J. Int. Financ. Markets Inst. Money 100 (2025) 102140

Contents lists available at ScienceDirect

Journal of International Financial Markets, Institutions & Money

journal homepage: www.elsevier.com/locate/intfin

From the executive suite to the environment: How does CEO power affect climate change disclosures?

Sudipta Bose [a], Sabri Boubaker [b,c,d], Hussein Daradkeh [f], Syed Shams [e,*]

[a] Discipline of Accounting and Finance, Newcastle Business School, University of Newcastle, Sydney, NSW 2000, Australia
[b] EM Normandie Business School, Métis Lab, France
[c] International School, Vietnam National University, Hanoi, Viet Nam
[d] Swansea University, Swansea, United Kingdom
[e] School of Business, University of Southern Queensland, Brisbane, QLD 4300, Australia
[f] Peter Faber Business School, Australian Catholic University, Banyo QLD, 4014, Australia

ARTICLE INFO

JEL classification:
G34
M41

Keywords:
CEO power
Chief Executive Officer (CEO)
Climate change disclosures
Institutional investors
Financial analysts
Governance
Firm value

ABSTRACT

This study examines the relationship between CEO power and corporate climate change disclosure and the moderating role of internal and external monitoring in this relationship. Using a sample of 3,512 United States firm-year observations, we find that firms with more powerful CEOs disclose less climate change information. However, this negative relationship is mitigated in firms with higher institutional ownership, greater financial analyst coverage, and stronger internal governance. Our results remain robust across a series of tests designed to address both observable and unobservable selection biases, as well as omitted variable biases. Further analysis reveals that reduced firm-level transparency is an underlying channel through which CEO power diminishes climate change disclosures. Additionally, we document that climate change disclosure acts as an underlying mechanism linking CEO power to firm value. The findings of our study have important implications for regulators, policymakers, researchers, investors, analysts, and company management, especially in the context of increasing regulatory pressure on firms to enhance their climate change disclosures.

1. Introduction

The growing impacts of greenhouse gas (GHG) emissions on climate change, as highlighted by the Intergovernmental Panel on Climate Change (Intergovernmental Panel on Climate Change [IPCC], 2019), have intensified environmental concerns among the public and stakeholders. This awareness is prompting political actions to incentivize businesses to reduce emissions. The Economist Intelligence Unit [EIU] (2015) predicts that climate change could lead to a global financial crisis, with potential stock market losses ranging from US$4.2 trillion to US$43 trillion over the next decade. Similarly, Swiss Re Group forecasts a loss of US$23 trillion for the global economy by 2050, driven by reduced crop yields, diseases, and rising sea levels. In response, major financial institutions like BlackRock are integrating climate considerations into their investment strategies. This shift towards transparency in climate-related practices is supported by initiatives such as the Task Force on Climate-Related Financial Disclosures (TCFD) and the Carbon

* Corresponding author at: School of Business, University of Southern Queensland, Brisbane, QLD 4300, Australia.
E-mail addresses: sudipta.bose@newcastle.edu.au (S. Bose), sboubaker@em-normandie.fr (S. Boubaker), hussein.daradkeh@acu.edu.au (H. Daradkeh), syed.shams@unisq.edu.au (S. Shams).

https://doi.org/10.1016/j.intfin.2025.102140
Received 2 June 2024; Accepted 20 February 2025

Disclosure Project (CDP). Consequently, the inclusion of climate-related information in business practices, driven by stakeholder pressure, has become a focal point in accounting and finance literature. Our study contributes to this evolving field by examining the underexplored role of CEO power in shaping corporate climate change disclosures, emphasizing how internal and external governance mechanisms interact with CEO dynamics to influence these disclosures.

Prior studies have identified various firm-level factors influencing climate change disclosures, including climate governance (Bui, Houqe, & Zaman, 2020), managerial ability (Daradkeh, Shams, Bose, & Gunasekarage, 2023), foreign institutional investor ownership (Bose, Lim, Minnick, & Shams, 2023c), CEO compensation structures (Bose, Burns, Minnick, & Shams, 2023b), board size (Liao, Luo, & Tang, 2015; Tauringana & Chithambo, 2015), board gender diversity (Liao et al., 2015; Ben-Amar, Chang, & McIlkenny, 2017; Haque, 2017), environmental committees (Peters & Romi, 2014; Liao et al., 2015), and CEO education and tenure (Lewis, Walls, & Dowell, 2014). Despite these insights, a gap remains in understanding the role of CEO power in climate change disclosures. Our research seeks to fill this void by exploring how CEO power shapes a firm's approach to disclosing its climate impact. Positioned within the broader literature on CEO characteristics and corporate disclosures, our study specifically addresses how CEO power, a critical yet often overlooked factor, impacts climate-related transparency, distinguishing itself from prior research that has primarily focused on general corporate social responsibility (CSR) and financial outcomes.

The relationship between CEO power and climate change disclosure can be viewed from two contrasting perspectives, rooted in the theoretical frameworks of stakeholder and agency theories. Stakeholder theory suggests that powerful CEOs serve as key agents in meeting the diverse expectations of their firm's stakeholders, which include not only shareholders but also employees, customers, regulators, and the broader community. Stakeholders are increasingly demanding transparency in how companies manage and report on environmental issues, particularly regarding climate change. In this context, CEOs with significant power may be motivated to engage in more extensive climate change disclosures to align with these stakeholder demands (Freeman, 2010). For example, disclosing climate-related risks and initiatives can enhance a firm's legitimacy and reputation, signaling its commitment to social responsibility, sustainability, and ethical governance. A powerful CEO is well-positioned to incorporate stakeholder interests into the firm's strategic direction, as they can leverage their influence to prioritize environmental and social goals within the organization. By embracing climate disclosures, these CEOs may not only enhance the firm's reputation but also strengthen their personal image as responsible leaders who are attuned to global environmental concerns (Ben-Amar & McIlkenny, 2015; Bose, Burns, Minnick, & Shams, 2023a). Transparent climate reporting can improve the firm's relationships with stakeholders, attract ESG-conscious investors, and reduce the risk of regulatory scrutiny. Additionally, research suggests that CEOs who engage in climate disclosure practices may strengthen their leadership position, as increased visibility and alignment with societal expectations can enhance their authority and credibility within and outside the firm (Li, Gong, Zhang, & Koh, 2018; Chu, Liu, & Chiu, 2023). Thus, from the perspective of stakeholder theory, CEO power is positively associated with climate change disclosures to meet stakeholder expectations and enhance both corporate and personal reputations.

On the other hand, agency theory presents a more critical perspective on the role of CEO power in climate change disclosures. Powerful CEOs, who may hold significant control over the firm's decision-making processes, could prioritize personal interests, such as job security, compensation, or prestige, over the long-term goals of shareholders, which may include environmental sustainability and transparency (Jensen & Meckling, 1976b). When CEOs accumulate too much power, they can influence board composition and weaken board oversight, which may lead to less effective governance and reduced accountability (Fama & Jensen, 1983). In this context, increased CEO power may result in less emphasis on climate change disclosures, as powerful CEOs could view these activities as non-essential to their short-term financial interests or personal agenda. Instead of focusing on long-term sustainability, these CEOs might underinvest in climate-related initiatives or disclosures if they perceive that doing so could diminish their ability to pursue more immediate business or personal objectives (Li et al., 2018; Rashid, Shams, Bose, & Khan, 2020; Chu et al., 2023).

Moreover, while a powerful CEO may initially adopt climate disclosures as a strategic tool to gain credibility or meet regulatory requirements, their incentive to continue these disclosures may diminish as they become more entrenched in their position. Once a CEO has established their authority and credibility, they might feel less pressure to maintain high levels of transparency if they no longer see it as essential to enhancing their reputation or achieving personal goals (Jiraporn & Chintrakarn, 2013). This potential decline in disclosure over time highlights a key concern in agency theory: powerful CEOs may act in their self-interest, prioritizing personal gains or avoiding potential scrutiny, particularly when board oversight is weak. As a result, while CEO power might initially drive an increase in climate disclosures, it could eventually lead to a reduction in transparency if governance mechanisms do not adequately check CEO influence.

These contrasting perspectives of stakeholder and agency theory illustrate the complex role of CEO power in shaping climate change disclosures. Given these competing scenarios, our research aims to explore how CEO power influences firm-level climate change disclosures and the extent to which governance mechanisms—both internal and external—moderate this relationship. By examining the interplay between CEO power and governance structures, we seek to provide insights into the conditions under which CEO power either amplifies or hinders climate transparency, contributing to the ongoing discussion on corporate governance and environmental responsibility.

Using a sample of 3,512 firm-year observations from United States (U.S.) firms that responded to the CDP questionnaire between 2005 and 2019, we examine the effect of CEO power on climate change disclosures. We measure climate change disclosures using CDP's climate change disclosure ratings, which encompass firm-level climate governance; climate change-related risks and opportunities; business strategy; climate-related targets and performance; firms' initiatives to reduce carbon emissions; verification of carbon emissions; carbon pricing; and engagement with value chain partners on climate-related activities. Our findings show that CEO power is negatively associated with climate change disclosures. To mitigate concerns about potential observable and unobservable selection biases, we employ entropy balancing and Heckman's (1979) two-stage analysis. To address endogeneity from correlated omitted variables, we use CEO dismissal as an instrument in an instrumental variable analysis. We also apply firm-fixed effects to control for time-invariant omitted variable bias. These robustness checks ensure that our results effectively address endogeneity concerns.

Further analysis suggests that reduced firm-level transparency is an underlying mechanism through which powerful CEOs limit climate change disclosures. Our study also investigates the moderating role of external and internal governance mechanisms in this relationship. We find that stronger external monitoring mechanisms, such as financial analyst coverage, institutional investor ownership, and stronger internal governance, attenuate the negative impact of CEO power on climate change disclosures. We also examine the role of the firm's external political environment in this relationship, finding that firms headquartered in Republican-controlled states exhibit a stronger negative relationship between CEO power and climate change disclosures compared to those in Democratic-controlled states. Additionally, we explore the role of climate change disclosure as a mediating mechanism in the relationship between CEO power and firm value. Our results suggest that climate change disclosure serves as an underlying mechanism in the relationship between CEO power and firm value.

Our study makes several significant contributions to the existing literature by uniquely examining CEO power as a key determinant of climate change disclosures and investigating the moderating roles of internal and external governance mechanisms in this relationship. First, we extend prior research on climate change disclosures by focusing specifically on CEO power, which has been relatively underexplored in this context. While previous studies have examined various CEO attributes (Prado-Lorenzo & García-Sánchez, 2010; Lewis, Walls, & Dowell, 2014; Daradkeh et al., 2023), our work emphasizes the distinct influence of CEO power on climate-related disclosures, addressing a gap in the literature where CEO power has predominantly studied in relation to general CSR and ESG disclosure (Jiraporn & Chintrakarn, 2013; Li et al., 2018; Rashid et al., 2020). Second, we contribute by highlighting the potential negative impact of powerful CEOs on climate change disclosures, aligning with previous findings that CEO power can inhibit CSR and environmental performance (Walls & Berrone, 2017). However, our study extends beyond this by focusing specifically on climate change disclosure, a critical area in today's regulatory and business environment, providing a more detailed understanding of how CEO power can influence corporate responses to climate risks.

Third, we add to the literature by exploring how external (e.g., financial analyst coverage and institutional ownership) and internal governance mechanisms (e.g., corporate governance quality) moderate the negative relationship between CEO power and climate change disclosures. While prior studies have explored the role of governance mechanisms in mitigating the influence of CEO power influence (Sun, Johnson, & Bradley, 2022), our study offers deeper insights by directly examining their role in the context of climate change disclosures, which are becoming increasingly central to corporate strategy and regulatory compliance. Fourth, we contribute to the existing literature by showing that reduced firm-level transparency is an underlying mechanism linking CEO power to climate change disclosures. Fifth, we make a novel contribution by investigating the mediating role of climate change disclosure in the relationship between CEO power and firm value. Our findings reveal that climate change disclosure acts as a critical mechanism through which CEO power affects firm value, providing fresh insights into how sustainability-related transparency influences financial performance. Finally, our findings have significant implications for regulators, policymakers, investors, financial analysts, academics, and businesses, particularly in light of the growing focus on climate change and sustainability. By addressing the underexplored area of CEO power in climate change disclosures and providing new insights into governance mechanisms that can mitigate its adverse effects, our study stands out as a meaningful contribution to both the academic literature and practical policymaking.

The remainder of the paper proceeds as follows. Section 2 reviews the relevant literature and the development of the research hypotheses. Section 3 outlines the methodology employed in the study. Section 4 discusses the empirical findings, while Section 5 presents the outcomes of several additional analyses. The final section (Section 6) concludes the paper.

2. Literature review and hypotheses development

The Chief Executive Officer (CEO) holds a central role in a firm, overseeing operations, making strategic decisions, and serving as the organization's public face. As a result, the relationship between CEO characteristics and various firm outcomes has been extensively studied. For instance, prior research has examined the impact of CEO traits on forward-looking information disclosures (Alqatamin, Aribi, & Arun, 2017), climate disclosures to the CDP (Lewis et al., 2014), financial disclosures (Buchholz, Jaeschke, Lopatta, & Maas, 2018), tunnelling (Chen, Han, & Reda, 2024), and corporate risk-taking (Wei, Luo, & Lu, 2025). Our study focuses explicitly on how CEO power influences corporate climate change disclosures.

The literature on CEO power presents mixed findings regarding its impact on firm decisions and performance. On one hand, CEO power is often viewed positively. Keltner, Gruenfeld, and Anderson (2003) suggest that powerful CEOs, less constrained by social norms, are more proactive in pursuing desired outcomes. Klein, Lim, Saltz, and Mayer (2004) argue that powerful CEOs excel at creating centralized social networks that facilitate access to critical information. Empirical studies support these views, showing that powerful CEOs can positively affect firm performance and labor efficiency (Han, Nanda, & Silveri, 2016) and are linked to greater CSR activities (Li et al., 2018; Rashid et al., 2020).

Conversely, other studies highlight the potential downsides of CEO power. Dunn (2004) and Bebchuk, Cremers, and Peyer (2011) caution that powerful CEOs may engage in self-serving behaviors that harm shareholders, ultimately diminishing firm value. Further, Morse, Nanda, and Seru (2011) and Abernethy, Kuang, and Qin (2015) document how powerful CEOs may manipulate performance metrics and compensation systems for personal benefit. Negative relationships between CEO power and financial outcomes, such as lower bond ratings and adverse capital structure impacts, are also noted (Liu & Jiraporn, 2010; Jiraporn, Chintrakarn, & Liu, 2012). In terms of CSR, studies indicate that powerful CEOs often show less commitment to CSR investments (Jiraporn & Chintrakarn, 2013; Li, Li, & Minor, 2016; Sheikh, 2019). Studies further indicate a negative correlation between CEO power and CSR performance, with stronger effects observed in younger, powerful CEOs (Harper & Sun, 2019; Chu et al., 2023).

The impact of CEO power on climate change disclosure can be viewed through the lenses of stakeholder and agency theories. According to stakeholder theory, powerful CEOs may enhance climate change disclosure to align with stakeholder demands and bolster the firm's image as a responsible corporate citizen (Freeman, Harrison, Wicks, Parmar, & De Colle, 2010). CEOs who are financially invested in their firms may also see environmental disclosure as a means to hedge risks and create value, especially when such disclosures positively impact the firm's public image and align with the increasing emphasis on sustainability in financial markets (Rashid et al., 2020). Moreover, powerful CEOs may be incentivized by the financial challenges associated with climate change risks, requiring higher compensation due to navigating such complexities. In this context, powerful CEOs could be motivated to enhance climate change disclosure to signal their firm's commitment to managing environmental risks effectively, thereby justifying higher compensation for their leadership in managing these risks. These arguments suggest that CEO power could lead to increased climate change disclosure.

In contrast, agency theory suggests a negative relationship. From this perspective, powerful CEOs may reduce board effectiveness, prioritizing personal agendas over stakeholder interests (Dalton & Kesner, 1987; Weisbach, 1988; Fiegener, Brown, Dreux, & Dennis, 2000). This weakened oversight could diminish the emphasis on CSR activities, with powerful CEOs potentially viewing climate change disclosures as unnecessary or counterproductive (Harper & Sun, 2019; Rashid et al., 2020; Chu et al., 2023). Additionally, powerful CEOs may withhold climate disclosures if they no longer serve to strengthen their control. Given these contrasting perspectives, our study hypothesizes that CEO power may negatively influence climate change disclosures. We aim to investigate the potential for CEO power to limit and shape environmental reporting practices, particularly through the agency theory lens, which suggests a detrimental impact. Thus, we formulate the following hypothesis:

H1: CEO power is negatively related to the extent of climate change disclosures.

Our study examines how external monitoring, represented by institutional ownership, analyst following, and internal governance, indicated by the Entrenchment Index (E-Index) score, affect the relationship between CEO power and climate change disclosure. We hypothesize that external monitoring may counteract the potential negative impact of CEO power on climate disclosures, as stronger external monitoring can drive greater corporate transparency.

