CEO power and stock price crash risk in India: the moderating effect of insider trades

Ankita Kalia
University Business School, Panjab University, Chandigarh, India

Received 3 October 2023
Revised 25 October 2023
7 December 2023
Accepted 19 December 2023

Abstract

Purpose – This study aims to explore the relationship between chief executive officer (CEO) power and stock price crash risk in India. Furthermore, it seeks to analyse how insider trades may moderate the impact of CEO power on stock price crash risk.

Design/methodology/approach – A study of 236 companies from the S&P BSE 500 Index (2014–2023) have been analysed through pooled ordinary least square (OLS) regression in the baseline analysis. To enhance the results' reliability, robustness checks include alternative methodologies, such as panel data regression with fixed-effects, binary logistic regression and Bayesian regression. Additional control variables and alternative crash risk measure have also been utilised. To address potential endogeneity, instrumental variable techniques such as two-stage least squares (IV-2SLS) and difference-in-difference (DiD) methodologies are utilised.

Findings – Stakeholder theory is supported by results revealing that CEO power proxies like CEO duality, status and directorship reduce one-year ahead stock price crash risk and vice versa. Insider trades are found to moderate the link between select dimensions of CEO power and stock price crash risk. These findings persist after addressing potential endogeneity concerns, and the results remain consistent across alternative methodologies and variable inclusions.

Originality/value – This study significantly advances research on stock price crash risk, especially in emerging economies like India. The implications of these findings are crucial for investors aiming to mitigate crash risk, for corporations seeking enhanced governance measures and for policymakers considering the economic and welfare consequences associated with this phenomenon.

Keywords CEO power, Corporate governance, Stock price crash risk, Insider trades, India

Paper type Research paper

1. Introduction

Corporate governance mechanisms have evolved into a crucial element in advancing the welfare of diverse stakeholders. According to Kumar and Singh (2013), corporate governance holds a central position in guiding organisations through financial crises with success. Moreover, the presence of strong governance mechanisms can adeptly address conflicts of interest within organisations, thereby bolstering overall operational efficiency at the corporate level (Sami *et al.*, 2011). It is worth noting that the risk of stock price crashes is intimately intertwined with these agency problems, as highlighted by Jin and Myers (2006). As such, the comprehensive analysis by Wu *et al.* (2020) regarding the pivotal role of

The author would like to thank Dr. Nguyen Ngoc Thach (Editor-in-Chief) and three anonymous reviewers for their helpful and constructive comments.

Funding: The author declares that no funds, grants or other support were received during the preparation of this manuscript.

Competing interests: The author has no relevant financial or non-financial interests to disclose.

Asian Journal of Economics and Banking
Emerald Publishing Limited
e-ISSN: 2633-7991
p-ISSN: 2615-9821
DOI 10.1108/AJEB-10-2023-0095

corporate governance in effectively mitigating the risk of stock price crashes holds significant importance.

A multitude of factors can set off fluctuations in a company's stock price (Cutler *et al.*, 1989). However, the primary emphasis within the literature on crash risk centres on the agency framework (Jin and Myers, 2006). Within this framework, researchers assert that stock price crash risk primarily emanates from the unequal distribution of information between the company's management and external stakeholders. This information asymmetry is directly correlated with the degree of control held by the management. According to the agency theory framework, the presence of such informational disparity provides managers with the means to withhold adverse company-specific information from investors to serve their personal interests (Graham *et al.*, 2005; Kothari *et al.*, 2009). Nevertheless, the strategy of concealing negative news possesses inherent constraints. When the accumulated adverse information surpasses a certain threshold, self-interested managers are compelled to disclose the concealed information all at once. This sudden revelation triggers a substantial decline in the company's stock prices, a phenomenon extensively documented by Jin and Myers (2006) and Hutton *et al.* (2009).

Usually, a company has command of officers; despite that, only a few are principally responsible for the company's operations (Thompson, 1967). The chief executive officer (CEO) is often regarded as the most influential organisational member (Pearce, 1981; Hambrick and Fukutomi, 1991). Hence, most research works revolve around the company's CEO (Norburn, 1989). The literature identifies various origins of CEO influence within an organisation. The seminal research by Finkelstein (1992) proposes four heads, namely structural, ownership, prestige and expert, as significant sources of CEO power. The structural dimension represents a CEO's hierarchical authority from the company's organisational structure (Hambrick, 1981; Brass, 1984). This form of power is considered one of the most dominant and influential sources (Finkelstein, 1992). CEO duality (*C_DUAL*) is one of the constituents of structural power that represents where the CEO and the board chairperson are the same individuals (Mizruchi, 1983; Harrison *et al.*, 1988; Finkelstein and D'aveni, 1994). CEO compensation (*C_COMP*) and directorship (*C_DIRECTOR*) are other examples of structural power (Molz, 1988; Lippert and Porter, 1997; Bonn and Pettigrew, 2009).

On the other hand, ownership power reflects the CEO's ownership stake in the company. CEOs who are founders or close relatives of the company's founder (*C_STATUS*) have significant influence through their ownership power. This influence enables them to shape the organisation, exert control over director selection and safeguard their position within the company (Boeker, 1989; Fredrickson *et al.*, 1988; Pfeffer, 1981). The third dimension, prestige power, arises from a CEO's board service in other companies or attainment of qualifications from prestigious educational institutions (Finkelstein, 1992). Finally, expert power denotes the CEO's ability to navigate and manage the organisation's external environment (Hambrick, 1981). A significant source of expert power is CEO tenure (*C_TENURE*), as it implies that individuals who serve as a CEO for longer periods accumulate more power. CEOs with longer tenures draw on their deep knowledge of the company's operational landscape, including industry dynamics, supply chain intricacies and market conditions (Firstenberg and Malkiel, 1994; Greve and Mitsuhashi, 2007).

The existing literature establishes a strong link between managers' ability to conceal adverse, company-specific information and the extent of power they wield within an organisation. Feng *et al.* (2011) and Friedman (2014) reveal that influential CEOs pressure chief financial officers (CFOs) to manipulate accounting practices and present performance results in their favour. Moreover, Fracassi and Tate (2012) find that powerful CEOs face less scrutiny from boards of directors, as they often play a pivotal role in appointing directors and maintaining close relationships with them. Managers also use strategies such as earnings management and tax avoidance to conceal negative information, which significantly increases

the risk of a stock price crash (Hutton *et al.*, 2009; Kim *et al.*, 2011). Despite the limited research on the association between CEO power and stock price crash risk, the insights offered by their results are imperative for the current study. For instance, Shahab *et al.* (2020) assessed the relationship between CEO power and stock price crash risk in the context of Chinese companies and found that higher CEO power is associated with an increased risk of stock price crashes. Similarly, Al Mamun *et al.* (2020) also found a positive and significant association between powerful CEOs and stock price crash risk in the American context. The researchers also contemplated that the presence of robust external mechanisms weakened the examined relationship, but could not eliminate the effect of CEO power on crash risk. Since the relationship between CEO power and stock price crash risk is similar across developed and developing economies, thus it is expected to observe similar results in India.

Another perspective on this matter suggests that managers do not always find it advantageous to keep bad news hidden. Upholding this notion some research studies indicate that managers may actively choose to disclose negative information sooner to reduce the risk of litigation (Skinner, 1994; Kasznik and Lev, 1995). Additionally, Hermalin and Wesibach (2001) argue that when managers gain power through their superior abilities, they have little incentive to withhold negative news. Founder CEOs, in particular, often aim to pursue strategies that maximise shareholder value, resulting in optimal stock market performance (Fahlenbrach, 2009). This tendency is particularly prominent in family-owned companies, where family members take on management, board and investor roles. In various roles and responsibilities, family members within a company often lack motivation to manipulate stock prices by hiding unfavourable information (Srinidhi and Liao, 2020). When family founders take on managerial roles, their personal identity becomes deeply intertwined with the company's identity (Dyer and Whetten, 2006). Graham *et al.* (2017) have shown that powerful CEOs, who feel secure in their positions despite poor financial performance, tend to promote greater corporate transparency and have fewer reasons to conceal bad news (Jiraporn *et al.*, 2014). Together, these arguments from previous research suggest that companies led by powerful CEOs may face a reduced risk of stock price crashes, as these CEOs have minimal incentives to withhold negative company-specific news.

Beyond investigating the connection between CEO power and stock price crash risk in India, this study extends to explore how insider trades moderate this relationship. It has been ascertained that insiders, primarily from the managerial group with significant ownership stakes, tend to trade based on advance knowledge of firm-specific negative news, potentially disadvantaging uninformed outside investors (Ke *et al.*, 2003; Dechow *et al.*, 2016). Consequently, it is anticipated that insider trades influence both CEO power and stock price crash risk.

The present study is a novel attempt to analyse the nexus between CEO power, insider trades and stock price crash risk in India using a dataset comprising companies listed on the S&P BSE 500 Index in India for the period spanning from 2014 to 2023. As far as author's knowledge extends, there is no similar study in India that has delved into this specific domain. Furthermore, the statistics underscore the fact that retail participation in India's stock markets is at an early stage of development. As of now, only approximately three percent of India's population has ventured into the stock markets, with the majority of investors continuing to lean towards safer investment options like bank deposits (Balwani *et al.*, 2021). This highlights the vulnerability of investor confidence in the face of a substantial stock price decline, making it imperative to thoroughly investigate the research issue at hand. Moreover, while there are multiple factors that may contribute to an elevated risk of stock price crashes, the paramount position of the bad news hoarding theory in the study of crash risk and its association with self-serving managerial conduct underscore the significance of exploring the influence of CEO power in this context.

The investigation employs various indicators of CEO power, including *C_COMP*, *C_DUAL*, *C_STATUS*, *C_TENURE* and *C_DIRECTOR* to elucidate the impact of CEO power

on the future stock price crash risk. To empirically gauge stock price crash risk, the study employs two proxies viz., negative conditional skewness ($NCSKEW_{t+1}$) and down-to-up volatility ($DUVOL_{t+1}$), both of which are measured for a future time period $t+1$. The study's findings conclude that greater CEO power is associated with a reduction in stock price crash risk over the subsequent year. These results carry statistical significance, particularly with respect to *C_DUAL*, *C_STATUS* and *C_DIRECTOR* as the chosen proxies for CEO power. Furthermore, these results withstand scrutiny when alternative methodologies and stock price crash risk measure are considered. Importantly, the findings remain robust even after accounting for potential endogeneity concerns. Additionally, moderation analysis reveals that insider trades moderate the relationship between select dimensions of CEO power (*C_DUAL*, *C_STATUS* and *C_DIRECTOR*) and stock price crash risk, providing crucial insights in this area.

The rest of the paper is organised as follows. Section 2 discusses the review of literature and hypotheses development. Section 3 outlines the research methodology, while section 4 presents the results and discussions emerging from the study. Lastly, Section 5 concludes the paper.

2. Review of literature and hypotheses development

2.1 CEO power and stock price crash risk

The foundation of stock price crash risk is primarily grounded in the perspective of bad news hoarding theory (Jin and Myers, 2006). This theory is based on the influential role of CEO power within top management. According to agency theorists, there are two key conditions that can exacerbate the risk of a stock price crash. The first condition involves management selectively withholding unfavourable news, while the second pertains to the eventual release of this news all at once (Hutton *et al.*, 2009; Kothari *et al.*, 2009). The selective hoarding of bad news by powerful managers is often driven by motives such as the desire to increase personal wealth (Andreou *et al.*, 2016) or concerns related to their own careers (Baginski *et al.*, 2018). When powerful managers are unable to continue withholding bad news beyond a certain threshold, it results in a one-time release of this information, which, in turn, leads to a significant decline in stock prices (Jin and Myers, 2006).

In contrast, proponents of stewardship theory challenge the conclusions drawn by agency theory. Stewardship theory posits that managers can be seen as trustworthy stewards of the company who find intrinsic satisfaction in tackling challenging tasks (Donaldson, 1990). Consequently, it is less likely that the presence of powerful managers in corporate management will lead to an increased risk of stock price crashes. Moreover, greater CEO power has been associated with improved decision-making speed, which can be beneficial for overall organisational development (Donaldson and Davis, 1991). Therefore, in uncertain situations where stock prices experience significant fluctuations, powerful management can utilise their quick decision-making abilities to respond effectively and mitigate stock price crashes (Tan and Liu, 2016).

Despite the various perspectives found in the literature regarding the influence of CEO power on a company, the predominant view in mainstream research leans towards a negative assessment. Powerful managers have been consistently shown to pursue objectives that do not align with the goal of maximising shareholder wealth (Daily and Johnson, 1997). Additionally, the presence of CEOs hailing from the founding family have also been associated with unfavourable corporate outcomes due to the potential lack of entrepreneurial talent (Morck *et al.*, 1988; Adams *et al.*, 2005). Furthermore, several issues, including the exertion of excessive influence on board members to secure extraordinary managerial compensation packages, the increased likelihood of corporate fraud and engagement in accounting manipulation, have all been linked to the presence of powerful top management

(Grabke-Rundell and Gomez-Mejia, 2002; Bebchuk and Fried, 2004; Grinstein and Hribar, 2004; Feng *et al.*, 2011; Morse *et al.*, 2011; Khanna *et al.*, 2015). As a result, the existence of opportunistic managerial behaviour has been linked with a positive impact on the risk of stock price crashes (Al Mamun *et al.*, 2020; Shahab *et al.*, 2020).

A CEO can accumulate power through various means, including their corporate ownership stake, structural position within the organisation, prestige, or by showcasing their expertise (Finkelstein, 1992; Daily and Johnson, 1997). As a result, research studies have adopted multifaceted frameworks to explore the connection between different sources of managerial power and their relationship with stock price crash risk. First and foremost, *C_COMP* has been extensively studied as a dimension of CEO power, and a significant portion of research has identified a notable and positive influence of CEO pay on stock price crash risk (Xu *et al.*, 2014; Cui *et al.*, 2019; Shahab *et al.*, 2020). In a similar vein, Andreou *et al.* (2016) have also found a significant positive impact of CEO compensation on stock price crash risk, particularly for younger CEOs. Their research indicates that young CEOs engage in significant bad news hoarding to enhance their immediate financial incentives with the expectation that their current poor performance will be offset by strong future performance.

