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Do co-opted boards increase insider profitability?

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ABSTRACT

Using a sample of U.S. firms over the period 1996–2014, this paper examines whether insider trading profitability increases with high board co-option. Indeed, we find that firms with a higher level of co-opted directors exhibit higher insider trading profitability, largely due to a lower level of managerial ability and analyst coverage. Co-opted boards are also unlikely to implement self-imposed insider trading restrictions, exacerbating this relationship. This positive association is mitigated by a higher level of external monitoring by institutional investors and if the CEO receives more performance-based incentives. Overall, co-opted directors demonstrate aligned interests with CEOs and corporate insiders rather than performing their role as monitors. As a result, a more co-opted board is positively associated with exploitative behaviour of insiders.

1. Introduction

> "The board is the ultimate legal authority with respect to decision making in the firm."
> (Adams and Ferreira, 2007, p. 218)
>
> "Members of the boards are cronies appointed by the very CEOs they're supposed to be watching." (Carl Icahn, activist investor, Business Week Online, November 18, 2005)

Previous literature predominantly investigates the influence of corporate governance on firm performance, financing decisions, operating decisions, and executive compensation (see Adams et al., 2010), with relatively less attention paid to insider trading (Jagolinzer et al., 2011; Dai et al., 2016). One particular mechanism by which corporate governance may influence insider trading is board co-option, which has received minimal scrutiny in the literature. Although insider trading can play a positive role by enhancing market efficiency and by assisting firms to compensate managers for their successful entrepreneurship (Roulstone, 2003; Piotroski and Roulstone, 2005), a large number of previous studies highlight the negative role of insider trading, wherein informed insider trading enables managers (insiders) to extract private benefits by allowing them to exploit their informational advantage over other market participants (Jagolinzer et al., 2011; Kraft et al., 2014; Lee et al., 2014; Agrawal and Cooper, 2015; Aitken et al., 2015; Dai et al., 2016; Rahman et al., 2021). Consequently, to curb insi-

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der trading, policymakers have amended section 16(b) of the SEC (1934) regulations, requiring the disclosure of insider trading within 2 days as opposed to the 10-day rule previously in force. Restrictions on insider trading are further imposed through the Insider Trading and Securities Fraud Act (1988) and the Stock Enforcement Remedies and Penny Stock Reform Act (1990). However, how exploitative insider trading occurs continues to perplex policymakers and academics alike.[1] In this paper, we aim to extend the previous literature on corporate governance and insider trading by investigating the effect of board co-option[2] on the ability of insiders to make an abnormal profit from their informational advantage over other market participants.

Board composition is key to directors' performance of their fiduciary duty to monitor incumbent management to protect shareholders' interests (Fama and Jensen, 1983). Therefore, well-governed firms should discourage the exploitation of private information. Traditional wisdom suggests that the appointment of more independent directors strengthens the monitoring function of the board (Adams and Ferreira, 2007) and thus should limit the ability of insiders to profit from their informational advantage and exploitative insider trading. Nonetheless, the empirical findings are mixed. Some studies support the traditional wisdom showing that independent directors reduce the profitability of insider trades (see Dai et al., 2016; Rahman et al., 2020), while others advocate that over time independent directors become less effective monitors of executive trading (Gao and Huang, 2017). A possible reason could be that so-called independent directors (as traditionally measured based on material ties with the firm) may establish close ties with CEOs, which in turn reduces board effectiveness over time (Coles et al., 2014). Moreover, Masulis and Zhang (2019) argue that a less distracted independent director who monitors the firm more closely should have more firm-specific knowledge and thus is more likely to actively trade in the firm's stock. This highlights the flaws in the conventionally measured board independence governance mechanisms that might motivate managers to engage in exploitative insider trading to pursue their own benefits. This trading is undertaken at the expense of other shareholders, creating a conflict of interests.

In this context, Coles et al. (2014) propose an alternative measure of board composition, namely board co-option (i.e., the number of directors hired after the CEO assumes office). Co-opted boards are assumed to lack independence and effective monitoring since they are more likely to be deeply beholden to the CEO who was involved in their initial appointment. Because of the inherent deficiency of conventional board independence measures, Coles et al. (2014) conclude that "if there was a statistical horse race between co-option and independence, co-option would appear to be more successful" (Coles et al., 2014, p.1753). Several studies validate this governance flaw by examining the effect of board co-option on corporate dividends, R&D expenditures, risk-taking, and default risk (see Chintrakarn et al., 2016; Jiraporna et al., 2017; Jiraporn and Lee, 2018; Harris et al., 2019; Huang et al., 2019; Baghdadi et al., 2020). Notably, these studies relate board co-option with indirect opportunistic behaviour of firms and largely ignore the individuals responsible for the firms' performance, namely the insiders. A handful of studies suggest that independent directors are more exploitative traders and earn higher abnormal returns relative to other insiders (see, e.g., Ravina and Sapienza, 2010). Several studies also advocate the positive side of board co-option. For instance, Nguyen et al. (2021) suggest that co-opted boards facilitate firm innovation, arguing that board co-option affects managers' willingness to take on innovation risk and thus align the interests of managers with those of shareholders. However, to the best of our knowledge, no study examines the direct relationship between board co-option and insider trading profitability.

As discussed earlier, the literature on insider trading comprises two perspectives. The positive view assumes that insiders signal the true value to investors (i.e., do not exploit information asymmetry) and contribute to the improvement of market efficiency (see Aboody and Lev, 2000; Lakonishok and Lee, 2001). Corporate insiders are not only the most informed and attentive investors to firm-relevant events, but they also have superior information processing abilities. For example, insiders use available information to predict financial consequences (Agrawal and Nasser, 2012) and extract profitability around corporate and macroeconomic events (see e.g., Engelberg et al., 2012). Several studies document that insiders use private firm-related information to profit from their trading and, in so doing, provide signals about a firm's fundamental value (Piotroski and Roulstone, 2005; Cohen et al., 2012). Consequently, more informative prices make boards more effective and reduce the need for board independence (Ferreira et al., 2011). However, the negative view, which dominates the insider trading literature, emphasizes that insiders have an informational advantage that they exploit for their own benefit at the expense of shareholders (Fishman and Hagerty, 1992; Jagolinzer et al., 2011; Agrawal and Cooper, 2015; Wu, 2018). This negative view stems from the idea that insider trading is potentially an outcome of both the agency problem and information asymmetry. Thus, a high level of board co-option reduces the information transparency of a firm and increases information asymmetry between insiders (e.g., CEOs, directors, other top-level managers, and majority shareholders) and outsiders. This scenario provides insiders with an increased level of private information and an environment they can exploit to make an abnormal profit at the expense of other majority shareholders. As evident from the above discussion, whether and to what extent board co-option increases (decreases) insider trading remains an open yet important question to answer.

There are several reasons why firms with high board co-option are expected to motivate insiders to exploit private information. First, if insiders engage in trading for their personal benefit at the expense of shareholders and if co-opted directors align their interests with those of managers (in particular, the CEO who was involved in their initial appointment) rather than aligning the interests of managers (agents) with those of shareholders (principal), this misalignment of interests

[1] For instance, the New York Times recently reported (Henning, 2019, p. 3) that "trading on confidential information remains hard to resist despite a decade of criminal enforcement and prison terms for those who get caught and prosecuted."

[2] Coles et al. (2014) define board co-option as the percentage of directors appointed after the CEO assumes office.

(agency problem) should entice insiders to profit from such informed trading. As evidence of the alignment of interests between co-opted directors and insiders, Huang et al. (2019) document that firms with a higher proportion of co-opted directors are less likely to adopt clawback provisions – the provisions which allow firms to get back compensation from managers in the event of an accounting restatement. Second, the Insider Trading and Securities Fraud Enforcement Act (ITSFEA) holds firms responsible for any illegal transactions from their employees. Prior studies suggest that firms with weak monitoring are associated with more securities fraud class actions and more accounting enforcement actions by the SEC (Beasley, 1996; Dechow et al., 1996; Helland and Sykuta, 2005). These pieces of evidence suggest that firms have strong incentives to implement effective monitoring mechanisms (i.e., a lower proportion of co-opted directors) to minimize legal risk arising from informed insider transactions. For the purpose of this study, we focus on the purchase transactions of the insiders rather than the sales transactions. This is because purchase transactions are mostly related to private information whereas sales transactions are driven by various other reasons including liquidity needs (Billings and Cedergren, 2015). Further, some studies show that insiders earn abnormal profit from their purchase transactions but not from their sales transactions (e.g., Jeng et al., 2003; Jagolinzer et al., 2011; Lee et al., 2014).

