+1}$. <i>CASH</i> is cash and cash equivalents divided by lagged total assets; <i>LNASSETS</i> is the natural log of total assets; <i>INVEST</i> is the sum of capital expenditures, research and development expense, and acquisitions less proceeds from sale of fixed assets and depreciation, divided by lagged total assets. Other variables have been defined before.
<i>NTPEG</i>	Ratio of the total negative earnings guidance to the total positive earnings guidance released by the firm as documented in the RavenPack News Analytics
<i>PRSHELT</i>	The estimated probability of engaging in tax-sheltering activities, based on Wilson's (2009). We use model 1 of Table 4 in Lisowsky (2010) to calculate <i>PRSHELT</i> .
<i>REST</i>	A dummy variable taking the value of one if the firm has any financial restatement in the financial year and zero otherwise.
<i>RET</i>	Mean of firm weekly returns over the fiscal year, times 100.
<i>ROA</i>	Return on assets, calculated as income before extraordinary items divided by lagged total assets.
<i>RSI</i>	Residual short interest (<i>RSI</i>), a measure of managerial personal bad news hiding; and positive to total earnings guidance following Boa et al (2018)
<i>SIGMA</i>	Standard deviation of firm-specific weekly returns over the fiscal year.
<i>TENURE</i>	Natural logarithm of 1 plus the tenure of the CEO for a firm at the end of the fiscal year.
<i>TENURESQ</i>	Square of <i>TENURE</i> .
<i>TOIND</i>	A hostile takeover index, which is a measure of takeover susceptibility based on Cain et al. (2017).
<i>TURNOVER</i>	A dummy variable taking the value of 1 if there is a change in CEO.
<i>ZSCORE</i>	Following Hasan et al. (2014), we use the modified Z-score = $(1.2WCAP + 1.4RE + 3.3PI + 0.999SALE)/AT$, where <i>WCAP</i> is the working capital, <i>RE</i> is retained earnings, <i>PI</i> is pretax income, <i>SALE</i> is total sales, and <i>AT</i> is total assets. We exclude the market-to-book ratio since it is a control in our main regression.

Table 1: Descriptive Statistics

This table presents the summary statistics on measures of stock price crash risk, Co-Opted boards, and other control variables related to the link between Co-Opted boards and stock price crash risk. The crash variables represent 1996–2019, while Co-Opted board and control variables represent 1995–2018. We present the variable definitions in the Appendix.

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>5%</i>	<i>Median</i>	<i>95%</i>	<i>SD</i>	<i>Skew.</i>
<i>Crash risk and Co-Opted board variables</i>							
<i>NCSKEW_{t+1}</i>	21302	0.125	-1.619	0.095	2.028	1.095	0.059
<i>DUVOL_{t+1}</i>	21302	-0.010	-0.684	-0.016	0.703	0.412	0.029
<i>CRASHD_{t+1}</i>	21302	0.210	0.000	0.000	1.000	0.407	1.424
<i>COOPBD</i>	21302	0.479	0.000	0.444	1.000	0.315	0.183
<i>TENWCOOPBD</i>	21302	0.315	0.000	0.183	1.000	0.327	0.983
<i>COOPBDIND</i>	21302	0.342	0.000	0.300	0.833	0.272	0.329
<i>COOPBDNONIND</i>	21302	0.137	0.000	0.077	0.625	0.209	2.124
<i>Control and additional variables</i>							
<i>NCSKEW_t</i>	21302	0.160	-1.499	0.111	2.060	1.058	0.205
<i>TOIND_t</i>	21302	0.168	0.040	0.140	0.350	0.101	0.969
<i>IODED_t</i>	21216	0.085	0.002	0.071	0.218	0.069	1.029
<i>BSIZE_t</i>	21302	2.353	1.946	2.303	3.091	0.350	1.529
<i>SIGMA_t</i>	21302	0.055	0.025	0.049	0.106	0.027	1.903
<i>RET_t</i>	21302	-0.202	-1.445	-0.163	0.886	0.724	-0.432
<i>DTURN</i>	21302	-0.004	-0.140	-0.003	0.125	0.101	1.183
<i>LEV_t</i>	21302	0.203	0.000	0.194	0.503	0.165	0.584
<i>LMVE_t</i>	21302	7.601	5.209	7.497	10.549	1.543	0.008
<i>ROA_t</i>	21302	0.056	-0.093	0.059	0.188	0.083	-0.899
<i>MTB_t</i>	21302	3.145	0.858	2.337	8.758	2.589	2.264
<i>CEOOWN_t</i>	21302	0.052	0.000	0.022	0.214	0.075	2.473
<i>TENURE_t</i>	21302	0.828	0.301	0.845	1.380	0.340	-0.091
<i>OPAQUE_t</i>	20790	0.213	0.045	0.162	0.545	0.193	4.121
<i>PRSHELT_t</i>	20790	0.083	0.002	0.026	0.297	0.289	20.194
<i>AUDITSPE_t</i>	18140	0.695	0.089	0.888	0.995	0.333	-0.742
<i>REST_t</i>	19721	0.415	0.014	0.255	1.000	0.373	0.707
<i>HOLD100_t</i>	21302	0.481	0.000	0.000	1.000	0.500	0.075
<i>CFOOPIN_t</i>	17426	0.087	0.000	0.058	0.282	0.093	1.800
<i>CEORETD_{t-1}</i>	18957	0.099	0.000	0.000	1.000	0.299	2.686
<i>CEOFO_{t-1}</i>	18957	0.031	0.000	0.000	0.000	0.175	5.370
<i>FAGE_{t-1}</i>	21293	27.162	6.000	22.000	59.000	16.700	0.556
<i>LAT_{t-1}</i>	21298	7.493	5.234	7.332	10.291	1.547	0.518
<i>NONCOMD_{t-1}</i>	18957	0.043	0.000	0.000	0.000	0.203	4.500
<i>AVGDIRAGE_{t-1}</i>	18957	8.534	1.778	8.111	16.222	4.072	0.542

Table 2. Board Co-option and Future Stock Price Crash Risk: Baseline Results

The table presents the results of the impact of Co-Opted boards on stock price crash risk. All regressions include year and Fama-French 49-industry fixed effects. Standard errors are clustered at both firm and year levels. *T*-statistics are reported in parentheses. The coefficients' 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively. All continuous variables are winsorized at the 1% level. Variable definitions are provided in the Appendix.