On the other hand, a study by Kim *et al.* (2011) took a unique approach by examining the role of financial incentives for the CFO instead of the CEO. The study concluded that equity incentives encourage managers, including CFOs, to engage in bad news hoarding, ultimately leading to a stock price crash. Notably, the role of financial incentives received by CFOs appears to be more influential in such situations compared to those received by CEOs. Lastly, Xu and Zou (2019) presented an inconsistent finding as their research could not discern a significant association between the CEO's share of pay and stock price crash risk. In summary, the following hypothesis has been formulated based on these diverse research findings.

H1. CEO compensation is positively related to future stock price crash risk.

Furthermore, another significant dimension of CEO power, *C_DUAL* has gained traction in the literature. Srinidhi and Liao (2020) found substantial evidence to suggest that *C_DUAL* enhances managerial incentives, which in turn may lead to the artificial inflation of performance and an increased risk of a stock price crash among companies listed in the United States. Similarly, Le *et al.* (2022) made similar observations, as they identified a significant positive impact of CEO duality on stock price crash risk. Additionally, Tran *et al.* (2023) proposed that the risk of a stock price crash increases significantly among Vietnamese family-owned companies with *C_DUAL* compared to other family companies without it. This suggests that in such cases, it becomes exceedingly challenging for the board of directors to remove powerful CEOs from the company, even when they may be inefficient.

However, it is worth noting that contrasting perspectives have also emerged in the literature. Hunjra *et al.* (2020) reached a different conclusion, suggesting that *C_DUAL* may have more favourable effects than adverse consequences, as it could signify better knowledge and expertise on the part of the CEO. Considering the extant literature, the following hypothesis has been formulated.

H2. CEO duality is positively related to future stock price crash risk.

CEOs can be classified into two broad categories viz., founders or their relatives (referred to as family CEOs), and those recruited externally (considered as agent CEOs). Family CEOs typically have long-standing relationships with board members and other key stakeholders, which often translates into greater power (Finkelstein, 1992). Additionally, family CEOs and agent CEOs have different outlook and behaviours. Family CEOs tend to engage in riskier ventures because they are less concerned about being fired (Dalton and Daily, 2001). Agent CEOs, on the other hand, may not face potential capital losses, but they often worry about job security

(Fahlenbrach, 2009). Based on these arguments, one might reasonably expect agent CEOs to more likely engage in bad news hoarding to protect their careers. This suggests that *C_STATUS* may lower stock price crash risk. Supporting this view, Yang *et al.* (2023a, b) found that family CEOs strengthen the negative relationship between corporate social responsibility (CSR) and stock price crash risk, since family firms experience lower Type I agency problems, which limits family managers from pursuing self-interested goals. Similarly, Tran *et al.* (2023) suggests that higher corporate ownership among CEOs makes them more risk-averse and leads them to engage in activities that reduce shareholder risk, thereby avoiding bad news hoarding. However, Long *et al.* (2020) and Al Mamun *et al.* (2020) found conflicting results, suggesting that even powerful managers, including family CEOs, can engage in bad news hoarding. Based on the majority of the literature, the following hypothesis has been formulated.

H3. CEO status is negatively related to future stock price crash risk.

C_TENURE carries significant implications for organisational performance (Hambrick and Fukutomi, 1991). The economic outcomes associated with *C_TENURE* can vary, resulting in either positive (Wu *et al.*, 2005) or negative (Miller, 1991) consequences for a firm. However, when focussing on the context of stock price crash risk, the present study aligns with empirical evidence that primarily supports the positive impact of *C_TENURE* (Cui *et al.*, 2019; Al Mamun *et al.*, 2020). CEOs s with longer tenures may become excessively entrenched in their perspectives of the firm, rendering them less adaptable to changes in the external environment (Levinthal and March, 1993). Therefore, based on the aforementioned explanation following hypothesis has been formulated.

H4. CEO tenure is positively related to future stock price crash risk.

Notably, not all attributes of CEO power have received considerable attention in the crash risk literature, and one such attribute is *C_DIRECTOR*, which has been largely overlooked. From the agency perspective, it is argued that to mitigate agency problems, the roles of the CEO and the chairman of the board should be separate (Fama and Jensen, 1983). Voordeckers *et al.* (2007) have asserted that the CEO's presence on the board serves as a source of CEO power and may potentially weaken the board's control. Thus, accordingly the following hypothesis has been formulated.

H5. CEO directorship is positively related to future stock price crash risk.

2.2 Moderating effect of insider trades on CEO power and stock price crash risk

The consequences of insider trades are not only linked with CEO power but also with the stock price crash risk (Jaffe, 1974; Elliott *et al.*, 1984; Fernandes and Ferreira, 2009; Kothari *et al.*, 2009). Several research studies have illustrated that powerful insiders usually indicated by CEOs or CFOs tend to incur insider sales prior to financial difficulties. For instance, higher insider sales have been witnessed prior to events such as filing of bankruptcy petition, dividend announcements linked with lower growth opportunities, public declaration of material internal control weaknesses or accounting irregularities (John and Lang, 1991; Seyhun and Bradley, 1997; Beneish, 1999; Johnson *et al.*, 2009; Thevenot, 2012; Skaife *et al.*, 2013; Agrawal and Cooper, 2015). Although the literature acknowledges the presence of studies examining the impact of CEO power and insider trades on stock price crash risk (e.g. Shahab *et al.*, 2020; He *et al.*, 2021), however the moderating effect of insider trades on the relationship between CEO power and stock price crash risk remains unexplored. Accordingly, driven by the outcomes of related literature the following hypothesis is proposed.

H6. Insider trades moderate the association between CEO power and future stock price crash risk.

3. Research methodology

3.1 Sample selection and data sources

The study is based on a sample of companies listed on the S&P BSE 500 Index, covering a ten-year period from April 1, 2013, to March 31, 2023. The sample was meticulously refined through a series of data filtering conditions, resulting in a final count of 236 companies, representing 2,360 firm-year observations. First and foremost, all banking and financial services companies were excluded from the sample due to their unique regulatory oversight under laws including the RBI Act, 1934 and the Banking Regulation Act, 1949. Secondly, public sector undertakings were also omitted from the sample, given their distinct social obligations. Thirdly, companies with fiscal year-ends other than March 31 were excluded from the final dataset. Fourthly, companies that were not consistently part of the Index throughout the study period were also eliminated. Lastly, companies undergoing corporate restructuring during the study period were likewise removed from consideration.

Data for the variables under investigation in this study has been collected from diverse sources. Specifically, proxies for CEO power have been obtained from the annual reports of the respective companies. In contrast, data related to stock price crash risk and various control variables have been sourced from the ProwessIQ database, which is meticulously maintained by the Centre for Monitoring Indian Economy (CMIE). Specifically, the data relating to the additional control variable in the robustness section, namely analyst coverage has been procured from the website of Trendlyne (https://trendlyne.com/). Lastly, the data concerning the moderating variable insider trades has been incorporated from the official website of BSE (https://bseindia.com/).

3.2 Variable measurement

3.2.1 Stock price crash risk. Building on the groundwork laid by prior research (Kim *et al.*, 2011; Xu *et al.*, 2014; Al Mamun *et al.*, 2020; Shahab *et al.*, 2020), this study employed two proxies, viz., $NCSKEW_{t+1}$ and $DUVOL_{t+1}$ to gauge stock price crash risk. These variables are measured in the time period $t+1$, reflecting future stock price crash risk. To commence, the study adopts the approach proposed by Fama and MacBeth (1973) for calculating firm-specific weekly returns ($W_{i,t}$). This calculation method involves estimating $W_{i,t}$ as the natural logarithm of one plus the residual returns derived from the market model outlined in Equation (1).

$$\mathrm{r}_{\mathrm{i,t}} = \alpha_i + \beta_{1,\mathrm{i}}\,\mathrm{r}_{m,t-2} + \beta_{2,i}\,\mathrm{r}_{m,t-1} + \beta_{3,i}\,\mathrm{r}_{m,t} + \beta_{4,i}\,\mathrm{r}_{m,t+1} + \beta_{5,i}\,\mathrm{r}_{m,t+2} + \varepsilon_{i,t} \tag{1}$$

where $r_{i,t}$ signifies the return of stock i on trading day t, and $r_{m,t}$ denotes the return on the S&P BSE 500 index on the same trading day t. $NCSKEW_{t+1}$ is derived by computing the negative of the third moment of abnormal weekly returns divided by the standard deviation of abnormal weekly returns raised to the third power (Chen *et al.*, 2001). A greater value for $NCSKEW_{t+1}$ signifies a heightened level of stock price crash risk. Equation (2) provides the mathematical formula for its calculation:

$$NCSKEW_{i,t+1} = -\frac{\left[n(n-1)^{3/2}\sum t=1\left(W_{i,t},-W_{i,t}{}^{3}\right)\right]}{(n-1)(n-2)\left(\sum t=1\left(W_{i,t},-W_{i,t}{}^{2}\right)\right)^{3/2}} \tag{2}$$

where, $W_{i,t}$ = firm-specific weekly return in the fiscal year, n = number of observations in the year t.

$DUVOL_{t+1}$ is the natural logarithm of the ratio of the standard deviation of the *"down"* weeks and the *"up"* weeks (Chen *et al.*, 2001). *"Down"* weeks are when the returns are lower than the annual mean, while *"up"* weeks are those when the returns are more than the annual

mean. A higher value of $DUVOL_{t+1}$ indicates a greater risk of a stock price crash. The formula for calculating $DUVOL_{t+1}$ is highlighted through Equation (3).

$$DUVOL_{i,t+1} = \log\left\{(n_u - 1)\sum_{down} w_{i,t}^2 \Big/ (n_d - 1)\sum_{up} w_{i,t}^2\right\} \quad (3)$$

where, n_u=number of *"up"* weeks in a year *t*, n_d=number of *"down"* weeks in a year *t*, $W_{i,t}$ = firm-specific weekly returns in the fiscal year.

3.2.2 Measures of CEO power. CEO power is a multi-dimensional concept, as acknowledged in previous research (Finkelstein, 1992). Building upon this understanding, Peni (2014) notes that CEOs occupy a pivotal position as the most influential executives within a company. Consequently, this study defines the diverse attributes of managerial power associated with a CEO. Drawing upon the various sources of CEO power identified by Finkelstein (1992), this study employs five distinct measures.

Firstly, the study employs *C_COMP*, representing an aspect of structural power. It encompasses the monetary value of total compensation, including salary, perquisites, commission, bonuses and similar components, paid to a CEO in the current financial year (Parthasarathy *et al.*, 2006). Another aspect of structural power, *C_DUAL*, is also examined. *C_DUAL* arises when a single individual simultaneously holds the positions of chairman of the board and CEO within a company (Herman, 1981; Firstenberg and Malkiel, 1994). This binary variable takes the value of one when the chairman of the board and the CEO roles are held by the same person and zero otherwise.

Additionally, *C_STATUS* represents another crucial aspect of structural power intertwined with ownership stakes (Daily and Johnson, 1997). This variable is also a binary measure, that takes the value of one if the CEO is the founder of the company or a relative of the founder and zero otherwise (Jayaraman *et al.*, 2000; Adams and Ferreira, 2009). *C_TENURE* serves as another proxy for CEO power, falling within the dimension representing the CEO's expertise. It quantifies the CEO's length of service in years within the company (Simsek, 2007; Lewellyn and Muller-Kahle, 2012).

Finally, *C_DIRECTOR* constitutes another dimension of CEO power within the structural category. It is an indicator variable that takes the value of one if the current CEO also holds a position on the board of the company and zero otherwise (Tien *et al.*, 2013; Ting and Huang, 2018). As recognised by Finkelstein (1992), the structural source of CEO power is considered one of the most predominant and influential sources of power. Therefore, this study places substantial emphasis on this dimension to define CEO power.

3.2.3 Insider trades. In compliance with India's stock market regulator's SEBI (Prohibition of Insider Trading) Regulations, 2015, insiders, classified as connected persons or those in possession of unpublished price-sensitive information, are mandated to disclose share transactions exceeding Rs. 10 lakhs within two trading days each quarter. These disclosures are submitted to both the respective companies and the stock exchanges where the stocks are listed. Information on this variable is sourced from the official BSE website (https://bseindia.com/). The variable is dichotomously measured, taking the value of one for insider trades within a financial year and zero otherwise, aligning with the approach used by Hasnan *et al.* (2022).

3.2.4 Control variables. To ensure a comprehensive understanding of the impact of CEO power on future stock price crash risk and to account for individual company characteristics, this analysis incorporates several control variables. This approach aligns with established research practices (Kim *et al.*, 2011; Xu *et al.*, 2014; Yeung and Lento, 2018; Al Mamun *et al.*, 2020; Shahab *et al.*, 2020; Srinidhi and Liao, 2020).

Firstly, the control variable *SIZE* reflects the size of the company and is measured by taking the natural logarithm of the market value of the firm's equity, consistent with prior

literature (Harvey and Siddique, 2000; Kim *et al.*, 2011; Callen and Fang, 2013). Additionally, *LEV*, which measures a company's financial leverage, is considered as a control variable due to its documented negative correlation with stock price crash risk (Hutton *et al.*, 2009). It is computed by taking the ratio of total non-current liabilities to the total asset base during a fiscal year (Fu and Zhang, 2019; Li and Zeng, 2019).

Further, *RET* signifying the historical returns from the company's share prices are also controlled for, since Chen *et al.* (2001) assert that they have a positive association with future stock price crash risk. It is defined as the average firm-specific weekly returns over a fiscal year, computed using Equation (1) outlined in the previous section. Furthermore, following the approach of Chen *et al.* (2001) and Hong and Stein (2003), de-trended turnover (*DTURNOVER*) is also included in the study's list of control variables. This variable represents the difference between the average monthly share turnover during fiscal year t and the average monthly share turnover of the previous year, $t-1$. Monthly share turnover is calculated as the monthly trading volume divided by the total number of outstanding shares over the month.

The study also incorporates a control variable, the market value of equity to the book value of equity (*M/B*) ratio, in alignment with Chen *et al.*'s (2001) discovery of its positive correlation with stock price crash risk. Hence, companies with high *M/B r*atios are typically associated with higher future stock price crash risk. Finally, industry (*IND*) and year (*YEAR*) dummies are included to control for industry and year-fixed effects. These dummies account for the possibility that certain years and industries may experience higher crash risk than others, thus mitigating potential biases. Table 1 summarises the definitions of all variables used in this study.

