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'No' to stock-based compensation for directors: is there an association between directors' compensation and financial statements fraud?

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ABSTRACT

Using a unique dataset of fraud firms in the United States over a 15 year-period (2005–2019), this study investigates whether compensation for the board of directors has an association with Financial Statements Fraud (FSF). It further investigates which components of the compensation package could be more amenable to this association. We find a positive association between the incidence of FSF and directors' stock-based compensation. Considering the remedy mechanism for FSF, we find a negative association between FSF and the average age of directors. Additionally, Chief Executive Officer (CEO) duality, size/type of auditor, institutional ownership, accounting returns, and firm size all significantly influence the incidence of FSF. We contribute to the accounting, governance, and accountability literatures, while critiquing agency theory in advancing an alternative view that stock-based compensation for directors should be used with caution, as it may provide an incentive for FSF. This research has implications for businesses and regulators regarding the design of directors' compensation packages.

1. Introduction

Financial statements form the backbone of financial investing, but if manipulated can result in substantial losses to various stakeholders (Coenen, 2008) and considerable enforcement costs to investigate such crimes (Nguyen, 2021). The economic losses caused by Financial Statements Fraud (FSF) are substantial. Rezaee (2005) documents losses of USD 500.0 billion suffered by market participants, including creditors, employees, investors, and pensioners. Similarly, Karpoff et al. (2008) identify a loss of USD 3.08 for every dollar financially misrepresented (due to expected legal penalties and lost reputation). Palmrose et al. (2004) also find evidence of negative returns in the case of fraud-related restatements. The urgency to curb FSF is evident in the heightened vigilance with respect to corporate governance in the United States (US). These include the passing of stringent laws, such as the Sarbanes–Oxley Act (2002), and enhanced governance requirements by stock exchanges. However, despite these efforts, the incidence of FSF continues. For instance, in the US, CIRCOR International Inc. (a technology manufacturer) has overstated its financial performance from 2019 to 2021. FSF is also a global problem, as highlighted by Canada's Nortel, China's Evergrande, Germany's Wirecard, Italy's Parmalat, Japan's Toshiba, and the United Kingdom (UK)'s Carillion.

Hence, the integrity of financial statements remains a key concern for various stakeholders and a topical issue in international accounting research. Prior studies suggest that the board of directors (BoD), a key corporate governance mechanism, helps to ensure that businesses achieve their goals and protect shareholders (Sobhan and Adegbite, 2021). In doing this, agency theory proposes compensation as an essential incentive to align the interests of directors and shareholders (Kerr and Bettis, 1987). However, compensation may also incentivize the board and executives to alter the business performance in order to achieve their targeted figures (Ye, 2014) or even commit FSF to achieve their personal goals (Davidson, 2022). Therefore, our main research question is whether directors' compensation, including share-based compensation and shareholding, has an association with the incidence of FSF.

This is an important enquiry because directors, as shareholders'

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representatives, also oversee financial statements via audit committees (Cohen et al., 2014). Thus, their role in curbing FSF is unequivocal. Therefore, it is important that directors' own interests are well aligned with those of the shareholders. However, if directors' self-interest overpowers this alignment, then the monitoring function of directors can be impaired (Dalton et al., 2007), which in turn may induce accounting irregularities and manipulations such as FSF. Directors' self-interest is a function of their wealth, which is often dependent on their compensation, including the value of their share-based compensation, as well as their shareholding in the corporation.

Executive directors' (ExDirs) and senior management teams' characteristics, compensation, and accounting irregularities, including earnings management and restatements, have been widely researched (Aljughaiman et al., 2023; Efendi et al., 2007; Erickson et al., 2006; Qiao et al., 2025). However, such research is seldom applied to all directors. Notably, prior research has focused on ExDirs and senior management teams alone, which does not provide a comprehensive picture as all directors, particularly non-executive and independent, have a crucial function to monitor the executives and management. Further, prior research on directors' compensation has either examined non-FSF type frauds, such as bribery, embezzlement, option back-dating, and securities fraud, or has looked at earnings management, restatements, and opportunistic timing of option grants. Moreover, the evidence provided by these studies on the impact of directors' compensation on fraud, earnings management, and restatements is mixed (i.e., Archambeault et al., 2008; Kim et al., 2013; Persons, 2012; Radwan et al., 2022; Ye, 2014).

This study stands out from previous research in several ways. One key distinction is our use of the Securities Class Action Clearinghouse (SCAC) database. While most prior studies rely on Accounting and Auditing Enforcement Releases (AAER) or restatements, our study's use of the SCAC database to identify fraud firms is methodologically superior for several reasons. SCAC is a very comprehensive database that was started in 1996 and gathers filings/information from diverse sources, including the Public Access to Court Electronic Records (PACER) database, US Securities and Exchange Commission (SEC) records, academic sources, news articles, and press releases (SCAC, 2024). The SCAC also provides the defendant's stock exchange listing (National Association of Securities Dealers Automated Quotations (NASDAQ), New York Stock Exchange (NYSE), OTC-BB).

The SCAC database is more robust than AAER, as many targeted firms are delisted before charges are formally filed by the regulators, thus, in many cases an AAER does not report a violation. Further, due to limited resources, the SEC is likely to focus on high-profile cases only (Agrawal and Chadha, 2005; Fich and Shivdasani, 2007). For instance, in 2019 there were 402 SCAC filings against companies, of which ~ 47% were listed on NASDAQ, ~48% on NYSE, ~4% on OTC-BB, and the remaining ~ 1% were ETFs/ Privately traded/initial offerings. As opposed to this, the SEC issued only 97 AAERs in 2019, and of these 25 AAERs were issued against companies, 31 AAERs were issued against executives of companies, and 41 AAERs were against accountants / accounting firms for dereliction of duty / misconduct.

Furthermore, on the SCAC's website, the SCAC filings are in the name of companies only, whereas on the SEC's website AAERs are in the name of both individuals and companies. Hence, there can be multiple AAERs related to one company in one year – those issued in the name of the company and those issued in the names of the executives / directors of the company. In 2019, between the SCAC filings and the AAERs, only 5 companies were common. Further, for 2019, only 34 companies in the SCAC database had a 2019 AAER with either a company's name or the name of a company's executive or director. This implies that both databases (AAER & SCAC) differ significantly in terms of their coverage (see Appendix A for a comparison of the number of SCAC filings and AAERs over the sample period). Thus, the wider coverage and composition of the SCAC database help us provide better insights into the association between FSF and directors' compensation. The SCAC is also used in very important studies investigating fraud (Dyck et al. 2010), the impact of securities class action lawsuits on stock price and shareholder wealth (Damak et al., 2022), and operating performance (McCarten and Diaz-Rainey, 2017).

This study also uses a broader definition of FSF by comprising fraud cases, including misleading information or failure to disclose information, in the financial statements, filings, and offering documents for the US market. The rationale for using a broader definition of FSF is well linked with the purpose of financial statements, which is to help its users make informed decisions about a company (Lennard, 2007). In addition, while Persons (2012) uses data on fraudulent financial reporting in the US from 1999 to 2003, our study adds to Persons (2012) by extending the research data for a period from 2005 to 2019 to cover the period of the post-Enron scandal and the launch of the Sarbanes-Oxley Act of 2002. In sum, our study extends prior studies by providing a new and comprehensive perspective on the association between directors' compensation and FSF. Further, in line with the international practice of directors' classification, this study bifurcates directors into three subcategories, namely Executive directors (ExDirs), independent directors (IndDirs), and non-executive non-independent directors (Non-ExIndDirs), and analyses each of them separately.

Our evidence is consistent with directors' share-based compensation having a significantly positive association with the incidence of FSF. In contrast, the average age of directors has a negative association with the occurrence of FSF. These results hold even after controlling for governance and firm-based factors. Among the control variables, Big 4 auditor, Chief Executive Officer (CEO) duality, institutional ownership, firm size, and accounting returns have statistically significant associations with FSF. Further, the results of the three categories of directors show that ExDirs' stock-based compensation drives the positive association between FSF and directors' stock-based compensation.