	<i>NCSKEW</i> _{<i>t</i>+1}			<i>DUVOL</i> _{<i>t</i>+1}		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>COOPBD</i> _{<i>t</i>}	0.1320*** (4.13)	0.1357*** (3.31)	0.1496*** (3.45)	0.0486*** (3.63)	0.0490*** (2.96)	0.0520*** (3.00)
<i>NCSKEW</i> _{<i>t</i>}	0.1279*** (7.38)	0.0411*** (3.66)	0.0437*** (3.68)	0.0398*** (7.32)	0.0167*** (3.80)	0.0196*** (4.46)
<i>BSIZE</i> _{<i>t</i>}	-0.0666** (-1.97)	-0.0681* (-1.88)	-0.0761** (-2.00)	-0.0037 (-0.32)	-0.0071 (-0.58)	-0.0114 (-0.87)
<i>SIGMA</i> _{<i>t</i>}	-1.7663** (-2.34)	-1.8313** (-2.36)	-1.8679** (-2.29)	-0.6590** (-2.21)	-0.6524** (-2.22)	-0.6658** (-2.16)
<i>RET</i> _{<i>t</i>}	0.1486*** (5.78)	0.1342*** (4.59)	0.1476*** (4.84)	0.0568*** (6.50)	0.0507*** (5.36)	0.0573*** (5.97)
<i>DTURN</i> _{<i>t</i>}	0.0482 (0.62)	0.1178 (1.35)	0.1067 (1.11)	0.0415 (1.21)	0.0678** (2.00)	0.0760** (2.13)
<i>LEV</i> _{<i>t</i>}	-0.2997*** (-4.27)	-0.3671*** (-4.83)	-0.3870*** (-4.47)	-0.0538*** (-2.73)	-0.0739*** (-3.11)	-0.0821*** (-3.02)
<i>LMVE</i> _{<i>t</i>}	0.0281** (2.43)	0.0452*** (4.45)	0.0484*** (4.08)	0.0063 (1.53)	0.0127*** (3.24)	0.0150*** (3.39)
<i>ROA</i> _{<i>t</i>+1}	-1.2461*** (-5.65)	-1.4274*** (-7.03)	-1.5073*** (-6.71)	-0.2149*** (-2.61)	-0.2734*** (-3.73)	-0.3117*** (-3.96)
<i>MTB</i> _{<i>t</i>}	0.0275*** (5.22)	0.0276*** (4.23)	0.0282*** (4.42)	0.0058*** (3.04)	0.0060*** (2.77)	0.0064*** (3.08)
<i>CEOOWN</i> _{<i>t</i>}	0.3303 (0.99)	0.3826 (1.03)	0.3107 (0.77)	0.0959 (0.81)	0.1588 (1.19)	0.1406 (0.99)
<i>CEOOWNSQ</i> _{<i>t</i>}	-0.4791 (-0.48)	-0.6002 (-0.58)	-0.2159 (-0.21)	-0.0731 (-0.20)	-0.3116 (-0.83)	-0.1879 (-0.49)
<i>TENURE</i> _{<i>t</i>}	0.1759 (1.35)	0.1513 (0.98)	0.1672 (0.98)	0.1105** (2.38)	0.0678 (1.24)	0.0611 (1.01)
<i>TENURESQ</i> _{<i>t</i>}	-0.0948 (-1.15)	-0.0724 (-0.73)	-0.0928 (-0.86)	-0.0628** (-2.20)	-0.0367 (-1.07)	-0.0351 (-0.95)
<i>OPAQUE</i> _{<i>t</i>}		0.2095** (1.96)	0.2034* (1.80)		0.0613 (1.52)	0.0606 (1.44)
<i>OPAQUESQ</i> _{<i>t</i>}		-0.1120** (-2.16)	-0.1124** (-2.06)		-0.0407* (-1.95)	-0.0398* (-1.82)
<i>PRSHELT</i> _{<i>t</i>}		0.0289 (1.16)	0.0391 (1.41)		0.0083 (0.95)	0.0122 (1.27)
<i>AUDITSPE</i> _{<i>t</i>}		-0.0178 (-0.71)	-0.0227 (-0.80)		-0.0042 (-0.47)	-0.0046 (-0.42)
<i>HOLD100</i> _{<i>t</i>}			0.0666*** (3.73)			0.0193** (2.49)
<i>CFOOPIN</i> _{<i>t</i>}			0.0514 (0.32)			0.0161 (0.31)
Constant	-0.1640 (-1.21)	-0.2365 (-1.27)	-0.2468 (-1.24)	-0.1940*** (-4.12)	-0.1969*** (-3.47)	-0.2104*** (-3.40)
Adj. R ²	0.0308	0.0298	0.0335	0.0277	0.0281	0.0321
Year & Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21302	17682	15511	21302	17682	15511

Table 3. Board Co-Option and Stock Price Crash Risk: Endogeneity and Selection Concerns

This table presents the test results addressing endogeneity in the relation between Co-Opted boards and stock price crash risk. Panel A presents the results utilizing the passage of the SOX Act of 2002 and subsequent changes in listing requirements of the NYSE and NASDAQ that mandate all firms to have majority independent boards as a natural experiment. Panel B reports the univariate test on the effect of exogenous CEO turnovers on stock price crash risk. Panel C reports the impact of exogenous CEO turnovers on crash risk. Panel D presents the results of the firm fixed effect regression. Panel E presents the regression results of the propensity score matching sample when we compare control (unfriendly Board) and treatment (friendly Board) firms. All regressions include year and Fama-French 49-industry fixed effects. Standard errors are clustered at both the firm and year levels. *T*-statistics are reported in parentheses. The coefficients' 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively. All continuous variables are winsorized at the 1% level. Variable definitions are provided in the Appendix.