3.3 Data analysis

3.3.1 Analysis of association between CEO power and stock price crash risk. The impact of CEO power on future stock price crash risk has been analysed by the following baseline pooled OLS regression model:

$$\text{Crash\_Risk}_{i,t+1} = \alpha + \beta_1 \text{CEOPower}_{i,t} + \beta_2 \text{Controls}_{i,t} + \varepsilon_{i,t} \quad (4)$$

where $\text{Crash\_Risk}_{i,t+1}$ is alternatively represented by $NCSKEW_{t+1}$ and $DUVOL_{t+1}$ measured one year ahead. $\text{CEOPower}_{i,t}$, the independent variable in the regression model, is proxied by five sources viz., *C_COMP, C_DUAL, C_STATUS, C_TENURE* and *C_DIRECTOR*. Controls include *SIZE, LEV, RET, DTURNOVER, M/B, IND* and *YEAR*. Table 1 provides detailed definitions of all the variables used in the regression analysis. The data set has been tested for serial auto-correlation and heteroskedasticity, and the test results of Durbin–Watson and Breusch-Pagan confirmed their existence (Durbin and Watson, 1950; Breusch and Pagan, 1979). Therefore, the analysis section reports robust standard errors clustered at the firm level to address these concerns (Petersen, 2009). Lastly, the dataset did not suffer from multicollinearity problem as the variance inflation factor (VIF) remained below 4 (O'Brien, 2007).

4. Results and discussion

4.1 Descriptive and correlation statistics

Panel A of Table 2 provides an overview of the sample data, including key statistics and patterns. Analysing the descriptive statistics, it was observed that for the future crash risk measures, $NCSKEW_{t+1}$ and $DUVOL_{t+1}$, the median (mean) values stood at −0.63 (−0.68) and 0.19 (0.28), respectively. These values indicate that the stock price crash risk level among Indian companies tends to be relatively high. For the three CEO power proxies,

Variable	Acronym	Definition
Panel A: stock price crash risk		
Negative conditional skewness	$NCSKEW_{t+1}$	Negative of the third moment of abnormal weekly returns over the standard deviation of abnormal weekly returns raised to the third power during $t+1$
Down to up volatility	$DUVOL_{t+1}$	Natural logarithm of the ratio of the standard deviation of the "down' weeks and the "up' weeks. The measure is computed at $t+1$
Panel B: CEO power		
CEO compensation	*C_COMP*	Includes sum of salary, bonus, perquisites, commission, etc. paid to CEO during a financial year
CEO duality	*C_DUAL*	Takes the value of one if CEO is also the Chairman of board and zero otherwise
CEO status	*C_STATUS*	Takes the value of one if the founder or his family member is CEO of the company and zero otherwise
CEO tenure	*C_TENURE*	Total number of years a person has served as the CEO of a company
CEO directorship	*C_DIRECTOR*	Takes the value of one if the CEO of a company also serves on the board as a director and zero otherwise
Panel C: control variables		
Leverage	*LEV*	The ratio of total non-current liabilities of a company to its total asset base
Natural log of market capitalisation	*SIZE*	Taking the natural log of the figure derived by multiplying the outstanding shares of a company by the prevailing share price
Return	*RET*	Average of firm-specific weekly returns over a fiscal year
De-trended turnover	*DTURNOVER*	Difference between the average monthly share turnover during fiscal year t and the average monthly share turnover of the previous year, $t-1$
Market to book value	*M/B*	Ratio of market value to book value of equity
Year dummy	*YEAR*	Nine year dummies with the financial year 2009–10 as the base
Industry dummy	*IND*	Five industry dummies representing six industries based on the two-digit National Industry Classification codes
Financial constraints	*FC*	Ratio of cash flow from operating activities to total assets
Analyst coverage	*AC*	Takes the value of one if the company is actively tracked by one or more analysts in any financial year and zero otherwise
Panel D: moderating variable		
Insider trades	*INSIDER_TRADES*	Takes the value of one if there are disclosures under SEBI (Prohibition of Insider Trading) Regulations, 2015 and zero otherwise

Table 1.
Variable description

Source(s): Author's compilation

namely *C_DUAL*, *C_STATUS* and *C_DIRECTOR*, the median values are all 1. This suggests that Indian companies frequently exhibit elevated CEO power, primarily due to their status of founder or their family members, who concurrently serve as both the CEO and the chairman of the board.

With regards to *C_TENURE*, the data reveals a mean of 12.39 years, with the maximum tenure reaching 57.8 years. This indicates that CEOs in these companies tend to serve for longer periods. Further, examining the mean and standard deviation values of *C_COMP*, which amount to Rs. 7,87,54,812 and Rs. 6,32,07,338, respectively, underscores the substantial compensation received by CEOs, coupled with significant variation in compensation levels across companies. Lastly, the descriptives concerning the moderating variable

Table 2.
Descriptive statistics and correlation matrix

Variables	Mean	Median	Standard deviation	Min	Max
Panel A: descriptive statistics					
$NCSKEW_{T+1}$	−0.68	−0.63	0.68	−1.83	2.43
$DUVOL_{T+1}$	0.28	0.19	0.11	−0.29	0.54
C_COMP	7,87,54,812	4,96,34,110	6,32,07,338	0	1,89,93,12,654
C_DUAL	0.40	1	0.51	0	1
C_STATUS	0.66	1	0.35	0	1
C_TENURE	12.39	6.5	14.13	0.05	57.80
C_DIRECTOR	0.91	1	0.27	0	1
INSIDER_TRADES	0.29	0	0.46	0	1
LEV	0.21	0.19	0.31	0	1.28
SIZE	24.76	24.48	1.03	20.06	28.40
RET	0.05	0.02	0.03	−0.08	0.05
M/B	5.45	4.05	8.91	−186.02	284.05
DTURNOVER	−1.86	0.91	51.06	−803.59	1097.25

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
Panel B: correlation statistics													
$NCSKEW_{T+1}$	1												
$DUVOL_{T+1}$	0.742**	1											
C_COMP	−0.127*	−0.015**	1										
C_DUAL	−0.061*	−0.0246**	0.261***	1									
C_STATUS	−0.234**	−0.372*	0.0882	0.445**	1								
C_TENURE	0.389*	0.087*	0.277	0.233**	0.461**	1							
C_DIRECTOR	−0.0945*	−0.112*	0.0798*	0.0156*	0.223**	0.065**	1						
INSIDER_TRADES	0.329*	0.517**	0.162	0.263*	0.182**	0.113	0.371*	1					
LEV	0.206**	0.443	0.0822	0.263**	0.087**	0.018	−0.045	0.477*	1				
SIZE	0.144	0.066**	0.562**	−0.0677	−0.457**	−0.142**	0.022	−0.104*	−0.212**	1			
RET	0.221**	0.183**	−0.116**	0.051*	0.178**	0.058*	0.086**	0.265	−0.098	−0.234**	1		
M/B	−0.018*	0.249	0.012	0.076	−0.033**	−0.071	−0.029*	0.172*	−0.109**	0.172**	0.761	1	
DTURNOVER	−0.213	0.056	−0.0577	−0.122	0.075*	0.05	0.056**	0.016	−0.081	−0.098	0.165**	0.047	1

Note(s): ***,**,* indicates the significance of the coefficient estimate at 1, 5 and 10% levels, respectively
Source(s): Author's calculations based on Stata 14 and IBM SPSS 25

INSIDER_TRADES portrayed a mean of 0.29 indicating lower levels of insider trading and standard deviation of 0.46 highlighted higher variation within sample companies.

In Table 2, Panel B presents the correlation statistics for the variables under investigation. Several measures of CEO power, including *C_DUAL*, *C_STATUS* and *C_DIRECTOR*, exhibit a significant negative correlation with both measures of stock price crash risk, namely $NCSKEW_{t+1}$ and $DUVOL_{t+1}$. Specifically, *C_COMP* demonstrates a negative correlation with both proxies of stock price crash risk, but this relationship is statistically significant only with $NCSKEW_{t+1}$. In contrast, *C_TENURE* is the only proxy positively correlated with stock price crash risk. The correlation matrix reveals that multicollinearity is not a concern, as the correlation coefficients all remain below 0.5 (Kohli, 2018). However, it is worth observing that the stock price crash risk proxies exhibit a moderately positive correlation ($r = 0.742$) at a 5% significance level. This suggests that these crash risk variables are measuring a related phenomenon (Chauhan *et al.*, 2017).

4.2 Baseline regression results- CEO power and future stock price crash risk

Table 3 portrays the baseline pooled OLS regression results on the impact of CEOs power on future stock price crash risk. The coefficient is significantly negative concerning *C_DUAL* $\{NCSKEW_{t+1}(\beta = -0.15, p < 0.01), DUVOL_{t+1}(\beta = -0.23, p < 0.05)\}$, *C_STATUS* $\{NCSKEW_{t+1}(\beta = -0.34, p < 0.01, DUVOL_{t+1}(\beta = -0.18, p < 0.10)\}$ and *C_DIRECTOR* $\{NCSKEW_{t+1}(\beta = -1.01, p < 0.01), DUVOL_{t+1}(\beta = -0.99, p < 0.10)\}$ across diverse measures of crash risk. The results concerning *C_COMP* is also negative with crash risk measures, however, they failed to exhibit any statistical significance $\{NCSKEW_{t+1}(\beta = -2.76, p > 0.05), DUVOL_{t+1}(\beta = -1.38, p > 0.05)\}$. Lastly, *C_TENURE* is the only proxy that exemplified a positive association with future stock price crash risk, however the results are not significant $\{NCSKEW_{t+1}(\beta = 0.11, p > 0.05, DUVOL_{t+1}(\beta = 0.17, p > 0.05)\}$.

Variable	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
C_COMP	−2.76 (0.28)	−1.38 (1.87)
C_DUAL	−0.15*** (0.96)	−0.23** (1.23)
C_STATUS	−0.34*** (1.99)	−0.18* (1.82)
C_TENURE	0.11 (0.87)	0.17 (0.76)
C_DIRECTOR	−1.01*** (3.43)	−0.99* (1.33)
DTURNOVER	0.01 (1.66)	0.08 (0.71)
RET	53.91*** (4.47)	11.88** (1.22)
M/B	−0.08*** (2.93)	−0.09 (1.79)
SIZE	−0.03*** (6.71)	−0.42*** (7.36)
LEV	0.55*** (8.91)	0.05*** (6.53)
Constant	0.51*** (4.51)	0.69*** (1.83)
N	2,360	2,360
R^2	0.69	0.71
Year effects	Yes	Yes
Industry effects	Yes	Yes

Note(s): *C_COMP* = CEO compensation; *C_DUAL* = CEO duality; *C_STATUS* = CEO status; *C_TENURE* = CEO tenure; *C_DIRECTOR* = CEO directorship; $NCSKEW_{t+1}$ = negative conditional skewness measured at *t+1*; $DUVOL_{t+1}$ = down-to-up-volatility measured at *t+1*; *DTURNOVER* = de-trended turnover; *RET* = company-specific weekly returns; *M/B* = market to book value of equity; *SIZE* = size of company measured by taking the natural log of market capitalisation; *LEV* = leverage. ***, ** and * indicates the level of significance at 1, 5 and 10% respectively. *t*-statistics reported in the parentheses are based on robust standard errors. Pooled OLS regression methodology has been applied to obtain the said test results

Source(s): Author's calculations based on using Stata 14

Table 3. Baseline regression results using pooled OLS

The baseline regression results suggest that higher CEO power is linked to a lower future stock price crash risk. These results offer substantial support to accept H2, H3 and H5, concerning *C_DUAL*, *C_STATUS* and *C_DIRECTOR*, while no empirical support could be garnered for H1 and H4 that related to *C_COMP* and *C_TENURE* respectively. The results suggest that CEOs demonstrate a strong stewardship role, particularly due to their extensive firm-specific knowledge, enabling them to strategically navigate the company through challenges. Furthermore, a CEO who also holds a position on the company's board, especially in the capacity of the chairman can effectively coordinate board actions and swiftly implement strategies, providing the company with a competitive edge, especially in adverse circumstances.

The findings related to *C_DUAL* and *C_DIRECTOR* align with established literature (e.g. Finkelstein and D'Aveni, 1994; Davis *et al.*, 1997; Li and Zeng, 2019) indicating that combining the roles of chairman and CEO, as well as the CEO's presence on the company's board, promotes enhanced information flow and coordination within the organisation. This, in turn, contributes to increased adaptability and more effective decision-making. Consequently, these sources of CEO power are seen as exerting a positive influence on firm value, as managers who act as stewards of the company tend to prioritise the maximisation of shareholder wealth. Furthermore, in accordance with the insights of Schein (1992) and Wasserman (2003), powerful managers play an autonomous role within the company, wielding substantial influence over hiring decisions and shaping the company's responses to challenges.

The findings highlight the significance of *C_STATUS* in shaping future stock price crash risk by reducing it. This observation stems from the distinctive approach of founder CEOs compared to external CEOs. Founder CEOs often view the company as a lifetime achievement, fostering a deep personal attachment that guides them toward adopting a long-term perspective in their organisational management (Fahlenbrach, 2009; Deb and Wiklund, 2017). They bear a significant responsibility in establishing the initial organisational architecture, embodying their profound passion, vision and personal dedication to the firm (Wasserman, 2003; He, 2008). In essence, it can be inferred that the presence of influential founder CEOs tends to correlate with enhanced corporate transparency and a reduced tendency to hoard bad news (Bertrand and Mullainathan, 2001; Adams and Ferreira, 2007; Armstrong *et al.*, 2012), thereby contributing to a diminished stock price crash risk.

The findings of this study align with previous research conducted by Hunjra *et al.* (2020) and Al Mamun *et al.* (2020), which also demonstrated a significant negative impact of CEO power on stock price crash risk. The results also indicate an underlying observation that since the Indian corporate space is largely characterised by family-run businesses (Chakrabarti *et al.*, 2008), the practice of appointing family members as CEOs is highly prevalent. As a result, it is highly probable that within these family-controlled companies, the interests of managers and investors are greatly aligned, leaving minimal opportunity for concealing bad news to artificially boost the company's stock prices (Srinidhi and Liao, 2020).