Following Coles et al. (2014), our primary measure of board co-option is the ratio of directors appointed after the CEO assumes their role to the total number of directors sitting on the board. We measure insider trading profitability as market-adjusted buy-and-hold abnormal returns over the window of 126 trading days (Jagolinzer et al., 2011). Using a sample of 20,720 insider transactions of 1,351 U.S firms over the period 1996–2014, we find that insider trading profitability is higher for firms with a higher level of board co-option. These results are robust to alternative proxies of board co-option (i.e., the ratio of total tenure of co-opted directors to the total tenure of all directors) and insider trading profitability (i.e., market-adjusted buy-and-hold abnormal returns for shorter and longer windows of 63 and 252 trading days, respectively), and to the inclusion of a series of additional control variables (i.e., trading size, professional attributes, CEO characteristics, and corporate governance mechanisms). Our results demonstrate an economically meaningful 5.4% increase in profitability, which indicates that a one standard deviation increase in board co-option increases 6-month market-adjusted buy-hold abnormal returns by about 32%.

A methodological challenge for our study is the possibility that the positive effect of board co-option on insider trading profitability is driven by the endogeneity bias (i.e., omitted variables and reverse causality). Since board co-option changes slowly over time, a firm fixed effects regression is not suitable to address omitted variables bias in our study. Alternatively, following in the spirit of Jiraporn and Lee (2018), we control for abnormal returns prior to insider trading. We also control for additional insider, CEO, and governance characteristics to account for some potential omitted characteristics. Although reverse causality is less likely in our regressions because of the inclusion of lagged independent and control variables, we further address this problem using the Sarbanes-Oxley (SOX) Act of 2002 as an exogenous shock to co-opted boards. Overall, the results from these identification tests confirm our main findings and suggest that board co-option has a causal influence on insider trading profitability.

In cross-sectional analyses, we perform several tests to understand the settings where the impact of co-opted boards on insider trading profitability is more or less pronounced. First, we argue that if the board co-option is considered a flaw in the governance mechanisms of the firm, better monitoring should mitigate this effect. We investigate the role of two important governance mechanisms - institutional investors and analysts - that can mitigate the effect of high board co-option on insider trading profitability. Institutional investors are considered better monitors of managerial opportunistic behaviour (Rubin and Smith, 2009) as they prevent manipulation of earnings and improve the overall governance environment of the firm (Liu, 2014). We also expect that analyst coverage reduces the information asymmetry which could otherwise be exploited by insiders (Wu, 2018). In other words, we expect that the positive effect of a co-opted board on insider trading profitability should be more pronounced for firms with a low level of institutional investors and analyst coverage. Accordingly, we find that the relation between co-opted boards and insider trading profitability is statistically significant and positive only for the sub-sample of firms with a low level of institutional investors and low analyst coverage. These results suggest that strong external monitoring and oversight reduces the insider trading profitability of firms with weak internal monitoring by co-opted boards. These findings imply that better monitoring mitigates the negative effect of board co-option (i.e., incentive-like features of board co-option do not encourage managers to pursue their own benefits at the expense of shareholders).

Second, we further consider how CEO incentives and managerial ability influence the relation between board co-option and insider trading profitability. CEO incentives are assumed to comprise an alternative governance mechanism to align the interests of management with those of shareholders (Shleifer and Vishny, 1997; Cheng and Indjejikian, 2009). We find that co-opted boards increase insider trading profitability only in the sub-sample of firms with a low level of performance-based CEO incentives. Moreover, prior studies suggest that less able managers fail to maximize shareholders' wealth and are often involved in earnings management (see Chemmanur et al., 2009; Demerjian et al., 2012a). Drawing on the literature, we expect that board co-option and resulting rent extraction is more likely in firms with CEOs having a low level of managerial ability. Accordingly, we find that the effect of co-opted boards on insider trading profitability is only significant (insignificant) in firms with a lower (higher) level of managerial ability.

Finally, we perform a cross-sectional test to understand the channel through which board co-option increases insider trading profitability. Roulstone (2003) argues that some firms have self-imposed insider trading restrictions to reduce rent extraction. In our setting, we show that self-imposed insider trading restrictions are less likely in firms with highly co-opted boards, which may lead to increased insider trading profitability.

We contribute to the co-opted board and insider trading literature in two important ways. First, we provide direct evidence that board co-option increases insider trading profitability. Prior studies focus on indirect linkages between co-opted boards and managerial behaviour, with inconclusive findings. Some studies advocate the negative impact of board-co-option (e.g., Jiraporn and Lee, 2018) whereas others find a positive association (e.g., Nguyen et al., 2021). Second, our findings show that board co-option is detrimental to firms' corporate governance structure and as such warrants more attention from market regulators, especially in the context of insider trading activity. This finding has important implications for policy formulations that can minimize opportunistic insider trading and other rent-seeking activities to safeguard majority shareholders' wealth.

The remainder of the paper is organized as follows. Section 2 reviews the key literature and develops our hypothesis. Section 3 describes the sample and variables, and Section 4 presents our empirical model. Section 5 presents descriptive statistics, baseline results, and several robustness checks. Section 6 supports our baseline analysis with cross-sectional heterogeneity analyses. Section 7 includes two additional tests to support and corroborate our main analyses, and Section 8 concludes the paper.

2. Relevant literature and hypothesis development

Insider trading is of significant interest to financial economists, with a body of research spanning the past three decades (e.g., Finnerty, 1976; Seyhun, 1986; Manove, 1989). Drawing on the market efficiency perspective, some scholars suggest that insiders signal true value to the market, leading to increased market efficiency (e.g., Aboody and Lev, 2000; Lakonishok and Lee, 2001). However, the consensus, from the perspective of agency theory and information asymmetry, is that insiders have superior information and their main purpose is not to signal, but rather to extract and transfer shareholders' wealth (e.g., Seyhun, 1986; Manove, 1989; Fishman and Hagerty, 1992; Aitken et al., 2015; Wu, 2018). Prior literature also indicates significantly higher abnormal returns from insider trading. For instance, Wu (2018) reports about 15% higher abnormal returns when information asymmetry increases following coverage reductions from analysts. In terms of abnormal returns, there is a consensus that insider purchases are mostly opportunistic, and sales are mostly driven by liquidity motives (e.g., Lakonishok and Lee, 2001; Jeng et al., 2003).

To further examine the exploitative behaviour of insiders, several studies link corporate governance with insider trading (e.g., Dai et al., 2016; Hodgson et al., 2018). In their seminal paper, Coles et al. (2014) set the foundation for studies regarding the quality of board structure, demonstrating that a captured, co-opted board can create agency problems. Several studies support this argument by documenting the negative consequences of higher board co-option (e.g., Khanna et al., 2015; Wilson, 2016; Jiraporn and Lee, 2018; Huang et al., 2019). One of the potential reasons could be that board members appointed by the CEO are less likely to monitor their actions and adopt clawback provisions (Huang et al., 2019)[3]. Wilson (2016) argues that co-opted boards favour decisions that are more beneficial for management than for the shareholders, decreasing board efficiency over time. Jiraporn and Lee (2018) also support this argument by reporting an inverse relationship between board co-option and corporate dividend policy. The intuition is that fewer dividends generate more free cash flow that managers could potentially exploit. Harris et al. (2019) provide further evidence of this exploitative behaviour, finding that a higher level of overinvestment in negative or unsuccessful long-term projects is prevalent in firms with higher board co-option. Overall, these studies provide evidence that board co-option reduces the quality of board functions, with consequences analogous to those of weak monitoring and governance.