Panel A. Regulatory-Induced Changes in Board Composition

	<i>NCSKEW</i> _{<i>t</i>+1}	<i>DUVOL</i> _{<i>t</i>+1}
	(1)	(2)
<i>COOPBD</i> _{<i>t</i>}	0.1100** (2.39)	0.0292* (1.77)
<i>COOPBD</i> _{<i>t</i>} * <i>PSOX</i> _{<i>t</i>}	0.0511 (0.90)	0.0184 (1.11)
<i>COOPBD</i> _{<i>t</i>} * <i>PSOX</i> * <i>NONCOMD</i> _{<i>t</i>}	0.1131* (1.92)	0.0456** (2.57)
<i>PSOX</i>	-0.2278 (0.001)	-0.0593 (0.012)
<i>NONCOMD</i> _{<i>t</i>}	-0.0099 (-0.35)	-0.0029 (-0.63)
Constant	-0.2187 (-1.17)	-0.2278*** (-4.25)
Adjusted R ²	0.0142	0.0229
Baseline all controls	Yes	Yes
Year & Industry FE	Yes	Yes
Observations	11024	11024

Panel B. Changes in Board Co-option Following Exogenous CEO Turnover

	<i>Post-turnover</i>	<i>Pre-turnover</i>	<i>Diff. (Pre – Post)</i>	<i>t-stat.</i>
<i>Based on CEOFO (Based on 342 292 treated firms)</i>				
<i>COOPBD</i> _{<i>t</i>}	0.246	0.538	-0.292***	-18.95
<i>NCSKEW</i> _{<i>t</i>}	0.033	0.168	-0.135***	-3.05
<i>DUVOL</i> _{<i>t</i>}	-0.001	0.012	-0.013***	-4.27

Panel C. Exogenous CEO Turnover: Difference-in-Differences Estimates

	<i>NCSKEW</i> _{<i>t</i>+1}	<i>DUVOL</i> _{<i>t</i>+1}
	(1)	(2)
Change	0.0985 (1.27)	0.0375 (1.43)
Treat	0.0780 (1.07)	0.0272 (1.23)
Treat*Change	-0.2267** (-2.28)	-0.0642** (-2.10)
Constant	-0.6674 (-1.24)	-0.2818 (-1.58)
Adjusted R ²	0.0121	0.0244
Baseline all controls	Yes	Yes
Year & Industry FE	Yes	Yes
Observations	1757	1757

Panel D. Firm Fixed-Effects Estimates

	<i>NCSKEW</i> _{<i>t</i>+1}	<i>DUVOL</i> _{<i>t</i>+1}
	(1)	(2)
<i>COOPBD</i> _{<i>t</i>}	0.1631** (2.39)	0.0631** (2.45)
Constant	-3.9840*** (-12.68)	-1.0405*** (-9.49)
Adjusted R ²	0.2508	0.2342
Baseline all controls	Yes	Yes
Year & Firm FE	Yes	Yes
Observations	15511	15511

Panel E. Propensity-Score-Matched Analysis

	<i>NCSKEW</i> _{<i>t</i>+1}	<i>DUVOL</i> _{<i>t</i>+1}
	(1)	(2)
<i>COOPBD</i> _{<i>t</i>}	0.2042* (1.93)	0.0931** (2.41)
Constant	-0.1791 (-0.30)	-0.1443 (-0.61)
Adjusted R ²	0.0327	0.0264
Baseline full controls	Yes	Yes
Year & Ind FE	Yes	Yes
Observations	1588	1588

Table 4. Board Co-option and Potential Mechanisms

Table 4 presents three panels. Panel A presents the impact of Co-Opted boards on proxies for hiding bad news: *REST*, a dummy variable that equals one to indicate financial reporting restatement and zero otherwise; residual short interest (*RSI*), a measure of managerial personal bad news hiding; and negative to total positive earnings guidance (*NTPEG*), a measure of strategic news manipulation. Panel B presents the results on the effect of Co-Opted boards on board members' meeting absenteeism. Panel C presents the impact of Co-Opted boards on overinvestment. All regressions include year and Fama-French 49-industry fixed effects. Standard errors are clustered at both the firm and year levels. *T*-statistics are reported in parentheses. The coefficients' 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively. All continuous variables are winsorized at the 1% level. Variable definitions are provided in the Appendix.

Panel A. Board Co-option and the Concealment of Adverse Information

	<i>REST</i> _{<i>t</i>+1}	<i>RSI</i> _{<i>t</i>+1}	<i>NTPEG</i> _{<i>t</i>+1}
	(1)	(3)	(4)
<i>COOPBD</i> _{<i>t</i>}	0.713*** (3.01)	0.008*** (3.35)	-0.082** (-1.97)
<i>ROA</i> _{<i>t</i>}	-2.674*** (-3.39)	-0.010 (-1.07)	-0.254 (-1.26)
<i>LEV</i> _{<i>t</i>}	0.385 (0.90)	0.013** (2.28)	0.075 (0.80)
<i>LMVE</i> _{<i>t</i>}	-0.087 (-1.56)	-0.006*** (-7.17)	-0.007 (-0.60)
<i>ACQ</i> _{<i>t</i>}	0.174 (1.28)	-0.004*** (-3.91)	-0.042 (-1.59)
<i>CEOPRCH</i> _{<i>t</i>}	0.088 (0.57)	-0.002* (-1.68)	-0.016 (-0.68)
<i>BLOCK</i> _{<i>t</i>}	-0.402** (-2.43)	0.004** (2.32)	-0.003 (-0.09)
<i>BIG4</i> _{<i>t</i>}	-0.164 (-1.19)	-0.001 (-0.73)	-0.021 (-0.89)
<i>BSIZE</i> _{<i>t</i>}	0.092 (0.55)	-0.003 (-1.48)	0.017 (0.39)
<i>BOIND</i> _{<i>t</i>}	-0.159 (-0.34)	-0.006 (-1.34)	0.061 (1.06)
<i>FAGE</i> _{<i>t</i>}	0.086 (0.67)	-0.007*** (-5.06)	-0.015 (-0.82)
<i>CEOOWN</i> _{<i>t</i>}	-0.881 (-0.85)	0.032*** (3.22)	-0.482*** (-4.03)
<i>TENURE</i> _{<i>t</i>}	-0.206 (-0.82)	-0.002 (-0.84)	0.013 (0.35)
Constant	-4.371*** (-3.29)	0.261*** (13.38)	0.518** (2.53)
Pseudo (Adjusted) R ²	0.116	0.245	0.021
Year & Industry FE	Yes	Yes	Yes
Observations	6136	13551	4174