First, research shows that institutional ownership, particularly by large investors, encourages management to make decisions that benefit all stakeholders (Bathala, 1996; Carleton, Nelson, & Weisbach, 1998). These investors bring expertise and influence, which can lead to more effective monitoring of management and reduce the CEO's ability to exert disproportionate influence over the board, particularly regarding decisions like CEO compensation (Khan, Dharwadkar, & Brandes, 2005). Moreover, institutional investors are increasingly prioritizing climate considerations in their investment decisions. Amel-Zadeh and Serafeim (2018) document that institutional investors view climate risks as financially material and actively integrate these considerations into their strategies. In line with this trend, prior studies (Krueger, Sautner, & Starks, 2020; Bose et al., 2023c) find that institutional investors are pressuring companies to improve their climate disclosures, emphasizing the growing demand for sustainability-related transparency. As a result, powerful CEOs may be motivated to enhance climate disclosures to meet institutional demands and maintain their reputations.

Second, large institutional investors, by virtue of their shareholding, have both the incentive and power to protect their investments through enhanced monitoring and exerting influence over the CEO and board (Lin & Fu, 2017; Saleh, Eleyan, & Maigoshi, 2022). Thirdly, Boone and White (2015) find that institutional investors pressure firms to increase public information releases to reduce their monitoring costs. This leads to an improved information environment and a higher level of voluntary disclosure (Lin, Mao, & Wang, 2018). Given the increasing focus on climate-related risks, external monitoring may encourage CEOs to provide more detailed climate change disclosures, aligning the firm's practices with institutional investors' growing emphasis on sustainable investing and climate-related goals.

Fourth, the number of analysts following a firm enhances monitoring of the firm's activities, reducing agency problems and increasing transparency (Jensen & Meckling, 1976a; Lang, Lins, & Miller, 2004). This transparency limits the CEO's ability to make decisions that may be detrimental to shareholders' interests. Fifth, analysts can influence board decisions by critically assessing the firm's investment choices and performance, potentially leading to changes in CEO if necessary (Farrell & Whidbee, 2002; Jung, Sun, & Yang, 2012). Aware of this scrutiny, powerful CEOs may choose to disclose more climate-related information to demonstrate their commitment to managing environmental risks and safeguarding their leadership positions. Given these arguments, supported by the growing influence of climate considerations on investment decisions (Amel-Zadeh & Serafeim, 2018; Krueger et al., 2020; Bose et al., 2023c), we predict that external monitoring will mitigate the negative effects of CEO power on climate change disclosure, potentially encouraging greater transparency in firms with powerful CEOs. Thus, we propose the following hypothesis:

H2: The negative relationship between CEO power and climate change disclosure is less pronounced in firms with stronger external monitoring.

Studies have consistently demonstrated that managers in firms with weak corporate governance prioritize personal interests over shareholder wealth (Shleifer & Vishny, 1989; Elyasiani & Zhang, 2015). This self-serving behavior has been linked to a diminished focus on stakeholder demands, reduced CSR initiatives, and the implementation of insufficient climate change and environmental policies (Hill & Jones, 1992; Jo & Harjoto, 2012). Weak governance structures create an environment where managers can make decisions that undermine stakeholder influence, which in turn hampers corporate efficiency and long-term performance (Hill & Jones, 1992). Furthermore, firms with weak governance have been found to lack transparency in their information disclosures (Ferreira & Laux, 2007). They are more likely to withhold negative financial information (Armstrong, Balakrishnan, & Cohen, 2012). In such environments, entrenched managers may manipulate non-public information, providing overly optimistic assessments to conceal actions that destroy firm value (Ulupinar, 2018). Aggarwal and Dow (2012) argue that poorly governed firms often prioritize short-term financial gains at the expense of long-term, sustainable investments, including those related to environmental sustainability. Jo and Harjoto (2012) further corroborate this by demonstrating that weak governance leads to diminished CSR engagement, while Cong and Freedman (2011) show that strong governance enhances transparency in pollution disclosures. Given this substantial body of evidence, we posit that the negative influence of CEO power on climate change disclosure is likely to be more pronounced in firms with weaker governance structures, as such firms are less capable of holding CEOs accountable for inadequate environmental transparency. Thus, we propose the following hypothesis:

H3: The negative relationship between CEO power and climate change disclosure is more pronounced in firms with weaker internal governance.

3. Research methodology

3.1. Sample and data

The sample for this study comprises all U.S. firms that responded to the CDP climate change questionnaire between 2005 and 2019. This period was selected because 2005 marks the initial availability of CDP climate change disclosure scores, while 2019 is the most recent data collection period. We sourced climate change disclosure data from the CDP database, while CEO power and corporate governance data were obtained from the BoardEx database. Financial data were collected from Compustat North America, stock price data from the Center for Research in Security Prices (CRSP), analyst coverage data from the Institutional Brokers' Estimate System (I/B/E/S), and institutional ownership data from the Thomson-Reuters 13f database. After merging all these databases and excluding all incomplete observations, we obtained an initial sample of 3,512 firm-year observations, covering 553 unique firms over the period from 2005 to 2019. Table 1, Panel A, shows the detailed steps in the sample selection process.

Table 1, Panel B provides the industry- and year-wise distribution of the sample observations.[1] Notably, the computer industry represents the largest portion of our sample, which accounts for 14.83 % of the total. On the other hand, the manufacturing (miscellaneous) industry has the smallest representation, with just 0.68 % of our sample. Regarding the year-wise distribution, the percentage of observations per year typically ranges between 6.06 % and 10.11 % throughout the study period, except for 2005, 2006, and 2007, which deviate from this pattern.

3.2. Measures of climate change disclosure

We measure climate change disclosure using the CDP climate change disclosure scores from the CDP database. CDP is an independent global non-profit organization that manages environmental disclosure systems for investors, facilitating company reporting on climate change-related information (Bose et al., 2023a; Bose et al., 2023c; Daradkeh et al., 2023; Dey, Bose, Luo, & Shams, 2024). CDP collects firms' responses on their climate change activities each year through questionnaires, which are then converted into scores. The CDP scoring system is widely recognized as one of the most credible environmental ratings globally (The SustainAbility Institute, 2023). These scores are also featured in Google Finance's Key Stats and Ratio section (Dey et al., 2024). The CDP climate change performance ratings assess a wide range of factors, including firm-level climate governance, climate risks and opportunities, business strategy, climate-related targets and performance, carbon emission reduction efforts, carbon verification, carbon pricing, and engagement with value chain partners on climate initiatives (Bose et al., 2023c; Daradkeh et al., 2023; Dey et al., 2024). While some questions in the CDP questionnaire are binary, most require qualitative or narrative responses, which are evaluated through content analysis based on CDP's established scoring methodology. This methodology initially assigned scores ranging from 0 to 100 for each participating firm. However, starting in 2016, CDP shifted from this scoring approach to a performance rating system.

In our study, we assign numerical values to CDP's performance bands: 8 for A, 7 for A-, 6 for B, 5 for B-, 4 for C, 3 for C-, 2 for D, and 1 for D- following prior studies (Bose et al., 2023c; Daradkeh et al., 2023; Dey et al., 2024). The scope of CDP ratings has evolved over time, including climate-related financial disclosures aligned with the TCFD framework starting in 2017. While variations in scores and performance bands across different years make direct comparisons challenging, this evolution is crucial for our study. We are particularly interested in examining both time series and cross-sectional aspects of climate change performance. To standardize the climate change disclosure scores, we developed a climate change disclosure percentile rank for each year calculated as: (firm rank – 1)/(number of firms – 1). This method produces scores ranging from 0 for the lowest-ranked firm to 1 for the highest-ranked firm. Additionally, for robustness checks, we used the probability of responding to the CDP questionnaire as an alternative proxy for a firm's climate change disclosure.

3.3. Measures of CEO power

In the accounting and finance literature, there is no consensus on a single definition of CEO power, and various studies have employed different proxies and indices to measure it. For example, Bebchuk et al. (2011) use the CEO's pay slice (CPS) as a proxy for CEO power, while Finkelstein (1992) considers a power index comprising multiple dimensions, including equity ownership and various forms of power, such as prestige, expertise, and structural power. Jackling and Johl (2009) propose an index that includes family status, tenure, equity ownership, and duality. Drawing from Finkelstein's concept of a multifaceted power index, we develop

[1] We use the industry classifications based on Barth, Beaver, and Landsman (1998) and modified by Dhaliwal, Li, Tsang, and Yang (2011a).

Table 1
Sample selection and distribution.

Panel A: Sample selection Firm-year observations		
Climate change score data available from CDP		5,406
Less: Firms dropped due to not merging with the Compustat database		(882)
Less: Firms having non-available CEO social ties data		4,524
Less: Firms dropped due to insufficient control variables		(1012)
Final Test Sample		**3,512**
Panel B: Industry-wise distribution of firms in the sample		
Name of industry	**Observations**	**% of sample**
Mining/Construction	66	1.88
Food	226	6.44
Textiles/Print/Publishing	140	3.99
Chemicals	168	4.78
Pharmaceuticals	167	4.76
Extractive	202	5.75
Manufacturing: Rubber/glass/etc.	49	1.40
Manufacturing: Metal	54	1.54
Manufacturing: Machinery	105	2.99
Manufacturing: Electrical Equipment	63	1.79
Manufacturing: Transport Equipment	122	3.47
Manufacturing: Instruments	194	5.52
Manufacturing: Miscellaneous	24	0.68
Computers	521	14.83
Transportation	245	6.98
Utilities	323	9.20
Retail: Wholesale	73	2.08
Retail: Miscellaneous	208	5.92
Retail: Restaurant	43	1.22
Financial	311	8.86
Insurance/Real Estate	36	1.03
Services	140	3.99
Others	32	0.91
Total sample	**3,512**	**100**
Panel C: Year-wise distribution of firms in the sample		
Year	**Observations**	**% of sample**
2005	81	2.31
2006	85	2.42
2007	155	4.41
2008	213	6.06
2009	216	6.15
2010	238	6.78
2011	233	6.63
2012	231	6.58
2013	240	6.83
2014	283	8.06
2015	287	8.17
2016	279	7.94
2017	289	8.23
2018	355	10.11
2019	327	9.31
Total sample	**3,512**	**100**

our own CEO power index that encompasses five dimensions: CEO duality, tenure, education, equity ownership, and age.

CEO duality occurs when the CEO also serves as the chairperson of the board. This dual role gives the CEO greater control over board meeting agendas and influence over board director appointments, potentially compromising board independence (Cannella Jr & Shen, 2001; Rashid et al., 2020). To measure this, we create a dummy variable for CEO duality, assigning it a value of 1 if the CEO is also the board chairman, indicating higher power, and 0 otherwise. Recognizing the potential impact of CEO tenure on corporate governance, we include it in the CEO power index. Long-serving CEOs may experience entrenchment, often leading to increased power and potential agency problems (Ryan Jr & Wiggins III, 2004). To quantify this, we construct a dummy variable for CEO tenure. This variable is assigned a value of 1 if the CEO's tenure exceeds the industry-year-adjusted median, suggesting a higher level of entrenched power, and 0 otherwise. CEO education is another dimension of our index. A CEO's educational attainment—whether a Bachelor's, Master's, MBA, or PhD degree—can reflect their advanced managerial skills and decision-making capabilities (Bowers & Seashore, 1966; Malmendier & Tate, 2008). To capture this, we introduce a dummy variable termed "CEO title," assigned a value of 1 if a CEO's educational qualifications exceed the median level within the same industry-year, indicating higher potential influence, and 0 otherwise. CEO equity ownership is a key component of CEO power, reflecting the CEO's vested interest in the firm and their potential influence in the boardroom and voting power within the company (Daily & Johnson, 1997). We create a dummy variable, "CEO ownership," and assign a value of 1 if the CEO's equity ownership exceeds the industry-year adjusted median, signaling greater power, and 0 otherwise. Lastly, we consider CEO age as a proxy for decision-making ability and influence, as older CEOs with more accumulated experience tend to wield more power (Harjoto & Jo, 2009). To measure this, we introduce a dummy variable, "CEO age," assigned a value of 1 if the CEO's age is above the industry-year adjusted median, indicating greater power due to experience, and 0 otherwise. After defining these five dimensions—CEO duality, tenure, title, equity ownership, and age—we combine them to create a composite index of CEO power, scaled by five (5).

3.4. Empirical models

Following prior studies (Bose et al., 2023c; Daradkeh et al., 2023; Dey et al., 2024), we adopt a lead-lag approach in all our regression models to address potential endogeneity issues arising from reverse causality between climate-change disclosures *(CCDS)* and CEO power. We utilize the following model to test hypothesis 1 (H1):

$$\begin{aligned} CCDS_{i,t+1} = {} & \beta_0 + \beta_1 CEO\_POWER_{i,t} + \beta_2 FIRM\_SIZE_{i,t} + \beta_3 MB_{i,t} + \beta_4 LEVERAGE_{i,t} + \beta_5 RGROWTH_{i,t} + \beta_6 EXTFIN_{i,t} + \beta_7 FOREIGN_{i,t} \\ & + \beta_8 LITIGATION_{i,t} + \beta_9 FIRM\_AGE_{i,t} + \beta_{10} PROFITABILITY_{i,t} + \beta_{11} CAPIN_{i,t} + \beta_{12} ASSET\_NEW_{i,t} \\ & + \beta_{13} ENV\_STRENGTH_{i,t} + \beta_{14} ENV\_CONCERN_{i,t} + \beta_{15} BOARD\_SIZE_{i,t} + \beta_{16} BOARD\_IND_{i,t} + \sum INDUSTRY_{i,t} \\ & + \sum YEAR_{i,t} + \varepsilon_{i,t+1} \end{aligned} \tag{1}$$

where *CCDS* represents the percentile rank of climate change disclosures, while *CEO_POWER* is the variable measuring CEO power. We expect a negative and statistically significant coefficient for *CEO_POWER* in Equation (1), which would support our first hypothesis (H1). To test our second hypothesis (H2), we introduce an interaction term between *CEO_POWER* and *HIGH_INSTOWN* (high institutional ownership), as well as *CEO_POWER* and *HIGH_ANALYST* (high analyst coverage), into Equation (1). These interaction terms enable us to assess the moderating effects of institutional ownership and analyst coverage on the relationship between CEO power and climate change disclosure. For our third hypothesis (H3), we examine the interaction between *CEO_POWER* and *HIGH_EIND* (high entrenchment index) by including it in Equation (1). This allows us to explore how weak internal governance moderates the relationship between CEO power and climate change disclosures. We expect a positive coefficient on *CEO_POWER* × *HIGH_ANALYST*, *CEO_POWER* × *HIGH_INSTOWN* to support our H2 and a negative coefficient on *CEO_POWER* × *HIGH_EIND* to support our H3.

We include several control variables in Equation (1) following the prior literature (Matsumura, Prakash, & Vera-Muñoz, 2013; Ben-Amar et al., 2017; Bose et al., 2023c; Daradkeh et al., 2023). Larger firms, which face greater stakeholder pressure, are more likely to prioritize comprehensive environmental disclosures to demonstrate their commitment to environmental responsibilities (Ben-Amar et al., 2017; Daradkeh et al., 2023). Therefore, we control for firm size using the natural logarithm of total assets. We also control for investment opportunities, proxied by the market-to-book ratio *(MB)* and growth potential (*RGROWTH)*, both of which have been shown to positively impact environmental disclosure (Bose et al., 2023a; Bose et al., 2023c). Additionally, based on the findings of Debreceny and Rahman (2005), leverage is associated with higher climate change disclosure; therefore, we include financial leverage *(LEVERAGE)* as a control variable.

Moreover, we control for profitability *(PROFITABILITY)*, as profitable firms, motivated by the need for social acceptance and the desire to meet stakeholder demands, tend to provide more environmental disclosures (Castelló & Lozano, 2011). Additionally, firms seeking external financing *(EXTFIN)* and those operating internationally *(FOREIGN)* are more likely to disclose environmental information (Dhaliwal, Li, Tsang, & Yang, 2011b). Therefore, we include controls for external financing and foreign operations. We also control for firm age *(FIRM_AGE)*, as older firms tend to disclose more environmental information (Bose et al., 2023a; Bose et al., 2023c). Consistent with Bui et al. (2020), we introduce a control for firms operating in highly litigated industries *(LITIGATION)*, as these firms face greater stakeholder pressure and often use environmental disclosures to manage reputational and legitimacy risks. Lastly, we control for capital intensity *(CAPIN)* and the age of firm assets *(ASSET_NEW)* since firms with higher capital intensity and newer assets may use disclosures to address information asymmetry (Bose et al., 2023c).

Board size *(BOARD_SIZE)* and board independence *(BOARD_IND)* are critical control variables, as both impact the effectiveness of board oversight on a CEO's decisions (Daradkeh et al., 2023). A larger board brings together more diverse and valuable resources, enabling better management of social concerns (Bose, Hossain, Sobhan, & Handley, 2022). Additionally, prior research demonstrates that board size and independence affect the volume of voluntary disclosures (Bose, Ali, Hossain, & Shamsuddin, 2022). Thus, we control for both board size and board independence. Furthermore, we include controls for environmental concerns *(ENV_CONCERN)* and environmental strengths *(ENV_STRENGTH)*, as these factors influence a firm's climate change disclosures (Matsumura et al., 2013; Daradkeh et al., 2023).