As evident from the aforementioned literature and to the best of our knowledge, no study examines how insider trading profitability is influenced by board co-option. Therefore, this study seeks to examine whether board co-option promotes rent-seeking behaviour in terms of insider trading profitability. Motivated by agency and information asymmetry perspectives, we argue that due to less effective board monitoring in co-opted firms, insiders may have superior information that they can exploit to make above-average abnormal returns. We conjecture our hypothesis as follows:

Hypothesis 1: Board co-option is positively associated with insider trading profitability.

3. Sample and variables

3.1. Sample

Co-opted board data are obtained from the personal website of Lalitha Naveen.[4] Our sample period begins in 1996 because our co-opted measures are only available for the period 1996–2014. We derive our final sample from the intersection of this database with the Thomson Reuters Insiders Filings database, ISS (Formerly RiskMetrics), Compustat, and CRSP. First, following Lakonishok and Lee (2001), we obtain open market insider purchase transactions of CEOs, directors, other top-level managers, and large shareholders from the Thomson Reuters Insiders Filings database. We only consider purchases because of the

[3] Clawback is a punishment provision linked to compensation of executives, allowing the firm to recover compensation from corporate executives if any accounting restatements take place. Huang et al. (2019) argue that in a captured co-opted board, managers are unlikely to adopt this provision due to a lack of monitoring and governance.

[4] The data is available at https://sites.temple.edu/lnaveen/data/

exploitative motive of these trades (Jeng et al., 2003).[5] Further, we do not consider insider purchases of less than 100 shares. This procedure leads to an initial sample of 276,635 insider purchase observations. Second, we merge this sample with our co-opted board data, which reduces our sample to 47,265 observations. Third, we obtain board characteristics data from Institutional Shareholder Services, in the process removing 2,630 insider observations from our sample. Fourth, we do not include regulated firms (SIC codes 4900–4999 and 6000–6999) and only consider common stocks with CRSP share codes of 10 or 11. We next remove all missing observations for the control variables constructed from the Compustat and CRSP databases. This process yields a final sample of 20,720 observations for 1,351 firms for the period 1996–2014.[6]

3.2. Variables[7]

3.2.1. Insider profitability

Our primary measure of insider trading profitability is market-adjusted buy-and-hold abnormal returns (*BHAR6MONTH*) over a six-month investment horizon (126 trading days). We use an event study approach (e.g., Seyhun, 1986; Wu, 2018) and Carhart's four-factor model (Carhart, 1997) for each insider observation. We estimate market-adjusted buy-and-hold abnormal returns following Jagolinzer et al. (2011) as per the following three steps:

$$R_{i,t} - R_{f,t} = \beta_{0,i} + \beta_{1,i}(R_{m,t} - R_{f,t}) + \beta_{2,i}\ (SMB_t) + \beta_{3,i}(HML_t) + \beta_{4,i}(MOM_t) + \varepsilon_{i,t} \tag{1}$$

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) = R_{i,t} - \left[\ \widehat{\beta}_{0,i} + \hat{\beta}_{1,i}(R_{m,t} - R_{f,t}) + \hat{\beta}_{2,i}\ (SMB_t) + \hat{\beta}_{3,i}(HML_t) + \hat{\beta}_{4,i}(MOM_t)\right] \tag{2}$$

$$BHAR6MONTH = \Pi(1 + AR) \tag{3}$$

where $R_{i,t}$ and $R_{f,t}$ are the stock and risk-free returns, respectively. $R_{m,t}$, SMB,HML, and MOM are the market returns, size, value, and momentum factors of Carhart's model. *BHAR6MONTH* is the market-adjusted buy-and-hold abnormal returns. In equation (1), we regress individual stocks' excess returns on Carhart's four-factor model. In equation (2), we estimate the abnormal returns and in equation (3), we estimate the *BHAR6MONTH*. We consider six months because of the "short-swing" rule introduced by section 16(b) of the SEC Act of 1934. According to this rule, insiders are prohibited to initiate a round-trip trade within six-months. However, in our robustness analyses we also check the profitability over both short- and long-term horizons by considering 63 (*BHAR3MONTH*) and 252 (*BHAR12MONTH*) trading days, respectively.

3.2.2. Board characteristics

Our key variable of interest is board co-option (*COOPTED_DIR*). Following Coles et al. (2014), we primarily consider directors appointed after a CEO assumes her role. *COOPTED_DIR* is measured as the ratio of the number of directors appointed after a CEO assumes office to the total number of directors sitting on the board. In the sensitivity analysis, we also use a tenure-weighted measure of board co-option (*COOPTED_DIR_TENURE*) estimated as the ratio of total tenure of co-opted directors to the total tenure of all directors.

Following prior literature (see Anderson et al., 2004), we also control for relevant board characteristics: board size and board independence. Board size (*SIZE_BOARD*) is the natural logarithm of the total number of directors, and board independence (*BOARD_IND*) is the ratio of the number of independent directors to the total number of directors on the board.

3.2.3. Firm characteristics

We include a relevant series of firm characteristics from prior literature. For instance, following Lakonishok and Lee (2001), we control for firm size (*FIRM_SIZE*) and market-to-book ratio (*MTB*). We include past return (*PASTRETURN*) to control for omitted variable concerns, momentum effect, and contrarian behaviour. We also control for research and development intensity (*RESEARCH_RATIO*), loss dummy (*LOSS*), firm age (*AGE*), average sales growth (*SALES_GROWTH*), stock return volatility (*VOLATILITY*), and stock turnover (*TURNOVER*) (Aboody and Lev, 2000; Skaife et al., 2013; Gao et al., 2014; Dai et al., 2016). Detailed descriptions of these variables are included in Table A2 (Appendix).

4. Model

To test whether insider trading is influenced by board co-option, we use the following regression model:

$$BHAR6MONTH_{i,t} = \alpha_0 + \alpha_1 COOPTED\_DIR_{i,t-1} + \sum_{k=2}^{12} \alpha_k CONTROLS_{i,t-1} + \sum INDUSTRY + \sum YEAR + \varepsilon \tag{4}$$

[5] Insider sales are not included in our sample because sales are mostly driven by liquidity needs, and regulatory and litigation costs are significantly high for these trades (Billings and Cedergren, 2015). We also conduct additional analysis in Section 7.1 to further portray why insider sales are not included.

[6] Please see Table A1 in the appendix for the construction of our sample.

[7] Please see Table A2 in the appendix for the description of our key variables.

where *BHAR6MONTH* is the measure of insider trading profitability and *COOPTED_DIR* is the proportion of co-opted directors on the board. CONTROLS include *SIZE_BOARD*, BOARD_IND, *FIRM_SIZE*, *MTB*, *PASTRETURN*, *RESEARCH_RATIO*, *LOSS*, *AGE*, *SALES_GROWTH*, *VOLATILITY*, and *TURNOVER*. In the regression models, we use 48 industry classifications (Fama and French, 1997) and include industry and year fixed effects to control for any time invariant omitted industry characteristics.

5. Results

5.1. Descriptive statistics and correlation matrix

Table 1 reports the descriptive statistics of all variables specified in equation (4). Panel A summarizes insider trading profitability. The mean profitability of insiders (*BHAR6MONTH*) is 5.4% over a six-month holding period, which is broadly consistent with prior studies. For instance, Dai et al. (2016) report 6.5% profitability over a six-month holding period. Panel B presents summary statistics for board characteristics. Our key variable *COOPTED_DIR* has a mean (median) value of 0.473 (0.428), which is comparable to the mean (median) value of 0.47 (0.44) reported by Coles et al. (2014). *SIZE_BOARD* and *BOARD_IND* are also consistent with prior studies. For instance, the mean value of *BOARD_IND* is 0.693, similar to Coles et al. (2014). In Panel C, we present descriptive statistics for the firm-level control variables. All the variables are consistent with our expectations and within reasonable limits. For example, *FIRM_SIZE* and *MTB* have mean values of 7.299 and 1.625, respectively, and *PASTRETURN* is negative (-0.05), implying the existence of undervalued stocks before insider purchases. These results are in line with Wu (2018), who reports a value of −0.074 for prior returns and similar statistics for firm size.