Lastly, examining the control variables, it has been found that *RET* and *LEV* exhibit a significant positive association with both measures of future stock price crash risk. This indicates that companies with high past stock returns and highly leveraged balance sheets are more prone to experiencing higher crashes. However, no significant relationship is observed between *DTURNOVER* and crash risk, implying that variations in investor beliefs do not significantly impact stock price crash risk. On the other hand, *SIZE* demonstrates a significant negative association with future stock price crash risk measures, suggesting that larger companies tend to be less exposed to crash risk.

4.3 Further tests and robustness check

4.3.1 Alternative econometric methodology. 4.3.1.1 Panel data regression. To ensure the robustness of the findings, this study employed a panel data regression analysis in addition

to the baseline pooled OLS regression model. Panel data regression models are advantageous as they control for both individual heterogeneity and time variation, making them suitable for datasets with both heterogeneous and homogeneous individuals. Furthermore, panel datasets provide higher degrees of freedom, lower collinearity and greater variability compared to cross-sectional data (Klevmarken, 1989; Hsiao, 2005).

There are two primary types of panel data regression models viz., random effects and fixed effects. To determine the appropriate model, the study conducted a Hausman specification test. Since the p-value of the chi-square test was less than 0.05, indicating a significant difference between the random and fixed effects models, the fixed-effects regression model was selected. Additionally, due to the presence of serial auto-correlation and heteroskedasticity in the dataset, robust standard errors clustered at the firm level were employed to address these issues. Equation (5) outlines the fixed-effects panel data regression model used to test the impact of CEO power on future stock price crash risk:

$$\text{Crash\_Risk}_{i,t+1} = \alpha_i + \beta_1 \text{CEOPower}_{i,t} + \beta_2 \text{Controls}_{i,t} + \varepsilon_{i,t} \quad (5)$$

In the fixed-effects model, the constant is allowed to differ between companies, but it remains time-invariant, unlike the pooled OLS regression model where the α is constant for all the firms. The coefficient α_i represents the firm-specific effects. The specification of the variables here is similar to the ones used in Model 4, and their definitions are laid down in Table 1. The fixed-effects panel data regression model results are presented in Table 4 and are akin to the baseline regression model. The coefficients of three sources of CEO power viz., *C_DUAL* $\{NCSKEW_{t+1}(\beta = -0.11,\ p < 0.10,\ DUVOL_{t+1}(\beta = -0.14,\ p < 0.05)\}$, *C_STATUS* $\{NCSKEW_{t+1}(\beta = -0.23,\ p < 0.01,\ DUVOL_{t+1}(\beta = -0.25,\ p < 0.10)\}$ and *C_DIRECTOR* $\{NCSKEW_{t+1}(\beta = -0.12,\ p < 0.01,\ DUVOL_{t+1}(\beta = -0.41,\ p < 0.01)\}$ maintained their significant negative association with future stock price crash risk. The value of the

Variable	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
C_COMP	−2.37 (1.23)	−3.17 (1.19)
C_DUAL	−0.11* (1.55)	−0.14** (0.97)
C_STATUS	−0.23*** (1.68)	−0.25* (4.76)
C_TENURE	0.09 (1.21)	0.03 (0.88)
C_DIRECTOR	−0.12*** (6.72)	−0.41*** (0.68)
DTURNOVER	0.01*** (4.75)	0.01** (2.36)
RET	67.82*** (3.54)	19.93*** (4.14)
M/B	−0.13** (3.28)	−0.91*** (5.02)
SIZE	−0.06** (1.96)	−0.04*** (3.28)
LEV	0.34*** (2.28)	0.13** (4.59)
Constant	0.48*** (6.13)	0.51*** (5.52)
N	2,360	2,360
R^2	0.81	0.74
Year effects	Yes	Yes
Industry effects	Yes	Yes

Note(s): *C_COMP* = CEO compensation; *C_DUAL* = CEO duality; *C_STATUS* = CEO status; *C_TENURE* = CEO tenure; *C_DIRECTOR* = CEO directorship; $NCSKEW_{t+1}$ = negative conditional skewness measured at $t+1$; $DUVOL_{t+1}$ = down-to-up-volatility measured at $t+1$; *DTURNOVER* = de-trended turnover; *RET* = company-specific weekly returns; *M/B* = market to book value of equity; *SIZE* = size of company measured by taking the natural log of market capitalisation; *LEV* = leverage. ***, **, * indicates the level of significance at 1, 5 and 10%, respectively. *t*-statistics reported in the parentheses are based on robust standard errors. Fixed-effects panel data regression methodology has been applied to obtain the said test results
Source(s): Author's calculations based on using Stata 14

Table 4. Robustness results-alternative methodology (panel data regression)

coefficients depicted through panel data fixed-effects regression models was higher than the baseline model. Additionally, other CEO power sources, *C_COMP* {$NCSKEW_{t+1}(\beta = -2.37, p > 0.05, DUVOL_{t+1}(\beta = -3.17, p > 0.05)$} and *C_TENURE* {$NCSKEW_{t+1}(\beta = 0.09, p > 0.05, DUVOL_{t+1}(\beta = 0.03$ and $p > 0.05)$}, also presented results in line with baseline section. Thus, the observation that higher CEO power leads to lower future stock price crash risk in India is maintained.

4.3.1.2 Bayesian regression. Beyond employing traditional frequentist methodological approaches, this study extends its analysis by incorporating Bayesian methods rooted in Bayes' theorem of probability (Bayes, 1763). In this approach, *a priori* beliefs about the association between CEO power and stock price crash risk are formulated. These beliefs are then combined with assumptions about the likelihood of observing the given data, forming a posterior distribution. The observed data serve to update and refine the initial beliefs, providing a nuanced perspective on the relationship between the variables under investigation.

Contrastingly, classical null hypothesis significance testing has faced criticism for its disproportionate emphasis on statistical significance to meet publication standards (Trafimow and Earp, 2017). As an alternative, Bayesian analysis has gained prominence in the social sciences (e.g. Hansen *et al.*, 2004; Block and Wagner, 2014; Cerqueti and Ventura, 2015; Kwon *et al.*, 2016; Segnon *et al.*, 2018; Jiang and Liu, 2020), offering a more nuanced perspective.

However, Bayesian analysis introduces challenges, particularly in the selection of prior distributions. Recognising the subjectivity associated with informative priors, this study aligns with the approach advocated by Jiang and Liu (2020), opting for the more cautious choice of non-informative prior distributions. Additionally, to explore the posterior distribution of parameters, the study employs Markov Chain Monte Carlo (MCMC) simulation (Gelman and Rubin, 1992), drawing a total of 11,000 samples and discarding the initial 1,000 to ensure convergence and reliability in the analysis.

Table 5 reports the regression results from the Bayesian analysis. The findings were similar in terms of directional impact of various dimensions of CEO power on future stock

Variable	$NCSKEW_{t+1}$		$DUVOL_{t+1}$	
	Posterior mean	95% C.I.	Posterior mean	95% C.I.
C_COMP	−5.17	[−8.47, −1.88]	−1.09	[−1.23, 3.89]
C_DUAL	−0.06	[−0.13, 0.01]	−0.00	[−0.02, 0.01]
C_STATUS	−0.06	[−0.13, 0.01]	−0.00	[−0.01, 0.01]
C_TENURE	−0.00	[−0.00, 0.00]	0.00	[0.00, 0.00]
C_DIRECTOR	−0.27	[−0.39, −0.14]	−0.02	[−0.04, 0.00]
DTURNOVER	0.00	[−0.00, 5.21]	2.63	[−3.34, 8.59]
RET	16.90	[12.12, 21.68]	2.77	[1.86, 3.69]
M/B	−0.00	[−0.01, −0.00]	0.00	[−0.00, 0.00]
SIZE	0.04	[0.02, 0.06]	0.01	[0.00, 0.01]
LEV	0.88	[0.66, 1.09]	0.01	[−0.05, 0.03]
Constant	−1.49	[−1.99, −0.99]	−0.21	[−0.31, −0.12]
N	2,360	2,360	2,360	2,360

Note(s): *C_COMP* = CEO compensation; *C_DUAL* = CEO duality; *C_STATUS* = CEO status; *C_TENURE* = CEO tenure; *C_DIRECTOR* = CEO directorship; $NCSKEW_{t+1}$ = negative conditional skewness measured at *t+1*; $DUVOL_{t+1}$ = down-to-up-volatility measured at *t+1; DTURNOVER* = de-trended turnover; *RET* = company-specific weekly returns*; M/B* = market to book value of equity; *SIZE* = size of company measured by taking the natural log of market capitalisation*; LEV* = leverage. Bayesian regression methodology based on the Markov Chain Monte Carlo (MCMC) simulation has been applied to obtain the said test results. Total number of draws 11,000 (of which 1,000 discarded)
Source(s): Author's calculations based on using Stata 14

Table 5. Robustness results-alternative methodology (Bayesian regression)

price crash risk. To illustrate, majority of the CEO power dimensions, viz., *C_COMP*, *C_DUAL*, *C_STATUS* and *C_DIRECTOR* were found to negatively impact stock price crash risk measured by $NCSKEW_{t+1}$ and $DUVOL_{t+1}$. Only *C_TENURE* was found to exhibit a positive impact on the crash risk measures. The results concerning the control variables also remained in line with the baseline frequentist results.

4.3.2 Alternative measure of stock price crash risk. The robustness of the test results has been further assessed by incorporating an alternative measure of stock price crash risk. In consistence with previous research studies (e.g. Kim *et al.*, 2011; Cui *et al.*, 2019; Xu and Zou, 2019; Al Mamun *et al.*, 2020; Srinidhi and Liao, 2020) a binary *CRASH* variable has been employed as an alternative measure of stock price crash risk to assess the relationship between CEO power and future stock price crash risk.

The *CRASH* indicator variable takes the value of one if a firm has encountered one or more crash weeks during a fiscal year and zero otherwise. Crash weeks are identified as those weeks in which a firm's firm-specific weekly returns ($W_{i,t}$) fall 3.2 standard deviations below the mean firm-specific weekly returns over the entire fiscal year. This alternative measure allows for a binary assessment of whether a firm experienced a stock price crash during the year, providing an additional perspective on the relationship between CEO power and stock price crash risk.

The binary logistic regression model gauges the effect of CEO power on future stock price crash risk. Table 6 presents the results relating to the *CRASH* binary variable. The results upheld that there is a significant negative impact of *C_DUAL* ($\beta = -0.15$, $p < 0.01$), *C_STATUS* ($\beta = -0.33, p < 0.01$) and *C_DIRECTOR* ($\beta = -0.36, p < 0.10$) on future stock price crash risk. Furthermore, the association of *C_COMP* and *C_TENURE* remained insignificantly negative and positive respectively with respect to crash risk.

4.3.3 Additional control variables. This section delves into an examination of the baseline regression results, scrutinising their sensitivity subsequent to the inclusion of two

Variable	$CRASH_{t+1}$
C_COMP	−2.08 (2.34)
C_DUAL	−0.15*** (2.09)
C_STATUS	−0.33*** (4.09)
C_TENURE	0.07 (10.7)
C_DIRECTOR	−0.36* (2.18)
DTURNOVER	0.01*** (8.30)
RET	−92.22*** (3.49)
M/B	−0.46*** (5.40)
SIZE	−0.02*** (5.93)
LEV	0.29*** (2.76)
Constant	0.21* (0.16)
N	2,360
R^2	0.68
Year effects	Yes
Industry effects	Yes

Note(s): *C_COMP* = CEO compensation; *C_DUAL* = CEO duality; *C_STATUS* = CEO status; *C_TENURE* = CEO tenure; *C_DIRECTOR* = CEO directorship; $CRASH_{t+1}$ = binary variable crash measured at *t+1; DTURNOVER* = de-trended turnover; *RET* = company-specific weekly returns; *M/B* = market to book value of equity; *SIZE* = size of company measured by taking the natural log of market capitalisation; *LEV* = leverage. ***, ** * indicates the level of significance at 1%, 5% and 10% respectively. *t*-statistics reported in the parentheses are based on robust standard errors. Binary logistic regression methodology has been applied to obtain the said test results

Source(s): Author's calculations based on using Stata 14

Table 6. Robustness results-alternative stock price crash risk measure

supplementary control variables, namely, financial constraints (*FC*) and analyst coverage (*AC*). *FC*, encapsulates the financial predicament of a firm hindering it from financing its intended investments (Lamont *et al.*, 2001). Consequently, such firms are anticipated to resort to external sources for fulfilling their funding needs. In the pursuit of external financing, financially constrained firms tend to withhold more bad news, thereby encountering an escalated risk of future stock price crashes (He and Ren, 2023). The measurement of *FC* commonly relies on cash flow sensitivity, proxied by the ratio of a firm's net cash flow from operating activities to total assets (Srinivasan and Thampy, 2017).

On the other hand, numerous research studies have identified a correlation between the influence of analyst coverage (*AC*) and the risk of stock price crashes (e.g. Xu *et al.*, 2013; He *et al.*, 2019; Kim *et al.*, 2019; Yang *et al.*, 2023a, b). The foundation of literature on stock price crash risk revolves around the concept of managerial behaviour characterised by the hoarding of negative news, driven by factors such as informational opacity and agency conflicts (Jin and Myers, 2006; Hutton *et al.*, 2009). In this context, financial analysts or brokerages play a crucial role as information intermediaries. It is posited that they can mitigate the tendency of managers to hoard bad news, consequently reducing the risk of a stock price crash. Analysts, with their sophisticated ability to acquire and process firm-specific information, are well-positioned to timely identify and communicate negative developments through brokerage reports or media coverage. This proactive communication is believed to contribute to a diminished stock price crash risk. *AC* is operationalised as a dummy variable, taking the value of one if a firm is covered by any financial analyst and zero otherwise.