We estimate our model using the ordinary least squares (OLS) regression approach. To address heteroscedasticity and serial correlation, we apply robust standard errors clustered at the firm level. Additionally, we control for both industry and year-fixed effects in all models to account for unobserved heterogeneity across industries and time periods.

4. Empirical results

4.1. Descriptive statistics

Table 2 reports the descriptive statistics for the variables used in Equation (1). The average *CCDS* score is 0.585, with a median of 0.659, indicating that firms in our sample tend to have moderate to high levels of climate change disclosure. The mean value of the CEO power index *(CEO_POWER)* is 0.50, suggesting that the CEOs in our sample generally hold a moderate level of power. The average firm size *(FIRM_SIZE)*, measured by the natural logarithm of total assets, is 9.801, indicating that the sample firms are relatively large. Additionally, the mean market-to-book ratio *(MB)* is 4.634, with a median of 2.774, reflecting substantial investment opportunities for the firms in our sample. The mean leverage ratio *(LEVERAGE)* is 0.271, indicating that, on average, 27.10 % of a firm's capital structure is composed of debt. Both profitability *(PROFITABILITY)* and sales revenue growth *(RGROWTH)* have positive mean values of 0.064 and 0.061, respectively, indicating that the firms are profitable and have the potential for growth.

The mean and median values of external financing *(EXTFIN)* are -0.012 and -0.017, respectively, implying that most firms generate their funds internally. Additionally, 70.10 % of the firms in our sample engage in foreign operations *(FOREIGN)*, and 27.30 % of firms operate in highly litigated industries *(LITIGATION)*. The mean firm age *(FIRM_AGE)* is 3.513, indicating that the average firm has been in operation for over 35 years (unreported). The mean capital intensity *(CAPIN)* is 8.80 % of total sales revenue, while asset newness *(ASSET_NEW)* stands at 50.40 % of gross property, plant, and equipment, showing that these firms continually invest in capital-intensive projects and new assets. The average environmental strengths *(ENV_STR)* and environmental concerns *(ENV_CON)* scores are 0.157 and 0.065, respectively, highlighting the firms' varying performance in addressing environmental issues. Lastly, the mean board size *(BOARD_SIZE)* is 2.730, which translates to an average of approximately 11 directors on the board (details not reported in this paper), and 61.50 % of firms in the sample have independent directors *(BOARD_IND)*.

4.2. Correlation matrix

Table 3 presents the Pearson correlation matrix of the variables used in Equation (1). We observe a significant negative correlation between CEO power (*CEO_POWER*) and climate change disclosure (*CCDS*).[2] Additionally, CEO power shows negative correlations with external financing while showing positive correlations with firm size, firm age, profitability, environmental strengths, environmental concerns, board size, and board independence. To address concerns of multicollinearity, we refer to the threshold suggested by Gujarati and Porter (2009), which states that a correlation coefficient below 0.80 generally indicates the absence of multicollinearity. In our study, the correlation coefficients between the variables are all below this threshold, suggesting no multicollinearity issues. This is further supported by our variance inflation factor (VIF) analysis. A VIF value below 10 indicates no significant multicollinearity, and the average VIF in our study is 1.21, with individual VIF values ranging from 1.06 to 1.47. These results confirm that multicollinearity is not a concern in our regression models.

4.3. Portfolio analysis

We employ portfolio analysis to gain an initial understanding of the relationship between CEO power and climate change disclosure. This method involves analyzing the distribution of climate change disclosure across different groups of firms, categorized based on their CEO power levels. Our sample is divided into three portfolios (Q1, Q2, and Q3) according to CEO power, with Q1 representing firms with the lowest CEO power and Q3 containing firms with the highest. Table 4 reports the results of the portfolio analysis. Panel A of Table 4 reveals significant variations in climate change disclosure (*CCDS*) across these portfolios. Notably, *CCDS* is considerably lower in the highest CEO power portfolio (Q3) compared to the lowest CEO power portfolio (Q1), with a difference of 0.04. This supports our hypothesis that increased CEO power is associated with reduced climate change disclosure. Panel B of Table 4 provides further insights, showing that firms in the highest CEO power portfolio (Q3) tend to have larger firm sizes (*FIRM_SIZE*), are older *(FIRM_AGE*), more profitable (*PROFITABILITY*), and exhibit stronger environmental performance profiles (*ENV_STRENGTH* and *ENV_CONCERN*). These firms also have larger boards (*BOARD_SIZE*) and more independent board members (*BOARD_IND*). In contrast, these firms exhibit lower reliance on external financing (*EXTFIN*). These findings align with our study's expectations and provide a nuanced understanding of how CEO power impacts climate change disclosure across various firm characteristics.

4.4. Baseline regression results

Table 5 presents the results of the OLS regression used to test our first hypothesis (H1), which predicts that CEO power is negatively

[2] We also analyze the correlations among the various components of the CEO power index, including CEO duality, tenure, title, age, and equity shareholdings. The unreported results show that each component captures a distinct dimension of CEO power. For example, the correlation between CEO duality and CEO age is 0.135 and statistically significant, indicating that although these variables are related, they reflect different aspects of CEO power, such as holding dual roles versus experience through age. Likewise, the negative correlation between CEO tenure and CEO equity ownership (−0.133) suggests that while some longer-tenured CEOs may hold less equity, tenure and ownership represent separate facets of CEO power. These variations across components support their combined use in the CEO power index, as they collectively offer a more comprehensive and nuanced measure of the CEO's influence within the firm.

Table 2
Descriptive statistics.

	Observations	Mean	Std. Dev.	Median	1st Quartile	3rd Quartile
CCDS	3,512	0.585	0.314	0.659	0.333	0.841
CEO_POWER	3,512	0.500	0.221	0.400	0.400	0.600
FIRM_SIZE	3,512	9.801	1.184	9.741	9.014	10.549
MB	3,512	4.634	44.859	2.774	1.722	4.514
LEVERAGE	3,512	0.271	0.172	0.254	0.155	0.366
RGROWTH	3,512	0.061	0.245	0.049	-0.009	0.113
EXTFIN	3,512	-0.012	0.104	-0.017	-0.054	0.014
FOREIGN	3,512	0.701	0.458	1.000	0.000	1.000
LITIGATION	3,512	0.273	0.445	0.000	0.000	1.000
FIRM_AGE	3,512	3.513	0.655	3.689	3.091	4.078
PROFITABILITY	3,512	0.064	0.069	0.060	0.029	0.098
CAPIN	3,512	0.088	0.138	0.041	0.024	0.086
ASSET_NEW	3,512	0.504	0.140	0.486	0.401	0.601
ENV_STRENGTH	3,512	0.157	0.175	0.133	0.000	0.214
ENV_CONCERN	3,512	0.065	0.136	0.000	0.000	0.111
BOARD_SIZE	3,512	2.730	0.180	2.773	2.639	2.833
BOARD_IND	3,512	0.615	0.110	0.625	0.563	0.667

This table reports descriptive statistics for the variables in our baseline model. Superscripts ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % levels, respectively. Std. Dev. = standard deviation. All variables are defined in Appendix A.

related to climate change disclosure. Model (1) reports the regression results for *CCDS* with firm-level control variables only. Model (2) presents the regression results between CEO power and *CCDS,* including firm-level control variables, while Model (3) reports the regression results for the full model, including both firm-level and corporate governance control variables. In both Model (2) and Model (3), the coefficients for *CEO_POWER* are negative and statistically significant at the 1 % level, indicating a negative relationship between CEO power and climate change disclosure. This finding supports our hypothesis (H1), suggesting that firms with more powerful CEOs tend to disclose less information related to climate change. In terms of economic significance, using the coefficient from Model (3), we estimate that an increase of one standard deviation in CEO power leads to a 2.41 % (-0.109 × 0.221) decrease in the percentile ranking of climate change disclosure.[3]

Regarding the control variables, the coefficients of *FIRM_SIZE*, *LITIGATION,* and *ENV_STRENGTH* are positive and statistically significant at the 1 % level. These results suggest that larger firms, firms operating in highly litigated industries, and firms with environmental strengths tend to disclose more climate change information. Conversely, the coefficient of *RGROWTH* is negative and statistically significant, implying that firms with greater growth opportunities tend to disclose less climate change information. Overall, we find that firms with more powerful CEOs disclose less climate change information.

4.5. *Endogeneity analysis*

A potential endogenous relationship between climate change disclosure *(CCDS)* and CEO power could be a concern in our regression models. Specifically, the relationship between CCDS and CEO power might be influenced by observable heterogeneity, unobservable heterogeneity, time-invariant omitted variable bias, and correlated omitted variables bias. To address these endogeneity issues, we employ several techniques, including (a) entropy balancing analysis, (b) Heckman's (1979) two-stage analysis, (c) firm fixed effects analysis, and (d) instrumental variable analysis.

4.5.1. *Entropy balancing analysis*

Our findings may be influenced by observable heterogeneity bias, which is a potential source of endogeneity. To address this concern, we employ the entropy balancing technique (Hainmueller, 2012). This method is preferred over the commonly used Propensity Score Matching (PSM) due to recent critiques regarding PSM's susceptibility to researcher bias (King & Nielsen, 2019). Entropy balancing requires fewer assumptions and eliminates the need for researcher adjustments in the propensity model (McMullin & Schonberger, 2020). While similar to PSM in balancing covariate distributions between treatment and control groups, entropy balancing assigns continuous weights to control group observations to equalize the distribution moments (means, variances, and skewness) for all variables. In applying entropy balancing, we first categorize firms into treatment *(HIGH_CEO_POWER = 1* for firms with above-median CEO power) and control groups *(HIGH_CEO_POWER = 0* for firms with below-median CEO power) following prior studies (Dey et al., 2024; Shams, Bose, & Sheikhbahaei, 2024). We then balance the distribution moments for all control variables

[3] We conducted additional analysis to explore the potential non-linear relationship between CEO power and climate change disclosures. By including a quadratic term for CEO power in our baseline regression, we examined whether the impact of CEO power shifts at higher levels. Our findings indicate that while the coefficient on CEO power is positive and statistically insignificant, the quadratic term is negative and significant, suggesting that beyond a certain threshold, increased CEO power reduces transparency in climate disclosures. This result aligns with agency theory, indicating that excessive CEO power may lead to reduced oversight and prioritization of personal interests, ultimately impacting disclosure transparency.

Table 3
Correlation matrix.

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]
CCDS	**[1]**	1.000																
CEO_POWER	**[2]**	-0.040**	1.000															
FIRM_SIZE	**[3]**	0.212***	0.149***	1.000														
MB	**[4]**	0.019	-0.007	0.021	1.000													
LEVERAGE	**[5]**	-0.021	-0.004	-0.066***	0.013	1.000												
RGROWTH	**[6]**	-0.022	-0.016	0.050***	0.007	-0.075***	1.000											
EXTFIN	**[7]**	-0.019	-0.035**	-0.092***	-0.000	0.155***	0.077***	1.000										
FOREIGN	**[8]**	0.025	0.025	0.123***	0.009	-0.056***	0.046***	-0.085***	1.000									
LITIGATION	**[9]**	0.023	-0.006	0.110***	0.021	-0.156***	0.041**	-0.076***	0.143***	1.000								
FIRM_AGE	**[10]**	0.046***	0.141***	0.176***	-0.037**	0.065***	-0.092***	-0.027	-0.030*	-0.139***	1.000							
PROFITABILITY	**[11]**	0.026	0.102***	0.259***	0.042**	-0.106***	0.098***	-0.261***	0.244***	0.113***	-0.036**	1.000						
CAPIN	**[12]**	-0.019	0.011	-0.057***	-0.023	0.067***	-0.005	0.138***	-0.243***	-0.169***	0.007	-0.180***	1.000					
ASSET_NEW	**[13]**	0.033**	0.023	0.102***	-0.026	0.137***	0.080***	0.132***	-0.340***	-0.121***	0.014	-0.093***	0.391***	1.000				
ENV_STRENGTH	**[14]**	0.202***	0.101***	0.181***	-0.014	-0.002	-0.028*	-0.028*	0.122***	0.056***	0.229***	0.058***	-0.061***	-0.042**	1.000			
ENV_CONCERN	**[15]**	0.049***	0.129***	0.193***	-0.023	0.010	-0.047***	0.012	-0.031*	-0.189***	0.252***	-0.046***	0.166***	0.217***	0.231***	1.000		
BOARD_SIZE	**[16]**	0.168***	0.127***	0.437***	-0.002	0.020	-0.049***	-0.069***	0.011	-0.071***	0.329***	0.042**	-0.097***	0.079***	0.204***	0.192***	1.000	
BOARD_IND	**[17]**	-0.021	0.187***	-0.000	0.025	0.089***	-0.045***	0.039**	0.030*	-0.096***	0.203***	-0.044***	-0.016	-0.026	0.059***	0.115***	-0.009	1.000

This table reports the Pearson correlation matrix for the variables in our baseline model. Superscripts ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % levels, respectively. All variables are defined in Appendix A.

Table 4
Portfolio analysis.

Panel A: *CCDS* for portfolios based on *CEO_POWER*				
	Q1 (Lowest)	**Q2**	**Q3 (Highest)**	**Q3–Q1**
CCDS	0.594	0.590	0.554	-0.040***
Panel B: Firm characteristics for portfolios based on *CEO_POWER*				
	Q1 (Lowest)	**Q2**	**Q3 (Highest)**	**Q3–Q1**
FIRM_SIZE	9.637	9.906	10.060	0.424***
MB	4.598	5.697	3.052	-1.545
LEVERAGE	0.269	0.276	0.265	-0.004
RGROWTH	0.065	0.060	0.055	-0.010
EXTFIN	-0.011	-0.011	-0.018	-0.008*
FOREIGN	0.692	0.704	0.721	0.029
LITIGATION	0.283	0.257	0.272	-0.010
FIRM_AGE	3.431	3.550	3.664	0.233***
PROFITABILITY	0.057	0.069	0.072	0.014***
CAPIN	0.088	0.082	0.095	0.007
ASSET_NEW	0.503	0.507	0.505	0.002
ENV_STRENGTH	0.142	0.165	0.183	0.041***
ENV_CONCERN	0.051	0.070	0.093	0.042***
BOARD_SIZE	2.706	2.749	2.760	0.055***
BOARD_IND	0.596	0.630	0.643	0.048***

This table presents the average climate change disclosure (Panel A) and all control variables in our baseline model (Panel B) in various portfolios sorted by CEO power. Superscripts ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % levels, respectively. All variables are defined in Appendix A.

between these groups. Subsequently, we re-estimate our baseline regression using the balanced treatment group.

Table 6 presents the descriptive statistics for firm characteristics and corporate governance control variables in Panels A and B. In Panel C, Models (1) and (2) report the re-estimated baseline regression results: Model (1) includes firm-level control variables only, while Model (2) adds corporate governance variables. In both models, the *CEO_POWER* variable remains negative and statistically significant at the 1 % level, confirming the robustness of our main findings and demonstrating that our results are robust to potential endogeneity concerns arising from observable heterogeneity bias.

4.5.2. Heckman's (1979) two-stage analysis

The empirical relationship between climate change disclosure and CEO power could be influenced by self-selection bias, as our sample includes only those firms that voluntarily provide climate change disclosure information to the CDP through the CDP questionnaire. To address this potential self-selection bias, we apply Heckman's (1979) two-stage procedure. In the first-stage model of Heckman's (1979) two-stage analysis, we develop a model to examine a firm's decision to respond to the CDP questionnaire by augmenting our sample with firms that did not respond to the CDP questionnaire during the sample period. Specifically, we develop the following probit regression model to predict the likelihood of a firm responding to the CDP questionnaire:

$$\begin{aligned} Pr(DISC\_CDP=1)_{i,t} = {} & \beta_0+\beta_1 PROPDISC_{i,t}+\beta_2 CDP\_LAG_{i,t}+\beta_3 FIRM\_SIZE_{i,t}+\beta_4 MB_{i,t}+\beta_5 LEVERAGE_{i,t}+\beta_6 RGROWTH_{i,t} \\ & +\beta_7 EXTFIN_{i,t}+\beta_8 FOREIGN_{i,t}+\beta_9 LITIGATION_{i,t}+\beta_{10} FIRM\_AGE_{i,t}+\beta_{11} PROFITABILITY_{i,t}+\beta_{12} CAPIN_{i,t} \\ & +\beta_{13} ASSET\_NEW_{i,t}+\beta_{14} ENV\_STRENGTH_{i,t}+\beta_{15} ENV\_CONCERN_{i,t}+\sum Year_{i,t}+\sum Industry_{i,t}+\varepsilon_{i,t} \end{aligned} \quad (2)$$

In the first-stage regression, we use a firm's decision to voluntarily respond to the CDP questionnaire *(DISC_CDP)* as the dependent variable, which is measured as a dummy variable that takes the value of 1 if the firm responds to the CDP questionnaire, and 0 otherwise. To satisfy the exclusion restrictions criteria, we introduce two additional variables based on prior studies (Matsumura, Prakash, & Vera-Munoz, 2014): *PROPDISC* and *CDP_LAG*. *PROPDISC* measures the proportion of firms within an industry that respond to the CDP questionnaire, capturing industry-level pressure to participate in the CDP, while *CDP_LAG* represents whether the firm responded to the CDP questionnaire in the previous year, reflecting a firm's historical tendency to disclose climate information. In the second stage, we conduct an OLS regression of *CEO_POWER* on *CCDS,* incorporating all control variables and the inverse Mills ratio (*IMR*) generated from the first-stage probit model, as shown in Equation (2). This process allows us to account for potential self-selection bias and provides a more accurate estimation of the relationship between CEO power and climate change disclosure.