The correlation matrix in Table 2 demonstrates initial support for our hypothesis that an increase in board co-option increases insider trading profitability. We find that the correlation coefficient of *COOPTED_DIR* with *BHAR6MONTH* is positive and statistically significant (0.030) at the 1% level. This result implies that an increase in board co-option is associated with an increase in insider profitability. Our study is not exposed to the multicollinearity problem as we find that the maximum correlation between independent variables (*SIZE_BOARD* and *FIRM_SIZE*) is 0.527; we expect large firms to have a higher number of directors sitting on the board. Further, the maximum correlation between our key variable of interest (*COOPTED_DIR*) and other control variables is −0.199 (between *COOPTED_DIR* and *AGE*).

5.2. Regression results

Table 3 presents the baseline results of the relationship between a co-opted board and insider trading profitability. The regression model (4) is reported in column (4). Column (1) shows the regression results including only the standard board and firm-level controls. Columns (2) and (3) display results with year and industry fixed effects, respectively. Column (4) shows the baseline results. Following Petersen (2009), standard errors are clustered at the firm level. Our baseline results suggest that high board co-option increases insider trading profitability. We find that the coefficient of *COOPTED_DIR* is positive and statistically significant at the 5% level. This coefficient is also economically meaningful. For instance, in column (4), the coefficient of *COOPTED_DIR* is reported as 0.054, which implies a 32.9% (0.054/0.054*0.329) increase in six-month market-adjusted buy-and-hold abnormal returns compared to the mean for a one standard deviation increase in board co-option. The coefficients of control variables are consistent with prior studies (e.g., Dai et al., 2016). For example, *FIRM_SIZE*, *MTB*, and *PASTRETURN* are negative and statistically significant. Overall, Table 3 provides strong supporting evidence for our hypothesis that highly co-opted boards increase insider trading profitability.[8]

5.3. Sensitivity analysis

Thus far, we report our baseline results using *COOPTED_DIR* as the primary measure of board co-option and *BHAR6MONTH* as the measure of insider trading profitability. In this section, we check the robustness of our results with tenure-weighted board co-option (*COOPTED_DIR_TENURE*) and market-adjusted buy-and-hold abnormal returns with both short (*BHAR3MONTH*) and long (*BHAR12MONTH*) windows. Table 4 displays the results.

Columns (1), (2), and (3) document the results with *COOPTED_DIR_TENURE* as an alternative measure, and columns (4) and (5) present the results for *BHAR3MONTH* and *BHAR12MONTH*, respectively. We find that coefficients of alternative proxies are positive and statistically significant. Overall, these results indicate that our baseline findings are robust to alternative measures and time windows.

5.4. Addressing endogeneity

5.4.1. Omitted variable bias

Although we run regressions with industry and year fixed effects to control for any time-invariant omitted industry characteristics, one may argue that our results could be driven by some unobservable omitted characteristics. One of the poten-

[8] Our results also remain qualitatively unchanged if we only use the co-option measure based on independent directors instead of all directors. The results are untabulated and available upon request.

Table 1
Key summary statistics.

	Observations	Mean	Standard Deviation	25th Percentile	Median	75th Percentile
Panel A: Insider profitability						
BHAR6MONTH	20,720	0.054	0.487	−0.175	0.024	0.233
Panel B: Board characteristics						
COOPTED_DIR	20,720	0.473	0.329	0.200	0.428	0.750
SIZE_BOARD	20,720	2.195	0.264	2.079	2.197	2.398
BOARD_IND	20,720	0.693	0.170	0.600	0.714	0.833
Panel C: Firm characteristics						
FIRM_SIZE	20,720	7.299	1.577	6.155	7.138	8.262
MTB	20,720	1.625	1.330	0.886	1.234	1.848
PASTRETURN	20,720	−0.050	0.169	−0.139	−0.044	0.041
RESEARCH_RATIO	20,720	0.036	0.069	0.000	0.002	0.041
LOSS	20,720	0.203	0.402	0.000	0.000	0.000
AGE	20,720	2.954	0.739	2.460	2.978	3.499
SALES_GROWTH	20,720	0.253	7.721	0.040	0.102	0.202
VOLATILITY	20,720	0.028	0.012	0.019	0.025	0.033
TURNOVER	20,720	1.801	1.760	0.701	1.285	2.286

Notes: The table describes the summary statistics for the key variables used in regression models. Panel A reports descriptive statistics for the insider profitability variable (*BHAR6MONTH*). Panel B summarizes board characteristics (*COOPTED_DIR*, *SIZE_BOARD*, and *BOARD_IND*) and Panel C displays all firm-related control variables (*FIRM_SIZE, MTB, PASTRETURN, RESEARCH_RATIO, LOSS, AGE, SALES_GROWTH, VOLATILITY*, and *TURNOVER*). Detailed descriptions of these variables are included in Table A2 (Appendix).

tial solutions to mitigate this concern is to run firm fixed effects regressions. However, following Jiraporn and Lee (2018), we argue that firm-fixed effects are not suitable in our setting, as the slow change in board co-option does not generate sufficient intertemporal variation. In our baseline models, following the spirit of Lakonishok and Lee (2001) and Jiraporn and Lee (2018), we control for abnormal returns (*PASTRETURN*) prior to insider trading. This approach mitigates omitted variable bias since both *PASTRETURN* and *BHAR6MONTH* are affected by the same unobservable time-invariant characteristics.

To further address omitted insider characteristics, we control for trading size and professional attributes of insiders that could influence trading profitability. For trading size, we construct a variable by taking the natural logarithm of the number of shares traded by insiders. For professional attributes, as our sample consists of four major categories of insiders: CEOs, other top-level managers, directors, and large shareholders, we construct an indicator variable for these attributes and include fixed effects in our baseline regression model. With these additional controls and fixed effects, our results (untabulated) further confirm that highly co-opted boards increase insider trading profitability.

Finally, there is also a possibility that CEO turnover could create noise in our baseline equation (4) and essentially make the relationship between co-opted boards and insider trading profitability a bit ambiguous. The idea is that when a new CEO is appointed, co-option becomes nil as the existing directors are already appointed before the new CEO assumes office. To mitigate this concern, we create a dummy variable (*CEO_TURNOVER*) that takes the value of 1 for CEO turnover in the year t-1 and otherwise 0.[9] We also include other CEO characteristics, namely *CEO_TENURE* (the number of years a CEO serves in a firm) and *CEO_PAY* (the natural logarithm of total compensation). In addition to *CEO_TURNOVER*, these two variables tackle the problem that a co-opted board could simply be an artefact of the CEO's power; in this scenario, the CEO's power may be driving our results rather than board co-option itself. We also include some additional governance-related variables including institutional monitoring (*INS*), analyst following (*ANALYST*), and self-imposed insider trading restrictions (*RESTRICT*). We measure INS as the natural logarithm of the number of institutional investors. To measure ANALYST, we take the natural logarithm of 1 plus the number of analysts following a firm. Finally, following Roulstone (2003), we identify *RESTRICT* firms based on the percentage of shares traded by insiders within one month following earnings announcements. If a 75% or greater level of insider trading takes place within this time window around the earnings announcement, firms are defined as *RESTRICT*. Table 5 reports the results of these regressions. Column (1) shows regression results after controlling for CEO characteristics (*CEO_TURNOVER*, *CEO_TENURE*, and *CEO_PAY*) and column (2) reports results after controlling governance variables (*INS*, *ANALYST*, and *RESTRICT*). In column (3), we control for both CEO characteristics and corporate governance variables. We find that the coefficients of *COOPTED_DIR* in all the columns are still positive and statistically significant. This further provides robust evidence of our baseline results.

