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Does managerial ability matter for corporate climate change disclosures?

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Abstract

Research Question/Issue: This study examines the association between managerial ability and the extent of firm-level climate change disclosures and the moderating role of corporate governance in this association.

Research Findings/Insights: Results based on a sample of 2298 firm-year observations from the United States (US) from 2005 to 2019 suggest that firms with more capable managers tend to make more climate change disclosures. This significant positive association is weakened when firms suffer from weak corporate governance. These findings remain robust after addressing omitted time-invariant variable bias, observable heterogeneity bias, sample selection bias, and reverse causality and when using alternative climate change disclosure proxies. Further analysis shows that climate change disclosures have a mediating role in the association between managerial ability and firm valuation.

Theoretical/Academic Implications: Given the growing importance of integrating climate change-related information into a firm's operations and the pressure exerted by various stakeholders, understanding the drivers of climate change disclosures has emerged as an important area of research in the accounting and finance literature. To the best of our knowledge, this is the first study to examine any link between managerial ability and climate change disclosures.

Practitioner/Policy Implications: Considering the recent pressure imposed on companies by regulatory authorities for more climate change disclosures, our study's findings have important implications for regulators, policy makers, investors, financial analysts, researchers, and firms.

KEYWORDS
climate change disclosures, firm value, governance, managerial ability

1 | INTRODUCTION

Over the past two decades, climate change and global warming have emerged as the most imminent global environmental issues. One of a sustainable economy's biggest challenges is managing climate change risk (United Nations [UN], 2020; World Bank, 2010), a risk that organizations are confronting today owing to extreme climate change-related events (Task Force on Climate-Related Financial Disclosures [TCFD], 2017). According to the Intergovernmental Panel on Climate Change (IPCC) (2014), climate change threatens the existence of mankind in the modern world. Consequently, companies are continuously pressured by various stakeholders to disclose information on their activities that affect climate change. This is evidenced by the formation of the Task Force on Climate-Related Financial Disclosure (TCFD) and the Carbon Disclosure Project (CDP). Given the growing importance of integrating climate change-related information into a firm's operations and the pressure exerted by various stakeholders, understanding the drivers of climate change disclosures has emerged as an important area of research in the accounting and finance literature. Previous studies suggest several of the firm-level factors that drive firms' climate change disclosures (Ben-Amar et al., 2017; Bui et al., 2020; Liao et al., 2015; Tauringana & Chithambo, 2015).[1] These researchers argue that more extensive climate change disclosures are made by firms with stronger climate governance (Bui et al., 2020), environmental committees (Liao et al., 2015; Peters & Romi, 2014), larger boards (Liao et al., 2015; Tauringana & Chithambo, 2015), and gender-diverse boards (Ben-Amar et al., 2017; Haque, 2017; Liao et al., 2015).

Although extant research helps to develop an understanding of the various firm-level determinants of climate change disclosures, evidence is lacking on whether climate change disclosures are affected by managerial ability. Managerial ability reflects the knowledge, skills, and experience possessed by the team that manages the firm and the efficiency displayed by managers in transforming corporate resources to revenue (Demerjian et al., 2012). Managers who are more capable are in a better position to understand advancements in technology and industry trends, to correctly project future product demands, to select and implement projects that generate higher returns, and to improve resources productivity, as well as being efficient in managing their employees. Finkelstein (1992) argues that top managers are entrusted with the power to deal with both internal and external uncertainty. Uncertainty is an integral part of climate change issues (Stern, 2008). The interview evidence presented by Kumarasiri and Gunasekarage (2017) reveals that, while perceiving climate change risk as a threat (both financial and reputational), company managers believed that climate change risk presented them with opportunities to develop new renewable energy sources, introduce low carbon products, and support their customers in managing their emissions.