The pooled OLS regression results, detailed in Table 7, align closely with the baseline findings. The outcomes consistently affirmed the significantly negative association of three

Variable	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
C_COMP	−3.73** (1.66)	−5.48* (3.25)
C_DUAL	−0.06* (0.03)	−0.04* (0.00)
C_STATUS	−0.06* (0.04)	−0.02* (0.01)
C_TENURE	0.00 (0.01)	0.00 (0.01)
C_DIRECTOR	−0.22*** (0.06)	−0.03** (0.02)
DTURNOVER	−0.00* (0.00)	0.00 (0.00)
RET	18.59*** (2.47)	3.01*** (0.48)
M/B	−0.08*** (0.00)	−0.00* (0.09)
SIZE	−0.05*** (0.01)	−0.01*** (0.00)
LEV	0.72*** (0.11)	0.02* (0.00)
FC	1.38*** (0.17)	0.06* (0.03)
AC	−0.08** (0.03)	−0.02*** (0.01)
Constant	−1.63*** (0.25)	−0.19*** (0.05)
N	2,360	2,360
R^2	0.63	0.76
Year effects	Yes	Yes
Industry effects	Yes	Yes

Note(s): *C_COMP* = CEO compensation; *C_DUAL* = CEO duality; *C_STATUS* = CEO status; *C_TENURE* = CEO tenure; *C_DIRECTOR* = CEO directorship; $NCSKEW_{t+1}$ = negative conditional skewness measured at *t+1*; $DUVOL_{t+1}$ = down-to-up-volatility measured at *t+1*; *DTURNOVER* = de-trended turnover; *RET* = company-specific weekly returns; *M/B* = market to book value of equity; *SIZE* = size of company measured by taking the natural log of market capitalisation; *LEV* = leverage; *FC* = financial constraints; *AC* = analyst coverage. ***, ** * indicates the level of significance at 1, 5 and 10%, respectively. *t*-statistics reported in the parentheses are based on robust standard errors. Pooled OLS regression methodology has been applied to obtain the said test results

Source(s): Author's calculations based on using Stata 14

Table 7. Robustness results-additional control variables

CEO power metrics—namely, *C_DUAL*, *C_STATUS* and *C_DIRECTOR* and stock price crash risk proxied by $NCSKEW_{t+1}$ and $DUVOL_{t+1}$. Additionally, it was observed that *C_COMP* exerted a significant and negative influence on future stock price crash risk. Notably, the impact of *C_TENURE* on crash risk remained statistically insignificant and positive. Turning attention to the newly incorporated control variables, the analysis revealed that financially constrained firms exhibited an elevated risk of stock price crashes. Furthermore, companies with stocks covered by analysts demonstrated a mitigated stock price crash risk. This broader set of variables not only fortified the robustness of the findings but also provided fresh insights into the nuanced dimensions of crash risk.

4.3.4 Addressing endogeneity concerns. To account for potential endogeneity in the relationship between CEO power and future stock price crash risk, this study employs the instrumental variables with the two-stage least squares (IV-2SLS) and difference-in-difference (DiD) methodologies. For the IV-2SLS technique, this study in line with previous research studies (Xu *et al.*, 2014; Yeung and Lento, 2018) employs industry averages of the various proxies of CEO power as the instrumental variables. The instrumental variables are selected based on the belief that they are correlated with the subsequent CEO power proxy of the relevant company, satisfying the selection criteria for instruments. Simultaneously, these industry averages are expected not to be associated with the relevant company's future stock price crash risk, satisfying the exclusion criteria for the instruments. Equation (6) outlines the regression model conducted for the first stage of the IV-2SLS regression, which is designed to estimate the relationship between the instrumental variables and CEO power:

$$\text{CEOPower}_{i,t} = \alpha + \beta_1 \text{AVG\_CEOPower}_{i,t} + \beta_2 \text{Controls}_{i,t} + \varepsilon_{i,t} \quad (6)$$

where $\text{AVG\_CEOPower}_{i,t}$ includes the individual industry averages of *C_COMP, C_DUAL, C_STATUS, C_TENURE and C_DIRECTOR*. The control variables are similar to those in Model 4. The predicted values obtained from Model 6 replace the instrumental variable $\text{AVG\_CEOPower}_{i,t}$ in the second stage of IV-2SLS regression model specified through following model:

$$\text{Crash\_Risk}_{i,t+1} = \alpha + \beta_1 \text{PREDICT\_CEOPower}_{i,t} + \beta_2 \text{Controls} + \varepsilon_{i,t} \quad (7)$$

The $\text{Crash\_Risk}_{i,t+1}$ includes both $NCSKEW_{t+1}$ and $DUVOL_{t+1}$ measures. $PREDICT\_CEOPower_{i,t}$ represents the predicted values of various CEO power proxies (*PREDICT_COMP, PREDICT_DUAL, PREDICT_STATUS, PREDICT_TENURE and PREDICT_DIRECTOR*) from Model 6. The list of control variables remains the same as in former regression models. Table 8 presents the results of regression Models 6 and 7. The significant negative association between select proxies of CEO power (*C_DUAL, C_STATUS and C_DIRECTOR*) and future stock price crash risk was maintained even after addressing the endogeneity concerns. Similarly, the regression results for *C_COMP* and *C_TENURE* also remained the same.

Although this research suggests a significant negative effect of CEO power on one-year ahead stock price crash, however the potential endogenous relation between the said variables can be a cause of concern. Endogeneity may arise from unobservable heterogeneity, as there could be hidden firm-specific factors that simultaneously impact both CEO power proxies and crash risk. Thus, drawing cues from Al Mamun *et al.* (2020) and follows DiD methodology to alleviate endogeneity concerns. The adoption of DiD approach tackles omitted variable bias that can be linked with CEO power and stock price crash risk. Further, this technique helps in establishing causality that is not ambiguous since it is conducted around exogenous shock to the core variable, i.e. CEO power. This section investigates the role of CEO turnover as an exogeneous event in assessing the changes in stock price crash risk. CEO turnover is considered to be related to CEO power, since powerful CEOs face lower

Table 8. Addressing endogeneity-IV-2SLS regression results

First stage Variable	C_COMP	C_DUAL	C_STATUS	C_TENURE	C_DIRECTOR	Second stage Variable	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
AVG_COMP	−10.11*** (11.2)	–	–	–	–	PREDICT_COMP	−3.12 (2.01)	−1.98 (4.56)
ACG_DUAL	–	−6.88*** (18.06)	–	–	–	PREDICT_DUAL	−0.15* (2.35)	−0.23** (3.12)
AVG_STATUS	–	–	−14.34*** (25.04)	–	–	PREDICT_ STATUS	−0.55* (2.33)	−0.40 (7.61)
AVG_TENURE	–	–	–	−8.77*** (14.11)	–	PREDICT_ TENURE	0.09 (0.65)	0.08 (6.43)
AVG_ DIRECTOR	–	–	–	–	−8.21*** (24.76)	PREDICT_ DIRECTOR	−0.78*** (1.29)	−0.65*** (5.61)
DTURNOVER	2.12*** (1.17)	−0.05 (2.75)	−0.14 (2.13)	−0.28 (2.59)	0.27 (0.71)	DTURNOVER	−0.03 (9.92)	2.37*** (1.07)
RET	−4.58*** (3.93)	−16.77*** (3.32)	12.36*** (1.75)	28.15** (2.07)	4.84*** (1.56)	RET	−65.31*** (11.28)	−10.96* (3.48)
M/B	−146*** (1.37)	0.85 (13.05)	−0.13* (7.16)	−0.59 (3.19)	0.24*** (6.54)	MB	−0.03*** (3.28)	−6.40 (1.12)
SIZE	−2.68*** (12.09)	−0.39 (4.15)	−0.22*** (16.38)	−0.67*** (9.41)	−0.39** (5.44)	SIZE	−0.32** (4.55)	−0.50*** (1.84)
LEV	8.97*** (6.69)	0.78*** (1.91)	0.99*** (12.19)	1.43 (10.7)	0.30 (3.06)	LEV	0.42*** (5.12)	0.16* (2.55)
Constant	6.54*** (4.77)	9.79*** (8.86)	7.09*** (15.31)	45.98*** (6.15)	5.66*** (18.73)	Constant	4.58*** (4.61)	0.01** (7.89)
N	2,360	2,360	2,360	2,360	2,360	N	2,360	2,360
R^2	0.19	0.17	0.31	0.19	0.24	R^2	0.87	0.77
Year effects	Yes	Yes	Yes	Yes	Yes	Year effects	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Industry effects	Yes	Yes

Note(s): *C_COMP* = CEO compensation; *C_DUAL* = CEO duality; *C_STATUS* = CEO status; *C_TENURE* = CEO tenure; *C_DIRECTOR* = CEO directorship; *AVG_C_COMP* = average measure for CEO compensation of companies in the same industry; *AVG_C_DUAL* = average measure for CEO duality for companies in the same industry; *AVG_C_STATUS* = average measure for CEO status for companies in the same industry; *AVG_C_TENURE* = average measure for CEO tenure for companies in the same industry; *AVG_C_DIRECTOR* = average measure for CEO directorship for companies in the same industry; *PREDICTED_C_COMP* = predicted value of CEO compensation as estimated in the first stage of IV-2SLS; *PREDICTED_C_DUAL* = predicted value of CEO duality as estimated in the first stage of IV-2SLS; *PREDICTED_C_STATUS* = predicted value of CEO status as estimated in the first stage of IV-2SLS; *PREDICTED_C_TENURE* = predicted value of CEO tenure as estimated in the first stage of IV-2SLS; *PREDICTED_C_DIRECTOR* = predicted value of CEO directorship as estimated in the first stage of IV-2SLS; $NCSKEW_{t+1}$ = negative conditional skewness measured at *t+1*; $DUVOL_{t+1}$ = down-to-up-volatility measured at *t+1; DTURNOVER* = de-trended turnover; *RET* = company-specific weekly returns; *M/B* = market to book value of equity; *SIZE* = size of company measured by taking the natural log of market capitalisation; *LEV* = leverage; *AVG_C_COMP*, *AVG_C_DUAL*, *AVG_C_STATUS*, *AVG_C_TENURE*, and *AVG_C_DIRECTOR*, are used as instrumental variables in the first stage of IV-2SLS model. ***, ** * indicates the level of significance at 1, 5 and 10%, respectively. *t*-statistics reported in the parentheses are based on robust standard errors

Source(s): Author's calculations based on using Stata 14

turnover risk vis-à-vis less powerful CEOs (Finkelstein *et al.*, 2009), alternatively, it is unlikely that CEO turnover directly affects stock price crash risk, therefore, reverse causality is not a concern here.

For the application of DiD technique, this study categorises sample firms into treatment and control groups. The companies categorised under treatment group are the ones where CEO turnover takes place during the study period, while control groups are similar companies based on firm size of treatment groups where no CEO turnover takes place. The changes in CEO power and stock price crash risk have been evaluated for both the treatment (companies with CEO turnover) and control (matched companies) groups. Panel A of Table 9

	Before	After	DiD
Panel A: univariate analysis			
Difference in mean $NCSKEW_{t+1}$ between treatment and control companies	−0.23** (0.09)	−0.16* (0.01)	−2.36*** (0.43)
Difference in mean $DUVOL_{t+1}$ between treatment and control companies	−0.12** (0.00)	−0.04** (0.00)	−1.42* (0.06)
Difference in mean C_COMP between treatment and control companies	0.43 (1.23)	0.36* (0.04)	1.05 (0.00)
Difference in mean C_DUAL between treatment and control companies	0.21* (0.63)	0.03* (0.02)	−3.48** (0.01)
Difference in mean C_STATUS between treatment and control companies	0.18*** (0.07)	0.06** (0.00)	−1.13* (0.00)
Difference in mean C_TENURE between treatment and control companies	0.35* (0.00)	0.27** (0.13)	2.49* (0.00)
Difference in mean C_DIRECTORSHIP between treatment and control companies	0.22** (0.06)	0.11* (0.18)	−1.77* (0.00)

Variable	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
Panel B: regression analysis		
TREAT	−0.01 (−1.09)	−0.00 (0.00)
POST	0.46*** (0.02)	0.08*** (0.01)
TREAT*POST	0.46*** (0.03)	0.08*** (0.01)
DTURNOVER	0.00 (0.00)	0.00 (0.00)
RET	−78.50*** (2.45)	−0.93*** (0.36)
M/B	−0.00 (0.00)	0.00 (0.00)
SIZE	−0.05*** (0.00)	−0.01*** (0.01)
LEV	0.29*** (0.05)	0.02** (0.01)
Constant	0.56*** (0.13)	0.08*** (0.02)
N	205	205
R^2	0.73	0.65
Year effects	Yes	Yes
Industry effects	Yes	Yes

Note(s): *TREAT* = binary variable that takes the value of 1 if the company is categorised under the treatment group i.e. the company experienced CEO turnover and 0 if the company is categorised under the control group i.e. the company did not experience any CEO turnover; *POST* = = binary variable that takes the value of 1 post the CEO turnover period and 0 otherwise; *TREAT*POST* = an interaction variable between the treatment group and post CEO turnover period; $NCSKEW_{t+1}$ = negative conditional skewness measured at *t+1*; $DUVOL_{t+1}$ = down-to-up-volatility measured at *t+1; DTURNOVER* = de-trended turnover; *RET* = company-specific weekly returns; *M/B* = market to book value of equity; *SIZE* = size of company measured by taking the natural log of market capitalisation; *LEV* = leverage. *** and ** indicates the level of significance at 1 and 5% respectively. *t*-statistics reported in the parentheses are based on robust standard errors. Difference-in-Difference panel data regression methodology has been applied to obtain the said test results
Source(s): Author's calculations based on using Stata 14

Table 9. Addressing endogeneity-difference-in-difference analysis

presents the test results from the univariate analysis. The results indicate that the differences in the mean values of all the proxies of CEO power between treatment and control companies prior to CEO turnover were statistically significant. Further, after CEO turnover, the mean values of CEO power proxies of treatment companies significantly lowered compared to control companies. The univariate analysis also revealed that the stock price crash risk increased more treatment companies vis-à-vis control group, indicating that CEO turnover lowers CEO power which further increases the risk of stock price crash.