[9] We also check the robustness of our baseline results excluding observations related to CEO turnover events. Our results are qualitatively unchanged for this reduced sample. The results are untabulated and available upon request.
[10] Please see Coles et al. (2014) for further explanation.

Table 2
Correlation matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) *BHAR6MONTH*	1												
(2) *COOPTED_DIR*	0.030***	1											
(3) *SIZE_BOARD*	−0.016*	−0.118***	1										
(4) *BOARD_IND*	−0.000	−0.026***	−0.008	1									
(5) *FIRM_SIZE*	−0.041***	−0.074***	0.527***	0.161***	1								
(6) MTB	−0.075***	0.083***	−0.028***	−0.098***	−0.054***	1							
(7) PASTRETURN	−0.073***	−0.004	0.049***	0.012	0.029***	−0.012	1						
(8) RESEARCH_RATIO	−0.018*	0.123***	−0.153***	−0.062***	−0.272***	0.325***	0.020**	1					
(9) LOSS	0.029***	−0.004	−0.127***	−0.035***	−0.219***	−0.115***	0.014*	0.337***	1				
(10) AGE	−0.003	−0.199***	0.339***	0.195***	0.351***	−0.010***	0.027***	−0.153***	−0.103***	1			
(11) SALES_GROWTH	−0.000	0.004	0.002	−0.015*	0.008	0.003	−0.008	−0.001	−0.006	−0.026***	1		
(12) VOLATILITY	0.038***	0.071***	−0.295***	−0.124***	−0.377***	−0.018*	−0.035***	0.254***	0.380***	−0.273***	0.028***	1	
(13) TURNOVER	0.018*	0.099***	−0.183***	0.166***	0.016*	0.062***	−0.085***	0.091***	0.090***	−0.134***	0.019**	0.331***	1

Notes: This table reports the Pearson correlations among the variables used in the main analyses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Detailed descriptions of these variables are included in Table A2 (Appendix).

Table 3
Co-opted boards and insider trading profitability.

VARIABLES	Dependent variable: Insider trading profitability (*BHAR6MONTH*)			
	(1)	(2)	(3)	(4)
COOPTED_DIR	0.054**	0.052**	0.055**	0.054**
	(2.12)	(2.09)	(2.12)	(2.10)
SIZE_BOARD	0.033	0.041	0.058	0.066
	(0.72)	(0.91)	(1.35)	(1.56)
BOARD_IND	−0.004	−0.032	−0.041	−0.065
	(-0.08)	(-0.55)	(-0.72)	(-1.10)
FIRM_SIZE	−0.016**	−0.015**	−0.017**	−0.017**
	(-2.44)	(-2.36)	(-2.49)	(-2.38)
MTB	−0.027***	−0.026***	−0.030***	−0.029***
	(-3.66)	(-3.45)	(-3.88)	(-3.64)
PASTRETURN	−0.205***	−0.189***	−0.206***	−0.190***
	(-4.09)	(-3.86)	(-4.13)	(-3.91)
RESEARCH_RATIO	−0.104	−0.095	−0.302	−0.288
	(-0.42)	(-0.41)	(1.28)	(-1.31)
LOSS	0.015	0.019	0.013	0.017
	(0.52)	(0.67)	(0.49)	(0.62)
AGE	0.011	0.012	0.008	0.009
	(0.90)	(0.97)	(0.63)	(0.65)
SALES_GROWTH	−0.000	−0.000	−0.000	−0.000
	(-0.30)	(-0.47)	(1.60)	(-1.43)
VOLATILITY	0.644	1.223	0.871	1.385
	(0.51)	(0.78)	(0.69)	(0.87)
TURNOVER	0.004	0.002	0.002	0.000
	(0.61)	(0.33)	(0.30)	(0.07)
Constant	0.052	0.021	0.119	0.086
	(0.49)	(0.16)	(0.95)	(0.58)
Observations	20,720	20,720	20,720	20,720
R-squared	0.015	0.021	0.025	0.031
Industry	No	No	Yes	Yes
Year	No	Yes	No	Yes
SE clustering	Firm	Firm	Firm	Firm

Notes: This table reports ordinary least squares regression (OLS) results for the relationship between co-opted boards (*COOPTED_DIR*) and insider trading profitability (*BHAR6MONTH*). We measure *COOPTED_DIR* as the proportion of directors appointed after a CEO assumes her role. The dependent variable (BHAR6MONTH) is measured using an event study approach for 126 trading days. A large set of control variables are included: *SIZE_BOARD, BOARD_IND, FIRM_SIZE, MTB, PASTRETURN, RESEARCH_RATIO, LOSS, AGE, SALES_GROWTH, VOLATILITY, and TURNOVER*. Detailed descriptions of these variables are included in Table A2 (Appendix). Standard errors are clustered at firm level and t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Table 4
Sensitivity analysis – alternative measures.

VARIABLES	Dependent Variable: Insider trading profitability (1)*BHAR3MONTH*	(2)*BHAR6MONTH*	(3)*BHAR12MONTH*	(4)*BHAR3MONTH*	(5)*BHAR12MONTH*
COOPTED_DIR_TENURE	0.024*	0.048*	0.108**		
	(1.66)	(1.86)	(2.05)		
COOPTED_DIR				0.030**	0.104**
				(2.15)	(2.04)
ALL CONTROLS	Yes	Yes	Yes	Yes	Yes
Observations	20,720	20,720	20,720	20,720	20,720
R-squared	0.041	0.030	0.028	0.041	0.028
Industry	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
SE clustering	Firm	Firm	Firm	Firm	Firm

Notes: This table reports sensitivity analysis with alternative measures of co-opted boards and insider trading profitability. We use a tenure based alternative measure for co-opted boards (*COOPTED_DIR_TENURE*) and insider trading profitability for 3-month and 12-month periods (*BHAR3MONTH* and *BHAR12MONTH*, respectively). *COOPTED_DIR_TENURE* is measured as the ratio of total tenure of co-opted directors to total tenure of all directors. *BHAR3MONTH* and *BHAR12MONTH* are estimated using the event study approach for 63 and 252 trading days, respectively. A large set of control variables are included: *SIZE_BOARD, BOARD_IND, FIRM_SIZE, MTB, PASTRETURN, RESEARCH_RATIO, LOSS, AGE, SALES_GROWTH, VOLATILITY*, and *TURNOVER*. Detailed descriptions of these variables are included in Table A2 (Appendix). Standard errors are clustered at firm level and t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

5.4.2. Reverse causality

The reverse causality problem is less likely in our regressions because we model our baseline equation with lagged independent and control variables. However, there is still a concern that insider trading could drive increased board co-option. We address this endogeneity issue by considering the passage of the *SOX* Act in 2002 as an exogenous shock to co-opted

Table 5
Additional controls.

	Dependent Variable: Insider trading profitability (*BHAR6MONTH*)		
	(1)	(2)	(3)
COOPTED_DIR	0.066*	0.105**	0.105*
	(1.92)	(2.37)	(1.73)
CEO_TURNOVER	−0.061*		−0.017
	(-1.71)		(-0.34)
CEO_TENURE	−0.001		−0.001
	(-0.46)		(-0.25)
CEO_PAY	−0.012		−0.001
	(-1.28)		(-0.07)
INS	−0.012	−0.140**	−0.139**
	(-1.28)	(-2.50)	(-2.49)
ANALYST	−0.012	0.028	0.044
	(-1.28)	(0.87)	(1.40)
RESTRICT	−0.012	−0.051*	−0.046
	(-1.28)	(-1.75)	(-1.57)
ALL OTHER CONTROLS	Yes	Yes	Yes
Observations	19,921	6,353	6,037
R-squared	0.033	0.075	0.057
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
SE clustering	Firm	Firm	Firm