Our findings have several contributions to the literature and practice as follows. First, this paper complements prior studies on executive compensation (Armstrong et al., 2010; Erickson et al., 2006) and on directors' compensation (Kim et al., 2013; Ye, 2014) by shedding light on how directors' compensation packages can be tailored to reduce the incidence of FSF. In addition, it examines whether there are any elements within the remuneration packages of directors which might be associated with FSF and, thus, harm the directors' ability to set the tone of 'truthfulness' at all levels within the organization. Second, our broader sample increases the statistical power of our regression analysis. Third, despite using data from the US market, our study is internationally relevant, especially to countries which have adopted class action lawsuits. See Appendix B for a list of the 34 non-US jurisdictions that have adopted class action lawsuits, partially or fully, with most using the US class action lawsuit model as the reference point (Hensler, 2017). For example, private action lawsuits for financial misstatements have also been adopted in the UK, indicating that such lawsuits are a tool for enhancing market value and liquidity rather than being used just for trivial litigations (Restrepo, 2023). Additionally, our results are generalizable to other countries following an Anglo-American corporate governance system similar to that of the US. Further, any structural difference in directors' compensation across countries is not likely to affect the generalizability of this study, as we investigate both directors' total compensation and equity-based compensation and consequently the examination of directors' total compensation is expected to annul any structural differences in compensation. Fourth, the study critiques the agency theorizing of corporate governance. Unlike previous research, which considered compensation a panacea for aligning the divergent interests of principals and agents (Jensen and Meckling, 1976; Phung et al., 2023), this study challenges such claims by finding a positive association between directors' stock-based compensation and FSF.

The remainder of the paper is organized as follows. Section 2 reviews relevant literature and develops the main research hypotheses. Section 3 presents the research methodology. Section 4 describes the results and

analysis, and Section 5 concludes the study.

2. Literature review, theoretical framework and hypothesis development

Agency relationships tend to be marked by agency conflicts, and corporate governance helps mitigate such conflicts (Dey, 2008). Compensation is regarded as one of the tools of corporate governance to deal with agency conflicts (Armstrong et al., 2010). However, compensation can also lead to fraud. The linkages between compensation and both corporate fraud, including financial restatements and FSF, and earnings management have been widely explored in prior research. However, the empirical results with respect to this association are mixed, with some studies arguing in favor and others against compensation as a means of fraud prevention.

On the one hand, in relation to executive compensation and fraud, Jiang et al. (2010) report a positive association between executive compensation and earnings management. Harris and Bromiley (2007) find that executive compensation coupled with poor corporate performance can induce firms to commit unethical behavior, translating into financial misrepresentation. Hsieh et al. (2016) argue that around the time of announcing employee layoffs, CEOs are more likely to engage in earnings management to maximize their equity-based compensation. BenYoussef and Khan (2018) suggest that managers act opportunistically by managing the timing of the release of adverse information so that they can maximize their stock-based compensation. Almadi and Lazic (2016) also find that CEO compensation and incentivization is positively related to earnings management. Conversely, Laux and Laux (2009) do not find any clear relationship between accounting manipulation and CEO incentive pay.

On the other hand, directors' compensation assumes importance because of the directors' critical role in the governance function. Neville et al. (2019) argue that as agents of the shareholders, directors have the primary role of conducting monitoring that aims to avoid corporate misconduct. Further, effective monitoring by directors is a function of their motivation (in terms of incentives) and ability (in terms of adequate wherewithal). However, the results of the studies on directors' compensation and corporate wrongdoing are also inconclusive (Archambeault et al., 2008; Kim et al., 2013; Persons, 2012; Radwan et al., 2022; Ye, 2014).

Theoretically, it can be argued that any involvement in fraud can lead to reputational losses and legal sanctions. Therefore, directors may be hesitant to be involved in fraud. However, evidence from prior studies is mixed and debatable. On the one hand, if directors are not interested or have no incentive in relation to fraud, they would move to new companies once their businesses are accused of being involved in fraud. However, according to Helland (2006), even when a fraud is detected directors do not face any reputational losses on being associated with fraudulent companies. Fich and Shivdasani (2007) also do not find abnormal turnover of outside directors of fraud firms. However, they find a significant decline in other board appointments held by outside directors of fraud firms. Similarly, Naumovska et al. (2020) in fraud firms find evidence of reputational immunity among minority directors, represented by female directors and directors from ethnic minorities. On the other hand, Chang and Sun (2016) find evidence of reputation loss in terms of abnormal turnover among directors of fraud firms. However, they do not find significant evidence in support of higher loss of directorships by directors at fraud firms as compared to directors at no-fraud firms.

Given the indeterminate evidence, this study attempts to provide an alternate explanation by employing the agency theory in order to investigate the linkages between directors' compensation and FSF. Agency theory postulates that work is delegated by principals to agents in the anticipation that agents will accomplish the task in the best interest of the principals (Jensen and Meckling, 1976). This principal-agent relationship holds true in the case of shareholders and directors, wherein directors are delegated monitors and agents acting on behalf of the shareholders. From the agency perspective, agents will act opportunistically if their interests are not aligned with those of the principals. This sets the stage for the agency problem, which can be rectified by using the two mechanisms of monitoring and compensation (Ali et al., 2022).

However, compensation can also induce fraud. Hsieh et al. (2016) report a positive association between the proportion of cash-based compensation and earnings management. Ye (2014) finds a positive association between earnings management and IndDirs' cash compensation. Beasley et al. (2001) identify misplaced compensation and incentives as one of the reasons for fraud, thereby implying that total compensation, including cash, bonuses, stocks, and options, could be a motivation for inducing self-serving and fraudulent behavior. Thus, drawing from the agency theory, the first hypothesis is:

H1: *Director compensation is positively associated with the likelihood of FSF.*

Prior research on whether directors' shareholding has an association with the incidence of FSF is sparse and inconclusive. Among the few papers, Rose et al. (2013) report that when BoD discussions are less transparent, stock-owning directors are more likely to agree to aggressive financial reporting by the management. Kim et al. (2013) report a positive association between SEC violations and directors' common stock compensation. Yang et al. (2008) find that discretionary accruals are positively related to outsider directors' stock ownership. However, Gulzar (2011) does not find any significant relationship between directors' shareholding and discretionary accruals.

The above evidence suggests that there may be a connection between directors' shareholding and FSF. Taking recourse to agency theory, in the context of self-serving behavior of the agents (Petrou and Procopiou, 2016), the next hypothesis is that:

H2: *Directors' stockholding is positively associated with the likelihood of FSF.*

Directors' remuneration packages may also include stock-based compensation such as restricted stock, shares, and options. There are two schools of thought on stock-based compensation. One view advocates/favors stock-based compensation. Armstrong et al. (2010) argue that financial irregularities are less frequent when CEOs have high equity incentives. Erickson et al. (2006) do not report any association between equity incentives of executives and fraud.

Proponents of the second view, such as Crutchley and Minnick (2012) find evidence against directors' incentive pay. For example, Harris et al. (2019) find that CEOs with high levels of equity based compensation engage in earnings management behavior. Research by Denis et al. (2006) and Peng and Röell (2008) also report evidence against stock-based compensation/options claiming that fraud and earnings manipulation are associated with executive stock-based compensation. Davidson (2022) finds that executives implicated in financial reporting fraud tend to have higher equity incentives.

In summary, Goldman and Slezak (2006, p. 603) contend that "stock-based compensation is a double-edged sword" which can encourage agents to make productive efforts but also to misrepresent performance. Further, option grants to IndDirs can result in alignment of their interests with those of the managers, rather than the shareholders. This may impair the independence of outside directors by inhibiting their oversight function (Cullinan et al., 2008). Hamdani and Kraakman (2007) support this assertion and argue that equity pay to directors undermines the directors' duty to protect the shareholders against managerial misconduct on two counts. First, it can act as an incentive to overlook managerial wrongdoing. Second, it can compromise directors' independence in cases where management has an influence over the tenure of directors. Therefore, applying agency theory, our next hypothesis is that:

H3: *Directors' stock-based compensation is positively associated with the likelihood of FSF.*

3. Research methodology

3.1. Sample selection process

We included all cases in the SCAC dataset for firms listed on the NYSE and the NASDAQ for the sample period (2005 to 2019). Firms listed on the NYSE and on the NASDAQ were chosen as these are the top two stock exchanges in the US. The filings were arranged in alphabetical order (by company name) and the duplicate filings were deleted. A filing was considered duplicate if there were more than one filing in one year for the same company or if there were filings in two consecutive years for the same company. However, if the difference between filing dates of two filings (for the same company) was more than 1 year, then both the filings were included in the sample.

In the next step, matched firms were identified. Matched firms were identified using three shortlisting criteria. First, each matched firm had to have the same standard industrial classification (SIC) code as that of its corresponding fraud firm (industry-level matching). Second, only firms which were not implicated in FSF during the sample period were included in the matched group. Additionally, companies that had FSF cases against them dismissed were considered fit to be matched firms.