After examining the univariate results, the following multivariate DiD regression model was run:

$$\text{Crash\_Risk}_{i,t+1} = \alpha + \beta_1 \text{POST}_{i,t} + \beta_2 \text{TREAT}_{i,t} + \beta_3 \text{POST} * \text{TREAT}_{i,t} + \beta_4 \text{Controls} + \varepsilon_{i,t} \quad (8)$$

where $\text{Crash\_Risk}_{i,t+1}$ is alternatively represented by $NCSKEW_{t+1}$ and $DUVOL_{t+1}$ measured one year ahead. $\text{POST}_{i,t}$ refers to the binary variable that takes the value of one post the CEO turnover period, and zero otherwise, $\text{TREAT}_{i,t}$ takes the value of one if a company has experienced CEO turnover and zero otherwise, $\text{POST*TREAT}_{i,t}$ is an interaction term, and Controls include *SIZE, LEV, RET, DTURNOVER, M/B, IND* and *YEAR*.

Panel B of Table 9 ascertains a significantly positive impact of $\text{POST*TREAT}_{i,t}$ on crash risk indicating that treatment companies experience a higher stock price crash risk following the event of CEO turnover, highlighting that CEO power weakens in companies post such an event. Therefore, these results further affirm that CEO power lowers the incidence of future stock price crash risk.

4.4 Assessing moderating effects of insider trades

The moderating effect of insider trades on the association between CEO power and future stock price crash risk has been analysed with the application of pooled OLS hierarchical regression methodology. The regression models for the same has been specified as below:

$$\text{Crash\_Risk}_{i,t+1} = \alpha + \beta_1 \text{CEOPower}_{i,t} + \beta_2 \text{InsiderTrades}_{i,t} + \beta_4 \text{Controls}_{i,t} + \varepsilon_{i,t} \quad (9)$$

$$\text{Crash\_Risk}_{i,t+1} = \alpha + \beta_1 \text{CEOPower}_{i,t} + \beta_2 \text{InsiderTrades}_{i,t} + \beta_3 \text{CEOPower}_{i,t} * \text{InsiderTrades}_{i,t} + \beta_4 \text{Controls}_{i,t} + \varepsilon_{i,t} \quad (10)$$

where $\text{Crash\_Risk}_{i,t+1}$ represents the variable future stock price crash risk ($NCSKEW_{t+1}$ and $DUVOL_{t+1}$) measured one year ahead. $\text{CEOPower}_{i,t}$, indicates the various proxies of power dimensions of a CEO (*C_COMP, C_DUAL, C_STATUS, C_TENURE* and *C_DIRECTOR)*. $\text{InsiderTrades}_{i,t}$ is the moderating variable when the interactive variable "$\text{CEOPower}_{i,t}$* $\text{InsiderTrades}_{i,t}$" is significant (Baron and Kenny, 1986). The list of controls remains the same as specified in Model 4 and Table 1 entails the detailed definitions of all the variables.

The moderating variable strengthens the relationship between two variables (Baron and Kenny, 1986). Data analysis in the hierarchical regression model follows certain steps. Firstly, the moderating variable, viz., insider trades is entered in the regression Model 9. Secondly, the interactive variable of five dimensions of CEO power and insider trades are included in the Model 10.

The test results of this section have been reported in Table 10. The findings indicate that the moderating variable insider trades poses a significantly positive impact on diverse measures of crash risk $\{NCSKEW_{t+1}(\beta = 0.06, p < 0.10, DUVOL_{t+1}(\beta = 0.07, p < 0.01)\}$. Further, the test results confirmed the moderation effects of insider trades on the association of select dimensions of CEO power viz., *C*_DUAL, *C_STATUS* and *C_DIRECTOR* and stock price crash risk. Thus, H6 is not fully supported.

Variable	Column A		Column B	
	$NCSKEW_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$DUVOL_{t+1}$
C_COMP	−4.81** (1.82)	−1.34 (1.90)	−1.16** (3.87)	−3.26 (3.84)
C_DUAL	−0.03* (0.05)	−0.09** (0.00)	−0.01* (0.01)	−0.05* (0.00)
C_STATUS	−0.02** (0.06)	−0.05* (0.04)	−0.07* (0.01)	−0.01* (0.01)
C_TENURE	0.04 (0.00)	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)
C_DIRECTOR	−0.06* (0.10)	−0.24*** (0.00)	−0.04* (0.02)	−0.17* (0.00)
INSIDER_TRADES	0.06* (0.03)	0.10* (0.09)	0.07*** (0.00)	0.09* (0.02)
C_COMP* INSIDER_TRADES	–	−8.28 (1.33)	–	−1.45 (3.89)
C_DUAL* INSIDER_TRADES	–	−0.13* (0.12)	–	−0.01* (0.00)
C_STATUS* INSIDER_TRADES	–	−0.06* (0.01)	–	−0.11* (0.00)
C_TENURE* INSIDER_TRADES	–	0.00* (0.08)	–	−0.00 (0.02)
C_DIRECTOR* INSIDER_ TRADES	–	−0.06* (0.02)	–	−0.03** (0.00)
DTURNOVER	−0.00* (0.00)	−0.00 (0.00)	−2.04 (0.00)	−6.19 (0.00)
RET	42.04*** (2.39)	16.75* (14.03)	4.38*** (0.51)	4.26* (4.63)
M/B	−0.00** (0.00)	−0.00 (0.00)	−0.00* (0.00)	−0.00 (0.00)
SIZE	−0.11*** (0.02)	0.04 (0.02)	0.09*** (0.00)	0.03 (0.01)
LEV	0.17* (0.15)	0.86* (0.21)	0.12* (0.04)	0.05 (0.03)
Constant	−3.19*** (0.47)	−1.55 (0.34)	−0.91*** (0.10)	−0.86 (0.15)
N	2,360	2,360	2,360	2,360
R^2	0.43	0.67	0.31	0.46
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes

Note(s): *C_COMP* = CEO compensation; *C_DUAL* = CEO duality; *C_STATUS* = CEO status; *C_TENURE* = CEO tenure; *C_DIRECTOR* = CEO directorship; *INSIDER_TRADES* = insider trading; *C_COMP*INSIDER_TRADES* = interaction variable between CEO compensation and insider trading; *C_DUAL*INSIDER_TRADES* = interaction variable between CEO duality and insider trading; *C_STATUS*INSIDER_TRADES* = interaction variable between CEO status and insider trading; *C_TENURE*INSIDER_TRADES* = interaction variable between CEO tenure and insider trading; *C_DIRECTOR*INSIDER_TRADES* = interaction variable between CEO directorship and insider trading; $NCSKEW_{t+1}$ = negative conditional skewness measured at *t+1*; $DUVOL_{t+1}$ = down-to-up-volatility measured at *t+1; DTURNOVER* = de-trended turnover; *RET* = company-specific weekly returns*; M/B* = market to book value of equity; *SIZE* = size of company measured by taking the natural log of market capitalisation*; LEV* = leverage. *** and ** indicates the level of significance at 1 and 5%, respectively. *t*-statistics reported in the parentheses are based on robust standard errors. Pooled OLS hierarchical regression methodology has been applied to obtain the said test results. Column A relates to the testing of Model 9 where only the moderating variable is entered, while Column B represents the results pertaining to Model 10 where both the moderating and interaction variables are entered

Source(s): Author's calculations based on using Stata 14

Table 10.
Assessing moderating effects of insider trades on association between CEO power and stock price crash risk

5. Conclusion

This study explores the impact of CEO power on future stock price crash risk within the context of companies listed on the S&P BSE 500 Index in India during the period from 2013 to 2022. The findings reveal that, except for CEO tenure, all other measures of CEO power examined show a negative association with one-year ahead or future stock price crash risk. Particularly, CEO duality, status and directorship exhibit significant negative effects on stock price crash risk, while CEO compensation does not demonstrate similar significance. These results maintain their robustness when applying alternative methodological approaches including a fixed-effects panel data regression model and Bayesian regression based on MCMC simulation. Further, the results hold even after incorporating an alternate measure of stock price crash risk and some additional control variables such as financial constraints and analyst coverage. Furthermore, the study addresses concerns of endogeneity

by initially employing the IV-2SLS estimation, using the average CEO power measures of other firms within the same industry as instruments. Secondly, DiD technique also addressed the endogeneity concerns by categorising the sample companies into treatment and control groups based on exogenous shock of CEO turnover. The study also examined the moderating effects of insider trades on the association between CEO power and stock price crash risk. The results found that the presence of insider trades increases the risk of a future crash risk and it also moderates the relationship between select dimensions of CEO power viz., duality, status and directorship and stock price crash risk.

These findings hold significant implications for emerging economies like India, where stock price crashes can pose a profound impact on the investment community. Firstly, despite the growing pertinence of understanding the nuances of stock price crash risk, limited heed has been paid to this area within the Indian stock market. There are studies that have examined the effect of outside block ownership (Chauhan *et al.*, 2015), stock liquidity (Chauhan *et al.*, 2017) and corporate governance including corporate social responsibility (Hunjra *et al.*, 2020) on stock price crash risk in India. However, the theme explored in this study remains unique.

Secondly, this study's results which pronounced the significant negative impact of CEO power gauged through CEO duality, status and directorship on the potential risk of future stock price crash risk signify a notable departure from the conventional reliance on agency theory. Instead, this research prominently highlights the application of stakeholder theory within the unique landscape of India's corporate environment. Thirdly, the findings bear substantial implications for retail investors, who, in contrast to institutional investors possess constrained resources to counter losses on account of stock price crashes. Through a comprehensive examination, this study unveils how specific indicators of CEO power can help mitigate the risk of stock price crashes, serving as a vital roadmap for retail investors seeking to reduce their exposure to risk in the ever-changing landscape of capital markets.

Fourthly, in 2020, the Securities and Exchange Board of India (SEBI) imposed a mandatory requirement for the top 500 listed companies based on market capitalisation to separate the roles of chairperson and CEO. However, this mandate was subsequently revised to become voluntarily. In contrast to this regulatory shift, the results of this study offer empirical evidence supporting a significant negative effect of CEO duality on stock price crash risk. This underscored the importance of regulators reconsidering their stance on CEO duality and its implications for corporate governance. Fifthly, the revelation that increased CEO power is associated with a reduced risk of future stock price crashes underscores the significance of family business structures within the Indian corporate landscape. Consequently, future research endeavours can delve deeper into this dimension by stratifying the study sample into family and non-family companies, thereby providing additional valuable insights. Sixthly, the study's findings, which link the presence of insider trades with the association between CEO power and future stock price crash risk, underscore the detrimental effects of such practices. Despite SEBI mandating the disclosure of insider trades, several illegal transactions evade detection by government and corporate authorities, posing threats to stock price declines. Addressing this issue further could be beneficial. Finally, the study was distinctive in its approach by incorporating Bayesian regression analysis, a non-frequentist methodology, alongside traditional classical methods. This novel inclusion of Bayesian techniques in management research represents a relatively unexplored avenue, adding depth and diversity to the analytical framework employed. In conclusion, the findings from this study offer essential insights for companies and retail investors seeking to manage and mitigate concerns related to stock price crash risk. These findings also hold significant relevance for policymakers, offering valuable input for future policy recommendations and considerations.

References

Adams, R.B. and Ferreira, D. (2007), "A theory of friendly boards", *The Journal of Finance*, Vol. 62 No. 1, pp. 217-250, doi: 10.1111/j.1540-6261.2007.01206.x.

Adams, R.B. and Ferreira, D. (2009), "Women in the boardroom and their impact on governance and performance", *Journal of Financial Economics*, Vol. 94 No. 2, pp. 291-309, doi: 10.1016/j.jfineco.2008.10.007.

Adams, R.B., Almeida, H. and Ferreira, D. (2005), "Powerful CEOs and their impact on corporate performance", *The Review of Financial Studies*, Vol. 18 No. 4, pp. 1403-1432, doi: 10.1093/rfs/hhi030.

Agrawal, A. and Cooper, T. (2015), "Insider trading before accounting scandals", *Journal of Corporate Finance*, Vol. 34, pp. 169-190, doi: 10.1016/j.jcorpfin.2015.07.005.

Al Mamun, M., Balachandran, B. and Duong, H.N. (2020), "Powerful CEOs and stock price crash risk", *Journal of Corporate Finance*, Vol. 62, 101582, doi: 10.1016/j.jcorpfin.2020.101582.

Andreou, P.C., Antoniou, C., Horton, J. and Louca, C. (2016), "Corporate governance and firm-specific stock price crashes", *European Financial Management*, Vol. 22 No. 5, pp. 916-956, doi: 10.1111/eufm.12084.

Armstrong, C.S., Balakrishnan, K. and Cohen, D. (2012), "Corporate governance and the information environment: evidence from state antitakeover laws", *Journal of Accounting and Economics*, Vol. 53 Nos 1-2, pp. 185-204, doi: 10.1016/j.jacceco.2011.06.005.

Baginski, S.P, Campbell, J.L., Hinson, L.A. and Koo, D.S. (2018), "Do career concerns affect the delay of bad news disclosure?", *The Accounting Review*, Vol. 93 No. 2, pp. 61-95, doi: 10.2308/accr-51848.

Balwani, S., Mazumdar, R. and Acharya, N. (2021), "Millions of millennials are piling into India's stock market, shows data", *Business Standard*, available at: https://www.business-standard.com/article/markets/millions-of-millennials-are-piling-into-india-s-stock-market-shows-data-121032500065_1.html (accessed 25 February 2022).

Baron, R.M. and Kenny, D.A. (1986), "The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations", *Journal of Personality and Social Psychology*, Vol. 51 No. 6, pp. 1173-1182, doi: 10.1037/0022-3514.51.6.1173.

Bayes, T. (1763), "An essay towards solving a problem in the doctrine of chances", *Philosophical Transaction of the Royal Society of London*, Vol. 53, pp. 370-418.

Bebchuk, L.A. and Fried, J.M. (2004), *Pay without Performance: the Unfulfilled Promise of Executive Compensation*, Harvard University Press, Cambridge, MA.

Beneish, M.D. (1999), "Incentives and penalties related to earnings overstatements that violate GAAP", *The Accounting Review*, Vol. 74 No. 4, pp. 425-457, doi: 10.2308/accr.1999.74.4.425.

Bertrand, M. and Mullainathan, S. (2001), "Are CEOs rewarded for luck? The ones without principals are", *The Quarterly Journal of Economics*, Vol. 116 No. 3, pp. 901-932, doi: 10.1162/00335530152466269.