Panel B. Board Co-option and Director Monitoring Effort

	<i>Meeting Absense_{t+1}</i>	
<i>COOPBD_t</i>	0.0155** (2.54)	0.0279** (2.44)
<i>BOIND_t</i>	-0.0145* (-1.68)	-0.0128 (-1.51)
<i>BSIZE_t</i>	0.0041** (2.24)	0.0055*** (2.75)
<i>DIRO4BD_t</i>	0.0186 (1.55)	0.0181 (1.55)
<i>DIRO70AGE_t</i>	0.0034 (0.68)	0.0071 (1.41)
<i>DIRO15TEN_t</i>	-0.0177*** (-2.86)	-0.0080** (-2.39)
<i>SIGMA_t</i>		0.0593 (1.42)
<i>RET_t</i>		-0.0001 (-0.11)
<i>LEV_t</i>		0.0010 (0.23)
<i>LMVE_t</i>		-0.0007 (-0.90)
<i>ROA_t</i>		-0.0042 (-0.27)
<i>MTB_t</i>		0.0005 (0.75)
<i>CEOOWN_t</i>		0.0146 (0.92)
<i>TENURE_t</i>		-0.0202** (-2.28)
Adjusted R ²	0.0174	0.0248
Year & Industry FE	Yes	Yes
Observations	10644	14505

Panel C. Board Co-option and Overinvestment

	<i>Overinvestment_{t+1}</i>	
	(1)	(2)
<i>COOPBD_t</i>	0.0319*** (2.66)	0.0293** (2.43)
<i>LNSALE_t</i>	-0.0664*** (-7.77)	-0.0625*** (-7.61)
<i>CASH_t</i>	0.0338** (2.26)	0.0336** (2.15)
<i>MTB_t</i>	-0.0020 (-1.11)	-0.0021 (-1.19)
<i>ROA_t</i>	0.0349 (1.00)	0.0226 (0.68)
<i>SG_t</i>	0.0383*** (4.55)	0.0377*** (4.66)
<i>LEV_t</i>	-0.0708** (-2.50)	-0.0574** (-1.96)
<i>ACQ_t</i>	-0.0121** (-2.28)	-0.0133** (-2.47)
<i>LFSIZE_t</i>	-0.0000 (-0.00)	-0.0024 (-0.19)
<i>RET_t</i>	0.0015 (0.44)	0.0023 (0.71)
<i>OPAQUE_t</i>	0.0162 (0.97)	0.0125 (0.79)
<i>PRSHELT_t</i>	0.0100 (1.14)	0.0107 (1.21)
<i>AUDITSPE_t</i>	-0.0091 (-0.85)	-0.0090 (-0.84)
<i>HOLD100_t</i>	0.0035 (0.50)	0.0052 (0.77)
<i>CEOOPIN_t</i>	-0.0378 (-1.62)	-0.0417* (-1.72)
<i>CFOOPIN_t</i>	-0.0163 (-0.41)	-0.0044 (-0.11)
<i>BOIND_t</i>		0.0274 (1.22)
<i>BSIZE_t</i>		-0.0343** (-2.41)
<i>IODED_t</i>		-0.2367*** (-4.18)
<i>INTGOV_t</i>		0.0018 (0.95)
<i>TOIND_t</i>		0.0290 (0.40)
Constant	0.4162*** (6.80)	0.5057*** (7.35)
Adjusted R ²	0.6636	0.6653
Year & Industry FE	Yes	Yes
Observations	13061	12706

Table 5: Co-Opted boards, governance mechanisms, and crash

Panel A presents the result of the disintegrated analysis. Panel B present the result of the effect of Co-Opted independent directors vs Co-Opted non-independent directors on crash. Panel C present the result of Co-Opted boards on crash risk controlling for an external monitoring mechanism. All regressions include year and Fama-French 49-industry fixed effects. Standard errors are clustered at both firm and year levels. *T*-statistics are reported in parentheses. The coefficients' 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively. All continuous variables are winsorized at the 1% level. Variable definitions are provided in the Appendix.

Panel A: Not all directors are the same.

		Co-Opted?			
		Yes		No	
		$NCSKEW_{t+1}$		$DUVOL_{t+1}$	
Independent?	Yes	0.0946*	-0.1446***	0.0320	-0.0393**
	No	0.2206***	-0.0875	0.0778***	-0.0396
		(1.91)	(-4.39)	(1.53)	(-2.55)
		(4.22)	(-1.07)	(4.08)	(-1.30)
Baseline full controls		Yes	Yes	Yes	Yes
Year & Industry FE		Yes	Yes	Yes	Yes
Observations		15511	15511	15511	15511

Panel B: Co-Opted independent directors vs Co-Opted non-independent directors.