Finally, for each potential matched firm, the difference between its market capitalization (Mcap) and that of the fraud firm was calculated using the formula: {(MCap of the Fraud Firm ÷ MCap of the potential matched Firm) * −1}*100. This process was repeated using net sales and total assets. Then, the potential non-fraud firm matched in the same industry as the fraud firm which had the smallest percentage difference in size relative to the fraud firm (in terms of market capitalization, net sales, or total assets in the match year) was chosen as the matched firm. This approach finds support in prior research where more than one financial variable was used to identify match firms. For example: McLaughlin et al. (2021) use size measured in terms of both revenue and market capitalization for identifying matched firms. Daines et al. (2021) use total assets and book-to-market ratio. O'Connor et al. (2006) use net sales and net income whereas Firth et al. (2011) use sales and total assets. Additionally, considering variables *ROA*, *MVBV*, and *Size* as proxies for profitability, market capitalization, and total assets, respectively, there is no significant difference between fraud firms and matched firms in our sample.

In the next step, we excluded from the sample those fraud firms for which no suitable matched firm could be found. The resultant sample constituted 1,029 fraud firms.

Data related to compensation, shareholding, gender, age, type of director (ExDir, IndDir, or NonExIndDir, and CEO duality needed to be manually hand collected from SEC filings for each director on the BoD of every fraud firm and corresponding matched firm. Therefore, a randomized sample of 500 fraud firms was chosen for further analysis. We excluded pairs of fraud firms and their corresponding matched firms for which compensation data was not available (either for the fraud firms or for the matched firms).

The SCAC provides status of each case/filing. As of a date, the status of a case can be Ongoing, Settled, Dismissed, or Remanded. An Ongoing case can either be Settled, Remanded, or Dismissed in future. Our final sample of fraud firms comprises SCAC filings which were either Ongoing, Settled, or Remanded as of January 1, 2020 (our cut-off date). Firms with Dismissed cases are excluded from our sample.

The final sample comprised 354 pairs of fraud firms and matched firms. In the final sample, on average the size of the matched firms was within +/-26% of the size of the fraud firms. Here is a detailed breakdown of the size difference in percentage between matched firms and fraud firms with the number of firms in parentheses: 0% − 10% (138); 11% − 20% (89); 21% − 30% (55); 31% − 40% (26); and > 40% (46).

Other needed firm-level data collected from Compustat and Thomson Reuters (Datastream). 'Pharmaceutical preparations' firms have the highest concentration in the sample, accounting for 6.50% (23 firms) of the total fraud firms. This is followed by 'computer programming and data processing' at 5.93% (21 firms) and 'biological products' at 5.08% (18 firms). Of the 354 fraud firms, 142 firms were listed on the NYSE and 212 fraud firms were listed on NASDAQ.

3.2. Research design

This study uses logistic regression on pairs of fraud and matched firms (McLaughlin, et al., 2021; Uzun, et al., 2004). Regarding variable measurement, the year immediately preceding the first alleged fraud year (i.e., year preceding the class period start date in SCAC filings) is used as the match year (Erickson et al., 2006; Hass et al., 2016).

3.2.1. Dependent variable

The dependent variable, *Fraud*, is a binary variable coded 1 for fraud firms and 0 for matched firms (Crutchley and Minnick, 2012; Hass et al., 2016).

3.2.2. Independent variables

To test **H1**, we use *DIR_COMP*. *DIR_COMP* is the log of the sum of directors' salary, bonuses, fees earned or paid in cash, value of stock awards, incentive compensation, value of option awards, non-equity incentive plan compensation, change in pension value, non-qualified deferred compensation earnings, and all other compensation, as detailed in the SEC Form DEF-14A (Conyon and He, 2016).

To test **H2**, *DIR_SHARE%* is used. *DIR_SHARE%* is measured as the number of shares beneficially held by directors divided by number of shares outstanding (Hass et al., 2016).

To test **H3**, *DIR_STKCOMP%* is used, *DIR_STKCOMP%* is measured as the sum of value of stock awards and the value of option awards divided by the sum of directors' salary, bonuses, fees earned or paid in cash, value of stock awards, incentive compensation, value of option awards, non-equity incentive plan compensation, change in pension value, non-qualified deferred compensation earnings, and all other compensation (Crutchley and Minnick, 2012).

3.2.3. Control variables

This study controls for the impact of BoD characteristics, corporate governance factors, and organizational performance. With respect to BoD characteristics, we control for gender diversity of the BoD measured by the percentage of female directors on the board (*FEMALE_DIR%*) (Ntim et al., 2015) and the average age of all directors (*DIR_AGE*) (Xu et al., 2018). On the corporate governance front, we control for board independence (*IND_DIR%*) (Hass et al., 2016), board size (*BoDSize)* (Deutsch et al., 2011), institutional ownership (*INSTL_OWNERSHIP*) (Ntim et al., 2015), proportion of executive directors on board (*EX_DIR %*), CEO duality (*CEODuality*) (Dahya et al., 2009), frequency of board meetings (*NumBoDMeetings*) (Erickson et al., 2006), ownership concentration (*HHI*) (Hadani et al., 2011), and type of auditor (*Big4*) (Lennox and Pittman, 2010). In terms of organizational performance, we control for accounting performance with Return on Assets (*ROA*), market performance with market value-to-book value (*MV/BV*) as well as leverage (*LEV*) (Conyon and He, 2016; Hass et al., 2016) and firm size (*Size*) (Gao et al., 2017).

The definitions of all variables and their measurement are set out in Appendix C.

3.2.4. Other variables

The compensation, shareholding, and stock-based compensation for the three sub-categories of directors are represented, respectively: for ExDirs: *EXDIR_COMP*, *EXDIR_SHARE%*, and *EXDIR_STKCOMP%*; for IndDirs: *INDIR_COMP*, *INDIR_SHARE%*, and *INDIR_STKCOMP%*;, and for NonExIndDirs: *NON-EX-INDIR_COMP*, *NON-EXINDIR_SHARE%*, and *NON-EXINDIR_STKCOMP%*.

3.3. Regression models

To examine the association between directors' compensation (**H1**) and FSF, we use Model 1:

$$Fraud_{i,t} = \alpha_{i,t} + \theta_1 DIR\_COMP_{i,t-1} + \beta_1 Controls_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

Controls represents other control variables related to BoD characteristics, corporate governance, ownership, performance, and firm characteristics.

To check the association between directors' shareholding and FSF (**H2**), Model 2 is used:

$$Fraud_{i,t} = \alpha_{i,t} + \theta_2 DIR\_SHARE\%_{i,t-1} + \beta_1 Controls_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

To investigate the association between directors' stock-based compensation and FSF (**H3**), Model 3 is used:

$$Fraud_{i,t} = \alpha_{i,t} + \theta_3 DIR\_STKCOMP\%_{i,t-1} + \beta_1 Controls_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

4. Result analysis

4.1. Descriptive statistics

Table 1 presents the descriptive statistics of variables for all firms.

Table 2 provides a comparative view of variables for our fraud and matched firms. Results from Table 2 show a significant difference in directors' stock based compensation, directors' age, CEO duality, and institutional ownership of fraud firms and matched firms. Stock-based compensation of directors and institutional ownership are lower for the matched firms compared to the fraud firms. However, matched firms have higher average age of the BoD members. On the governance front, the mean value of CEO duality is lower for the matched firms compared to the fraud firms. This is intuitive because when CEOs also act as the chair of the BoD, they can exercise greater control over the BoD, which can open the gateway for manipulation of financials.

Results of the Pearson correlation analysis in Table 3 exhibit high correlation among all directors' total compensation, stock-based compensation, and shareholding and that of ExDirs, IndDirs, and NonExIndDirs, respectively. This is understandable, as their total compensation, stock-based compensation, and shareholding are subsets of the total compensation, stock-based compensation, and shareholding of all the directors. However, these high correlations do not affect the analysis, as models for ExDirs, IndDirs, and NonExIndDirs are run separately. With respect to other variables, no issues related to multi-collinearity are expected as the largest correlation (0.68) in the sample is below the accepted threshold (0.70) (Deutsch et al., 2011). Also, we test our models for multi-collinearity using variance inflation factor (VIF) analysis and find that the VIF for Models 1, 2, and 3 is less than 10.

Table 1
Descriptive statistics of variable for all firms.