Table 7, Panel A reports the results of the first-stage probit regression. The results show that both *PROPDISC* and *CDP_LAG* have positive and statistically significant coefficients, supporting their relevance as exogenous variables in the model. The model's pseudo *R*-squared value is 55.60 %. Notably, the partial R^2 values for *PROPDISC* and *CDP_LAG* are 7.78 % and 20.80 %, respectively, both significant at the 1 % level. These results highlight the appropriateness of these variables in satisfying the exclusion restrictions criteria for the model. In Panel B of Table 7, we report the second-stage regression results. The coefficient of *CEO_POWER* shows a negative and statistically significant at the 1 % level, indicating a negative impact of CEO power on climate change disclosure. Additionally, the inverse Mills ratio *(IMR)* coefficients in Models (1) and (2) are also negative and significant at the 1 % level, suggesting that our results

Table 5
Regression results between climate change disclosure and CEO power.

	Dependent variable = $CCDS_{t+1}$		
	Model (1)	**Model (2)**	**Model (3)**
CEO_POWER	—	-0.105***	-0.109***
		(-3.536)	(-3.703)
FIRM_SIZE	0.052***	0.055***	0.047***
	(5.281)	(5.510)	(4.389)
MB	0.000	0.000	0.000
	(1.119)	(1.085)	(1.052)
LEVERAGE	0.078	0.077	0.071
	(1.187)	(1.182)	(1.086)
RGROWTH	-0.039**	-0.040***	-0.038***
	(-2.546)	(-2.675)	(-2.632)
EXTFIN	-0.018	-0.015	-0.010
	(-0.314)	(-0.266)	(-0.176)
FOREIGN	0.021	0.020	0.017
	(0.909)	(0.884)	(0.772)
LITIGATION	0.181**	0.175***	0.190***
	(2.574)	(2.627)	(2.827)
FIRM_AGE	0.002	0.005	-0.004
	(0.109)	(0.272)	(-0.204)
PROFITABILITY	-0.055	-0.034	-0.011
	(-0.437)	(-0.270)	(-0.090)
CAPIN	-0.032	-0.030	-0.020
	(-0.389)	(-0.363)	(-0.251)
ASSET_NEW	0.066	0.057	0.056
	(0.815)	(0.707)	(0.695)
ENV_STRENGTH	0.347***	0.350***	0.345***
	(6.302)	(6.409)	(6.357)
ENV_CONCERN	-0.041	-0.035	-0.038
	(-0.559)	(-0.481)	(-0.524)
BOARD_SIZE	—	—	0.119**
			(2.112)
BOARD_IND	—	—	0.032
			(0.432)
Intercept	-0.377**	-0.347*	-0.601***
	(-2.142)	(-1.935)	(-2.836)
Year-fixed effects	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes
Observations	3512	3512	3512
R^2	0.169	0.174	0.177
Adjusted-R^2	0.157	0.162	0.165

This table reports the baseline ordinary least squares (OLS) regression results for the relationship between CEO power and climate change disclosure. Model (1) reports the coefficients of firm characteristics' control variables. Model (2) reports the coefficients of CEO power and firm characteristics' control variables only. Model (3) reports the coefficients of CEO power and all control variables in our baseline model. Superscripts ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % levels, respectively. All variables are defined in Appendix A.

remain robust even after correcting for potential self-selection bias.

4.5.3. *Firm fixed-effect regressions*

To address potential bias from omitted time-invariant variables that could influence climate change disclosure, we employ firm fixed-effect regressions in our study. This technique effectively mitigates concerns about unknown firm characteristics not accounted for in our baseline regression model. By implementing fixed-effect regressions, we eliminate cross-sectional variation, focusing solely on the variation within each firm over time (Kim, Saha, & Bose, 2021). This approach strengthens the robustness of our analysis by concentrating on internal firm dynamics, providing a more precise assessment of the factors influencing climate change disclosure.

We re-estimate our baseline model using firm fixed-effect regression, with the results shown in Table 8. Models (1) and (2) report a negative and statistically significant coefficient at the 5 % level for *CEO_POWER*. We notice that the *CEO_POWER* coefficients are smaller than those reported in Table 5 due to the removal of possible omitted time-invariant variable bias. However, the firm fixed-effect regression results confirm our main findings of a negative relationship between CEO power and climate change disclosure.

4.5.4. *Instrumental variable analysis*

In estimating our regression models, we apply a lead-lag approach, which helps to mitigate some concerns related to reverse causality. However, correlated omitted variables remain a potentially more significant issue. For example, an unobserved factor could influence both a firm's CEO power and climate change disclosures, leading to biased regression coefficients and standard errors, which could result in a spurious relationship. To address this concern, we employ instrumental variable analysis. This approach helps

Table 6
Entropy balancing analysis.

Panel A: Descriptive statistics for *CCDS* model variables after entropy balancing

	Treatment (*HIGH_CEO_POWER*)			Control (*LOW_CEO_POWER*)		
	Mean	**Variance**	**Skewness**	**Mean**	**Variance**	**Skewness**
FIRM_SIZE	9.966	1.310	0.133	9.966	1.310	0.133
MB	4.671	3160.000	6.434	4.671	3160.000	6.434
LEVERAGE	0.272	0.026	1.822	0.272	0.026	1.822
RGROWTH	0.058	0.023	2.248	0.058	0.023	2.286
EXTFIN	-0.014	0.008	3.172	-0.014	0.008	3.172
FOREIGN	0.710	0.206	-0.927	0.710	0.206	-0.927
LITIGATION	0.263	0.194	1.077	0.263	0.194	1.077
FIRM_AGE	3.594	0.384	-1.011	3.594	0.384	-1.011
PROFITABILITY	0.070	0.004	-0.545	0.070	0.004	-0.545
CAPIN	0.087	0.015	3.446	0.087	0.015	3.446
ASSET_NEW	0.506	0.019	0.323	0.506	0.019	0.323
ENV_STRENGTH	0.172	0.035	1.480	0.172	0.035	1.480
ENV_CONCERN	0.079	0.022	2.157	0.079	0.022	2.157

Panel B: Descriptive statistics for *CCDS* model variables after entropy balancing

	Treatment (*HIGH_CEO_POWER*)			Control (*LOW_CEO_POWER*)		
	Mean	**Variance**	**Skewness**	**Mean**	**Variance**	**Skewness**
FIRM_SIZE	9.966	1.310	0.133	9.966	1.310	0.133
MB	4.671	3160.000	6.434	4.671	3160.000	6.434
LEVERAGE	0.272	0.026	1.822	0.272	0.026	1.822
RGROWTH	0.058	0.023	2.248	0.058	0.023	2.280
EXTFIN	-0.014	0.008	3.172	-0.014	0.008	3.172
FOREIGN	0.710	0.206	-0.927	0.710	0.206	-0.927
LITIGATION	0.263	0.194	1.077	0.263	0.194	1.077
FIRM_AGE	3.594	0.384	-1.011	3.594	0.384	-1.011
PROFITABILITY	0.070	0.004	-0.545	0.070	0.004	-0.545
CAPIN	0.087	0.015	3.446	0.087	0.015	3.446
ASSET_NEW	0.506	0.019	0.323	0.506	0.019	0.323
ENV_STRENGTH	0.172	0.035	1.480	0.172	0.035	1.480
ENV_CONCERN	0.079	0.022	2.157	0.079	0.022	2.157
BSIZE	2.753	0.024	-1.171	2.753	0.024	-1.171
BIND	0.635	0.008	-0.875	0.635	0.008	-0.875

Panel C: Second-stage regression results of the relationship between CEO power and climate change performance

	Dependent variable = $CCDS_{t+1}$	
	Model (1)	**Model (2)**
CEO_POWER	-0.036***	-0.038***
	(-2.745)	(-2.930)
Intercept	-0.421**	-0.653***
	(-2.214)	(-2.936)
Firm-level control variables	Yes	Yes
Board-related variables	No	Yes
Year-fixed effects	Yes	Yes
Industry-fixed effects	Yes	Yes
Observations	3512	3512
R^2	0.183	0.185

This table presents the results of the entropy balancing analysis. Panels A and B report the moments for the covariates for the treatment group (i.e., CEO power higher than the sample's median) and control groups (i.e., CEO power lower than the sample's median). Panel C reports the regression results based on the entropy-balanced sample. Robust two-tailed *t*-statistics clustered by firm are presented in parentheses. Superscripts ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % levels, respectively. All variables are defined in Appendix A.

mitigate bias from correlated omitted variables, providing more accurate and robust estimates. Specifically, we select CEO dismissal (i.e., forced or involuntary turnover), represented by *CEO_DISMISSAL*, as an instrumental variable. CEO dismissal refers to forced CEO turnover for reasons other than age or health concerns (Fredrickson, Hambrick, & Baumrin, 1988; Zhang, 2008; Wang, Zhu, Avolio, Shen, & Waldman, 2023). It typically occurs when a CEO is removed due to performance issues, strategic disagreements, or governance concerns rather than voluntary retirement or resignation due to personal health or age-related factors. Previous studies have shown that powerful CEOs can shield themselves from forced turnover (Pi & Lowe, 2011). Additionally, Onali, Galiakhmetova, Molyneux, and Torluccio (2016) employed unforced turnover as an instrument for CEO power. Since *CEO_DISMISSAL* is highly correlated with CEO power but unrelated to climate change disclosure, *CEO_DISMISSAL* serves as a valid instrumental variable. Following Wang et al. (2023), we measure *CEO_DISMISSAL* as an indicator variable that takes a value of 1 if the CEO was dismissed during the year and 0 otherwise.

Table 7
Heckman's (1979) two-stage analysis.

Panel A: Heckman's (1979) first-stage probit regression results

	Dependent variable = CDP_t		
	Coefficient	**z-statistic**	**p-value**
PROPDISC	2.778	8.284	0.000
CDP_LAG	2.342	34.244	0.000
FIRM_SIZE	0.157	5.583	0.000
MB	0.000	0.925	0.355
LEVERAGE	-0.051	-0.314	0.753
RGROWTH	-0.132	-1.568	0.117
EXTFIN	-0.096	-0.389	0.697
FOREIGN	0.163	2.686	0.007
LITIGATION	-0.152	-0.783	0.434
FIRM_AGE	0.074	1.795	0.073
PROFITABILITY	-0.402	-1.128	0.259
CAPIN	-0.164	-0.907	0.364
ASSET_NEW	-0.469	-2.308	0.021
ENV_STRENGTH	1.571	6.827	0.000
ENV_CONCERN	-0.361	-1.300	0.194
Intercept	-4.088	-8.218	0.000
Year-fixed effects		Yes	
Industry-fixed effects		Yes	
Observations		5,487	
Pseudo-R^2		0.556	
Log-likelihood		-1595.39	
Partial R^2 – *PROPDISC*		7.78 %	
Partial R^2 – *CDP_LAG*		20.80 %	

Panel B: Heckman's (1979) second-stage regression results

	Dependent variable = $CCDS_{t+1}$	
	Model (1)	**Model (2)**
CEO_POWER	-0.103***	-0.109***
	(-3.288)	(-3.481)
IMR	-0.071***	-0.067***
	(-4.833)	(-4.546)
Intercept	-0.214	-0.489**
	(-1.154)	(-2.235)
Firm-level control variables	Yes	Yes
Board-related variables	No	Yes
Year-fixed effects	Yes	Yes
Industry-fixed effects	Yes	Yes
Observations	3200	3200
R^2	0.189	0.192

This table presents the results of Heckman's (1979) two-stage analysis. Panel A reports Heckman's (1979) first-stage regression results, where firms' responses to the CDP questionnaire are used as a dependent variable. Panel B reports Heckman's (1979) second-stage regression results where climate change disclosure is used as a dependent variable. Robust two-tailed *t*-statistics clustered by firm are presented in parentheses. Superscripts ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % levels, respectively. All variables are defined in Appendix A.

Table 9 presents the results from the two-stage least squares (2SLS) regression. In Model (1), the coefficient for *CEO_DISMISSAL* is negative and statistically significant at the 1 % level. Additionally, the first-stage regression shows Shea's Partial R^2 value of 3.70 % and a partial *F*-statistic of 149.255, indicating that our instrumental variable is not weak, as supported by Stock, Wright, and Yogo (2002). Therefore, our choice of instruments meets the conditions for both exogeneity and relevance. In Model (2), the predicted CEO power *(CEO_POWER_PREDICTED)* shows a negative and statistically significant coefficient at the 1 % level, further reinforcing the finding that CEO power negatively influences climate change disclosure under the instrumental variable approach.

4.6. Alternative measures of climate change disclosure and CEO power

We further explore alternative measures for climate change disclosure beyond the primary climate change disclosure scores. We investigate the relationship between CEO power and several proxies for climate change disclosures, including firms' responses to the CDP climate change questionnaire response, climate-linked CEO compensation, GHG emissions scopes, and assurance of GHG emissions, as suggested by previous literature (Cohen & Simnett, 2015; Depoers, Jeanjean, & Jérôme, 2016; Bose et al., 2023a; Dey et al., 2024). Table 10 reports the regression results, with Model (1) reporting the results for the impact of CEO power on the likelihood of the firms' responses to the CDP climate change survey. We find a significant coefficient on *CEO_POWER* (coefficient=-0.765, p-value < 0.01). This suggests that firms with more powerful CEOs are less likely to respond to the CDP climate change survey. Furthermore, Model (2) reports the results on the influence of CEO power on the probability of a climate-linked compensation contract being

Table 8
Firm fixed-effects regression results between climate change disclosure and CEO power.

	Dependent variable = $CCDS_{t+1}$	
	Model (1)	**Model (2)**
CEO_POWER	-0.073**	-0.072**
	(-2.445)	(-2.352)
FIRM_SIZE	0.035*	0.035*
	(1.707)	(1.684)
MB	0.000	0.000
	(1.161)	(1.165)
LEVERAGE	0.205***	0.204***
	(2.947)	(2.928)
RGROWTH	-0.020*	-0.020*
	(-1.799)	(-1.773)
EXTFIN	0.010	0.011
	(0.193)	(0.200)
FOREIGN	-0.004	-0.004
	(-0.169)	(-0.174)
FIRM_AGE	0.208***	0.208***
	(2.972)	(2.946)
PROFITABILITY	0.214**	0.215**
	(2.081)	(2.094)
CAPIN	-0.026	-0.025
	(-0.293)	(-0.285)
ASSET_NEW	-0.115	-0.118
	(-0.806)	(-0.829)
ENV_STRENGTH	0.094*	0.093*
	(1.952)	(1.946)
ENV_CONCERN	-0.078	-0.079
	(-0.967)	(-0.973)
BOARD_SIZE	——	0.015
		(0.240)
BOARD_IND	——	-0.033
		(-0.286)
Intercept	-0.476*	-0.496
	(-1.666)	(-1.590)
Year-fixed effects	Yes	Yes
Industry-fixed effects	Yes	Yes
Observations	3512	3512
R^2	0.605	0.605

This table reports the firm fixed-effect regression results. Robust two-tailed *t*-statistics clustered by firm are presented in parentheses. Superscripts ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % levels, respectively. All variables are defined in Appendix A.

awarded to the CEO by the firm. We find a significant negative relationship between CEO power and the likelihood of aligning CEO compensation contracts with stakeholder interests (coefficient=-0.492, p-value < 0.10). This indicates that firms with more powerful CEOs are less likely to adopt climate-linked compensation contracts.

Table 10, Models (3)–(5) report the regression results for the relationship between CEO power and the three scopes of GHG emissions. The results show that CEO power (*CEO_POWER*) has a significant negative impact on the disclosure of both direct (Scope1) and indirect (Scope2) GHG emissions, with coefficients of -0.548 and -0.560, respectively (both significant at p-value < 0.05). This indicates that more powerful CEOs are less likely to disclose this emissions information. In Model (5), the influence of CEO power on Scope3 GHG emissions (supply chain emissions) is also negative but not statistically significant. This suggests a less pronounced effect of CEO power on the disclosure of Scope 3 emissions because Scope 3 is not as dominant as it is on Scopes 1 and 2. Table 10, Model (6) reports the regression results of the relationship between CEO power and the assurance of GHG emissions. The coefficient of *CEO_POWER* is negative and statistically significant, suggesting that CEO power negatively impacts a firm's decision to obtain assurance on GHG emissions.