Variables	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
	(1)	(2)
$COOPBDIND_t$	0.1125***	0.0364**
	(2.60)	(1.99)
$COOPBDNONIND_t$	0.2189***	0.0740***
	(4.85)	(4.69)
Diff in Coefficients	6.08	5.71
F-test for Diff in Coefficient	[0.00]	[0.00]
Constant	-0.2097	-0.2018***
	(-1.27)	(-4.64)
Adjusted R ²	0.0421	0.0407
Baseline all controls	Yes	Yes
Year & Industry FE	Yes	Yes
Observations	15511	15511

Panel C: Co-Opted boards, external monitoring, and crash risk.

	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
	(1)	(2)
$COOPBD_t$	0.1284***	0.0504***
	(2.87)	(2.87)
$IODED_t$	-0.3985***	-0.0330
	(-3.21)	(-0.85)
$TOIND_t$	-0.2278	-0.0679
	(-1.27)	(-1.10)
Constant	-0.2296	-0.2062***
	(-1.15)	(-3.33)
Adjusted R ²	0.0400	0.0374
Year & Industry FE	Yes	Yes
Baseline full controls	Yes	Yes
Observations	15461	1546

Table 6: Co-Opted Boards and Stock Price Crash Risk: Cross-Sectional Evidence

This table presents several panels to examine the link between Co-Opted boards and stock price crash risk conditioning for the impact of CEO delta, CEO general skills, powerful CEOs, and director's entrenchment. All regressions include year and Fama-French 49-industry fixed effects. Standard errors are clustered at both firm and year levels. *T*-statistics are reported in parentheses. The coefficients' 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively. All continuous variables are winsorized at the 1% level. Variable definitions are provided in the Appendix.

Panel A: Co-Opted boards, CEO delta (DELTA), and crash risk

	NCSKEW _{t+1}		DUVOL _{t+1}	
	Low DELTA	High DELTA	Low DELTA	High DELTA
	(1)	(2)	(1)	(2)
COOPBD_t	0.1197**	0.2736***	0.0248	0.0941***
	(1.96)	(4.22)	(1.01)	(3.62)
Constant	0.1296	0.8080**	-0.2097*	0.0654
	(0.39)	(2.01)	(-1.66)	(0.51)
<i>Chi (Diff. in coefficient)</i>		3.30		3.60
<i>P-value</i>		[0.06]		[0.05]
Adjusted R ²	0.0591	0.0316	0.0474	0.0311
Baseline full controls	Yes	Yes	Yes	Yes
Year & Industry FE	Yes	Yes	Yes	Yes
Observations	4693	4527	4693	4527

Panel C: Co-Opted boards, powerful CEOs, and crash risk

	NCSKEW _{t+1}		DUVOL _{t+1}	
	Non-powerful CEOs	Powerful CEOs	Non-powerful CEOs	Powerful CEOs
	(1)	(2)	(1)	(2)
COOPBD_t	0.0859*	0.4896***	0.0298	0.1494***
	(1.65)	(3.46)	(1.40)	(2.88)
Constant	0.0648	-0.1807	-0.2143**	-0.0767
	(0.28)	(-0.49)	(-2.56)	(-0.58)
<i>Chi (Diff. in coefficient)</i>		5.03		3.77
<i>P-value</i>		[0.02]		[0.05]
Adjusted R ²	0.0370	0.0687	0.0355	0.0633
Baseline full controls	Yes	Yes	Yes	Yes
Year & Industry FE	Yes	Yes	Yes	Yes
Observations	11543	2184	11543	2184

Table 7: Additional Robustness Checks

This table presents several robustness checks of our main results. Panel A presents the results of the alternative measure of Co-Opted boards (tenure-weighted Co-Opted boards) on stock price crash risk. Panel B presents results using an alternative definition of crash risks: crash dummy (*CRASHD*). All regressions include year and Fama-French 49-industry fixed effects. Standard errors are clustered at both firm and year levels. *T*-statistics are reported in parentheses. The coefficients' 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively. All continuous variables are winsorized at the 1% level. Variable definitions are provided in the Appendix.

Panel A: Controlling for CEO tenure, involved CEO and inexperience board

	<i>NCSKEW</i> _{<i>t</i>+1}	<i>DUVOL</i> _{<i>t</i>+1}
	(1)	(2)
<i>COOPBD</i> _{<i>t</i>}	0.1548*** (3.26)	0.0534*** (2.82)
<i>INVOLVEDCEO</i> _{<i>t</i>}	0.0703*** (2.86)	0.0276*** (3.13)
<i>INEXBOARD</i> _{<i>t</i>}	-0.0136 (-0.49)	-0.0042 (-0.43)
Constant	-0.2223 (-1.11)	-0.2010*** (-3.20)
Adjusted R ²	0.0339	0.0325
Baseline controls	Yes	Yes
Year & Industry FE	Yes	Yes
Observations	15511	15511

Panel B: Alternative measure of Co-Opted boards

	<i>NCSKEW</i> _{<i>t</i>+1}	<i>DUVOL</i> _{<i>t</i>+1}
	(1)	(2)
<i>TENWCOOPBD</i> _{<i>t</i>}	0.1173*** (2.67)	0.0342** (1.98)
Constant	-0.2426 (-1.21)	-0.2068*** (-3.34)
Adjusted R ²	0.0381	0.0366
Baseline controls	Yes	Yes
Year & Industry FE	Yes	Yes
Observations	15511	15511

Panel C: Alternative measures of crash risk

	<i>CRASHD</i> _{<i>t</i>+1}
	(2)
<i>COOPBD</i> _{<i>t</i>}	0.4031*** (3.87)
Constant	-1.4780*** (-3.23)
Adjusted R ²	0.0271
Baseline full controls	Yes
Year & Industry FE	Yes
Observations	15511

Internet Appendix on

Independent or Co-Opted? Evidence on Board Co-Option and Stock Price Crash Risk

This Internet Appendix provides supplementary analyses and additional robustness tests for the paper. Section IA1 presents information on how we calculate crash risk. Section IA2 examines whether the relation between Co-Opted boards and future stock price crash risk is robust to adjusting the Co-Opted-board measure for CEO tenure. The Internet Appendix also contains four supplementary tables. Table IA1 presents the correlation matrix for the variables used in the analysis. Table IA2 supplements the propensity score matching analysis in Section 4.2.4 of the main paper by reporting the covariate balance between matched treatment and control firms. Table IA3 supplements the alternative-explanation tests by reporting residual-based measures of board capture that adjust for (i) CEO involvement in director selection and board inexperience and (ii) CEO tenure. Table IA4 reports additional robustness tests controlling for CEO- and firm-level characteristics that may affect future stock price crash risk.