Variable	N	Mean	Std. dev.	Minimum	Maximum
DIR_COMP	706	15.25	1.27	7.24	22.79
DIR_SHARE%	703	13.68%	0.19	0.00%	92.69%
DIR_STKCOMP%	708	48.23%	0.25	0.00%	100.00%
EXDIR_COMP	699	14.91	1.48	0.00	22.65
EXDIR_SHARE%	703	7.35%	0.15	0.00%	91.90%
EXDIR_STKCOMP%	708	43.99%	0.29	0.00%	100.00%
INDIR_COMP	698	13.73	1.08	5.87	20.54
INDIR_SHARE%	703	4.34%	0.10	0.00%	68.55%
INDIR_STKCOMP%	708	52.85%	0.25	0.00%	100.00%
NON-EXINDIR_COMP	184	12.13	1.40	6.91	19.29
NON-EXINDIR_SHARE%	703	1.99%	0.08	0.00%	84.06%
NON-EXINDIR_STKCOMP%	708	10.81%	0.25	0.00%	100.00%
IND_DIR%	708	76.46%	0.15	0.00%	100.00%
FEMALE_DIR%	708	12.22%	0.12	0.00%	100.00%
DIR_AGE	708	60.36	5.28	37.00	76.33
ROA	708	−1.27%	0.22	−154.41%	71.02%
MVBV	708	3.99	10.22	−63.48	145.83
BoDSize	708	8.99	2.58	1.00	20.00
EX_DIR%	708	17.25%	0.11	0.00%	100.00%
INSTL_OWNERSHIP	681	67.82%	0.31	0.00%	165.72%
CEODuality	708	0.43	0.50	0.00	2.00
LEV	708	0.19	0.23	0.00	1.63
Big4	708	0.78	0.41	0.00	1.00
NoBM	671	8.38	4.28	1.00	35.00
HHI	682	0.12	0.18	0.02	1.00
Size	708	6.93	1.93	0.18	13.64

4.2. Empirical results

The results of the logistic regression are presented in Table 4. The results from Table 4 do not support the notion that directors' total compensation is positively associated with incidence of FSF as the log of directors' total compensation (*DIR_COMP*) is not statistically significant. Therefore, **H1** is not supported. This result is consistent with existing literature on financial reporting fraud. For example, Ndofor et al. (2015) also did not find any significant association between CEO total compensation and fraudulent financial reporting.

Regarding H2, we expected that directors' stockholding is positively associated with the likelihood of FSF. However, the results from Table 4 show that the coefficient of percentage shareholding of all directors (*DIR_SHARE%*) is not statistically significant. Therefore, we cannot conclude any association between directors' shareholding and the likelihood of *Fraud* (**H2** is not supported).

Interestingly, in relation H3, the results from Table 4 show that *DIR_STKCOMP%*, (directors' stock-based compensation) has a positive and statistically significant coefficient at 10% level (coef. = 0.75). Thus, ***H3** is supported*, implying that stock-based compensation is positively associated with *Fraud*. Our results are in line with prior research, such as Magilke et al. (2009) and Deutsch et al. (2011). From a country-specific point of view, the US is marked by an individualistic culture with a focus on the protection of one's self-interests. This, coupled with the existence of high information asymmetries, creates agency problems which necessitate the alignment of the divergent interests of agents and principals (Lubatkin et al., 2005). Thus, the use of incentive mechanisms is advocated to achieve this alignment. However, the significant positive association between directors' stock-based compensation and FSF in this study questions the efficacy of stock-based compensation. Therefore, in line with Boumosleh (2009), it can be argued that stock-based compensation aligns directors' interests with those of the management rather than with those of the shareholders (principals), and this convergence exhibits itself in increased likelihood of FSF.

In consideration of the remedy mechanism, the results for the control variable related to the proportion of IndDirs (*IND_DIR%*) are mixed across the regression models. Models 1 and 3 exhibit a significant negative association between the proportion of IndDirs and the incidence of FSF, whereas Model 2 provides no significant results. Prior research also provides mixed results with respect to the impact of IndDirs. On the one hand, some studies argue that greater BoD independence is related to lower information asymmetry (Goh et al., 2016) or that the incidence of fraud and board composition/structure are significantly related, as fraud firms have a lower number of IndDirs (Uzun et al., 2004). On the other hand, some studies do not find any impact of the proportion of IndDirs versus outside directors on financial restatements (Agrawal and Chadha, 2005).

With respect to the gender composition of the BoD, the percentage of female directors (*FEMALE_DIR%*) is not significant in any model. This alludes to the absence of any association between the presence of female directors and the incidence of FSF, which is in tune with prior research by Harris et al. (2019). However, directors' average age (*DIR_AGE*) is significant and negative across all the models, suggesting that older directors are associated with increased monitoring effectiveness of the BoD. This result supports the views of Xu et al. (2018), who argue that

Table 2
Statistical description of variables for fraud vs. no fraud firms, 2005–2019.

Variable	Fraud Firms		Matched Firms			Fraud Firms	Matched Firms	
	N	Mean	N	Mean	p-value	Median	Median	p-value
DIR_COMP	354	15.30	352	15.21	0.33	15.42	15.22	0.06
DIR_SHARE%	352	14.14%	351	13.22%	0.53	4.57%	4.12%	0.60
DIR_STKCOMP%	354	50.05%	354	46.40%	0.05**	55.14%	48.26%	0.04**
EXDIR_COMP	351	14.93	348	14.88	0.65	15.15	14.91	0.09
EXDIR_SHARE%	352	7.38%	351	7.32%	0.96	1.94%	1.89%	0.99
EXDIR_STKCOMP%	354	45.88%	354	42.09%	0.08	52.48%	44.76%	0.06
INDIR_COMP	349	13.77	349	13.70	0.42	13.93	13.87	0.23
INDIR_SHARE%	352	4.43%	351	4.25%	0.82	0.57%	0.68%	0.36
INDIR_STKCOMP%	354	54.31%	354	51.40%	0.12	57.48%	54.25%	0.07
NON-EXINDIR_COMP	93	12.20	91	12.06	0.49	12.23	11.97	0.28
NON-EXINDIR_SHARE%	352	2.33%	351	1.64%	0.28	0.00%	0.00%	0.89
NON-EXINDIR_STKCOMP%	354	11.40%	354	10.22%	0.53	0.00%	0.00%	0.93
IND_DIR%	354	76.18%	354	76.74%	0.61	80.00%	80.00%	0.78
FEMALE_DIR%	354	11.84%	354	12.59%	0.41	11.11%	11.11%	0.49
DIR_AGE	354	59.44	354	61.28	0*	60.20	61.60	0*
ROA	354	−2.18%	354	−0.37%	0.27	2.53%	3.38%	0.15
MVBV	354	3.81	354	4.17	0.64	2.58	2.39	0.18
BoDSize	354	8.98	354	9.00	0.92	9.00	9.00	0.74
EX_DIR%	354	16.98%	354	17.52%	0.50	14.29%	14.29%	0.71
INSTL_OWNERSHIP	345	70.13%	336	65.45%	0.05**	79.34%	75.64%	0.02**
CEODuality	354	0.47	354	0.39	0.04**	0	0	0.04**
LEV	354	0.21	354	0.18	0.21	0.14	0.10	0.19
Big4	354	0.77	354	0.79	0.65	1.00	1.00	0.65
NoBM	340	8.69	331	8.06	0.06	8.00	7.00	0.01**
HHI	346	0.12	336	0.12	0.62	0.05	0.06	0.11
Size	354	7.05	354	6.81	0.11	6.95	6.75	0.15

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. P-value of the mean and the associated significance is based on *t*-test whereas p-value of the median and the associated significance is based on Wilcoxon Rank-sum (Mann–Whitney) Test. T-tests were undertaken to check the robustness of the matched pairs. The results show that the matching was robust, as the p-values were mostly not significant at 5% significance level. This implies that the fraud firms and matched firms were similar in size, as measured by the market capitalization, net sales, and total assets. Appendix C defines all variables.

there exists a negative association between BoD age and corporate fraud. Also, older directors/executives tend to be more conservative and ethical in their conduct (Xu et al., 2018).