Notes: This table demonstrates the robustness of our results by including *CEO_TURNOVER, CEO_TENURE, CEO_PAY, INS, ANALYST*, and *RESTRICT* as additional controls. We create a dummy variable (*CEO_TURNOVER*) taking the value of 1 if there is a CEO turnover in the year t-1 and zero otherwise. We consider the number of years a CEO serves in a firm as the measure of *CEO_TENURE* and the natural logarithm of total compensation as a measure of *CEO_PAY*. We estimate INS as the natural logarithm of the number of institutional investors. We take the natural logarithm of 1 plus the number of analysts following a firm as a measure of *ANALYST*. We identify *RESTRICT* firms based on the percentage of shares traded by insiders within one month following earnings announcements. If 75% or greater level of insider trading takes place within this time window around the earnings announcement, firms are defined as *RESTRICT*. The dependent variable (*BHAR6MONTH*) is measured using the event study approach for 126 trading days. A large set of control variables are included: *SIZE_BOARD, BOARD_IND, FIRM_SIZE, MTB, PASTRETURN, RESEARCH_RATIO, LOSS, AGE, SALES_GROWTH, VOLATILITY*, and *TURNOVER*. Detailed descriptions of these variables are included in Table A2 (Appendix). Standard errors are clustered at firm level and t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

boards. This act, along with listing rules of NASDAQ and NYSE, requires a 100% independent audit committee and a majority of independent directors on the board. As a result, firms not compliant with this requirement are forced to increase the number of independent directors. Coles et al. (2014) identify this regulatory requirement as an exogenous shock to board co-option. We conduct propensity score matching for compliant and non-compliant firms. Nearest neighbour propensity score matching with a 0.005 caliper is conducted based on all control variables used in equation (4). Panel A of Table 6 shows the summary statistics for these matching variables. The coefficients reported in column (5) are all statistically insignificant, implying that none of the firm characteristics are significantly different between compliant and non-compliant firms. In the next step, we follow the procedure adopted by Coles et al. (2014) and run the following regression model:

$$\begin{aligned} BHAR6MONTH = {} & \alpha_0 + \alpha_1 COOPTED\_DIR + \alpha_2 (SOX \times COOPTED\_DIR) + \alpha_3 (NON\_COMPLIANT \times COOPTED\_DIR) \\ & + \alpha_4 (SOX \times NON\_COMPLIANT \times COOPTED\_DIR) + \alpha_5 SOX + \alpha_6 NON\_COMPLIANT \\ & + \sum_{k=7}^{17} \alpha_k CONTROLS + \sum INDUSTRY + \varepsilon \end{aligned} \tag{5}$$

where *SOX* and *NON_COMPLIANT* are indicator variables. *SOX* takes the value of 1 if the observations are from the year 2002 or later and 0 otherwise. *NON_COMPLIANT* are those firms that are forced to increase the number of independent directors. All other variables are defined previously. The estimated coefficients related to the clean effect of board co-option are α_1, α_3, and α_4. In other words, the clean effect is represented by $\alpha_1 + \alpha_3 + \alpha_4$.[10] We expect that if there is a causal relationship between board co-option and insider trading profitability, the estimated coefficient of $(\alpha_1 + \alpha_3 + \alpha_4)$ is positive and significant. Panel B of Table 6 displays the results. Like Coles et al. (2014), for brevity, we show the baseline effect and clean effect (diff-in-diff estimate) in columns (1) and (2), respectively. We find that consistent with baseline estimates, the diff-in-diff estimate is

[10] Please see Coles et al. (2014) for further explanation.

Table 6
Addressing endogeneity (voluntary compliant versus non-compliant firms).

Panel A: Ex-ante summary statistics for compliant vs. non-compliant firms

VARIABLES	Compliant Firms		Non-compliant Firms		Compliant – Non-compliant Firms
	Mean(1)	Standard deviation(2)	Mean(3)	Standard deviation(4)	Difference in means(5)
SIZE_BOARD	2.199	0.274	2.200	0.271	−0.001
					(-0.12)
BOARD_IND	0.624	0.178	0.620	0.192	0.004
					(0.78)
FIRM_SIZE	8.082	1.673	8.080	1.766	0.002
					(0.04)
MTB	1.661	1.466	1.692	1.257	−0.031
					(-0.71)
PASTRETURN	−0.048	0.160	−0.042	0.158	−0.006
					(-1.27)
RESEARCH_RATIO	0.024	0.048	0.025	0.042	−0.001
					(-0.50)
LOSS	0.109	0.312	0.110	0.312	−0.001
					(-0.05)
AGE	3.062	0.721	3.056	0.640	0.006
					(0.30)
SALES_GROWTH	0.147	0.213	0.160	0.297	−0.013
					(-1.59)
VOLATILITY	0.026	0.011	0.026	0.011	0.000
					(0.15)
TURNOVER	1.836	1.503	1.791	1.509	0.045
					(0.93)

Panel B: Difference-in-difference analysis using the SOX Act as an exogenous shock

VARIABLES	Dependent variable: Insider trading profitability (*BHAR6MONTH*)	
	(1)Baseline estimate	(2)Clean estimate
COOPTED_DIR (1)	0.054**	0.311**
DIFF-IN-DIFF (2)	(2.10)	(2.65)
ALL OTHER CONTROLS	Yes	Yes

Notes: This table reports the effect of co-opted boards on insider trading profitability using a quasi-natural experiment. We run the difference-in-difference (diff-in-diff) test following Coles et al. (2014). Panel A shows the ex-ante statistics for the matching variables used for *SOX* compliant versus non-compliant firms. The matching is conducted based on nearest neighbour propensity score matching with a 0.005 caliper. All the right-hand side variables of equation (4) are matched between compliant and non-compliant firms. The variables include: *COOPTED_DIR, SIZE_BOARD, BOARD_IND, FIRM_SIZE, MTB, PASTRETURN, RESEARCH_RATIO, LOSS, AGE, SALES_GROWTH, VOLATILITY*, and *TURNOVER*. Detailed descriptions of these variables are included in Table A2 (Appendix). Panel B shows the baseline and clean estimates (diff-in-diff estimate) of the effect of co-opted boards on insider trading profitability. Standard errors are clustered at firm level and t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

positive and significant. This result further supports our claim that highly co-opted boards increase profitability from insider trading.

6. Cross-sectional heterogeneity analysis

In the previous section, we show that there is a causal relationship between board co-option and insider trading profitability. To understand the mechanism, we present several cross-sectional analyses. First, we examine the mitigating mechanisms, especially in terms of how high vs low oversight from institutional investors (Section 6.1) and analysts (Section 6.2) influences the relationship between board-co-option and insider profitability. Second, we study the supporting mechanisms of how the relationship between co-opted boards and insider trading profitability varies with high vs low levels of CEO incentives (Section 6.3) and managerial ability (Section 6.4). Finally, we demonstrate a channel (low level of self-imposed insider trading restrictions) through which board co-option can increase insider trading profitability (Section 6.5).

6.1. Institutional investors

The literature suggests that institutional investors provide important monitoring and disciplinary roles (Rubin and Smith, 2009; Brown et al., 2011). The argument is that institutional investors have a higher level of monitoring incentives and can reduce the rent-seeking activities of corporate insiders. Liu (2014) supports this argument by empirically showing that a higher level of institutional stakeholders reduces earnings manipulations and improves governance. If institutional stakeholders are indeed effective monitors, we argue that insider trading profitability from co-opted boards is less pronounced with a higher representation of these investors. We obtain institutional holding data from the Thomson Reuters Institutional Holdings 13F database. We construct a variable that represents the percentage of institutional investors in a particular year.

We define this variable as the natural logarithm of the number of institutional investors (*INS*). We classify *INS* into high and low groups based on the median of the total sample. If *INS* is higher than the sample median, we define this group as "High" and if the score is lower than the sample median, we define this group as "Low". Results presented in column (2) of Table 7 show a positive and significant relationship between *COOPTED_DIR* and insider trading profitability (*BHAR6MONTH*). We find a significant relationship only for the "Low" *INS* group. This result suggests that external monitoring by institutional investors could potentially reduce insider trading profitability from highly co-opted boards.