Block, J.H. and Wagner, M. (2014), "The effect of family ownership on different dimensions of corporate social responsibility: evidence from large US firms", *Business Strategy and the Environment*, Vol. 23 No. 7, pp. 475-492, doi: 10.1002/bse.1798.

Boeker, W. (1989), "Strategic change: the effects of founding and history", *Academy of Management Journal*, Vol. 32 No. 3, pp. 489-515, doi: 10.5465/256432.

Bonn, I. and Pettigrew, A. (2009), "Towards a dynamic theory of boards: an organisational life cycle approach", *Journal of Management and Organization*, Vol. 15 No. 1, pp. 2-16, doi: 10.5172/jmo.837.15.1.2.

Brass, D.J. (1984), "Being in the right place: a structural analysis of individual influence in an organization", *Administrative Science Quarterly*, Vol. 29 No. 4, pp. 518-539, doi: 10.2307/2392937.

Breusch, T.S. and Pagan, A.R. (1979), "A simple test for heteroscedasticity and random coefficient variation", *Econometrica: Journal of The Econometric Society*, Vol. 47 No. 5, pp. 1287-1294, doi: 10.2307/1911963.

Callen, J.L. and Fang, X. (2013), "Institutional investor stability and crash risk: monitoring versus short-termism?", *Journal of Banking and Finance*, Vol. 37 No. 8, pp. 3047-3063, doi: 10.1016/j.jbankfin.2013.02.018.

Cerqueti, R. and Ventura, M. (2015), "Risk and uncertainty in the patent race: a probabilistic model", *IMA Journal of Management Mathematics*, Vol. 26 No. 1, pp. 39-62, doi: 10.1093/imaman/dpt020.

Chakrabarti, R., Megginson, W. and Yadav, P.K. (2008), "Corporate governance in India", *Journal of Applied Corporate Finance*, Vol. 20 No. 1, pp. 59-72, doi: 10.1111/j.1745-6622.2008.00169.x.

Chauhan, Y., Wadhwa, K., Syamala, S.R. and Goyal, A. (2015), "Block-ownership structure, bank nominee director and crash-risk", *Finance Research Letters*, Vol. 14, pp. 20-28, doi: 10.1016/j.frl.2015.07.002.

Chauhan, Y., Kumar, S. and Pathak, R. (2017), "Stock liquidity and stock prices crash-risk: evidence from India", *The North American Journal of Economics and Finance*, Vol. 41, pp. 70-81, doi: 10.1016/j.najef.2017.04.003.

Chen, J., Hong, H. and Stein, J.C. (2001), "Forecasting crashes: trading volume, past returns, and conditional skewness in stock prices", *Journal of Financial Economics*, Vol. 61 No. 3, pp. 345-381, doi: 10.1016/S0304-405X(01)00066-6.

Cui, H., Chen, C., Zhang, Y. and Zhu, X. (2019), "Managerial ability and stock price crash risk", *Asia-Pacific Journal of Accounting and Economics*, Vol. 26 No. 5, pp. 532-554, doi: 10.1080/16081625.2019.1636662.

Cutler, D.M., Poterba, J.M. and Summers, L.H. (1989), "What moves stock prices?", *Journal of Portfolio Management*, Vol. 15, pp. 4-12, doi: 10.3386/w2538.

Daily, C.M. and Johnson, J.L. (1997), "Sources of CEO power and firm financial performance: a longitudinal assessment", *Journal of Management*, Vol. 23 No. 2, pp. 97-117, doi: 10.1016/S0149-2063(97)90039-8.

Dalton, D.R. and Daily, C.M. (2001), "Director stock compensation: an invitation to a conspicuous conflict of interests?", *Business Ethics Quarterly*, Vol. 11 No. 1, pp. 89-108, doi: 10.2307/3857871.

Davis, J.H., Schoorman, F.D. and Donaldson, L. (1997), "Toward a stewardship theory of management", *Academy of Management Review*, Vol. 22 No. 1, pp. 20-47, doi: 10.2307/259223.

Deb, P. and Wiklund, J. (2017), "The effects of CEO founder status and stock ownership on entrepreneurial orientation in small firms", *Journal of Small Business Management*, Vol. 55 No. 1, pp. 32-55, doi: 10.1111/jsbm.12231.

Dechow, P.M., Lawrence, A. and Ryans, J.P. (2016), "SEC comment letters and insider sales", *The Accounting Review*, Vol. 91 No. 2, pp. 401-439, doi: 10.2308/accr-51232.

Donaldson, L. (1990), "The ethereal hand: organisational economics and management theory", *Academy of Management Review*, Vol. 15 No. 3, pp. 369-381, doi: 10.5465/amr.1990.4308806.

Donaldson, L. and Davis, J.H. (1991), "Stewardship theory or agency theory: CEO governance and shareholder returns", *Australian Journal of Management*, Vol. 16 No. 1, pp. 49-64, doi: 10.1177/031289629101600103.

Durbin, J. and Watson, G.S. (1950), "Testing for serial correlation in least squares regression: i", *Biometrika*, Vol. 37 Nos 3/4, pp. 409-428, doi: 10.1093/biomet/37.3-4.409.

Dyer, W.G. and Whetten, D.A. (2006), "Family firms and social responsibility: preliminary evidence from the S&P 500", *Entrepreneurship Theory and Practice*, Vol. 30 No. 6, pp. 785-802, doi: 10.1111/j.1540-6520.2006.00151.x.

Elliott, J., Morse, D. and Richardson, G. (1984), "The association between insider trading and information announcements", *The Rand Journal of Economics*, Vol. 15 No. 4, pp. 521-536, doi: 10.2307/2555523.

Fahlenbrach, R. (2009), "Founder-CEOs, investment decisions, and stock market performance", *Journal of Financial and Quantitative Analysis*, Vol. 44 No. 2, pp. 439-466, doi: 10.1017/S0022109009090139.

Fama, E. and Jensen, M.C. (1983), "Separation of ownership and control", *Journal of Law and Economics*, Vol. 26 No. 2, pp. 301-325, doi: 10.1086/467037.

Fama, E.F. and MacBeth, J.D. (1973), "Risk, return, and equilibrium: empirical tests", *Journal of Political Economy*, Vol. 81 No. 3, pp. 607-636, doi: 10.1086/260061.

Feng, M, Ge, W., Luo, S. and Shevlin, T. (2011), "Why do CFOs become involved in material accounting manipulations?", *Journal of Accounting and Economics*, Vol. 51 Nos 1-2, pp. 21-36, doi: 10.1016/j.jacceco.2010.09.005.

Fernandes, N. and Ferreira, M.A. (2009), "Insider trading laws and stock price informativeness", *The Review of Financial Studies*, Vol. 22 No. 5, pp. 1845-1887, doi: 10.1093/rfs/hhn066.

Finkelstein, S. (1992), "Power in top management teams: dimensions, measurement, and validation", *Academy of Management Journal*, Vol. 35 No. 3, pp. 505-538, doi: 10.5465/256485.

Firstenberg, P.B. and Malkiel, B.G. (1994), "The twenty-first-century boardroom: who will be in charge?", *MIT Sloan Management Review*, Vol. 36 No. 1, pp. 27-36.

Finkelstein, S. and D'aveni, R.A. (1994), "CEO duality as a double-edged sword: how boards of directors balance entrenchment avoidance and unity of command", Vol. 37 No. 5, pp. 1079-1108, doi: 10.5465/256667.

Finkelstein, S., Hambrick, D.C. and Cannella, A.A. (2009), *Strategic Leadership: Theory and Research on Executives, Top Management Teams, and Boards*, Oxford University Press, New York.

Fracassi, C. and Tate, G. (2012), "External networking and internal firm governance", *The Journal of Finance*, Vol. 67 No. 1, pp. 153-194, doi: 10.1111/j.1540-6261.2011.01706.x.

Fredrickson, J.W., Hambrick, D.C. and Baumrin, S. (1988), "A model of CEO dismissal", *Academy of Management Review*, Vol. 13 No. 2, pp. 255-270, doi: 10.5465/amr.1988.4306882.

Friedman, H.L. (2014), "Implications of power: when the CEO can pressure the CFO to bias reports", *Journal of Accounting and Economics*, Vol. 58 No. 1, pp. 117-141, doi: 10.1016/j.jacceco.2014.06.004.

Fu, X. and Zhang, Z. (2019), "CFO cultural background and stock price crash risk", *Journal of International Financial Markets, Institutions and Money*, Vol. 62, pp. 74-93, doi: 10.1016/j.intfin.2019.05.001.

Gelman, A. and Rubin, D.B. (1992), "Inference from iterative simulation using multiple sequences", *Statistical Science*, Vol. 7 No. 4, pp. 457-472, doi: 10.1214/ss/1177011136.

Grabke-Rundell, A. and Gomez-Mejia, L.R. (2002), "Power as a determinant of executive compensation", *Human Resource Management Review*, Vol. 12 No. 1, pp. 3-23, doi: 10.1016/S1053-4822(01)00038-9.

Graham, J.R., Harvey, C.R. and Rajgopal, S. (2005), "The economic implications of corporate financial reporting", *Journal of Accounting and Economics*, Vol. 40 Nos 1-3, pp. 3-73, doi: 10.1016/j.jacceco.2005.01.002.

Graham, J.R., Kim, H. and Leary, M. (2017), "CEO power and board dynamics", Working Paper, Duke University, available at: https://www.lebow.drexel.edu/sites/default/files/1523767562-kim-graham-learyceo-power-and-board-dynamics.pdf (accessed 25 June 2022).

Greve, H.R. and Mitsuhashi, H. (2007), "Power and glory: concentrated power in top management teams", *Organization Studies*, Vol. 28 No. 8, pp. 1197-1221, doi: 10.1177/0170840607075674.

Grinstein, Y. and Hribar, P. (2004), "CEO compensation and incentives: evidence from M&A bonuses", *Journal of Financial Economics*, Vol. 73 No. 1, pp. 119-143, doi: 10.1016/j.jfineco.2003.06.002.

Hambrick, D.C. (1981), "Environment, strategy, and power within top management teams", *Administrative Science Quarterly*, Vol. 26 No. 2, pp. 253-275, doi: 10.2307/2392472.

Hambrick, D.C. and Fukutomi, G.D. (1991), "The seasons of a CEO's tenure", *Academy of Management Review*, Vol. 16 No. 4, pp. 719-742, doi: 10.5465/amr.1991.4279621.

Hansen, M.H., Perry, L.T. and Reese, C.S. (2004), "A Bayesian operationalization of the resource-based view", *Strategic Management Journal*, Vol. 25 No. 13, pp. 1279-1295, doi: 10.1002/smj.432.

Harrison, J.R., Torres, D.L. and Kukalis, S. (1988), "The changing of the guard: turnover and structural change in the top-management positions", *Administrative Science Quarterly*, Vol. 33 No. 2, pp. 211-232, doi: 10.2307/2393056.

Harvey, C.R. and Siddique, A. (2000), "Conditional skewness in asset pricing tests", Vol. 55 No. 3, pp. 1263-1295, doi: 10.1111/0022-1082.00247.

Hasnan, S., Rahman, N.A., Mohamed Hussain, A.R. and Mohd Ali, M. (2022), "Corporate governance and ownership structure on illegal insider trading activities in Malaysian public listed companies", *Management and Accounting Review*, Vol. 21 No. 1, pp. 95-117.

He, L. (2008), "Do founders matter? A study of executive compensation, governance structure and firm performance", *Journal of Business Venturing*, Vol. 23 No. 3, pp. 257-279, doi: 10.1016/j.jbusvent.2007.02.001.

He, G. and Ren, H.M. (2023), "Are financially constrained firms susceptible to a stock price crash?", *The European Journal of Finance*, Vol. 29 No. 6, pp. 612-637, doi: 10.1080/1351847X.2022.2075280.

He, G., Bai, L. and Ren, H.M. (2019), "Analyst coverage and future stock price crash risk", *Journal of Applied Accounting Research*, Vol. 20 No. 1, pp. 63-77, doi: 10.1108/JAAR-09-2017-0096.

He, G., Ren, H.M. and Taffler, R. (2021), "Do corporate insiders trade on future stock price crash risk?", *Review of Quantitative Finance and Accounting*, Vol. 56 No. 4, pp. 1561-1591, doi: 10.1007/s11156-020-00936-3.

Hermalin, B.E. and Weisbach, M.S. (2001), "Boards of directors as an endogenously determined institution: a survey of the economic literature", *Economic Policy Review*, Vol. 9 No. 1, pp. 7-26, doi: 10.3386/w8161.

Herman, E.S. (1981), *Corporate Control, Corporate Power*, Cambridge University Press, New York.

Hong, H. and Stein, J.C. (2003), "Differences of opinion, short-sales constraints, and market crashes", *The Review of Financial Studies*, Vol. 16 No. 2, pp. 487-525, doi: 10.1093/rfs/hhg006.

Hsiao, C. (2005), "Why panel data?", *The Singapore Economic Review*, Vol. 50 No. 2, pp. 143-154, doi: 10.1142/S0217590805001937.

Hunjra, A.I., Mehmood, R. and Tayachi, T. (2020), "How do corporate social responsibility and corporate governance affect stock price crash risk?", *Journal of Risk and Financial Management*, Vol. 13 No. 2, pp. 30-45, doi: 10.3390/jrfm13020030.

Hutton, A.P., Marcus, A.J. and Tehranian, H. (2009), "Opaque financial reports, R 2, and crash risk", *Journal of Financial Economics*, Vol. 94 No. 1, pp. 67-86, doi: 10.1016/j.jfineco.2008.10.003.

Jaffe, J.F. (1974), "Special information and insider trading", *The Journal of Business*, Vol. 47 No. 3, pp. 410-428, doi: 10.1086/295655.

Jayaraman, N, Khorana, A., Nelling, E. and Covin, J. (2000), "CEO founder status and firm financial performance", *Strategic Management Journal*, Vol. 21 No. 12, pp. 1215-1224, doi: 10.1002/1097-0266.

Jiang, H. and Liu, C. (2020), "Economic policy uncertainty, CEO characteristics and firm R&D expenditure: a Bayesian analysis", *Applied Economics*, Vol. 52 No. 34, pp. 3709-3731, doi: 10.1080/00036846.2020.1721422.