Among the firm-level variables, *MVBV*, *LEV*, and *HHI* are not significant, implying that these firm-level characteristics have no association with the incidence of FSF. However, *Size* is statistically significant with a positive coefficient, which implies that the incidence of FSF can be expected to increase with an increase in firm size. Choi et al. (2023) also find a significant positive association between firm size and fraud. Among the governance variables, *Big4* (−), *CEODuality* (+), *INSTL_OWNERSHIP* (+), and *ROA* (−) are statistically significant. *Big4* is statistically significant with a negative co-efficient, which alludes to the superior quality of external monitoring provided by the Big-4 audit firms, a result also confirmed by Lennox and Pittman (2010). Negative impact of ROA finds support in Conyon and He (2016) with respect to the negative effect of ROA on CEO turnover in fraud firms. Though unexpected, the association between *INSTL_OWNERSHIP* and the incidence of FSF has also been confirmed by Burns et al. (2010), who find that institutional ownership is associated with higher propensity of misreporting. Further, this association is driven by institutional investors who are less focused on monitoring investee firms. The positive association between *CEODuality* (CEO duality) and the incidence of FSF has been confirmed by Saona et al. (2020) in their study on earnings management.

4.3. Additional tests

This study undertakes additional tests to investigate the association of compensation and shareholding of the three sub-categories of directors with the incidence of FSF. Although directors can be either executive or non-executive, the fiduciary duties of both are similar (Bugeja et al., 2016). But there is a disparity in terms of compensation, with ExDirs being paid more handsomely compared to non-executive directors (Lazar et al., 2014). In the US, ExDirs are generally the highest paid in the corporation. In addition, by virtue of ExDirs playing a key role in the day-to-day operations of the corporation, they are in an influential position. Guangguo et al. (2019) argue in favor of ExDirs and conclude that when elected by controlling shareholders, they lessen the information asymmetry between the shareholders and managers, thereby reducing earnings management and increasing pay–performance symmetry.

According to Adithipyangkul and Leung (2018), incentive pay for non-executive directors in the US is recommended. However, such incentive pay can fail if it is not designed well and not backed by strong monitoring mechanisms. Hence, we undertake additional analysis of the associations between FSF and both the compensation and shareholding for ExDirs, IndDirs, and NonExIndDirs.

To test the association of compensation for ExDirs, IndDirs, and NonExIndDirs with FSF, we re-estimate regression Models 1, 2, and 3 by replacing the director compensation variables with analogous variables for each type of director. Specifically, we re-estimate Model 1 by replacing *DIR_COMP* with *EXDIR_COMP*, *INDIR_COMP*, and *NON-EXINDIR_COMP* in Models 4a, 5a, and 6a, respectively. We re-estimate model 2 by replacing *DIR_SHARE%* with: *EXDIR_SHARE%*, *INDIR_SHARE%*, and *NON-EXINDIR_SHARE%* in Models 4b, 5b, and 6b, respectively. We re-estimate Model 3 by replacing *DIR_STKCOMP%* with *EXDIR_STKCOMP%*, *INDIR_STKCOMP%*, and *NON-EXNON-INDIR_STKCOMP%* in Models 4c, 5c, and 6c, respectively.

The results of these models are set out in Table 5. With respect to executive directors, both *EXDIR_COMP* and *EXDIR_SHARE&* are not statistically significant. However, *EXDIR_STKCOMP%* is statistically significant and positive, implying that executive directors' stock-based compensation increases the incidence of FSF. The association of compensation, shareholding, and share-based compensation of IndDirs and NonExIndDirs with the likelihood of FSF is not significant. Among the firm-level variables and governance variables, the results mostly tally with those of Models 1, 2 and 3 (except for Model 6a, which could be due to fewer observations).

Table 3
Correlation matrix of variables.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
DIR_COMP (1)	1.00												
DIR_SHARE% (2)	−0.39***	1.00											
DIR_STKCOMP% (3)	0.48***	−0.19***	1.00										
EXDIR_COMP (4)	0.92***	−0.37***	0.43***	1.00									
EXDIR_SHARE% (5)	−0.42***	0.74***	−0.28***	−0.39***	1.00								
EXDIR_STKCOMP% (6)	0.52***	−0.25***	0.89***	0.50***	−0.29***	1.00							
INDIR_COMP (7)	0.80***	−0.42***	0.47***	0.64***	−0.44***	0.41***	1.00						
INDIR_SHARE% (8)	−0.08**	0.49***	0.03	−0.10***	−0.04	−0.05	−0.06*	1.00					
INDIR_STKCOMP% (9)	0.33***	−0.08**	0.68***	0.28***	−0.22***	0.43***	0.40***	0.13***	1.00				
NON-EXINDIR_COMP (10)	0.58***	−0.26***	0.13*	0.46***	−0.33***	0.19**	0.58***	−0.17**	0.12	1.00			
NON-EXINDIR_SHARE% (11)	−0.07*	0.42***	0.01	−0.04	0.01	−0.01	−0.14***	−0.04	0.02	0.05	1.00		
NON-EXINDIR_STKCOMP% (12)	0.03	0.07*	0.06*	0.01	−0.02	0.02	0.02	−0.01	0.14***	0.12*	0.22***	1.00	
IND_DIR% (13)	0.29***	−0.38***	0.33***	0.23***	−0.39***	0.30***	0.44***	0.09**	0.23***	−0.04	−0.30***	−0.33***	1.00
FEMALE_DIR% (14)	0.20***	−0.12***	0.13***	0.19***	−0.07*	0.15***	0.29***	−0.08**	0.02	0.07	−0.05	−0.07**	0.16***
DIR_AGE (15)	0.27***	−0.26***	0.005	0.27***	−0.16***	0.04	0.21***	−0.20***	−0.01	0.14*	−0.07**	−0.04	0.24***
ROA (16)	0.06	−0.09**	−0.14***	0.03	0.02	−0.10***	0.02	−0.19***	−0.10***	0.02	0.00	−0.02	0.02
MVBV (17)	0.06	0.04	0.06	0.04	0.03	0.05	0.06	−0.00	0.07*	0.06	0.04	0.01	−0.08**
BoDSize(18)	0.51***	−0.26***	0.15***	0.46***	−0.31***	0.18***	0.49***	−0.02	0.06*	0.28***	−0.03	0.06*	0.28***
EX_DIR% (19)	−0.32***	0.34***	−0.31***	−0.24***	0.52***	−0.27***	−0.43***	−0.06*	−0.21***	−0.21***	−0.05	−0.08**	−0.64***
INSTL_OWNERSHIP (20)	0.36***	−0.40***	0.31***	0.32***	−0.35***	0.31***	0.41***	−0.13***	0.27***	0.29***	−0.18***	−0.02	0.34***
CEODuality (21)	−0.01	0.00	−0.11***	0.01	0.18***	−0.10***	−0.05	−0.15***	−0.07*	0.028	−0.12***	−0.07*	0.00
LEV (22)	0.22***	−0.04	0.07*	0.22***	−0.13***	0.06*	0.16***	−0.03	0.05	0.07	0.16***	0.05	0.02
Big4 (23)	0.43***	−0.27***	0.26***	0.36***	−0.29***	0.27***	0.44***	0.02	0.17***	0.25***	−0.15***	−0.04	0.30***
NoBM (24)	0.09**	−0.12***	0.02	0.08**	−0.15***	0.03	0.15***	−0.04	−0.01	0.15**	0.01	−0.03	0.13***
HHI (25)	−0.28***	0.29***	−0.10***	−0.24***	0.25***	−0.13***	−0.28***	0.12***	−0.11***	−0.25***	0.11***	0.05	−0.22***
Size (26)	0.63***	−0.40***	0.16***	0.57***	−0.31***	0.21***	0.57***	−0.22***	0.04	0.35***	−0.11***	−0.00	0.27***

Variables	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
FEMALE_DIR% (14)	1.00												
DIR_AGE (15)	−0.05	1.00											
ROA (16)	0.09**	0.04	1.00										
MVBV (17)	−0.01	−0.06	−0.10***	1.00									
BoDSize (18)	0.25***	0.15***	0.05	−0.10***	1.00								
EX_DIR% (19)	−0.09**	−0.16***	−0.07*	0.13***	−0.44***	1.00							
INSTL_OWNERSHIP (20)	0.18***	0.18***	0.20***	0.01	0.11***	−0.29***	1.00						
CEODuality (21)	0.01	0.05	0.14***	−0.03	0.00	0.13***	−0.06	1.00					
LEV (22)	0.01	0.05	−0.05	−0.01	0.15***	−0.11***	0.12***	−0.02	1.00				
Big4 (23)	0.14***	0.13***	0.10***	−0.04	0.37***	−0.30***	0.36***	0.02	0.13***	1.00			
NoBM (24)	0.01	0.02	−0.16***	−0.05	0.16***	−0.15***	0.11***	−0.05	0.12***	0.09**	1.00		
HHI (25)	−0.17***	−0.31***	−0.19***	0.01	−0.09**	0.17***	−0.58***	0.02	0.00	−0.26***	−0.04	1.00	
Size (26)	0.22***	0.30***	0.30***	−0.10***	0.59***	−0.34***	0.29***	0.14***	0.23***	0.46***	0.12***	−0.30***	1.00

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Appendix C defines all variables.