6.2. Analyst coverage

Empirical evidence suggests that information asymmetry increases with the reduction of analyst coverage, which leads to an increase in the profitability of insider trading by 15% (Wu, 2018). In this section, we therefore examine whether the relation between co-opted boards and insider trading profitability is conditional on the information asymmetry of the firm. We expect the positive effect of a co-opted board to be less pronounced for the firms with a higher level of analyst following. We collect analyst following data from I/B/E/S and construct a variable (*ANALYST*), which is the natural logarithm of 1 plus the number of analysts following a firm. We split the sample into two groups: "High" ("Low") based on whether a firm is followed by more (fewer) analysts than the sample median. Table 8 reports the results from the analysis. Our results show that the role of co-opted boards (*COOPTED_DIR*) on insider trading profitability (*BHAR6MONTH*) is positive and significant only for the "Low" *ANALYST* group. However, the coefficient is insignificant for the "High" *ANALYST* group. These results indicate that analyst following reduces opportunities for exploiting private information and therefore suppresses the influence of co-opted boards on insider trading profitability. These findings provide support for the argument that the positive association between co-opted boards and insider trading profitability is conditional on the information asymmetry of firms.

6.3. CEO incentives

CEO incentives can effectively discipline managers (Shleifer and Vishny, 1997). The general notion is that CEO incentives aligned with firm performance provide a complementary governance mechanism (Cheng and Indjejikian, 2009). Consistent with this view of CEO incentives, we argue that a higher level of performance-based compensation reduces insider trading profitability even in co-opted boards. We collect *CEO_VEGA* from Coles et al. (2006), which represents the change in CEO wealth for 0.01 change in the standard deviation of returns. Following Hirshleifer et al. (2012), we consider the natural logarithm of 1 plus *CEO_VEGA* as the measure of CEO incentives.

We use sub-sample analysis for "High" and "Low" levels of pay-performance sensitivity (*CEO_VEGA*). "High" ("Low") groups are defined based on whether *CEO_VEGA* is higher (lower) than the sample median. We run the baseline equation (4) for both sub-samples. Table 9 reports the results of these analyses. We find that *COOPTED_DIR* is positive and significant only in the "Low" pay-performance sensitivity group. This is consistent with our understanding that co-option implies lower governance quality which leads insiders to exploit their knowledge when trading.

6.4. Managerial ability

Prior literature documents that less able managers are likely to be involved in earnings management and may not engage in wealth maximization of shareholders (see Chemmanur et al., 2009; Demerjian et al., 2012a). Alternatively, Demerjian et al. (2012a) argue that more able managers make prudent decisions, invest in positive NPV projects, and manage firms efficiently compared to their less able counterparts. Due to these positive characteristics and outcomes, more able managers are less likely to engage in any rent-seeking activities (Demerjian et al., 2012b). Therefore, we argue that the relation between co-opted boards and insider trading profitability is conditional on the level of managerial ability. We collect managerial ability (*MANAGER_ABILITY*) scores from Demerjian et al. (2012a) who have developed this measure using data envelopment analysis (*DEA*). This is an optimization technique to disentangle firm efficiency from managerial efficiency; the managerial efficiency reflects managerial ability.[11] To test our hypothesis, we classify scores into high and low based on the median of the total sample. If the *MANAGER_ABILITY* score is higher than the sample median, we define this group as "High" and if the score is lower than the sample median, we identify this group as "Low". Table 10 presents the results. We find a positive and significant relationship between *COOPTED_DIR* and *BHAR6MONTH* only in the "Low" *MANAGER_ABILITY* group. This result further supports our argument that less able managers are driving our results, as they are most likely to increase board co-option.

6.5. Insider trading restrictions

Roulstone (2003) argues that some firms have self-imposed insider trading restrictions that reduce rent extraction by insiders. These restrictions are in the form of trading windows around earnings announcements. We argue that highly co-opted boards are less likely to implement these self-imposed restrictions and as a result insider profitability increases. Following Roulstone (2003), we identify firms with restrictions ("*Restrict*") and without ("*No_Restrict*") based on the percentage

[11] Please see Demerjian et al. (2012a) for the detailed estimation procedure.

Table 7
Cross-sectional analysis - co-opted boards, institutional investors, and insider trading profitability.

	Dependent Variable: Insider trading profitability (*BHAR6MONTH*)	
	(1)High (*INS* > Median)	(2)Low (INS < Median)
COOPTED_DIR	0.034	0.168**
	(1.14)	(2.39)
ALL OTHER CONTROLS	Yes	Yes
Observations	3,588	3,599
R-squared	0.122	0.091
Industry	Yes	Yes
Year	Yes	Yes
SE clustering	Firm	Firm
Difference in coefficients on COOPTED_DIR between High vs Low INS sub-sample: $\chi 2$ (p-value)	7.07**(0.03)	

Notes: This table presents the mechanism describing how institutional investors (*INS*) moderate the relationship between co-opted boards (*COOPTED_DIR*) and insider trading profitability (*BHAR6MONTH*). We estimate INS as the natural logarithm of the number of institutional investors. We classify our sample into 'High' ('Low') groups based on whether *INS* is greater (lower) than the median. A large set of control variables are included: *SIZE_BOARD, BOARD_IND, FIRM_SIZE, MTB, PASTRETURN, RESEARCH_RATIO, LOSS, AGE, SALES_GROWTH, VOLATILITY*, and *TURNOVER*. Detailed descriptions of these variables are included in Table A2 (Appendix). Standard errors are clustered at firm level and t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Table 8
Cross-sectional analysis - co-opted boards, analyst coverage, and insider trading profitability.

	Dependent Variable: Insider trading profitability (*BHAR6MONTH*)	
	(1)High (*ANALYST* > Median)	(2)Low (*ANALYST* < Median)
COOPTED_DIR	0.054	0.067**
	(1.48)	(1.99)
ALL OTHER CONTROLS	Yes	Yes
Observations	10,442	10,278
R-squared	0.051	0.052
Industry	Yes	Yes
Year	Yes	Yes
SE clustering	Firm	Firm
Difference in coefficients on *COOPTED_DIR* between High vs Low *ANALYST* sub-sample: $\chi 2$ (p-value)	6.32**(0.04)	

Notes: This table presents the mechanism describing how analyst coverage (*ANALYST*) influences the relationship between co-opted boards (*COOPTED_DIR*) and insider trading profitability (*BHAR6MONTH*). We take the natural logarithm of 1 plus the number of analysts following a firm as a measure of ANALYST. We classify our sample into 'High' ('Low') groups based on whether *ANALYST* is greater (lower) than the median. A large set of control variables are included: *SIZE_BOARD, BOARD_IND, FIRM_SIZE, MTB, PASTRETURN, RESEARCH_RATIO, LOSS, AGE, SALES_GROWTH, VOLATILITY*, and *TURNOVER*. Detailed descriptions of these variables are included in Table A2 (Appendix). Standard errors are clustered at firm level and t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

of shares traded by insiders within one month following earnings announcements. If a 75% or greater level of insider trading takes place within this time window around the earnings announcement, firms are identified as "*Restrict*", and "*No_Restrict*" otherwise. We conduct a sub-sample analysis for our baseline equation (4), with results presented in Table 11. We find that board co-option (*COOPTED_DIR*) significantly increases insider trading profitability (*BHAR6MONTH*) only for the "*No_Restrict*" group. This result further supports our hypothesis that because of poor governance quality in co-opted boards, self-imposed insider trading restrictions are less likely and insider trading profitability increases.

7. Additional analyses

In this section, we present additional analyses to further support our baseline findings (for more detail, please see the Internet Appendix).

7.1. Do insider sales matter?

Although there is a consensus that sales are mostly driven by liquidity needs (Lakonishok and Lee, 2001; Jeng et al., 2003) and regulatory and litigation costs are significantly high for these trades (Billings and Cedergren, 2015), in this section, we analyse insider sales to confirm the validity of our sample construction. Following the event study approach and Carhart (1997), we estimate the 6-month market-adjusted buy-and-hold abnormal returns (*BHAR6MONTH*) for insider sales and run regression equation (4). We find that there is no significant relationship between *COOPTED_DIR* and *BHAR6MONTH*. This

Table 9
Cross-sectional analysis - co-opted boards, CEO incentives, and insider trading profitability.