Finally, to ensure the robustness of our findings, we developed an alternative CEO power index using principal component analysis (PCA). PCA is widely used in research to combine multiple related variables into a single index, as it reduces dimensionality while preserving the underlying structure of the data (Lee & Bose, 2021). Specifically, we applied PCA to combine CEO duality, tenure, title (i.e., education qualification), age, and equity shareholdings into a single power index, capturing the common variance among these variables. The results remain qualitatively similar, as shown in Model (7) of Table 10. The consistency of the coefficients and significance levels across both approaches confirms the robustness of our findings, regardless of how CEO power is measured. Overall, our main findings remain robust using this alternative measure as a proxy for climate change disclosure.

Table 9
Instrumental variable analysis.

	First Stage DV = *CEO_POWER*$_t$ Model (1)	Second Stage DV = *CCDS* $_{t+1}$ Model (2)
CEO_POWER_PREDICTED	—	-0.938***
		(-7.35)
SIZE	0.025***	0.67***
	(6.55)	(9.59)
MB	-0.000	0.000
	(-0.51)	(0.81)
LEV	-0.006	0.60
	(-0.26)	(1.42)
SGROWTH	-0.013	-0.045*
	(-1.23)	(-2.84)
FIN	0.007	0.004
	(0.22)	(0.07)
FOREIGN	-0.009	0.010
	(-0.93)	(0.68)
LITG	-0.024	0.159***
	(-0.64)	(3.46)
FAGE	0.0133*	0.007
	(2.16)	(0.75)
ROA	0.193***	0.175
	(3.57)	(1.82)
CAPIN	0.021	0.002
	(0.64)	(0.04)
NEW	-0.066*	-0.010
	(-2.12)	(-0.20)
ENV_STRENGTH	0.294	0.358***
	(1.06)	(8.16)
ENV_CONCERN	0.029	-0.133
	(0.82)	(-0.23)
CEO_DISMISSAL	-0.188***	—
	(-12.22)	
Intercept	-0.216**	-0.657***
	(-2.90)	(-4.67)
Year-fixed effects	Yes	Yes
Industry-fixed effects	Yes	Yes
Observations	3,512	3,512
R^2	0.159	0.178
Shea's Partial *R*-squared	0.0366	—
Partial *F*-statistic	149.255	—

This table presents the results of two-stage least squares (2SLS) regression results. Model (1) shows the first-stage regression results where CEO power is used as the dependent variable. Model (2) shows the second-stage regression results where climate change disclosure is used as the dependent variable. Superscripts ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % levels, respectively. DV = dependent variable. All variables are defined in Appendix A

4.7. Potential mechanism in the relationship between climate change disclosure and CEO power

In this section, we explore the mechanism through which CEO power reduces climate change disclosure, with a focus on firm-level transparency. Specifically, we assess how earnings management, as a proxy for transparency, enables powerful CEOs to influence climate change disclosures. CEOs can mask the costs or risks associated with climate initiatives by manipulating earnings to meet short-term goals, often at the expense of long-term sustainability. In firms with strong CEO power, this practice may reduce the quality and reliability of climate change disclosures, potentially misleading stakeholders. Thus, we examine firm-level transparency as a key mechanism in the negative relationship between CEO power and climate change disclosures. To test this mediation effect, we develop the following set of equations:

$$CCDS_{i,t+1} = \beta_0 + \beta_1 CEO\_POWER_{i,t} + \sum Controls_{i,t} + \sum YEAR_{i,t} + \sum INDUSTRY_{i,t} + \varepsilon_{i,t+1} \quad (3.1)$$

$$TRANS_{i,t+1} = \gamma_0 + \gamma_1 CEO\_POWER_{i,t} + \sum Controls_{i,t} + \sum YEAR_{i,t} + \sum INDUSTRY_{i,t} + \varepsilon_{i,t+1} \quad (3.2)$$

Table 10
Regression results of the relationship between CEO power and climate change disclosure: Alternative proxies for climate change disclosure and CEO power.

	DV=CDP_Response $_{t+1}$ Model (1)	DV=Climate_Incentive $_{t+1}$ Model (2)	DV=Scope1_Disc $_{t+1}$ Model (3)	DV=Scope2_Disc $_{t+1}$ Model (4)	DV=Scope3_Disc $_{t+1}$ Model (5)	DV = GHG_Assurance $_{t+1}$ Model (6)	DV=CCDS$_{t+1}$ Model (7)
CEO_POWER	-0.765***	-0.492*	-0.548**	-0.560**	-0.157	-0.799**	-0.018***
	(-5.711)	(-1.860)	(-1.996)	(-2.086)	(-0.580)	(-2.363)	(-2.752)
FIRM_SIZE	0.285***	0.196***	-0.132*	-0.151**	-0.412***	0.476***	0.047***
	(7.082)	(2.734)	(-1.892)	(-2.157)	(-4.765)	(5.120)	(4.342)
MB	0.001*	-0.000	0.000	0.000	-0.002*	0.000	0.000
	(1.745)	(-0.590)	(0.389)	(0.233)	(-1.907)	(0.119)	(1.103)
LEVERAGE	0.217	-0.299	0.680	0.631	0.299	0.236	0.069
	(1.109)	(-0.719)	(1.630)	(1.530)	(0.640)	(0.463)	(1.050)
RGROWTH	-0.236*	-0.101	-0.271	-0.277	-0.151	-0.441	-0.039***
	(-1.712)	(-0.328)	(-1.481)	(-1.519)	(-0.949)	(-1.350)	(-2.677)
EXTFIN	-0.187	-0.140	-0.427	-0.462	-0.067	-0.067	-0.008
	(-0.984)	(-0.289)	(-1.026)	(-1.119)	(-0.155)	(-0.143)	(-0.140)
FOREIGN	0.115	-0.127	0.011	0.044	-0.090	-0.235	0.016
	(1.516)	(-0.852)	(0.080)	(0.311)	(-0.504)	(-1.274)	(0.688)
LITIGATION	0.259	0.196	0.340	0.312	1.601**	-0.741	0.192***
	(0.963)	(0.417)	(0.476)	(0.446)	(2.260)	(-1.039)	(2.866)
FIRM_AGE	0.202***	0.281***	0.157	0.142	0.175	-0.141	-0.003
	(3.566)	(2.622)	(1.462)	(1.317)	(1.341)	(-1.033)	(-0.156)
PROFITABILITY	-0.673*	0.393	0.344	0.422	0.288	-0.042	-0.032
	(-1.747)	(0.440)	(0.426)	(0.515)	(0.275)	(-0.041)	(-0.263)
CAPIN	-0.005	0.536	0.440	-0.087	-0.230	0.139	-0.023
	(-0.037)	(1.015)	(0.856)	(-0.176)	(-0.450)	(0.219)	(-0.285)
ASSET_NEW	-0.927***	-0.581	-0.337	-0.182	0.874	1.008	0.058
	(-3.346)	(-0.975)	(-0.641)	(-0.344)	(1.379)	(1.423)	(0.725)
ENV_STRENGTH	2.531***	1.085***	2.064***	2.366***	1.527***	2.302***	0.346***
	(9.582)	(2.711)	(4.475)	(5.097)	(3.479)	(4.697)	(6.326)
ENV_CONCERN	-0.649**	-1.000*	0.026	-0.982*	-1.785***	1.435**	-0.040
	(-2.484)	(-1.668)	(0.047)	(-1.741)	(-2.809)	(1.999)	(-0.536)
BOARD_SIZE	0.799***	1.202***	0.691*	0.834**	1.955***	0.705	0.107*
	(3.780)	(3.118)	(1.846)	(2.273)	(4.422)	(1.468)	(1.903)
BOARD_IND	-0.121	0.047	-0.056	-0.083	-0.343	-0.058	0.065
	(-0.477)	(0.091)	(-0.108)	(-0.163)	(-0.608)	(-0.090)	(0.861)
Intercept	-4.740***	-5.058***	-0.929	-0.953	-2.851**	-26.462***	-0.318
	(-6.415)	(-3.949)	(-0.688)	(-0.671)	(-2.238)	(-16.197)	(-1.557)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,758	3,512	3,512	3,512	3,512	3,512	3,512
Pseudo-R^2/R^2	0.218	0.117	0.161	0.120	0.200	0.303	0.176

This table presents the regression results of the relationship between CEO power and some components of climate change disclosure. Model (1) shows the regression results using firms' responses to the CDP questionnaire as the dependent variable. Model (2) shows the regression results using the linking of climate-related issues with incentive contracts as the dependent variable. Models (3)-(5) show the regression results using the firms' disclosure of Scope 1, Scope 2, and Scope 3 emissions disclosure as the dependent variable. Model (6) shows the regression results using the assurance of carbon emissions information as the dependent variable. Model (7) shows the regression results using an alternative measure of the CEO power index based on principal component analysis (PCA). Robust two-tailed t-statistics clustered by firm are presented in parentheses. Superscripts ***, **, and * indicate statistical significance levels at 1 %, 5 %, and 10 % levels, respectively. All variables are defined in Appendix A.

$$CCDS_{i,t+1} = \omega_0 + \omega_1 CEO\_POWER_{i,t} + \omega_2 TRANS_{i,t+1} + \sum Controls_{i,t} + \sum YEAR_{i,t} + \sum INDUSTRY_{i,t} + \varepsilon_{i,t+1} \quad (3.3)$$

In Equation (3.1), the coefficient of β_1 represents the total impact of *CEO_POWER* on a firm's climate change disclosures (*CCDS)*. In Equation (3.2), γ_1 reflects the effect of *CEO_POWER* on transparency *(TRANS)*,[4] while ω_1 in Equation (3.3) represents the direct effect of *CEO_POWER* on *CCDS* after controlling for the mediator variable, *TRANS*. We follow Wen and Ye's (2014) assumption by considering *TRANS* as a mediator variable. For *TRANS* to be considered a mediator, three conditions must be met: (1) *CEO_POWER* must be significantly related to *CCDS* ($\beta_1 \neq 0$) in Equation (3.1); (2) *CEO_POWER* must be significantly related to *TRANS* ($\gamma_1 \neq 0$) in Equation (3.2); and (3) *TRANS* must be significantly related to *CCDS* ($\omega_2 \neq 0$) after controlling for *CEO_POWER* in Equation (3.3). Once these relationships are established, it is essential to determine whether the average causal mediation effect is statistically significant. To assess whether *TRANS* transmits the effect of the treatment variable *(CEO_POWER)* on CCDS, we apply the bootstrapped Sobel–Goodman test (Preacher & Hayes, 2004). This test is particularly useful when analyzing potential mediation by running Equations (3.1)–(3.3) concurrently, allowing us to explore the relationships between *CEO_POWER*, *CCDS,* and *TRANS*.

Table 11 reports the regression results. In Model (1), the coefficient for *CEO_POWER* is negative and statistically significant at the 1 % level when *CCDS* is the dependent variable, indicating that firms with higher CEO power provide lower levels of climate change disclosures. In Model (2), *CEO_POWER* has a positive and statistically significant coefficient at the 1 % level, suggesting that firms with powerful CEOs exhibit lower transparency. Furthermore, in Model (3), the coefficient for *CEO_POWER* remains negative and statistically significant at the 1 % level when *CCDS* is the dependent variable, while the coefficient for *TRANS* is also negative and significant at the 1 % level. These results indicate partial mediation, as the negative impact of *CEO_POWER* on transparency remains even after accounting for its influence on climate change disclosures.

Table 11 presents mediation-related statistics, showing that the direct effect of *TRANS* on *CCDS* is -0.033, while the total effect is -0.052. The *z*-statistic confirms that this mediation effect is statistically significant, with the mediated portion of firm value attributed to *TRANS* accounting for 36.54 % of the total effect. The results are also graphically represented in Fig. 1. In summary, the mediation analysis demonstrates that *CEO_POWER* reduces climate change disclosures by lowering firm-level transparency, highlighting the important role of transparency in this relationship.

4.8. CEO power and climate change disclosures: Roles of internal and external monitoring

Hypothesis H2 predicts that the negative relationship between CEO power and climate change disclosure is weaker for firms with a higher level of external monitoring. We use financial analyst following and institutional ownership as proxies for external monitoring. We create a dummy variable for analyst following (*HIGH_ANALYST*) that takes the value of 1 if the total number of analyst coverage in a firm is equal to or larger than the sample's yearly median, and 0 otherwise. Similarly, we create a dummy variable *HIGH_INSTOWN* to capture institutional ownership, with this variable taking the value of 1 if the number of institutional owners is equal to or larger than the sample's yearly median, and 0 otherwise.

To capture the effects of CEO power on climate change disclosure for firms with a high number of analyst coverage and a high level of institutional ownership, the study uses the interaction terms *CEO_POWER* × *HIGH_ANALYST* and *CEO_POWER* × *HIGH_INSTOWN*, respectively. Table 12, Models (1) and (2) report positive and statistically significant coefficients at the 1 % level for *CEO_POWER* × *HIGH_ANALYST*, indicating that increased analyst coverage weakens the negative impact of CEO power on climate change disclosure. Similarly, Models (3) and (4) show positive and statistically significant coefficients at the 5 % level for *CEO_POWER* × *HIGH_INSTOWN*, suggesting that increased institutional ownership weakens the negative impact of CEO power on climate change disclosure. These results imply that the negative effect of CEO power on climate change disclosure is mitigated by stronger external monitoring from analysts and institutional investors.

Hypothesis H3 predicts that the negative relationship between CEO power and climate change disclosure is weaker for firms with weak internal governance. We employ Bebchuk, Cohen, and Ferrell's (2009) Entrenchment Index (E-index) as a proxy for the quality of internal governance. The E-Index comprises six different factors; hence, it can have a score from 0 to 6. A lower E-Index score suggests stronger governance, while a higher score suggests weaker governance. We create a dummy variable *HIGH_EIND* that takes the value of 1 if the firm's E-Index score is higher than or equal to the sample's yearly median score, and 0 otherwise. Therefore, *HIGH_EIND* = *1* means that the firm experiences poor internal governance, while *HIGH_EIND* = *0* means that the firm is experiencing strong governance.

The interaction term *CEO_POWER* × *HIGH_EIND* captures the effects of CEO power on climate change disclosure for firms with poor internal governance. Table 12, Models (5) and (6) report negative and statistically significant coefficients at 5 % levels (respectively) for *CEO_POWER* × *HIGH_EIND*, indicating that weak internal governance amplifies the negative impact of CEO power on climate change disclosure. This suggests that in firms with weak governance and less oversight, the negative effect of CEO power on climate change disclosure is stronger, as CEOs are more likely to withhold climate-related information in the absence of robust internal

[4] We measure transparency *(TRANS)* as the absolute value of abnormal accruals, estimated based on the modified Jones model, following Bose and Yu (2023). A higher value of *TRANS* indicates a lower level of transparency, and vice versa.

Table 11
Channel analysis: Regression results between climate change disclosure and CEO power.

	DV= *CCDS* $_{t+1}$ Model (1)	DV = *TRANS*$_t$ Model (2)	DV= *CCDS* $_{t+1}$ Model (3)
CEO_POWER	-0.052***	0.084***	-0.033***
	(-7.250)	(24.480)	(-4.223)
TRANS	—	—	-0.223***
			(-5.577)
FIRM_SIZE	0.030***	0.019***	0.034***
	(5.910)	(7.670)	(6.691)
MB	0.001	0.001	0.000
	(0.070)	(0.590)	(0.138)
LEVERAGE	0.065*	-0.032*	0.058*
	(0.060)	(-1.950)	(1.683)
RGROWTH	-0.035	0.057***	-0.023
	(-1.040)	(3.480)	(-0.669)
EXTFIN	0.002	-0.039*	-0.006
	(0.050)	(-1.730)	(-0.137)
FOREIGN	0.032**	0.006	0.033**
	(2.290)	(0.850)	(2.390)
LITIGATION	0.107***	0.090***	0.127***
	(2.620)	(4.650)	(3.126)
FIRM_AGE	0.004	-0.016	0.000
	(0.440)	(-0.3810)	(0.033)
PROFITABILITY	0.040***	0.074*	0.056
	(0.500)	(1.930)	(0.706)
CAPIN	0.0990*	-0.027	0.093*
	(1.900)	(-1.100)	(1.793)
ASSET_NEW	0.093**	0.068***	0.108**
	(2.030)	(3.140)	(2.376)
ENV_STRENGTH	0.261***	-0.077***	0.243***
	(7.080)	(-4.390)	(6.622)
ENV_CONCERN	-0.066	0.079***	-0.048
	(-1.290)	(3.250)	(-0.946)
Intercept	0.104	-0.062*	0.090
	(1.350)	(-1.700)	(1.174)
Year-fixed effects	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes
Observations	2,751	2,751	2,751
R^2	0.146	0.426	0.155
Mediating effects (Bootstrapped)			
Indirect effect – *TRANS* × *CEO_POWER*		-0.019***	
z-statistic for indirect effect – *TRANS* × *CEO_POWER*		(-5.437)	
Direct effect		-0.033	
Total effect		-0.052	
% of the total mediated effect		36.54 %	

This table presents the regression results of the mediation role of firm-level transparency in the relationship between CEO power and firm valuation. Model (1) shows the regression results of the impact of CEO power on climate change disclosure. Model (2) shows the regression results of the impact of CEO power on firm-level transparency. Model (3) shows the regression results of the impact of CEO power on climate change disclosure after controlling for firm-level transparency. The mediation effect test statistics are reported in the bottom section of the table. Robust two-tailed *t*-statistics are presented in parentheses. Superscripts ***, **, and * indicate statistical significance levels at 1 %, 5 %, and 10 % levels, respectively. DV = dependent variable. All variables are defined in Appendix A.

governance.[5]

4.9. CEO power and climate change disclosures: Role of external political environment

Prior research argues that firm-level environmental disclosures are impacted by the community preferences in the area where a firm's headquarters are located (Deng, Kang, & Low, 2013; Di Giuli & Kostovetsky, 2014). Building on this research, which links community preferences and CSR practices (Deng et al., 2013; Di Giuli & Kostovetsky, 2014), we hypothesize that the political leaning of a state might affect the relationship between climate change disclosures and CEO power. Specifically, we anticipate that firms headquartered in Republican-controlled states (Red states) may exhibit a stronger negative relationship between CEO power and

[5] We further conduct subsample analyses by splitting the sample at the median based on CEO power, internal governance, and external monitoring levels. The regression results for these subsamples are compared to assess whether the coefficients differ across groups. For the sake of brevity, we do not tabulate the regression outputs. However, the unreported results indicate that the findings remain qualitatively consistent across subsamples.