Table 4
Logistic regression on matched pairs.

	Model 1	Model 2	Model 3
DIR_COMP	0.13		
	(0.29)		
DIR_SHARE%		0.19	
		(0.73)	
DIR_STKCOMP%			0.75*
			(0.07)
IND_DIR%	−1.51*	−1.35	−1.63*
	(0.08)	(0.12)	(0.06)
FEMALE_DIR%	−0.79	−0.81	−0.81
	(0.33)	(0.33)	(0.33)
DIR_AGE	−0.12***	−0.12***	−0.11***
	(0.00)	(0.00)	(0.00)
ROA	−0.97**	−1.11**	−0.84*
	(0.03)	(0.01)	(0.07)
MVBV	−0.00	0.00	−0.00
	(0.94)	(1.00)	(0.89)
BoDSize	−0.09*	−0.08*	−0.07
	(0.06)	(0.08)	(0.12)
EX_DIR%	−1.80	−1.28	−1.32
	(0.18)	(0.33)	(0.31)
INSTL_OWNERSHIP	0.82**	1.01***	0.76**
	(0.03)	(0.01)	(0.05)
CEODuality	0.40**	0.38**	0.41**
	(0.02)	(0.03)	(0.02)
LEV	0.29	0.28	0.33
	(0.46)	(0.48)	(0.41)
Big4	−0.62***	−0.57**	−0.64***
	(0.01)	(0.02)	(0.01)
NoBM	0.03	0.03	0.04*
	(0.11)	(0.12)	(0.09)
HHI	−0.58	−0.51	−0.67
	(0.32)	(0.39)	(0.26)
Size	0.19***	0.25***	0.21***
	(0.01)	(0.00)	(0.00)
Constant	5.61***	6.80***	6.75***
	(0.00)	(0.00)	(0.00)
Observations	652	647	652
R^2	0.08	0.08	0.08

Notes: p-values in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Appendix C defines all variables.

4.4. Robustness checks

Diagnostic tests for heteroscedasticity are undertaken. Heteroscedasticity is tested using the Breusch–Pagan/Cook–Weisberg test and the White test. The results of these tests are mixed. Therefore, a conservative approach is adopted by assuming the presence of heteroscedasticity and this issue is addressed by calculating robust standard errors. Models 1, 2, and 3 are also tested using conditional logistic regression, logistic regression, and probit regression (Table 6, Panels A, B, & C). The results reconfirm the positive association between directors' stock-based compensation (*DIR_STKCOMP%*) and *Fraud* as well as a negative association between the average age of directors (*DIR_AGE*) and the likelihood of FSF.

We also addressed concerns with respect to endogeneity. Endogeneity can arise on account of omitted variables, simultaneity, reverse causality, or measurement error (Certo et al., 2016; Roberts and Whited, 2013). To test for omitted variables, we use the STATA command 'estat ovtest, rhs' (Zahid et al., 2020). The non-significant test results suggests that there are no omitted variables in Model 3. However, the p-values for Model 1 and Model 2 are significant at 0.0757 and 0.0621, respectively, implying that there are omitted variables in these models. To address this, we use 'ivprobit' in STATA (Wooldridge 2010) by using the log of net sales as an instrumental variable for log of total assets. After applying 'ivprobit', the p-values of the Wald exogeneity test are not significant for both Models 1 and 2, implying that there are no missing values. *DIR_AGE* continues to be significant with a negative coefficient across both models whereas *DIR_SHARE%* continues not to be significant. However, directors' compensation becomes significant at 10% level (results can be provided on request).

To deal with the issue of outliers, all variables are winsorized at 1% and 99% (Chhaochharia et al., 2012). The results (provided on request) show a consistent finding in relation to the negative association of average age of directors (*DIR_AGE*) with likelihood of FSF. However, the positive association of directors' stock-based compensation (*DIR_STKCOMP%*) and *Fraud* loses it significant.

Notably, years 2008 and 2009 (i.e. match years 2007 and 2008) are part of a global economic meltdown marked by many cases of fraud being brought to light. Hence, sub-sample analysis excluding match year 2007 and 2008 is performed. Under this analysis, the results (provided on request) show consistent findings in relation to the positive association between directors' stock-based compensation and likelihood of FSF, and a negative association between average age of director and likelihood of FSF.

In addition, following Efendi et al. (2007), we conducted another sub-sample analysis by excluding firms in the financial services sector as their corporate governance and financial ratios differ from those of other industries. The results (provided on request) show directors' stock-based compensation, *DIR_STKCOMP%* (+), and average age of directors, *DIR_AGE* (−), are still significant.

The results of the step-wise regression (backward selection with significance level for removal from the model set at pr(0.1)) for Models 1, 2, and 3 also reconfirm the significance of *DIR_STKCOMP%* (+) and *DIR_AGE* (−) (the results can be provided on request). Finally, by using a binary variable *FAFD*, coded 1 if the number of female directors is equal to or greater than 3 and 0 otherwise, a factor analysis is also performed. However, the results (provided on request) show that *FAFD* is not significant across Models 1, 2, and 3, whereas *DIR_STKCOMP%* (+) and *DIR_AGE* (−) continue to be significant.

As an additional robustness test, we examined AAERs issued in the name of companies from 2005 to 2019. This involved excluding AAERs in the names of the CPAs (Certified Public Accountants), accounting firms, & individuals. We found 28 companies which were common between AAERs and our sample. On excluding these 28 AAER companies from our sample, *DIR_STKCOMP%* continues to be significantly positively associated with the incidence of FSF with a co-efficient of 0.81 and a p-value of 0.064, whereas *DIR_AGE* continues to be significantly negatively associated with *Fraud* (results can be provided on request).

To further check the robustness of our results, we conducted two additional tests by excluding matched pairs from the sample where the size difference between the fraud firm and the matched firm was more than 40% (46 cases) and more than 30% (72 cases), respectively. In both scenarios, *DIR_STKCOMP%* continues to be significantly positively associated with the incidence of FSF and *DIR_AGE* continues to be significantly negatively associated with *Fraud* (results can be provided on request).

5. Discussion and conclusions

The results of this study indicate that the incidence of FSF is significantly and positively associated with directors' stock-based compensation but has a significant negative association with directors' age. These results are robust to alternative statistical measures and to endogeneity tests. Big 4 auditor, CEO duality, firm size, and institutional ownership are also significant factors affecting FSF. Thus, this research enhances our understanding of the association between directors' compensation and FSF. Specifically, it contributes to the accounting and accountability literature by augmenting the limited empirical evidence available on directors' compensation and its association with the incidence of FSF.

It also contributes methodologically by employing a more comprehensive source of data. Unlike prior research, which has predominantly used data from the SEC to identify fraud firms, this study uses data from

Table 5
Additional models of logistic regression on matched pairs.