	Dependent Variable: Insider trading profitability (*BHAR6MONTH*)	
	(1)High (CEO_VEGA > Median)	(2)Low (CEO_VEGA < Median)
COOPTED_DIR	0.039	0.069*
	(1.36)	(1.77)
ALL OTHER CONTROLS	Yes	Yes
Observations	10,741	9,979
R-squared	0.051	0.052
Industry	Yes	Yes
Year	Yes	Yes
SE clustering	Firm	Firm
Difference in coefficients on *COOPTED_DIR* between High vs Low *CEO_VEGA* sub-sample: $\chi 2$ (p-value)	4.72*(0.09)	

Notes: This table presents the mechanism describing how CEO risk incentives (*CEO_VEGA*) influence the relationship between co-opted boards (*COOPTED_DIR*) and insider trading profitability (*BHAR6MONTH*). *CEO_VEGA* is the change in CEO wealth for 0.01 change in standard deviation of returns. Consistent with Hirshleifer et al. (2012), we take the natural logarithm of (1 + CEO_VEGA) in our model. We classify our sample into 'High' ('Low') groups based on whether *CEO_VEGA* is greater (lower) than the median. A large set of control variables are included: *SIZE_BOARD, BOARD_IND, FIRM_SIZE, MTB, PASTRETURN, RESEARCH_RATIO, LOSS, AGE, SALES_GROWTH, VOLATILITY*, and *TURNOVER*. Detailed descriptions of these variables are included in Table A2 (Appendix). Standard errors are clustered at firm level and t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Table 10
Cross-sectional analysis – managerial ability, co-opted boards, and insider trading profitability.

	Dependent Variable: Insider trading profitability (*BHAR6MONTH*)	
	(1)High (MANAGER_ABILITY > Median)	(2)Low (MANAGER_ABILITY < Median)
COOPTED_DIR	0.013	0.078**
	(0.35)	(2.16)
ALL OTHER CONTROLS	Yes	Yes
Observations	10,150	10,118
R-squared	0.040	0.062
Industry	Yes	Yes
Year	Yes	Yes
SE clustering	Firm	Firm
Difference in coefficients on *COOPTED_DIR* between High vs Low *MANAGER_ABILITY* sub-sample: $\chi 2$ (p-value)	4.92*(0.08)	

Notes: This table documents the cross-sectional test for the role of managerial ability (*MANAGER_ABILITY*). We obtain *MANAGER_ABILITY* scores from Demerjian et al. (2012a). We classify scores into 'High' ('Low') groups based on whether *MANAGER_ABILITY* is greater (lower) than the median. The key variables are *COOPTED_DIR* and *BHAR6MONTH*. A large set of control variables are included: *SIZE_BOARD, BOARD_IND, FIRM_SIZE, MTB, PASTRETURN, RESEARCH_RATIO, LOSS, AGE, SALES_GROWTH, VOLATILITY, and TURNOVER*. Detailed descriptions of these variables are included in Table A2 (Appendix). Standard errors are clustered at firm level and t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Table 11
Cross-sectional analysis – co-opted boards, self-imposed insider trading restrictions, and profitability.

	Dependent Variable: Insider trading profitability (*BHAR6MONTH*)	
	(1)Restrict	(2)No_Restrict
COOPTED_DIR	0.027	0.088**
	(0.77)	(2.45)
ALL OTHER CONTROLS	Yes	Yes
Observations	10,589	6,694
R-squared	0.074	0.062
Industry	Yes	Yes
Year	Yes	Yes
SE clustering	Firm	Firm
Difference in coefficients on *COOPTED_DIR* between *Restrict* vs *No_Restrict* sub-sample: $\chi 2$ (p-value)	6.58**(0.03)	

Notes: This table documents the relation between co-opted boards and insider trading profitability based on whether a firm implements self-imposed insider trading restrictions. Following Roulstone (2003), we identify "*Restrict*" and "*No_Restrict*" groups of firms based on the percentage of shares traded by insiders within one month following earnings announcements. If 75% or greater level of insider trading takes place within this time window around the earnings announcement, firms are identified as "*Restrict*" and "*No_Restrict*" otherwise. The key variables are *COOPTED_DIR* and *BHAR6MONTH*. A large set of control variables are included: *SIZE_BOARD, BOARD_IND, FIRM_SIZE, MTB, PASTRETURN, RESEARCH_RATIO, LOSS, AGE, SALES_GROWTH, VOLATILITY*, and *TURNOVER*. Detailed descriptions of these variables are included in Table A2 (Appendix). Standard errors are clustered at firm level and t-statistics are reported in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

result indicates that insider sales do not have an exploitative motive and therefore are excluded from our baseline sample. The results are available in Internet Appendix (IA1).

7.2. Opportunistic versus routine traders

Recent literature argues that opportunistic insiders primarily use exploitative behaviour in their trading (Cohen et al., 2012). Following Cohen et al. (2012), we identify "*Routine*" ("*Opportunistic*") traders if insiders are trading (not trading) on the same calendar month for three consecutive years over the sample period. We run regression equation (4) for both sub-samples and find that *COOPTED_DIR* remains significant for the "*Opportunistic*" group of insiders. This result further confirms that our baseline results are robust to alternative specifications of insider trading. The results are available in Internet Appendix (IA2).

8. Conclusion

In this study, we provide comprehensive evidence on the relationship between co-opted boards and profitability of insider trading in US firms over the period 1996–2014. We document three notable findings. First, we find that firms with a higher level of co-opted directors exhibit higher insider trading profitability. Second, this positive association between co-opted boards and insider trading profitability is more prevalent in the presence of a lower level of external monitoring by institutional investors and if the CEO receives less performance-based incentives. We also find that a lower level of managerial ability and analyst coverage drives the positive linkage between board co-option and insider trading profitability. Third, we demonstrate that self-imposed insider trading restrictions are less likely in firms with highly co-opted boards, which essentially leads to increased insider trading profitability. Overall, our results highlight the importance of board co-option in instigating insiders' rent-seeking trading behaviour. In particular, our study provides support to the call for less co-opted boards, a contemporary measure of board effectiveness, while showing for the first time that board co-option leads to higher insider trading profitability conditioned on oversight by institutional investors and analysts as well as performance-based incentives and managerial ability.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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A. Appendix

Table A1

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jcae.2021.100265.

Table A1
Sample selection

Data source		Observations
Thomson Reuters Insiders Filings database S&P 1500		276,635
Less:		
Missing co-opted board data from the website of Lalitha Naveen S&P 500	229,370	
Missing board characteristics data from ISS	2,630	
Standard filtering and missing firm characteristics from Compustat and CRSP	23,915	
		255,915
Final sample for the period 1996-2014		20,720

Notes: This table presents the construction of our final sample. The final sample includes 20,720 insider observations for the period 1996-2014.

Table A2
Description of key variables

Variables	Description
Panel A: Insider profitability	
BHAR6MONTH	The market-adjusted buy-and-hold abnormal returns over 126 trading days
Panel B: Board characteristics	
COOPTED_DIR	The proportion of directors appointed after a CEO assumes her role
SIZE_BOARD	Estimated by the natural logarithm of the total number of directors
BOARD_IND	Calculated by the ratio of the number of independent directors to all directors
Panel C: Firm characteristics	
FIRM_SIZE	The natural logarithm of total assets
MTB	The ratio of market value of equity and debt to total assets
PASTRETURN	Abnormal returns 21 trading days (one-month) prior to the insider transaction
RESEARCH_RATIO	The ratio of research and development expenditures to total assets
LOSS	An indicator variable taking the value of 1 if a firm makes a loss in a financial year and zero otherwise
AGE	The natural logarithm of the total number of years since a firm first appears in CRSP
SALES_GROWTH	The average of sales growth over the last five years
VOLATILITY	The standard deviation of daily stock returns over a one-year horizon
TURNOVER	The average of share volume to share outstanding ratio over a one-year period

Notes: This table presents the description of key variables used in the main analyses of this study.

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