IA1. Crash risk measures

In this section, we outline how we obtain crash risk measures. We first estimate firm-specific weekly returns using the following expanded market model:

$$r_{j,\tau} = \alpha_j + \beta_{1j}r_{m,\tau-2} + \beta_{2j}r_{m,\tau-1} + \beta_{3j}r_{m,\tau} + \beta_{4j}r_{m,\tau+1} + \beta_{5j}r_{m,\tau+2} + \varepsilon_{j\tau} \dots\dots\dots(\text{IA1})$$

where $r_{j,\tau}$ is the return on stock j in week τ , and $r_{m,\tau}$ is the return on the CRSP value-weighted market index in week τ . We include two leads and two lags of the market return to account for

nonsynchronous trading (Dimson, 1979). Following Kim et al. (2011a, 2011b) and Al Mamun et al. (2020a, 2020b), we calculate the firm-specific weekly return as:

$$W_{j,t} = \ln(1 + \hat{\varepsilon}_{ijt}), \dots \dots \dots (IA2)$$

where $\hat{\varepsilon}_{ijt}$ is the residual from the expanded market model. Following Kim et al. (2011a & b), we calculate each crash-risk measure using firm-specific weekly returns over a 12-month window beginning three months after the fiscal year-end of year t . The resulting measures are denoted $NCSKEW_{t+1}$ and $DUVOL_{t+1}$.

Our first measure, $NCSKEW$, is the negative conditional skewness of firm-specific weekly returns. For each firm-year, we calculate $NCSKEW$ as follows:

$$NCSKEW_{ijt+1} = - \frac{n(n-1)^{\frac{3}{2}} \sum (W_{ijt} - \bar{W}_{ijt})^3}{(n-1)(n-2) \left[\sum (W_{ijt} - \bar{W}_{ijt})^2 \right]^{\frac{3}{2}}} \quad (IA3)$$

where W_{ijt} is the firm-specific weekly return, $\bar{W}_{ijt}$ is the average firm-specific weekly return over the 12-month period beginning three months after each firm's fiscal year-end year t , and n is the number of observations in the 12-month period. The minus sign in front of the right-hand side ensures that an increase in the value of $NCSKEW$ corresponds to a stock having a more left-skewed distribution, that is, more “crash-prone.”

Our second measure, $DUVOL$, captures the relative volatility of firm-specific returns during down and up weeks. We classify a week as a down week if the firm-specific weekly return is below the firm's mean weekly return over the measurement window and as an up week if it is above the mean. We calculate $DUVOL$ as:

$$DUVOL_{ijt+1} = \ln \left[\frac{(n_u-1) \sum_{DOWN} (W_{ijt+1} - \bar{W}_{ijt+1})^2}{(n_d-1) \sum_{UP} (W_{ijt+1} - \bar{W}_{ijt+1})^2} \right] \quad (IA4)$$

where $n_d(n_u)$ is the number of down (up) weeks. A higher DUVOL value corresponds to a greater crash risk. We also employ two alternative measures of stock price crash risk. The first, $CRASHD_{t+1}$ is an indicator variable equal to one if the firm experiences at least one firm-specific weekly return that falls 3.2 standard deviations or more below its mean firm-specific weekly return during the 12-month measurement window, and zero otherwise (Kim et al., 2011a, 2011b).

IA1. CEO-Tenure-Adjusted Co-Opted Boards and Crash Risk

Our baseline regressions include CEO tenure as a control variable. Nevertheless, because directors classified as Co-Opted are those appointed after the incumbent CEO assumes office, $COOPBD$ is mechanically related to CEO tenure. This raises the possibility that the positive association between Co-Opted boards and future crash risk may partly reflect the effects of CEO tenure rather than board capture itself.

To address this concern more directly, we follow Coles et al. (2014) and construct a CEO-tenure-adjusted measure of Co-Opted boards. Specifically, we regress $COOPBD$ on CEO tenure and use the residual from this regression, $RCOOPBD$, as the adjusted measure of co-opted board. By construction, $RCOOPBD$ captures variation in co-opted boards that is orthogonal to CEO tenure, thereby enabling us to examine whether the relation between Co-Opted boards and crash risk persists after removing the component of $COOPBD$ associated with CEO tenure.

Panel B of Table IA3 reports the results. The coefficient on $RCOOPBD$ is positive and statistically significant for both measures of future crash risk. Specifically, the coefficient is 0.1009 ($t = 2.83$) for $NCSKEW$ and 0.0251 ($t = 2.09$) for $DUVOL$. These findings indicate that the positive association between Co-Opted boards and future stock price crash risk is not attributable to CEO

tenure and provide further support for our interpretation that board capture itself is associated with greater future crash risk.

Section IA2 - Additional CEO- and Firm-Level Controls

We next examine whether our baseline results are robust to controlling for additional CEO- and firm-level characteristics that may independently affect future stock price crash risk. Specifically, we augment the baseline specification with firm age, CEO age, R&D intensity, financial condition, CEO turnover, and alternative measures of CEO power. Prior research suggests that CEO characteristics may influence managerial incentives to withhold adverse information and, consequently, crash risk. For example, Al Mamun et al. (2020a) document an association between CEO power and the risk of stock price crashes, while Andreou et al. (2017) show that firms led by younger CEOs are more likely to experience stock price crashes. We therefore control for CEO age and alternative dimensions of CEO power. Consistent with Al Mamun et al. (2020), we employ three measures of CEO power: an indicator for a founder CEO (*CEOFO*); an indicator for a founder CEO who also serves as chair, president, or both (*CEOFEPCB*); and an indicator for a CEO who simultaneously serves as president and chair (*CEOPRCH*).