	Model 4a	Model 4b	Model 4c	Model 5a	Model 5b	Model 5c	Model 6a	Model 6b	Model 6c
EXDIR_COMP	0.04								
	(0.62)								
EXDIR_SHARE%		−0.21							
		(0.79)							
EXDIR_STKCOMP%			0.61*						
			(0.06)						
INDIR_COMP				0.05					
				(0.72)					
INDIR_SHARE%					0.14				
					(0.87)				
INDIR_STKCOMP%						0.50			
						(0.19)			
NON-EXINDIR_COMP							−0.17		
							(0.30)		
NON-EXINDIR_SHARE%								1.25	
								(0.34)	
NON-EXINDIR_STKCOMP%									−0.13
									(0.74)
IND_DIR%	−1.46*	−1.42	−1.60*	−1.47*	−1.42	−1.50*	−3.70*	−1.06	−1.57
	(0.10)	(0.10)	(0.07)	(0.10)	(0.10)	(0.08)	(0.08)	(0.24)	(0.10)
FEMALE_DIR%	−0.77	−0.78	−0.81	−0.73	−0.79	−0.68	−2.93	−0.84	−0.71
	(0.35)	(0.35)	(0.32)	(0.37)	(0.34)	(0.41)	(0.11)	(0.31)	(0.39)
DIR_AGE	−0.12***	−0.12***	−0.11***	−0.12***	−0.12***	−0.11***	−0.10**	−0.12***	−0.11***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
ROA	−1.05**	−1.09**	−0.87*	−1.03**	−1.10**	−0.95**	−2.10	−1.14**	−1.04**
	(0.02)	(0.02)	(0.06)	(0.02)	(0.02)	(0.04)	(0.19)	(0.01)	(0.02)
MVBV	−0.00	−0.00	−0.00	0.00	0.00	−0.00	0.133**	−0.00	0.00
	(0.97)	(0.99)	(0.90)	(0.94)	(1.00)	(0.94)	(0.04)	(0.97)	(0.97)
BoDSize	−0.08*	−0.08*	−0.07*	−0.08*	−0.08*	−0.07*	0.05	−0.08*	−0.08*
	(0.08)	(0.08)	(0.10)	(0.09)	(0.08)	(0.09)	(0.57)	(0.08)	(0.09)
EX_DIR%	−1.81	−1.14	−1.48	−1.40	−1.25	−1.49	−2.84	−0.84	−1.73
	(0.19)	(0.41)	(0.25)	(0.29)	(0.34)	(0.26)	(0.36)	(0.54)	(0.21)
INSTL_OWNERSHIP	0.97**	0.97**	0.78**	0.92**	0.99***	0.82**	2.00**	1.03***	0.93**
	(0.01)	(0.01)	(0.04)	(0.02)	(0.01)	(0.03)	(0.02)	(0.01)	(0.01)
CEODuality	0.41**	0.38**	0.41**	0.40**	0.38**	0.39**	0.60	0.39**	0.39**
	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)	(0.02)	(0.13)	(0.03)	(0.03)
LEV	0.40	0.29	0.34	0.30	0.29	0.31	1.26	0.21	0.31
	(0.33)	(0.47)	(0.39)	(0.46)	(0.47)	(0.44)	(0.14)	(0.61)	(0.43)
Big4	−0.61**	−0.57**	−0.64***	−0.62**	−0.57**	−0.61**	0.25	−0.54**	−0.60**
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.60)	(0.02)	(0.01)
NoBM	0.03	0.03	0.03*	0.03	0.03	0.03*	0.02	0.03	0.03
	(0.13)	(0.13)	(0.09)	(0.13)	(0.12)	(0.10)	(0.54)	(0.13)	(0.13)
HHI	−0.34	−0.49	−0.65	−0.47	−0.50	−0.55	−0.61	−0.48	−0.55
	(0.58)	(0.41)	(0.27)	(0.43)	(0.39)	(0.36)	(0.66)	(0.42)	(0.35)
Size	0.21***	0.24***	0.21***	0.22***	0.24***	0.23***	0.06	0.25***	0.22***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.65)	(0.00)	(0.00)
Constant	6.54***	6.99***	6.96***	6.46***	6.91***	6.66***	8.22**	6.58***	7.08***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
Observations	646	647	652	650	647	652	171	647	652
R^2	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.08	0.08

Notes: p-values in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Appendix C defines all variables.

SCAC. We also use a broader definition of FSF by including corporations that had misstatements in their offer documents, statements, and filings. Further, we do not expect the litigiousness of the US environment to influence our findings, as this risk has been mitigated by excluding cases which were dismissed. Also, private action lawsuits are not limited to just the US, as we find evidence of adoption of SCAC in other international markets as well.

This study also makes significant contributions to international accounting and international corporate governance research. *First*, across the world, disclosures with respect to directors' compensation (including quantity and composition) are a vital part of the annual audited accounting results filed by companies with regulatory agencies. The results of this study argue in favor of changing the composition of directors' compensation by avoiding stock-based compensation. Any change in the composition of directors' compensation can impact the nature/scope of disclosures related to directors' compensation in the accounting reports. *Second*, our results are generalizable to other countries which also follow an Anglo-American corporate governance system, such as Canada and the UK, which is similar to the US system (Ahmad and Omar, 2016). For example, US directors' compensation has equity and cash components (Engel et al., 2010). Equity ownership is held by directors in some other countries, including Canada, China, and the UK (Chen and Keefe, 2018; Goh and Gupta, 2016; Khalil et al., 2008). Conversely, in Australia non-executive directors neither receive bonus payments nor can they participate in option / share schemes (Bugeja et al., 2016). However, these structural differences in directors' compensation across countries are not expected to affect the generalizability of this study, as we also investigated directors' total compensation. In addition, our results are consistent with some prior studies done in contexts other than the US. For example, Ye (2014) used a sample of companies from China and also reports a positive association between directors' compensation and earnings management.

The study also contributes to the literature on corporate governance, agency theory and accounting fraud by combining the agency perspective (represented by compensation and the agency relationship between directors and shareholders) with the corporate governance perspective

Table 6
Conditional logistic, logit, and probit results for Models 1, 2, and 3.

Panel A. Conditional logistic, logit, and probit results for Model 1.

	Clogit	*Logit*	*Probit*
DIR_COMP	0.26*	0.13	0.08
	(0.06)	(0.29)	(0.29)
IND_DIR%	−1.52	−1.51*	−0.88*
	(0.15)	(0.08)	(0.09)
FEMALE_DIR%	0.11	−0.79	−0.52
	(0.91)	(0.33)	(0.30)
DIR_AGE	−0.13***	−0.12***	−0.07***
	(0.00)	(0.00)	(0.00)
ROA	−1.40*	−0.97**	−0.60**
	(0.07)	(0.03)	(0.03)
MVBV	0.01	−0.00	−0.00
	(0.55)	(0.94)	(0.96)
BoDSize	−0.11*	−0.09*	−0.05*
	(0.05)	(0.06)	(0.06)
EX_DIR%	−3.33*	−1.80	−1.09
	(0.05)	(0.18)	(0.17)
INSTL_OWNERSHIP	0.33	0.82**	0.51**
	(0.52)	(0.03)	(0.03)
CEODuality	0.26	0.40**	0.25**
	(0.21)	(0.02)	(0.02)
LEV	−0.02	0.29	0.19
	(0.97)	(0.46)	(0.44)
Big4	−0.26	−0.62***	−0.39***
	(0.47)	(0.01)	(0.01)
NoBM	0.03	0.03	0.02
	(0.32)	(0.11)	(0.10)
HHI	−1.35*	−0.58	−0.37
	(0.06)	(0.32)	(0.31)
Size	1.84***	0.19***	0.12***
	(0.00)	(0.01)	(0.01)
Constant		5.61***	3.50***
		(0.00)	(0.00)
Observations	606.00	652.00	652.00
R^2	0.25	0.08	0.08

Panel B. Conditional logistic, logit, and probit results for Model 2.

	Clogit	*Logit*	*Probit*
DIR_SHARE%	0.62	0.19	0.10
	(0.40)	(0.73)	(0.76)
IND_DIR%	−0.94	−1.35	−0.79
	(0.37)	(0.12)	(0.13)
FEMALE_DIR%	0.07	−0.81	−0.53
	(0.94)	(0.33)	(0.29)
DIR_AGE	−0.13***	−0.12***	−0.07***
	(0.00)	(0.00)	(0.00)
ROA	−1.65**	−1.11**	−0.68**
	(0.03)	(0.01)	(0.01)
MVBV	0.01	0.00	0.00
	(0.54)	(1.00)	(0.98)
BoDSize	−0.08	−0.08*	−0.05*
	(0.12)	(0.08)	(0.07)
EX_DIR%	−2.70	−1.28	−0.80
	(0.11)	(0.33)	(0.32)
INSTL_OWNERSHIP	0.61	1.01***	0.61***
	(0.24)	(0.01)	(0.01)
CEODuality	0.24	0.38**	0.24**
	(0.25)	(0.03)	(0.03)
LEV	−0.06	0.28	0.18
	(0.91)	(0.48)	(0.46)
Big4	−0.32	−0.57**	−0.36**
	(0.38)	(0.02)	(0.02)
NoBM	0.02	0.03	0.02
	(0.49)	(0.12)	(0.11)
HHI	−1.07	−0.51	−0.33
	(0.14)	(0.39)	(0.37)
Size	1.89***	0.25***	0.15***
	(0.00)	(0.00)	(0.00)
Constant		6.80***	4.19***
		(0.00)	(0.00)
Observations	596.00	647.00	647.00
R^2	0.25	0.08	0.08

(*continued on next page*)

Table 6 (*continued*)