Jin, L. and Myers, S.C. (2006), "R^2 around the world: new theory and new tests", *Journal of Financial Economics*, Vol. 79 No. 2, pp. 257-292, doi: 10.1016/j.jfineco.2004.11.003.

Jiraporn, P., Liu, Y. and Kim, Y.S. (2014), "How do powerful CEOs affect analyst coverage?", *European Financial Management*, Vol. 20 No. 3, pp. 652-676, doi: 10.1111/j.1468-036X.2012.00655.x.

John, K. and Lang, L.H. (1991), "Insider trading around dividend announcements: theory and evidence", *The Journal of Finance*, Vol. 46 No. 4, pp. 1361-1389, doi: 10.1111/j.1540-6261.1991.tb04621.x.

Johnson, S.A., Ryan, H. Jr and Tian, Y.S. (2009), "Managerial incentives and corporate fraud: the sources of incentives matter", *Review of Finance*, Vol. 13 No. 1, pp. 115-145, doi: 10.1093/rof/rfn014.

Kasznik, R. and Lev, B. (1995), "To warn or not to warn: management disclosures in the face of an earnings surprise", *Accounting Review*, Vol. 70, pp. 113-134.

Ke, B., Huddart, S. and Petroni, K. (2003), "What insiders know about future earnings and how they use it: evidence from insider trades", *Journal of Accounting and Economics*, Vol. 35 No. 3, pp. 315-346, doi: 10.1016/S0165-4101(03)00036-3.

Khanna, V., Kim, E. and Lu, Y. (2015), "CEO connectedness and corporate fraud", *Journal of Finance*, Vol. 70 No. 3, pp. 1203-1252, doi: 10.1111/jofi.12243.

Kim, J.B., Li, Y. and Zhang, L. (2011), "CFOs versus CEOs: equity incentives and crashes", *Journal of Financial Economics*, Vol. 101 No. 3, pp. 713-730, doi: 10.1016/j.jfineco.2011.03.013.

Kim, J.B., Lu, L.Y. and Yu, Y. (2019), "Analyst coverage and expected crash risk: evidence from exogenous changes in analyst coverage", *The Accounting Review*, Vol. 94 No. 4, pp. 345-364, doi: 10.2308/accr-52280.

Klevmarken, N.A. (1989), "Panel Studies: what can we Learn from them?", *European Economic Review*, Vol. 33 Nos 2-3, pp. 523-529, doi: 10.1016/0014-2921(89)90131-1.

Kohli, M. (2018), "Impact of ownership type and board characteristics on the pay–performance relationship: evidence from India", *Indian Journal of Corporate Governance*, Vol. 11 No. 1, pp. 1-34, doi: 10.1177/0974686218763853.

Kothari, S.P., Shu, S. and Wysocki, P.D. (2009), "Do managers withhold bad news?", *Journal of Accounting Research*, Vol. 47 No. 1, pp. 241-276, doi: 10.1111/j.1475-679X.2008.00318.x.

Kumar, N. and Singh, J.P. (2013), "Global financial crisis: corporate governance failures and lessons", *Journal of Finance, Accounting and Management*, Vol. 4 No. 1, pp. 21-34.

Kwon, H.D., Xu, W., Agrawal, A. and Muthulingam, S. (2016), "Impact of Bayesian learning and externalities on strategic investment", *Management Science*, Vol. 62 No. 2, pp. 550-570, doi: 10.1287/mnsc.2015.2156.

Lamont, O., Polk, C. and Saaá-Requejo, J. (2001), "Financial constraints and stock returns", *The Review of Financial Studies*, Vol. 14 No. 2, pp. 529-554, doi: 10.1093/rfs/14.2.529.

Le, V.P., Nguyen, A.-N. and Gregoriou, A. (2022), "Insider trading, gender diversity within the board room, CEO pay gap, and stock price crash risk", *International Journal of Finance and Economics*, pp. 1-23, doi: 10.1002/ijfe.2731.

Levinthal, D.A. and March, J.G. (1993), "The myopia of learning", *Strategic Management Journal*, Vol. 14 No. 2, pp. 95-112, doi: 10.1002/smj.4250141009.

Lewellyn, K.B. and Muller-Kahle, M.I. (2012), "CEO power and risk taking: evidence from the subprime lending industry", *Corporate Governance: An International Review*, Vol. 20 No. 3, pp. 289-307, doi: 10.1111/j.1467-8683.2011.00903.x.

Lippert, R.L. and Porter, G. (1997), "Understanding CEO pay: a test of two pay-to-performance sensitivity measures with alternative measures of alignment and influence", *Journal of Business Research*, Vol. 40 No. 2, pp. 127-138, doi: 10.1016/S0148-2963(96)00283-4.

Li, Y. and Zeng, Y. (2019), "The impact of top executive gender on asset prices: evidence from stock price crash risk", *Journal of Corporate Finance*, Vol. 58, pp. 528-550, doi: 10.1016/j.jcorpfin.2019.07.005.

Long, W., Tian, G.G., Hu, J. and Yao, D.T. (2020), "Bearing an imprint: CEOs' early-life experience of the Great Chinese Famine and stock price crash risk", *International Review of Financial Analysis*, Vol. 70, 101510, doi: 10.1016/j.irfa.2020.101510.

Miller, D. (1991), "Stale in the Saddle: CEO tenure and the match between organization and environment", *Management Science*, Vol. 37 No. 1, pp. 34-52, doi: 10.1287/mnsc.37.1.34.

Mizruchi, M.S. (1983), "Who controls whom? An examination of the relation between management and boards of directors in large American corporations", *Academy of Management Review*, Vol. 8 No. 3, pp. 426-435, doi: 10.5465/amr.1983.4284426.

Molz, R. (1988), "Managerial domination of boards of directors and financial performance", *Journal of Business Research*, Vol. 16 No. 3, pp. 235-249, doi: 10.1016/0148-2963(88)90072-0.

Morck, R., Shleifer, A. and Vishny, R.W. (1988), "Management ownership and market valuation: an empirical analysis", *Journal of Financial Economics*, Vol. 20, pp. 293-315, doi: 10.1016/0304-405X(88)90048-7.

Morse, A., Nanda, V. and Seru, A. (2011), "Are incentive contracts rigged by powerful CEOs?", *Journal of Finance*, Vol. 66 No. 5, pp. 1779-1821, doi: 10.1111/j.1540-6261.2011.01687.x.

Norburn, D. (1989), "The chief executive: a breed apart", *Strategic Management Journal*, Vol. 10 No. 1, pp. 1-15, doi: 10.1002/smj.4250100102.

O'Brien, R.M. (2007), "A caution regarding rules of thumb for variance inflation factors", *Quality and Quantity*, Vol. 41 No. 5, pp. 673-690, doi: 10.1007/s11135-006-9018-6.

Parthasarathy, A., Menon, K. and Bhattacherjee, D. (2006), "Executive compensation, firm performance and governance: an empirical analysis", *Economic and Political Weekly*, Vol. 41 No. 39, pp. 4139-4147.

Pearce, J.A. (1981), "An executive-level perspective on the strategic management process", *California Management Review*, Vol. 24 No. 1, pp. 39-48, doi: 10.2307/41164941.

Peni, E. (2014), "CEO and Chairperson characteristics and firm performance", *Journal of Management and Governance*, Vol. 18 No. 1, pp. 185-205, doi: 10.1007/s10997-012-9224-7.

Petersen, M.A. (2009), "Estimating standard errors in finance panel data sets: comparing approaches", *The Review of Financial Studies*, Vol. 22 No. 1, pp. 435-480, doi: 10.1093/rfs/hhn053.

Pfeffer, J. (1981), *Power in Organizations*, Pitman, Marshfield.

Sami, H., Wang, J. and Zhou, H. (2011), "Corporate governance and operating performance of Chinese listed firms", *Journal of International Accounting, Auditing and Taxation*, Vol. 20 No. 2, pp. 106-114, doi: 10.1016/j.intaccaudtax.2011.06.005.

Schein, E.H. (1992), *Organizational Culture and Leadership*, Jossey-Bass, San Francisco.

Segnon, M., Gupta, R., Bekiros, S. and Wohar, M.E. (2018), "Forecasting US GNP growth: the role of uncertainty", *Journal of Forecasting*, Vol. 37 No. 5, pp. 541-559, doi: 10.1002/for.2517.

Seyhun, H.N. and Bradley, M. (1997), "Corporate bankruptcy and insider trading", *The Journal of Business*, Vol. 70 No. 2, pp. 189-216, doi: 10.1086/209715.

Shahab, Y., Ntim, G., Ullah, F., Yugang, C., Ye, Z. and Yugang, C. (2020), "CEO power and stock price crash risk in China: do female directors' Critical Mass and ownership structure matter?", *International Review of Financial Analysis*, Vol. 68, 101457, doi: 10.1016/j.irfa.2020.101457.

Simsek, Z. (2007), "CEO tenure and organizational performance: an intervening model", *Strategic Management Journal*, Vol. 28 No. 6, pp. 653-662, doi: 10.1002/smj.599.

Skaife, H.A., Veenman, D. and Wangerin, D. (2013), "Internal control over financial reporting and managerial rent extraction: evidence from the profitability of insider trading", *Journal of Accounting and Economics*, Vol. 55 No. 1, pp. 91-110, doi: 10.1016/j.jacceco.2012.07.005.

Skinner, D.J. (1994), "Why firms voluntarily disclose bad news", *Journal of Accounting Research*, Vol. 32 No. 1, pp. 38-60, doi: 10.2307/2491386.

Srinidhi, B. and Liao, Q. (2020), "Family firms and crash risk: alignment and entrenchment effects", *Journal of Contemporary Accounting and Economics*, Vol. 16 No. 2, 100204, doi: 10.1016/j.jcae.2020.100204.

Srinivasan, A. and Thampy, A. (2017), "The effect of relationships with government-owned banks on cash flow constraints: evidence from India", *Journal of Corporate Finance*, Vol. 46, pp. 361-373, doi: 10.1016/j.jcorpfin.2017.07.007.

Tan, M. and Liu, B. (2016), "CEO's managerial power, board committee memberships and idiosyncratic volatility", *International Review of Financial Analysis*, Vol. 48, pp. 21-30, doi: 10.1016/j.irfa.2016.09.003.

Thevenot, M. (2012), "The factors affecting illegal insider trading in firms with violations of GAAP", *Journal of Accounting and Economics*, Vol. 53 Nos 1-2, pp. 375-390, doi: 10.1016/j.jacceco.2011.08.002.

Thompson, D. (1967), *Organizations in Action*, McGraw-Hill, New York.

Tien, C., Chen, C.N. and Chuang, C.M. (2013), "A study of CEO power, pay structure, and firm performance", *Journal of Management and Organization*, Vol. 19 No. 4, pp. 424-453, doi: 10.1017/jmo.2013.30.

Ting, H. and Huang, P. (2018), "CEOs' power and perks: evidence from Chinese banks", *Journal of Economics and Business*, Vol. 97, pp. 19-27, doi: 10.1016/j.jeconbus.2018.02.003.

Trafimow, D. and Earp, B.D. (2017), "Null hypothesis significance testing and Type I error: the domain problem", *New Ideas in Psychology*, Vol. 45, pp. 19-27, doi: 10.1016/j.newideapsych.2017.01.002.

Tran, O.T.K., Nguyen, A.H.V., Nguyen, P.Y.N. and Duong, K.D. (2023), "CEO overpower and stock price crash risk: evidence from family businesses in Vietnam", *Journal of Eastern European and Central Asian Research*, Vol. 10 No. 3, pp. 425-438, doi: 10.15549/jeecar.v10i3.1195.

Voordeckers, W., Van, A. and Van, J. and (2007), "Board composition in small and medium-sized family firms", *Journal of Small Business Management*, Vol. 45 No. 1, pp. 137-156, doi: 10.1111/j.1540-627X.2007.00204.x.

Wasserman, N. (2003), "Founder-CEO succession and the paradox of entrepreneurial success", *Organization Science*, Vol. 14 No. 2, pp. 149-172, doi: 10.1287/orsc.14.2.149.14995.

Wu, S., Levitas, E. and Priem, R.L. (2005), "CEO tenure and company invention under differing levels of technological dynamism", *Academy of Management Journal*, Vol. 48 No. 5, pp. 859-873, doi: 10.5465/amj.2005.18803927.

Wu, S.F., Fang, C.Y. and Chen, W. (2020), "Corporate governance and stock price crash risk: evidence from Taiwan", *Managerial and Decision Economics*, Vol. 41 No. 7, pp. 1312-1326, doi: 10.5465/amj.3177.

Xu, J. and Zou, L. (2019), "The impact of CEO pay and its disclosure on stock price crash risk: evidence from China", *China Finance Review International*, Vol. 9 No. 4, pp. 479-497, doi: 10.1108/cfri-10-2018-0138.

Xu, N., Jiang, X., Chan, K.C. and Yi, Z. (2013), "Analyst coverage, optimism, and stock price crash risk: evidence from China", *Pacific-Basin Finance Journal*, Vol. 25, pp. 217-239, doi: 10.1016/j.pacfin.2013.09.001.

Xu, N., Li, X., Yuan, Q. and Chan, K.C. (2014), "Excess perks and stock price crash risk: evidence from China", *Journal of Corporate Finance*, Vol. 25 No. 4, pp. 419-434, doi: 10.1016/j.jcorpfin.2014.01.006.

Yang, M., Chen, S., Wang, J. and Wang, Y. (2023a), "Corporate social responsibility and stock price crash risk: does analyst coverage matter?", *Applied Economics*, Vol. 55 No. 10, pp. 1045-1061, doi: 10.1080/00036846.2022.2095347.

Yang, M., Wang, Y., Bai, L. and Maresova, P. (2023b), "Corporate social responsibility, family involvement, and stock price crash risk", *Corporate Social Responsibility and Environmental Management*, Vol. 30 No. 3, pp. 1204-1225, doi: 10.1002/csr.2414.

Yeung, W.H. and Lento, C. (2018), "Ownership structure, audit quality, board structure, and stock price crash risk: evidence from China", *Global Finance Journal*, Vol. 37 No. 1, pp. 1-24, doi: 10.1016/j.gfj.2018.04.002.

Corresponding author
Ankita Kalia can be contacted at: ankitakubs@gmail.com