We also control for several firm characteristics that may be associated with crash risk. Firm age (*FAGE*) captures differences in organizational maturity and information environments. R&D intensity (*R&DINTEN*), measured as R&D expenditure divided by total assets, controls for differences in investment in relatively risky and difficult-to-value activities (Hoskisson et al., 1993). We include the modified Z-score (*ZSCORE*) to account for firms' underlying financial condition (Hasan et al., 2014). Finally, we control for CEO turnover (*CEOTURNOVER*), as CEO

changes may disrupt the accumulation of undisclosed adverse information and therefore affect subsequent crash risk.

Table IA4 reports the results. Most importantly, the coefficient on *COOPBD* remains positive and statistically significant across all six specifications. For *NCSKEW*, the coefficients range from 0.1048 to 0.1118 and are significant at the 5% level. For *DUVOL*, they range from 0.0477 to 0.0495 and are significant at the 1% level. Thus, the positive association between Co-Opted boards and future crash risk is robust to controlling for these additional CEO- and firm-level characteristics.

The additional controls yield several findings. Firm age is negatively associated with *NCSKEW* but is not significantly associated with *DUVOL*. R&D intensity is negatively associated with both crash-risk measures, with significance at the 10% level for *NCSKEW* and the 1% level for *DUVOL*. *ZSCORE* is positively associated with both measures, while CEO turnover is negatively associated with both across all specifications. Each of the three CEO-power measures used by Al Mamun et al. (2020a)—*CEOFO*, *CEOPRCH*, and *CEOFPCB*—has a positive coefficient, significant at the 5% level for *NCSKEW* and the 10% level for *DUVOL*. Most relevant to our analysis, the coefficient on board co-option remains positive and statistically significant after these CEO and firm characteristics are included. These results indicate that the baseline association is robust to the additional observable controls.

Table IA1 - Correlation matrix

This table presents the correlation matrix for the stock price crash risk, CEO power, and key control variables. The coefficients' 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively. We present the variable definitions in the Appendix.

	1	2	3	4	5	6	7	8	9	10	
<i>NCSKEW_{t+1}</i>	1										
<i>DUVOL_{t+1}</i>	2	0.891***	1								
<i>COOPBD</i>	3	0.045***	0.035***	1							
<i>TENWCOOPBD</i>	4	0.039***	0.025***	0.935***	1						
<i>NONCOOPTIND_t</i>	5	-0.033***	-0.031***	-0.736***	-0.687***	1					
<i>COOPBDNONIND_t</i>	6	0.034***	0.021***	0.530***	0.515***	-0.016	1				
<i>SIGMA_t</i>	7	-0.036***	-0.025***	0.058***	0.075***	-0.110***	0.068***	1			
<i>RET_t</i>	8	0.007	0.044***	-0.040***	-0.053***	0.041***	-0.040***	-0.158***	1		
<i>DTRUN_t</i>	9	-0.002	0.010	-0.013	-0.015	-0.001	0.006	0.154***	-0.016	1	
<i>LEV_t</i>	10	-0.040***	-0.010**	-0.037***	-0.044***	0.052***	-0.001	-0.006	0.001	0.059***	1
<i>LMVE_t</i>	11	0.035***	0.035***	-0.047***	-0.070***	0.091***	-0.067***	-0.396***	0.123***	0.010	0.098***
<i>ROA_t</i>	12	-0.024***	0.001	-0.004	-0.014*	-0.004	-0.026***	-0.350***	0.246***	-0.012	-0.186***
<i>MTB_t</i>	13	0.044***	0.035***	0.003	0.010	0.015	0.019***	-0.108***	0.132***	0.039***	0.049***
<i>CEOOWN_t</i>	14	0.017***	0.014	0.203***	0.216***	-0.190***	0.070***	-0.051***	0.039***	-0.014	-0.074***
<i>TENURE_t</i>	15	0.031***	0.027***	0.628***	0.583***	-0.640***	0.153***	0.010	-0.037***	-0.012	-0.050***
<i>OPAQUE_t</i>	16	0.009	-0.005	0.028***	0.045***	-0.046***	-0.002	0.232***	-0.051***	-0.033***	-0.120***
<i>PRSHELT_t</i>	17	0.015	0.013*	-0.017	-0.027***	0.016	-0.037***	-0.101***	0.017	0.004	-0.028***
<i>AUDITSPE_t</i>	18	-0.012	-0.010	-0.014	-0.017	-0.015	-0.033***	-0.003	0.005	-0.016**	0.028***
<i>HOLD100_t</i>	19	0.050***	0.037***	0.164***	0.154***	-0.202***	0.013	0.049***	-0.010	0.004	-0.066***
<i>CFOOPIN_t</i>	20	0.052***	0.046***	0.043***	0.041***	-0.058***	-0.008	-0.123***	0.075***	-0.006	-0.058***
		11	12	13	14	15	16	17	18	19	20
<i>LMVE_t</i>	11	1									
<i>ROA_t</i>	12	0.294***	1								
<i>MTB_t</i>	13	0.343***	0.355***	1							
<i>CEOOWN_t</i>	14	-0.131***	0.067***	-0.002	1						
<i>TENURE_t</i>	15	-0.046***	0.051***	-0.012	0.244***	1					
<i>OPAQUE_t</i>	16	-0.112***	-0.075***	0.052***	-0.037***	-0.021***	1				
<i>PRSHELT_t</i>	17	0.114***	0.088***	0.015	-0.013	-0.001	-0.058***	1			
<i>AUDITSPE_t</i>	18	0.032***	-0.013	-0.024***	0.017**	0.009	-0.002	0.010	1		
<i>HOLD100_t</i>	19	0.073***	0.106***	0.122***	0.034***	0.264***	0.058***	-0.001	0.044***	1	
<i>CFOOPIN_t</i>	20	0.444***	0.195***	0.322***	-0.112***	0.053***	0.031***	0.040***	0.030***	0.195***	1

Table IA2: Appendix to Section 4.2.4 (Quality of propensity score matching)

This table presents the matching quality related to our propensity score matching regression sample. The coefficients 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively. All continuous variables are winsorized at the 1% level. Variable definitions are provided in the Appendix.