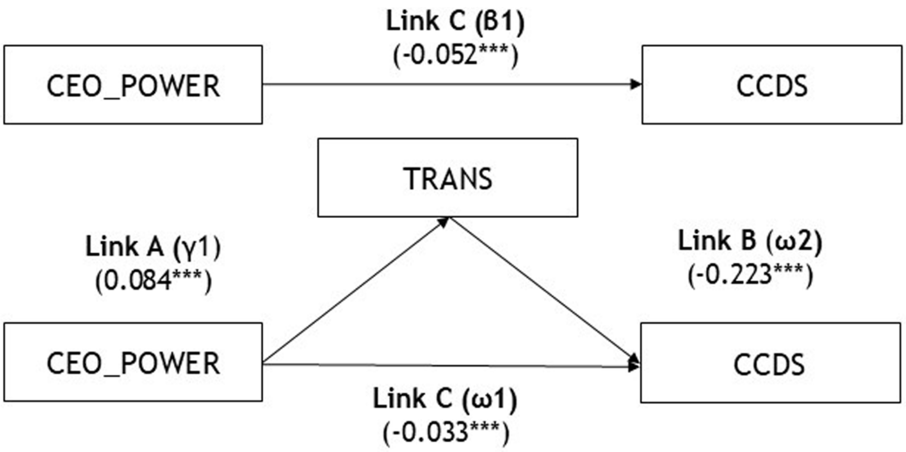

Fig. 1. Paths between CCDS, CEO power, and Transparency.

Table 12
Regression results between climate change disclosure and CEO power: Role of internal and external monitoring.

	Dependent variable = $CCDS_{t+1}$					
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
CEO_POWER	-0.118***	-0.128***	-0.082**	-0.091**	0.062	0.054
	(-3.030)	(-3.313)	(-1.987)	(-2.189)	(1.360)	(1.204)
CEO_POWER × HIGH_ANALYST	0.148***	0.161***	—	—	—	—
	(3.040)	(3.312)				
HIGH_ANALYST	-0.049	-0.059*	—	—	—	—
	(-1.616)	(-1.949)				
CEO_POWER × HIGH_INSTOWN	—	—	0.106**	0.113**	—	—
			(2.000)	(2.125)		
HIGH_INSTOWN	—	—	-0.074**	-0.080**	—	—
			(-2.270)	(-2.484)		
CEO_POWER × HIGH_EIND	—	—	—	—	-0.122**	-0.115**
					(-2.220)	(-2.104)
HIGH_EIND	—	—	—	—	0.040	0.029
					(1.247)	(0.921)
Intercept	0.018	-0.255	0.131	-0.129	0.017	-0.267
	(0.100)	(-1.255)	(0.763)	(-0.652)	(0.095)	(-1.340)
Firm-level control variables	Yes	Yes	Yes	Yes	Yes	Yes
Board-related variables	No	Yes	No	Yes	No	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3438	3438	3429	3429	3390	3390
R^2	0.176	0.179	0.171	0.174	0.168	0.173

This table presents the regression results for the role of internal and external monitoring. Models (1) and (2) show the regression results of the moderating role of financial analysts' coverage in the relationship between CEO power and climate change disclosure. Models (3) and (4) show the regression results of the moderating role of institutional investors' ownership in the relationship between CEO power and climate change disclosure. Models (5) and (6) show the regression results of the moderating role of the entrenchment index in the relationship between CEO power and climate change disclosure. Robust two-tailed t-statistics clustered by firm are presented in parentheses. Superscripts ***, **, and * indicate statistical significance levels at 1 %, 5 %, and 10 % levels, respectively. All variables are defined in Appendix A.

climate change disclosure compared to firms in Democrat-controlled states (Blue states). To test this hypothesis, we categorize firms based on the political control of the state where their headquarters are located and conduct separate regression analyses for each group. This approach allows us to assess whether the political context, which reflects community preferences in these states, moderates the influence of CEO power on a firm's climate change disclosure practices.

Table 13 presents the regression results for firms categorized by the political leaning of the state in which their headquarters are located. In Models (1) and (3), we observe that the coefficients for *CEO_POWER* in Blue states are negative and statistically significant at the 5 % level. Similarly, in Models (2) and (4), the coefficients for *CEO_POWER* in Red states are negative and statistically significant at the 1 % level. While all models show a negative and significant relationship, the coefficients for firms headquartered in Red states are notably larger than those for firms in Blue states. This indicates that firms with headquarters in Red states exhibit a stronger negative relationship between CEO power and climate change disclosure compared to those in Blue states, supporting the hypothesis that political context moderates this relationship.

Table 13
Regression results of the relationship between CEO power and climate change disclosure: Democratic Party (Blue) states vs. Republican Party (Red) states.

	Dependent variable = *CCDS* $_{t+1}$			
	BLUE Model (1)	**RED Model (2)**	**BLUE Model (3)**	**RED Model (4)**
CEO_POWER	-0.086**	-0.151***	-0.088**	-0.164***
	(-2.296)	(-3.153)	(-2.338)	(-3.468)
FIRM_SIZE	0.043***	0.077***	0.033**	0.077***
	(3.217)	(4.806)	(2.268)	(4.243)
MB	0.000	0.000	0.000	0.000
	(1.052)	(0.690)	(0.987)	(0.609)
LEVERAGE	0.012	0.151*	0.005	0.155*
	(0.148)	(1.886)	(0.068)	(1.942)
RGROWTH	-0.031***	-0.100	-0.028**	-0.097
	(-2.623)	(-1.603)	(-2.412)	(-1.567)
EXTFIN	0.063	-0.091	0.069	-0.098
	(1.005)	(-1.031)	(1.084)	(-1.142)
FOREIGN	0.011	0.108***	0.009	0.105***
	(0.346)	(3.194)	(0.270)	(2.975)
LITIGATION	0.241**	-0.336***	0.262**	-0.312***
	(2.324)	(-3.382)	(2.515)	(-3.126)
FIRM_AGE	0.024	-0.026	0.013	-0.033
	(1.076)	(-0.794)	(0.591)	(-0.949)
PROFITABILITY	0.045	-0.211	0.091	-0.195
	(0.253)	(-1.179)	(0.505)	(-1.081)
CAPIN	0.252	0.088	0.221	0.097
	(1.213)	(0.791)	(1.107)	(0.885)
ASSET_NEW	0.088	0.046	0.096	0.047
	(0.873)	(0.288)	(0.957)	(0.290)
ENV_STRENGTH	0.315***	0.356***	0.307***	0.355***
	(5.167)	(3.014)	(5.038)	(3.013)
ENV_CONCERN	-0.066	-0.052	-0.063	-0.063
	(-0.728)	(-0.540)	(-0.693)	(-0.664)
BOARD_SIZE	—	—	0.167**	0.028
			(2.490)	(0.262)
BOARD_IND	—	—	0.060	0.148
			(0.614)	(1.047)
Intercept	-0.234	0.285	-0.597***	0.104
	(-1.382)	(1.428)	(-2.841)	(0.324)
Year-fixed effects	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes
Observations	2229	1026	2229	1026
R^2	0.195	0.299	0.200	0.301

This table presents the regression results of the relationship between CEO power and climate change disclosure separately for firms headquartered in Democratic Party (Blue) states and those headquartered in Republican Party (Red) states. Models (1) and (3) show the regression results of the relationship between CEO power and climate change disclosure-based firms headquartered in Democratic Party (Blue) states. Models (2) and (4) show the regression results of the relationship between CEO power and climate change disclosure-based firms headquartered in Republican Party (Red) states. Robust two-tailed t-statistics clustered by firm are presented in parentheses. Superscripts ***, **, and * indicate statistical significance levels at 1 %, 5 %, and 10 % levels, respectively. All variables are defined in Appendix A.

5. Additional analyses and robustness checks

5.1. Role of environmentally-sensitive and financial industries

While we control for industry in our analyses, it is essential to account for materiality in climate change disclosures, especially in environmentally-sensitive industries. In these industries, climate risks are integral to operations, driving more extensive disclosures, whereas non-sensitive industries may disclose less due to lower perceived relevance. Financial institutions, despite their indirect climate change impact through financing, often overlook such disclosures under materiality considerations. By distinguishing between these industry types, we show how CEO power influences climate disclosures differently, depending on the industry's relevance to environmental issues. This approach provides a nuanced understanding of CEO power's impact on transparency, addressing industry-specific materiality considerations that shape disclosure practices. Therefore, we conducted sub-sample analyses based on environmentally sensitive versus non-sensitive industries and financial versus non-financial industries, the results of which are presented in

Table 14
Regression results between climate change disclosure and CEO power: Role of industry.

Panel A: Sub-sample analysis results between climate change disclosure and CEO power based on environmentally-sensitive industries

	Dependent variable = $CCDS_{t+1}$			
	ESI = 1 Model (1)	ESI = 0 Model (2)	ESI = 1 Model (3)	ESI = 0 Model (4)
CEO_POWER	-0.099*	-0.103***	-0.101*	-0.110***
	(-1.867)	(-2.865)	(-1.880)	(-3.087)
BOARD_SIZE	—	—	0.249**	0.092
			(2.434)	(1.409)
BOARD_IND	—	—	0.063	0.054
			(0.535)	(0.569)
Intercept	0.443*	-0.380**	0.010	-0.597**
	(1.819)	(-2.074)	(0.037)	(-2.568)
Year-fixed effects	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes
Observations	989	2523	989	2523
R^2	0.185	0.188	0.199	0.190

Panel B: Sub-sample analysis results between climate change disclosure and CEO power based on financial industries

	Dependent variable = $CCDS_{t+1}$			
	FINANCIAL = 1 Model (1)	FINANCIAL = 0 Model (2)	FINANCIAL = 1 Model (3)	FINANCIAL = 0 Model (4)
CEO_POWER	-0.049	-0.111***	-0.058	-0.115***
	(-0.692)	(-3.436)	(-0.763)	(-3.613)
BOARD_SIZE	—	—	0.154	0.113*
			(1.239)	(1.829)
BOARD_IND	—	—	0.085	0.032
			(0.460)	(0.405)
Intercept	0.241	-0.349*	-0.137	-0.588***
	(1.168)	(-1.892)	(-0.342)	(-2.671)
Year-fixed effects	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes
Observations	347	3165	347	3165
R^2	0.331	0.166	0.338	0.169

This table reports the regression results of the relationship between CEO power and climate change disclosure. Panel A reports sub-sample analysis results between climate change disclosure and CEO power based on environmentally-sensitive industries. Panel B reports the sub-sample analysis results between climate change disclosure and CEO power based on financial industries. Panel C reports the sub-sample analysis results between climate change disclosure and CEO power based on Covid-19. Superscripts ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % levels, respectively. All variables are defined in Appendix A.

Table 14.

Panel A presents regression results for environmentally-sensitive industries.[6] In both Model (1) and Model (3), which focus on firms in environmentally-sensitive industries (ESI = 1), CEO power is negatively associated with climate change disclosure. Similarly, in Models (2) and (4) for non-environmentally-sensitive industries (ESI = 0), CEO power also has a significant negative effect on disclosure. This suggests that more powerful CEOs, regardless of the industry's environmental sensitivity, tend to disclose less climate change-related information. This may imply that powerful CEOs, who often have greater decision-making control, deprioritize environmental transparency to avoid scrutiny or because they perceive these disclosures as less critical to their personal or the firm's objectives.

Table 14, Panel B focuses on financial industries. The results show a significant negative relationship between CEO power and climate change disclosure in non-financial firms in Models (2) and (4). In contrast, there is no significant association in financial firms *(FINANCIAL = 1)* in Models (1) and (3). This suggests that powerful CEOs in non-financial industries are less likely to disclose climate change information, possibly due to perceived costs, regulatory burdens, or concerns over shareholder scrutiny. However, in the financial sector, the lack of a significant relationship may reflect a stronger regulatory environment and external pressures from regulators and investors, which drive disclosure practices more than internal CEO dynamics.

5.2. *CEO power, climate change disclosure, and firm valuation: Mediation effect*

In this study, we document that CEO power is negatively associated with climate change disclosure. This investigation is particularly significant in light of prior research that presents a dual perspective on CEO power. On one hand, CEO power is associated with

[6] Following Clarkson, Li, Richardson, and Vasvari (2008), environmentally-sensitive industries *(ESI)* are defined as an indicator variable that takes a value of 1 if a firm operates in Pulp and Paper, Chemicals, Oil and Gas, Metals and Mining, and Utilities industries, and 0 otherwise.

enhanced firm value (Lee & Chen, 2011), suggesting a potential positive impact of strong leadership. On the other hand, there are concerns about powerful CEOs potentially engaging in activities that, while personally beneficial, might be detrimental to shareholder wealth, thereby eroding firm value (Jiraporn & Chintrakarn, 2013). Our study, therefore, examines the mediating role of CCDS in the relationship between CEO power and firm value. To carry out our mediation test, we develop the following sets of equations:

$$TOBINQ_{i,t+1} = \beta_0 + \beta_1 CEO\_POWER_{i,t} + \sum Controls_{i,t} + \sum YEAR_{i,t} + \sum INDUSTRY_{i,t} + \varepsilon_{i,t+1} \quad (4.1)$$

$$CCDS_{i,t+1} = \gamma_0 + \gamma_1 CEO\_POWER_{i,t} + \sum Controls_{i,t} + \sum YEAR_{i,t} + \sum INDUSTRY_{i,t} + \varepsilon_{i,t+1} \quad (4.2)$$

$$TOBINQ_{i,t+1} = \omega_0 + \omega_1 CEO\_POWER_{i,t} + \omega_2 CCDS_{i,t+1} + \sum Controls_{i,t} + \sum YEAR_{i,t} + \sum INDUSTRY_{i,t} + \varepsilon_{i,t+1} \quad (4.3)$$

We use *TOBINQ* as a proxy for firm value. Following Bose, Khan, and Monem (2021), *TOBINQ* is measured as the ratio of the book value of total assets plus the market value of equity minus the book value of equity to total assets. Starting with Equation (4.1), the coefficient of β_1 represents the total impact of *CEO_POWER* on a firm's *TOBINQ*. In Equation (4.2), γ_1 represents the influence of *CEO_POWER* on *CCDS*, while ω_1 in Equation (4.3) represents the direct effect of *CEO_POWER* on *TOBINQ*, after controlling for the mediator variable, *CCDS*. We follow Wen and Ye's (2014) assumption by considering *CCDS* as a mediator variable. If *CEO_POWER* is significantly related to *TOBINQ* ($\beta_1 \neq 0$) in Equation (4.1); if *CEO_POWER* is significantly related to *CCDS* ($\gamma_1 \neq 0$) in Equation (4.2); and if *CCDS* is significantly related to *TOBINQ* ($\omega_2 \neq 0$) after controlling for *CEO_POWER* in Equation (4.3), then we consider *CCDS* to be a mediator. It is crucial to determine if the average causal mediation effect is statistically significant after the links have been established. To determine whether a mediator transmits the effect of the treatment variable to a dependent variable, we employ the bootstrapped Sobel–Goodman test (Preacher & Hayes, 2004). This test is helpful when we concurrently run Equations (4.1)–(4.3) to analyze any possible relationships between the study's variables of interest, *CEO_POWER*, *CCDS,* and *TOBINQ*. Fig. 2 presents the procedure for the mediation test.