Panel C. Conditional logistic, logit, and probit results for Model 3.			
	Clogit	*Logit*	*Probit*
Panel C. Conditional logistic, logit, and probit results for Model 3.			
	Clogit	*Logit*	*Probit*
DIR_STKCOMP%	1.62***	0.75*	0.45*
	(0.00)	(0.07)	(0.07)
IND_DIR%	−1.37	−1.63*	−0.95*
	(0.19)	(0.06)	(0.07)
FEMALE_DIR%	0.06	−0.81	−0.53
	(0.95)	(0.33)	(0.29)
DIR_AGE	−0.13***	−0.11***	−0.07***
	(0.00)	(0.00)	(0.00)
ROA	−1.14	−0.84*	−0.52*
	(0.15)	(0.07)	(0.07)
MVBV	0.01	−0.00	−0.00
	(0.59)	(0.89)	(0.91)
BoDSize	−0.07	−0.07	−0.04
	(0.24)	(0.12)	(0.11)
EX_DIR%	−2.08	−1.32	−0.80
	(0.24)	(0.31)	(0.31)
INSTL_OWNERSHIP	0.25	0.76**	0.47**
	(0.64)	(0.05)	(0.04)
CEODuality	0.27	0.41**	0.26**
	(0.20)	(0.02)	(0.02)
LEV	0.07	0.33	0.21
	(0.91)	(0.41)	(0.39)
Big4	−0.28	−0.64***	−0.40***
	(0.42)	(0.01)	(0.01)
NoBM	0.03	0.04*	0.02*
	(0.23)	(0.09)	(0.08)
HHI	−1.57**	−0.67	−0.42
	(0.03)	(0.26)	(0.26)
Size	1.95***	0.21***	0.13***
	(0.00)	(0.00)	(0.00)
Constant		6.75***	4.14***
		(0.00)	(0.00)
Observations	606.00	652.00	652.00
R^2	0.27	0.08	0.08

Notes: p-values in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Appendix C defines all variables.

(represented by governance variables), which are both significant in the context of accounting fraud. The study also extends previous research by offering an alternate view to the agency theory, which conventionally supports stock-based compensation as a means of aligning the interests of agents (directors) and principals (shareholders) (Boumosleh, 2009; Jensen and Meckling, 1976). We offer an alternate view which argues that stock-based compensation may provide incentives for FSF. From a practical perspective, these findings provide insights into effectively structuring and designing directors' compensation packages by arguing against stock-based compensation for directors.

In terms of limitations, our study is restricted to the analysis of publicly listed companies due to the data constraints regarding corporate governance and compensation practices for private US companies. Further, this research focuses on reported cases of FSF. However, there may be many cases that have either not been reported or not yet discovered. Another limitation of this study is the sample size. The initial sample of fraud firms was very large. However, the data on directors' compensation and a number of other governance and demographic variables had to be hand collected from SEC filings as many of these firms were either delisted or were not covered by databases such as Boardex or Execomp. For example, Boardex provides compensation data only for S&P500 and NASDAQ listed firms which are presently alive/listed. Similarly, Execomp has limited coverage of US corporations. Hence, the initial sample was randomized to include only 500 fraud firms. Out of these, compensation data was available for only 354 matched pairs. However, the sample was still larger than many existing studies on compensation and fraud. Another limitation of the study is that the fraud sample included ongoing, settled, and remanded cases from SCAC.

In conclusion, the extant research has focused on compensation, representing directors' self-interest, and fraud. An interesting extension of our study is to explore whether incentive / self-interest in the form of director's reputation (Masulis and Mobbs, 2014) has any effect on containing / reducing the incidence of FSF. Future research can consider alternative explanations for directors' involvement in fraud. For example, could it be that the directors are unaware or underestimate the risk or reputational loss of being associated with fraud, or are they less risk-averse? To address agency issues, we also call for further research on alternative ways of compensating directors besides stock-based compensation.

CRediT authorship contribution statement

Juhee Jain: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing. **Emmanuel Adegbite:** Conceptualization, Methodology, Project administration, Supervision, Validation, Visualization, Writing – review & editing. **Tam Huy Nguyen:** Conceptualization, Methodology, Project administration, Supervision, Validation, Visualization, Writing – review & editing.

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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Appendix A. . Number of SCAC filings and AAERs over the sample period

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
SCAC Filings	182	121	177	223	164	175	188	151	165	168	208	271	411	402	402	3,408
AAERs	195	170	230	150	179	131	127	85	88	93	112	108	76	96	97	1,937

Notes: Sources: https://www.sec.gov/enforcement-litigation/accounting-auditing-enforcement-releases?year = 2005&month = All; https://securities.stanford.edu/charts.html.

Appendix B. . Countries that have adopted class action lawsuits for one or more types of legal claims

Americas: Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Ecuador, Mexico, Panama, Peru, Uruguay, Venezuela

Africa: South AfricaAsia & Australia: Australia, China, Indonesia, Japan, South Korea, Taiwan, Thailand

Europe & Middle East: Belgium, Bulgaria, Denmark, England & Wales, Finland, France, Israel, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Ukraine

Note: Source: Hensler (2017, p. 967).

Appendix C. . Variable definition and measurement

Variable	Definition
Fraud	Coded 1 for fraud firm and 0 for matched firm. Source: SCAC, Compustat.
DIR_COMP	Log of total compensation for all directors. Source: SEC Filings.
DIR_SHARE%	Percentage of shares held by all directors. Number of shares beneficially owned by all Directors (per the SEC filing for the match year)/ Number of shares outstanding. Source: SEC Filings − beneficial ownership statistics, Compustat.
DIR_STKCOMP%	(value of stock awards + value of option awards) / (salary + bonus + fees earned or paid in cash + value of stock awards + incentive compensation + value of option awards + non-equity incentive plan compensation + change in pension value and non-qualified deferred compensation earnings + all other compensation). Source: SEC Filings.
EXDIR_COMP	Log of compensation for executive directors. Source: SEC Filings.
EXDIR_SHARE%	Percentage of shares held by executive directors. Formula same as for *DIR_SHARE%*. Source: SEC Filings.
EXDIR_STKCOMP%	Percentage of share-based compensation for executive directors. Formula same as for *DIR_STKCOMP%*. Source: SEC Filings.
INDIR_COMP	Log of the compensation for all independent directors. Source: SEC Filings.
INDIR_SHARE%	Percentage of shares held by independent directors. Formula same as for *DIR_SHARE%*. Source: SEC Filings.
INDIR_STKCOMP%	Percentage of share-based compensation for independent directors. Formula same as for *DIR_STKCOMP%*. Source: SEC Filings.
NON-EXINDIR_COMP	Log of the compensation for all non-executive and non-independent directors. Source: SEC Filings.
NON-EXINDIR_SHARE%	Percentage of shares held by non-executive non-independent directors. Formula same as for *DIR_SHARE%*; Source: SEC Filings.
NON-EXINDIR_STKCOMP%	Percentage of share-based compensation for non-executive non-independent directors. Formula same as for *DIR_STKCOMP%*. Source: SEC Filings.
IND_DIR%	Percentage of Independent Directors. Source: SEC Filings.
FEMALE_DIR%	Percentage of Female Directors. Source: SEC Filings.
DIR_AGE	Average age of all directors. Source: SEC Filings.
ROA	Return on Assets (ROA) calculated as Net Income/ Total Assets; Source: Compustat.
MV/BV	Market Price per share / Book Value per share calculated as Closing Price per share / Book Value per share; Source: Compustat.
BoDSize	Total number of Directors. Source: SEC Filings.
EX_DIR%	Percentage of Executive Directors. Source: SEC Filings. Reference: Guangguo et al. (2019).
INSTL_OWNERSHIP	Percentage of shares held by Institutional Owners. Source: Thomson Reuters Institutional (13f) Holdings − Stock Ownership Summary via Wharton Research Data Services (WRDS). As per WRDS and following Hadani et al. (2011), institutional ownership data is taken from SEC 13f filings, and that institutional ownership can sometimes exceed 100% because it includes data only on long positions.
CEODuality	Binary variable coded 1 in case of CEO duality, and 0 otherwise. Source: SEC Filings.
LEV	Leverage measured as Total Debt / Total Assets. Source Compustat.
Big4	Binary variable coded 1 if auditor a Big4 public accounting firm (Deloitte, EY, KPMG, & PwC), and 0 if auditor is not a Big4 public accounting firm. Source Compustat.
NumBoDMeetings	Number of Board Meetings in the Match Year; Source DataStream.
HHI	Ownership Concentration using Herfindahl − Hirschman Index. Source: WRDS Thomson Reuters Institutional (13f) Holdings − Stock Ownership Summary.
Size	Log of Total Assets. Source Compustat.

Note: All variables are measured as of the match year.

Data availability

Data will be made available on request.

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