	<i>Treated</i> <i>(Co-Opted Board)</i>	<i>Control</i> <i>(UnCo-Opted Board)</i>	<i>Diff.</i> <i>Treated – Control</i>	<i>t-stat.</i>
<i>Based on the median co-option</i>				
	N=794	N=794		
<i>NCSKEW</i> _{<i>t</i>+1}	0.155	0.010	0.146	2.45**
<i>DUVOL</i> _{<i>t</i>+1}	0.002	-0.057	0.059	2.57***
<i>RET</i> _{<i>t</i>}	-0.167	-0.167	0.000	0.00
<i>DTURN</i> _{<i>t</i>}	0.001	0.000	0.000	0.05
<i>SIGMA</i> _{<i>t</i>}	0.057	0.054	0.004	1.45
<i>LEV</i> _{<i>t</i>}	0.210	0.217	-0.008	-0.81
<i>ROA</i> _{<i>t</i>}	7.543	7.478	0.065	0.76
<i>LMVE</i> _{<i>t</i>}	0.058	0.053	0.004	0.87
<i>MTB</i> _{<i>t</i>}	3.199	3.248	-0.049	-0.32
<i>TENURE</i> _{<i>t</i>}	0.039	0.038	0.002	0.47
<i>CEOOWN</i> _{<i>t</i>}	0.568	0.574	-0.006	-0.41

Table IA3: Alternative Measures of Board Co-Option and Future Stock Price Crash Risk

This table presents additional test results relating to Section 8.1 in our main paper to rule out alternative explanations. Panel A: Board co-option adjusted for CEO involvement in director selection and board inexperience. Panel B: Board co-option adjusted for CEO tenure. The coefficients 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively. All continuous variables are winsorized at the 1% level. Variable definitions are provided in the Appendix.

Panel A: Involved CEO and inexperienced board Adj. Co-Opted boards and crash risk.

	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
	(1)	(2)
$ICIECOOPBD_t$	0.7505**	0.2997**
	(2.34)	(2.37)
Constant	-0.5009**	-0.3192***
	(-2.08)	(-4.06)
Adjusted R ²	0.0321	0.0311
Baseline full controls	Yes	Yes
Year & Industry FE	Yes	Yes
Observations	15511	15511

Panel B: CEO Tenure adjusted residual Co-Opted boards and crash risk.

	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
	(1)	(2)
$RCOOPBD_t$	0.1009***	0.0251**
	(2.83)	(2.09)
Constant	-0.1646	-0.1772***
	(-0.88)	(-3.12)
Adjusted R ²	0.0327	0.0312
Baseline full controls	Yes	Yes
Year & Industry FE	Yes	Yes
Observations	15511	15511

Table IA4: Robustness check - Controlling for additional factors.

This table presents the Robustness check of our main result, controlling for additional control variables relating to CEO characteristics and firm characteristics. All regressions include year and Fama-French 49-industry fixed effects. Standard errors are clustered at both firm and year levels. *T*-statistics are reported in parentheses. The coefficients' 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively. All continuous variables are winsorized at the 1% level. Variable definitions are provided in the Appendix.

	<i>NCSKEW_{t+1}</i>				<i>DUVOL_{t+1}</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>COOPBD_t</i>	0.1118** (2.48)	0.1048** (2.31)	0.1071** (2.35)	0.0495*** (2.82)	0.0477*** (2.68)	0.0483*** (2.71)
<i>FAGE_t</i>	-0.1062*** (-4.10)	-0.0891*** (-3.33)	-0.0901*** (-3.43)	-0.0121 (-1.57)	-0.0071 (-0.92)	-0.0072 (-0.95)
<i>CEOAGE_t</i>	-0.1510* (-1.67)	-0.1316 (-1.46)	-0.1302 (-1.45)	-0.0338 (-0.97)	-0.0277 (-0.79)	-0.0272 (-0.78)
<i>R&DINTEN_t</i>	-0.6089* (-1.68)	-0.6188* (-1.72)	-0.6150* (-1.71)	-0.3289*** (-2.63)	-0.3333*** (-2.67)	-0.3320*** (-2.66)
<i>ZSCORE_t</i>	0.0669*** (3.80)	0.0667*** (3.79)	0.0666*** (3.78)	0.0183*** (3.11)	0.0182*** (3.09)	0.0182*** (3.08)
<i>CEOFO_t</i>	0.0523** (2.23)			0.0186* (1.93)		
<i>CEOPRCH_t</i>		0.1430** (2.26)			0.0411* (1.73)	
<i>CEOFPCB</i>			0.1539** (2.52)			0.0453* (1.89)
<i>CEOTURNOVER_t</i>	-0.1265*** (-3.64)	-0.1272*** (-3.68)	-0.1268*** (-3.67)	-0.0399*** (-3.13)	-0.0404*** (-3.18)	-0.0402*** (-3.17)
Constant	0.5005 (1.23)	0.3445 (0.84)	0.3366 (0.83)	-0.0558 (-0.38)	-0.1033 (-0.71)	-0.1065 (-0.73)
Adjusted R ²	0.0402	0.0415	0.0416	0.0354	0.0360	0.0361
Baseline full controls	Yes	Yes	Yes	Yes	Yes	Yes
Year & Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15484	15484	15484	15484	15484	15484