Table 15 reports the regression results. Model (1) provides a negative and statistically significant coefficient at the 5 % level for *CEO_POWER* when *TOBINQ* is the dependent variable, suggesting that firms with higher CEO power have lower firm value. Furthermore, Model (2) presents a negative and statistically significant coefficient at the 1 % level for *CEO_POWER*, as in our baseline model findings. This finding suggests that firms with powerful CEOs provide less climate change information. Additionally, in Model (3), the coefficient for *CEO_POWER* is negative and statistically significant at the 5 % level when the dependent variable is *TOBINQ*), while the coefficient for *CCDS* is positive and significant at the 1 % level. These findings support partial mediation as *CEO_POWER*'s negative impact on firm value persists even after controlling for *CCDS*'s impact.

Table 15 provides mediation-related statistics that suggest that the direct and total effects of *CCDS* on firm value are -0.160 and -0.180, respectively. As revealed by the reported z-statistic, this mediation effect is statistically significant; the mediated portion of firm value attributed to CCDS is 11.32 % of the total effect. We also graphically present the results in Fig. 2. In summary, the mediation analysis provides evidence that CEO_POWER reduces reducing climate change disclosures.

6. Conclusions

This study investigates the influence of CEO power on climate change disclosure in all U.S. firms that responded to the CDP questionnaire from 2005–2019. We find that CEO power is negatively related to climate change disclosure, suggesting that CEO power reduces the extent of firm-level climate change disclosure. Furthermore, we find evidence of the impact of external monitoring (proxied by institutional ownership and analyst following) and internal governance (proxied by the E-Index score) on the relationship between CEO power and climate change disclosure. Our findings suggest that a high level of institutional ownership, a high number of

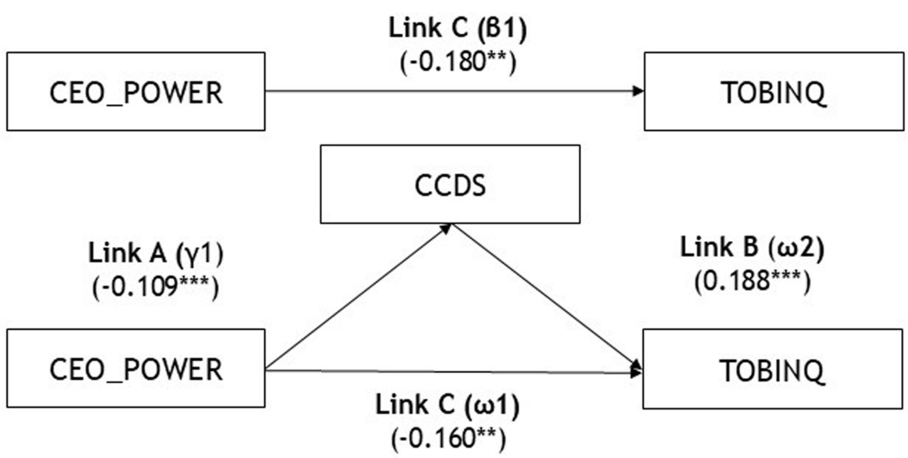

Fig. 2. Paths between CCDS, CEO power, and firm value.

Table 15
Mediation regression results of the relationship between CEO power, climate change disclosure, and firm value.

	DV = *TOBINQ* $_{t+1}$ Model (1)	DV=*CCDS* $_{t+1}$ Model (2)	DV = *TOBINQ* $_{t+1}$ Model (3)
CEO_POWER	-0.180**	-0.109***	-0.160**
	(-2.430)	(-4.610)	(-2.151)
CCDS	—	—	0.188***
			(3.514)
FIRM_SIZE	0.203***	0.047***	0.194***
	(11.320)	(8.330)	(10.729)
MB	0.001***	0.001	0.001***
	(2.660)	(1.430)	(2.580)
LEVERAGE	0.589***	0.071**	0.575***
	(5.570)	(2.120)	(5.445)
RGROWTH	0.066	-0.038*	0.073
	(1.010)	(-1.810)	(1.117)
EXTFIN	-0.779***	-0.010	-0.777***
	(-4.910)	(-0.210)	(-4.903)
FOREIGN	-0.107**	0.018	-0.111***
	(-2.550)	(1.310)	(-2.636)
LITIGATION	0.582***	0.191***	0.546***
	(4.040)	(4.180)	(3.789)
FIRM_AGE	-0.113***	-0.003	-0.112***
	(-3.980)	(-0.380)	(-3.968)
PROFITABILITY	5.486***	-0.009	5.487***
	(21.130)	(-0.110)	(21.167)
CAPIN	-0.317**	-0.020	-0.314**
	(-2.120)	(-0.420)	(-2.097)
ASSET_NEW	-0.446***	0.057	-0.457***
	(-3.150)	(1.260)	(-3.229)
ENV_STRENGTH	-0.431***	0.345***	-0.496***
	(-3.580)	(9.020)	(-4.075)
ENV_CONCERN	-0.471***	-0.039	-0.464***
	(-3.060)	(-0.790)	(-3.016)
BOARD_SIZE	-0.397***	0.120***	-0.419***
	(-3.720)	(3.540)	(-3.933)
BOARD_IND	-0.318**	0.032	-0.325**
	(-2.140)	(0.690)	(-2.182)
Intercept	1.578***	-0.604***	1.692***
	(4.300)	(-5.190)	(4.601)
Year-fixed effects	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes
Observations	3,510	3,510	3,510
R^2	0.363	0.177	0.365
Mediating effects (Bootstrapped)			
Indirect effect – *CCDS* × *CEO_POWER*		-0.020***	
z-statistic for indirect effect – *CCDS* × *CEO_POWER*		(-2.795)	
Direct effect		-0.160	
Total effect		-0.180	
% of the total mediated effect		11.32 %	

This table presents the regression results of the mediation role of climate change performance in the relationship between CEO power and firm valuation. Model (1) shows the regression results of the impact of CEO power on Tobin's Q. Model (2) shows the regression results of the impact of CEO power on climate change disclosure. Model (3) shows the regression results of the impact of CEO power on Tobin's Q after controlling for firm-level climate change disclosure. The mediation effect test statistics are reported in the bottom section of the table. Robust two-tailed *t*-statistics are presented in parentheses. Superscripts ***, **, and * indicate statistical significance levels at 1 %, 5 %, and 10 % levels, respectively. DV = dependent variable. All variables are defined in Appendix A.

analysts following, and low-quality internal governance inhibit the relationship between CEO power and climate change disclosure by reducing CEO power's negative effect. We also examine the underlying channel in the relationship between CEO power and climate change disclosures, finding that reduced firm-level transparency acts as the mechanism through which CEO power decreases climate change disclosures. Furthermore, we investigate the role of climate change disclosure as an intermediary mechanism in the relationship between CEO power and firm value. Our analysis reveals that this relationship is mediated by climate change disclosure, highlighting its significance in linking CEO power to firm valuation.

The findings of this study have important implications for regulators, investors, and corporate governance structures. Regulators should consider that powerful CEOs may limit climate change disclosures, potentially compromising transparency and accountability. This highlights the need for stricter regulations and mandatory disclosure requirements to ensure uniformity in environmental reporting. For investors, the study reveals that stronger external monitoring, such as institutional ownership and analyst coverage, can mitigate the negative influence of CEO power on climate change disclosures. This indicates that effective governance mechanisms are crucial for enhancing corporate transparency in environmental matters. Companies, in turn, should focus on improving internal governance structures, particularly by increasing board independence and aligning CEO compensation with environmental performance, to promote greater transparency and meet stakeholder demands. These results contribute to the broader literature on corporate governance and sustainability by demonstrating the dual role of CEO power and the moderating effects of governance mechanisms on climate change disclosures, highlighting areas for future research.

Our research, while providing valuable insights, has limitations due to its sole focus on the U.S. Different countries may exhibit varying dynamics between CEO power and climate change disclosure, warranting further investigation in a global context. Future studies could explore how CEO power influences climate change disclosure internationally and assess its impact on capital market outcomes, such as the cost of equity. Previous findings suggest that strong environmental performance can reduce the cost of equity; our study builds on this by analyzing the moderating effects of CEO power on the relationship between climate change disclosure and financial performance. Secondly, an intriguing direction for future research is to explore the behavior of environmentally inclined CEOs in relation to climate disclosures. Specifically, while our findings suggest that CEOs may reduce disclosure levels regardless of their personal stance, future studies could investigate whether environmentally friendly CEOs also curtail disclosures for strategic or personal gains. This could reveal whether environmental values remain secondary to self-interest in disclosure practices, even among pro-environment CEOs. Such research would deepen the understanding of how personal values interact with power dynamics in influencing corporate transparency. Additionally, further research could investigate the role of CEO power in firms with board members on environmental committees, analyzing how this influence specifically shapes climate change disclosure practices.

CRediT authorship contribution statement

Sudipta Bose: Software, Formal analysis, Data curation, Conceptualization. **Sabri Boubaker:** Writing – review & editing, Conceptualization. **Hussein Daradkeh:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Syed Shams:** Supervision, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

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

Acknowledgement

We would like to express our gratitude to the Editor, Associate Editor, and anonymous reviewers for their constructive comments and valuable suggestions throughout the review process. This paper is based on Hussein Daradkeh's PhD thesis.

Appendix A. Descriptions of variables

Variable	Variable in full	Definition
CCDS	Climate change disclosure score	Percentile rank of climate change disclosure score/band.
CEO_POWER	CEO power	The CEO power index is computed based on the CEO's duality, tenure, title (i.e., education qualification), age, and equity shareholdings. The CEO's duality is measured as a dummy variable that takes the value of 1 if the CEO serves as the chairman of the board, and 0 otherwise. The CEO's tenure, title, age, and equity shareholdings are dummy variables that take the value of 1 if the firm's observation is higher than the industry-year adjusted median, and 0 otherwise. We then add together all five variables and create a composite index of CEO power scaling by 5.
HIGH_ANALYST	Analysts' coverage	An indicator variable that takes the value of 1 if a firm's total number of analysts following is greater than the year's median of analysts' coverage, and 0 otherwise.
HIGH_EINDEX	Managerial Entrenchment Index (E-Index) score	An indicator variable that takes the value of 1 if a firm's E-Index score is greater than the year's median E-Index score, and 0 otherwise. The E-Index is the Entrenchment Index constructed by Bebchuk et al. (2009).
HIGH_INSTOWN	Institutional ownership	The percentage of shareholdings by institutional investors. *HIGH_INSTOWN* is an indicator variable that takes the value of 1 if a firm's institutional ownership is greater than the year's median institutional ownership of firms in the sample, and 0 otherwise.
FIRM_SIZE	Firm size	The natural logarithm of the market value of equity at the beginning of the year.
MB	Market-to-book value	The market value of equity divided by the book value of equity.
LEVERAGE	Leverage	The ratio of total debt to total assets.
RGROWTH	Firm's growth	The percentage change in annual revenue.
EXTFIN	New financing	The amount of debt or equity capital raised by the firm in a given year, divided by total assets at the beginning of that year. It is calculated as the issuance of common stock and preferred shares minus the purchase of common stock and preferred shares plus the issuance of long-term debt minus the payment of long-term debt.

(*continued on next page*)

(*continued*)

Variable	Variable in full	Definition
LITIGATION	Litigation risk	An indicator variable that takes the value of 1 if the firm operates in a high-litigation industry (Standard Industrial Classification [SIC] codes of 2833–2836, 3570–3577, 3600–3674, 5200–5961 and 7370), and 0 otherwise.
FOREIGN	Foreign operations	An indicator variable that takes the value of 1 if a firm reports foreign income, and 0 otherwise.
FIRM_FAGE	Firm age	The natural logarithm of the number of years since the firm appeared in the Compustat database.
ASSET_NEW	Asset newness	The ratio of net property, plant, and equipment to gross property, plant, and equipment at the beginning of the year.
PROFITABILITY	Return on assets	The ratio of income before extraordinary items to total assets at the beginning of the year.
CAPIN	Capital intensity	The ratio of capital spending to total sales at the beginning of the year.
ENV_STRENGTH	Environmental strengths	The percentage of the total number of raw environmental strengths scaled by the total number of items of environmental strengths for a firm reported by the MSCI environmental, social, and governance (ESG) database.
ENV_CONCERN	Environmental concerns	The percentage of the total number of raw environmental concerns scaled by the total number of items of environmental concerns for a firm reported by the MSCI ESG database.
BOARD_IND	Board independence	Percentage of independent directors on the board.
BOARD_SIZE	Board size	The natural logarithm of the total number of directors on the board.
DISC_CDP	CDP response	An indicator variable that takes a value of 1 if the firm responds to the CDP questionnaire, and 0 otherwise.
PROPDISC	Proportion of disclosure	Measured as the proportion of firms in an industry that respond to the CDP questionnaire.
CDP_LAG	Previous year CDP disclosure	An indicator variable that takes a value of 1 if the firm responds to the CDP questionnaire in the previous year, and 0 otherwise.
TOBINQ	Firm value	The sum of the market value of common equity plus the book value of total debt scaled by total assets
CEO_DISMISSAL	CEO dismissal	An indicator variable that takes a value of 1 if the CEO was dismissed during the year and 0 otherwise.
TRANS	Firm-level transparency	Firm-level transparency is measured using the absolute value of abnormal accruals estimated based on the modified Jones model. A higher value of *TRANS* indicates a lower level of transparency, and vice versa.
ESI	Environmentally sensitive industries	An indicator variable that takes a value of 1 if a firm operates in Pulp and Paper, Chemicals, Oil and Gas, Metals and Mining, and Utilities industries, and 0 otherwise.
FINANCIAL	Financial industries	An indicator variable that takes a value of 1 if a firm operates in the financial industry, and 0 otherwise.

Data availability

Data will be made available on request.

References

Abernethy, M.A., Kuang, Y.F., Qin, B., 2015. The influence of CEO power on compensation contract design. Account. Rev. 90 (4), 1265–1306.

Aggarwal, R., Dow, S., 2012. Corporate governance and business strategies for climate change and environmental mitigation. Eur. J. Financ. 18 (3–4), 311–331. https://doi.org/10.1080/1351847X.2011.579745.

Alqatamin, R., Aribi, Z.A., Arun, T., 2017. The effect of CEOs' characteristics on forward-looking information. J. Appl. Acc. Res. 18 (4), 402–424.

Amel-Zadeh, A., Serafeim, G., 2018. Why and how investors use ESG information: evidence from a global survey. Financ. Anal. J. 74 (3), 87–103. https://doi.org/10.2469/faj.v74.n3.2.

Armstrong, C.S., Balakrishnan, K., Cohen, D., 2012. Corporate governance and the information environment: evidence from state antitakeover laws. J. Account. Econ. 53 (1), 185–204. https://doi.org/10.1016/j.jacceco.2011.06.005.

Barth, M.E., Beaver, W.H., Landsman, W.R., 1998. Relative valuation roles of equity book value and net income as a function of financial health. J. Account. Econ. 25 (1), 1–34.

Bathala, C.T., 1996. Determinants of managerial stock ownership: the case of CEOs. Financ. Rev. 31 (1), 127–147.

Bebchuk, L., Cohen, A., Ferrell, A., 2009. What matters in corporate governance? Rev. Financ. Stud. 22 (2), 783–827.

Bebchuk, L.A., Cremers, K.M., Peyer, U.C., 2011. The CEO pay slice. J. Financ. Econ. 102 (1), 199–221.

Ben-Amar, W., Chang, M., McIlkenny, P., 2017. Board gender diversity and corporate response to sustainability initiatives: evidence from the carbon disclosure project. J. Bus. Ethics 142 (2), 369–383.

Ben-Amar, W., McIlkenny, P., 2015. Board effectiveness and the voluntary disclosure of climate change information. Bus. Strateg. Environ. 24 (8), 704–719.

Boone, A.L., White, J.T., 2015. The effect of institutional ownership on firm transparency and information production. J. Financ. Econ. 117 (3), 508–533.

Bose, S., Ali, M.J., Hossain, S., Shamsuddin, A., 2022. Does CEO–audit committee/board interlocking matter for corporate social responsibility? J. Bus. Ethics 179, 819–847.

Bose, S., Burns, N., Minnick, K., Shams, S., 2023a. Climate-linked compensation, societal values, and climate change impact: international evidence. Corp. Gov. 31 (5), 759–785.

Bose, S., Burns, N., Minnick, K., Shams, S., 2023b. Climate-linked compensation, societal values, and climate change impact: international evidence. Corp. Gov. 31 (5), 759–785.

Bose, S., Hossain, S., Sobhan, A., Handley, K., 2022. Does female participation in strategic decision-making roles matter for corporate social responsibility performance? Account. Finance 62 (3), 4109–4156. https://doi.org/10.1111/acfi.

Bose, S., Khan, H.Z., Monem, R.M., 2021. Does green banking performance pay off? evidence from a unique regulatory setting in Bangladesh. Corp. Gov. 29 (2), 162–187. https://doi.org/10.1111/corg.12349.

Bose, S., Lim, E.K., Minnick, K., Shams, S., 2023c. Do foreign institutional investors influence corporate climate change disclosure quality? International evidence. Corp. Gov. https://doi.org/10.1111/corg.12535.

Bose, S., & Yu, C. (2023). Does earnings quality influence corporate social responsibility performance? Empirical evidence of the causal link. *Abacus,* https://doi.org/10.1111/abac.12286. doi:https://doi.org/10.1111/abac.12286.

Bowers, D.G., Seashore, S.E., 1966. Predicting organizational effectiveness with a four-factor theory of leadership. Adm. Sci. Q. 238–263.

Buchholz, F., Jaeschke, R., Lopatta, K., Maas, K., 2018. The use of optimistic tone by narcissistic CEOs. Account. Audit. Account. J. 31 (2), 531–562.

Bui, B., Houqe, M.N., Zaman, M., 2020. Climate governance effects on carbon disclosure and performance. Br. Account. Rev. 52 (2), 100880.
Cannella Jr, A.A., Shen, W., 2001. So close and yet so far: promotion versus exit for CEO heirs apparent. Acad. Manag. J. 44 (2), 252–270.
Carleton, W.T., Nelson, J.M., Weisbach, M.S., 1998. The influence of institutions on corporate governance through private negotiations: evidence from TIAA-CREF. J. Financ. 53 (4), 1335–1362.
Castelló, I., Lozano, J.M., 2011. Searching for new forms of legitimacy through corporate responsibility rhetoric. J. Bus. Ethics 100, 11–29.
Chen, S., Han, X., Reda, A., 2024. CEO's early-life famine experience and tunneling: evidence from China. J. Int. Financ. Manag. Acc. 35 (3), 651–693.
Chu, H.-L., Liu, N.-Y., Chiu, S.-C., 2023. CEO power and CSR: the moderating role of CEO characteristics. China Account. Finance Rev. 25 (1), 101–121.
Clarkson, P.M., Li, Y., Richardson, G., Vasvari, F., 2008. Revisiting the relation between environmental performance and environmental disclosure: an empirical analysis. Acc. Organ. Soc. 33 (4–5), 303–327.
Cohen, J.R., Simnett, R., 2015. CSR and assurance services: a research agenda. Audit. J. Pract. Theory 34 (1), 59–74.
Cong, Y., Freedman, M., 2011. Corporate governance and environmental performance and disclosures. Adv. Account. 27 (2), 223–232. https://doi.org/10.1016/j.adiac.2011.05.005.
Daily, C.M., Johnson, J.L., 1997. Sources of CEO power and firm financial performance: a longitudinal assessment. J. Manag. 23 (2), 97–117.
Dalton, D.R., Kesner, I.F., 1987. Composition and CEO duality in boards of directors: an international perspective. J. Int. Bus. Stud. 18 (3), 33–42.
Daradkeh, H., Shams, S., Bose, S., & Gunasekarage, A. (2023). Does managerial ability matter for corporate climate change disclosures? *Corporate Governance: An International Review, 31*(1), 83–104. doi:https://doi.org/10.1111/corg.12436.
Debreceny, R., Rahman, A., 2005. Firm-specific determinants of continuous corporate disclosures. Int. J. Account. 40 (3), 249–278. https://doi.org/10.1016/j.intacc.2005.06.002.
Deng, X., Kang, J.-K., Low, B.S., 2013. Corporate social responsibility and stakeholder value maximization: evidence from mergers. J. Financ. Econ. 110 (1), 87–109.
Depoers, F., Jeanjean, T., Jérôme, T., 2016. Voluntary disclosure of greenhouse gas emissions: contrasting the carbon disclosure project and corporate reports. J. Bus. Ethics 134, 445–461.
Dey, S. K., Bose, S., Luo, L., & Shams, S. (2024). Impact of Corporate Climate Change Performance on Information Asymmetry: International Evidence. *Journal of International Accounting Research,* 10.2308/jiar-2022-057, 1–33. doi:10.2308/jiar-2022-057.
Dhaliwal, D.S., Li, O.Z., Tsang, A., Yang, Y.G., 2011a. Voluntary non-financial disclosure and the cost of equity capital: the initiation of corporate social responsibility reporting. Account. Rev. 86 (1), 59–100.
Dhaliwal, D.S., Li, O.Z., Tsang, A., Yang, Y.G., 2011b. Voluntary nonfinancial disclosure and the cost of equity capital: the initiation of corporate social responsibility reporting. Account. Rev. 86 (1), 59–100.
Di Giuli, A., Kostovetsky, L., 2014. Are red or blue companies more likely to go green? politics and corporate social responsibility. J. Financ. Econ. 111 (1), 158–180. https://doi.org/10.1016/j.jfineco.2013.10.002.
Dunn, P., 2004. The impact of insider power on fraudulent financial reporting. J. Manag. 30 (3), 397–412.
Economist Intelligence Unit [EIU]. (2015). The cost of inaction: Recognising the value at risk from climate change. Retrieved from https://eiuperspectives.economist.com/sustainability/cost-inaction (accessed on 12 May 2024).
Elyasiani, E., Zhang, L., 2015. Bank holding company performance, risk, and "busy" board of directors. J. Bank. Financ. 60, 239–251. https://doi.org/10.1016/j.jbankfin.2015.08.022.
Fama, E.F., Jensen, M.C., 1983. Separation of ownership and control. J. Law Econ. 26 (2), 301–325.
Farrell, K.A., Whidbee, D.A., 2002. Monitoring by the financial press and forced CEO turnover. J. Bank. Financ. 26 (12), 2249–2276.
Ferreira, M.A., Laux, P.A., 2007. Corporate Governance, idiosyncratic risk, and information flow. J. Financ. 62 (2), 951–989. https://doi.org/10.1111/j.1540-6261.2007.01228.x.
Fiegener, M.K., Brown, B.M., Dreux, D.R., Dennis, W.J., 2000. CEO stakes and board composition in small private firms. Enterp. Theory Pract. 24 (4), 5–24. https://doi.org/10.1177/104225870002400401.
Finkelstein, S., 1992. Power in top management teams: dimensions, measurement, and validation. Acad. Manag. J. 35 (3), 505–538.
Fredrickson, J.W., Hambrick, D.C., Baumrin, S., 1988. A model of CEO dismissal. Acad. Manag. Rev. 13 (2), 255–270. https://doi.org/10.5465/amr.1988.4306882.
Freeman, R.E., 2010. Strategic management: A stakeholder approach. Cambridge University Press.
Freeman, R.E., Harrison, J.S., Wicks, A.C., Parmar, B.L., De Colle, S., 2010. Stakeholder theory: The state of the art. Cambridge University Press.
Hainmueller, J., 2012. Entropy balancing for causal effects: a multivariate reweighting method to produce balanced samples in observational studies. Polit. Anal. 20 (1), 25–46.
Han, S., Nanda, V.K., Silveri, S., 2016. CEO power and firm performance under pressure. Financ. Manag. 45 (2), 369–400.
Haque, F., 2017. The effects of board characteristics and sustainable compensation policy on carbon performance of UK firms. Br. Account. Rev. 49 (3), 347–364.
Harjoto, M.A., Jo, H., 2009. CEO power and firm performance: a test of the life-cycle theory. Asia-Pac. J. Financ. Stud. 38 (1), 35–66.
Harper, J., Sun, L., 2019. CEO power and corporate social responsibility. Am. J. Bus. 34 (2), 93–115. https://doi.org/10.1108/AJB-10-2018-0058.
Heckman, J.J., 1979. Sample selection bias as a specification error. Econometrica 47 (1), 153–161.
Hill, C.W., Jones, T.M., 1992. Stakeholder-agency theory. J. Manag. Stud. 29 (2), 131–154.
Intergovernmental Panel on Climate Change [IPCC]. (2019). Global warming of 1.5°C. Retrieved from https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf (accessed on 10 May 2022).
Jackling, B., Johl, S., 2009. Board structure and firm performance: evidence from India's top companies. Corp. Gov. 17 (4), 492–509.
Jensen, M.C., Meckling, W.H., 1976a. Agency costs and the theory of the firm. J. Financ. Econ. 3 (4), 305–360.
Jensen, M.C., Meckling, W.H., 1976b. Theory of the firm: managerial behavior, agency costs, and ownership structure. J. Financ. Econ. 3 (4), 305–360.
Jiraporn, P., Chintrakarn, P., 2013. How do powerful CEOs view corporate social responsibility (CSR)? an empirical note. Economics Letters 119 (3), 344–347.
Jiraporn, P., Chintrakarn, P., Liu, Y., 2012. Capital structure, CEO dominance, and corporate performance. J. Financ. Serv. Res. 42, 139–158.
Jo, H., Harjoto, M.A., 2012. The causal effect of corporate governance on corporate social responsibility. J. Bus. Ethics 106 (1), 53–72. https://doi.org/10.1007/s10551-011-1052-1.
Jung, B., Sun, K.J., Yang, Y.S., 2012. Do financial analysts add value by facilitating more effective monitoring of firms' activities? J. Acc. Audit. Financ. 27 (1), 61–99.
Keltner, D., Gruenfeld, D.H., Anderson, C., 2003. Power, approach, and inhibition. Psychol. Rev. 110 (2), 265.
Khan, R., Dharwadkar, R., Brandes, P., 2005. Institutional ownership and CEO compensation: a longitudinal examination. J. Bus. Res. 58 (8), 1078–1088.
Kim, S., Saha, A., Bose, S., 2021. Do capital expenditures influence earnings performance: evidence from loss-making firms. Account. Finance 61, 2539–2575.
King, G., Nielsen, R., 2019. Why propensity scores should not be used for matching. Polit. Anal. 27 (4), 435–454.
Klein, K.J., Lim, B.-C., Saltz, J.L., Mayer, D.M., 2004. How do they get there? an examination of the antecedents of centrality in team networks. Acad. Manag. J. 47 (6), 952–963.
Krueger, P., Sautner, Z., Starks, L.T., 2020. The importance of climate risks for institutional investors. Rev. Financ. Stud. 33 (3), 1067–1111.
Lang, M.H., Lins, K.V., Miller, D.P., 2004. Concentrated control, analyst following, and valuation: do analysts matter most when investors are protected least? J. Account. Res. 42 (3), 589–623.
Lee, C.-H., Bose, S., 2021. Do family firms engage in less tax avoidance than non-family firms? the corporate opacity perspective. J. Contemp. Account. Econ. 17 (2), 1–22.
Lee, S.P., Chen, H.J., 2011. Corporate governance and firm value as determinants of CEO compensation in Taiwan: 2SLS for panel data model. Manag. Res. Rev. 34 (3), 252–265.
Lewis, B.W., Walls, J.L., Dowell, G.W.S., 2014. Difference in degrees: CEO characteristics and firm environmental disclosure. Strateg. Manag. J. 35 (5), 712–722. https://doi.org/10.1002/smj.2127.
Li, F., Li, T., Minor, D., 2016. CEO power, corporate social responsibility, and firm value: a test of agency theory. Int. J. Manag. Financ. 12 (5), 611–628.

Li, Y., Gong, M., Zhang, X.-Y., Koh, L., 2018. The impact of environmental, social, and governance disclosure on firm value: the role of CEO power. Br. Account. Rev. 50 (1), 60–75. https://doi.org/10.1016/j.bar.2017.09.007.

Liao, L., Luo, L., Tang, Q., 2015. Gender diversity, board independence, environmental committee, and greenhouse gas disclosure. Br. Account. Rev. 47 (4), 409–424. https://doi.org/10.1016/j.bar.2014.01.002.

Lin, Y., Mao, Y., Wang, Z., 2018. Institutional ownership, peer pressure, and voluntary disclosures. Account. Rev. 93 (4), 283–308.

Lin, Y.R., Fu, X.M., 2017. Does institutional ownership influence firm performance? evidence from China. Int. Rev. Econ. Financ. 49, 17–57.

Liu, Y., Jiraporn, P., 2010. The effect of CEO power on bond ratings and yields. J. Empir. Financ. 17 (4), 744–762.

Malmendier, U., Tate, G., 2008. Who makes acquisitions? CEO overconfidence and the market's reaction. J. Financ. Econ. 89 (1), 20–43.

Matsumura, E.M., Prakash, R., Vera-Munoz, S.C., 2014. Firmvalue effects of carbon emissions and carbon disclosures. Account. Rev. 89 (2), 695–724.

Matsumura, E. M., Prakash, R., & Vera-Muñoz, S. C. (2013). Firm-value effects of carbon emissions and carbon disclosures. *The Accounting Review,* http://aaajournals.org/doi/abs/10.2308/accr-50629. doi:http://aaajournals.org/doi/abs/10.2308/accr-50629.

McMullin, J.L., Schonberger, B., 2020. Entropy-balanced accruals. Rev. Acc. Stud. 25 (1), 84–119.

Morse, A., Nanda, V., Seru, A., 2011. Are incentive contracts rigged by powerful CEOs? J. Financ. 66 (5), 1779–1821.

Onali, E., Galiakhmetova, R., Molyneux, P., Torluccio, G., 2016. CEO power, government monitoring, and bank dividends. J. Financ. Intermed. 27, 89–117. https://doi.org/10.1016/j.jfi.2015.08.001.

Peters, G.F., Romi, A.M., 2014. Does the voluntary adoption of corporate governance mechanisms improve environmental risk disclosures? evidence from greenhouse gas emission accounting. J. Bus. Ethics 125, 637–666.

Pi, L., Lowe, J., 2011. Can a powerful CEO avoid involuntary replacement?—an empirical study from China. Asia Pac. J. Manag. 28 (4), 775–805. https://doi.org/10.1007/s10490-009-9178-8.

Prado-Lorenzo, J.M., García-Sánchez, I.M., 2010. The role of the board of directors in disseminating relevant information on greenhouse gases. J. Bus. Ethics 97 (3), 391–424.

Preacher, K.J., Hayes, A.F., 2004. SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behav. Res. Methods, Instruments, & Comput. 36 (4), 717–731.

Rashid, A., Shams, S., Bose, S., Khan, H., 2020. CEO power and corporate social responsibility (CSR) disclosure: does stakeholder influence matter? Manag. Audit. J. 35 (9), 1279–1312. https://doi.org/10.1108/MAJ-11-2019-2463.

Ryan Jr, H.E., Wiggins III, R.A., 2004. Who is in whose pocket? director compensation, board independence, and barriers to effective monitoring. J. Financ. Econ. 73 (3), 497–524.

Saleh, M.W., Eleyan, D., Maigoshi, Z.S., 2022. Moderating effect of CEO power on institutional ownership and performance. EuroMed J. Bus.

Shams, S., Bose, S., Sheikhbahaei, A., 2024. Pricing media sentiment: evidence from global mergers and acquisitions. Pac. Basin Financ. J. 86, 102447. https://doi.org/10.1016/j.pacfin.2024.102447.

Sheikh, S., 2019. An examination of the dimensions of CEO power and corporate social responsibility. Rev. Acc. Financ. 18 (2), 221–244.

Shleifer, A., Vishny, R.W., 1989. Management entrenchment: the case of manager-specific investments. J. Financ. Econ. 25 (1), 123–139. https://doi.org/10.1016/0304-405X(89)90099-8.

Stock, J.H., Wright, J.H., Yogo, M., 2002. A survey of weak instruments and weak identification in generalized method of moments. J. Bus. Econ. Stat. 20 (4), 518–529.

Sun, L., Johnson, G., Bradley, W., 2022. CEO power and annual report reading difficulty. J. Contemp. Account. Econ. 18 (2), 100315. https://doi.org/10.1016/j.jcae.2022.100315.

Tauringana, V., Chithambo, L., 2015. The effect of DEFRA guidance on greenhouse gas disclosure. Br. Account. Rev. 47 (4), 425–444.

The SustainAbility Institute. (2023). Rate the Raters 2023: ESG Ratings at a Crossroads. Retrieved from https://www.sustainability.com/thinking/rate-the-raters-2023/ (accessed on 20 June 2024).

Ulupinar, B., 2018. The effect of managerial entrenchment on analyst bias. Glob. Financ. J. 37, 25–38. https://doi.org/10.1016/j.gfj.2018.04.001.

Walls, J.L., Berrone, P., 2017. The power of one to make a difference: how informal and formal CEO power affect environmental sustainability. J. Bus. Ethics 145 (2), 293–308.

Wang, D., Zhu, Q., Avolio, B.J., Shen, W., Waldman, D., 2023. Do employees' views matter in corporate governance? the relationship between employee approval and CEO dismissal. Strateg. Manag. J. 44 (5), 1328–1354. https://doi.org/10.1002/smj.3465.

Wei, D., Luo, C., Lu, J., 2025. CEOs with a financial background and corporate risk-taking, forthcoming. J. Int. Financ. Manag. Acc.

Weisbach, M.S., 1988. Outside directors and CEO turnover. J. Financ. Econ. 20, 431–460.

Wen, Z., Ye, B., 2014. Analyses of mediating effects: the development of methods and models. Adv. Psychol. Sci. 22 (5), 731–745.

Zhang, Y., 2008. Information asymmetry and the dismissal of newly appointed CEOs: an empirical investigation. Strateg. Manag. J. 29 (8), 859–872. https://doi.org/10.1002/smj.689.