Existing evidence on managerial ability reveals that the more capable managers lead their companies to success during crisis periods through efficient utilization of resources, making use of low-cost debt financing and grabbing investment opportunities available in the market (Andreou et al., 2017; Lee et al., 2018). Grenadier (2002) contends that investments made during periods of severe uncertainty can create strategic advantages in an imperfect setting by enabling companies to acquire growth opportunities, thereby increasing their market share. Therefore, capable managers should be in a position to manage climate change risk by implementing climate change risk management policies while making use of any advantages arising from uncertainty associated with climate change issues. From the legitimacy theory perspective, an organization exists only if the society confers upon the organization the state of legitimacy (Deegan, 2002) and managers use social and environmental disclosures as a means to counter legitimacy threats (Deegan, 2019). The increased stakeholder demand for the disclosure of climate change information (Ben-Amar et al., 2017; Bui et al., 2020; Clarkson et al., 2015; Kolk et al., 2008) can be viewed as societal pressure in this legitimization process. Together with their desire to maintain the social license to operate, capable managers' ability to manage the uncertainty associated with climate change while making use of the opportunities presented by the same scenario can consequently create a link between managerial ability and firms' climate change disclosures.

Therefore, the main objective of our study is to investigate whether managerial ability influences the disclosure of climate change information at the firm-level. As prior studies show that firms' climate change disclosures are influenced by corporate governance mechanisms (Bui et al., 2020), we examine the moderating role played by corporate governance mechanism in the association between managerial ability and climate change disclosures. Furthermore, we examine the mediating role of climate change disclosures in the association between managerial ability and firm valuation, given the inconclusive findings of this association.

Using a sample of 2298 firm-year observations for the period 2005–2019, we examine the association between managerial ability and the extent of firm-level climate change disclosures and the moderating role of corporate governance in this association. We estimate and measure managerial ability using a modified version of Demerjian et al.'s (2012) firm efficiency model by adding board size, board independence, and Chief Executive Officer (CEO) duality as additional control variables, along with six firm characteristics (firm size, market share, firm age, positive free cash flow, complex multisegment, and international operations). We measure the level of climate change disclosure with the CDP climate change disclosure score. To estimate the regression models, we use the ordinary least squares (OLS) regression method. As our findings may be affected by observable and unobservable selection bias, we employ propensity score matching (PSM) analysis and Heckman's (1979) two-stage analysis. We undertake several robustness analyses, including firm fixed-effect regression, instrumental variable (IV) analysis, and quasi-experimental analysis. We also examine the mediating role of climate change disclosures in the association between managerial ability and firm valuation.

We find that managerial ability has a positive and significant influence on the level of climate change disclosures of firms in our sample. This finding supports the view that capable managers have less career concerns and, thus, are motivated to disclose more climate change information. We also find that the above influence is weakened if firms have weak corporate governance. Our findings remain robust after addressing the omitted time-invariant variable bias using firm fixed effects, observable selection bias using PSM analysis, unobservable selection bias using Heckman's (1979) two-stage analysis, and endogeneity concerns by implementing two-stage analysis with IVs and quasi-experimental analysis. We also find that climate change disclosures have a mediating role in the association between managerial ability and firm valuation.

Our study makes several contributions to the existing literature. Firstly, as the TCFD recommends that companies demonstrate their resilience in the strategies implemented and operations undertaken to meet the challenge posed by global warming,[2] we make a timely contribution by analyzing how capable managers contribute to the wider community's aspirations. Secondly, we contribute to the literature on factors that influence firms' climate change disclosures. While previous studies concentrate on variables, such as size, leverage, profitability, shareholder resolutions, and institutional ownership (Bui et al., 2020; Cotter & Najah, 2012; Freedman & Jaggi, 2005; Reid & Toffel, 2009), evidence on how managerial capability influences climate change disclosures is markedly absent. Thirdly, we contribute to the literature on managerial ability by investigating its influence on firm-level disclosure of nonfinancial information. Most prior studies analyze how managerial ability shapes the firm's financial performance (Bertrand & Schoar, 2003; Bonsall et al., 2017; Holcomb et al., 2009; Koester et al., 2017); however, only a few studies examine the role that managerial ability plays in the area of corporate social performance (e.g., Yuan et al., 2019). Fourthly, we consider the influence of a powerful corporate governance mechanism (weak governance, as proxied by managerial entrenchment) to discover whether this variable moderates the main relationship revealed in the study. Finally, we contribute to the firm valuation literature by showing the important mediating role played by climate change disclosures in the association between managerial ability and firm valuation. Taken together, our findings have important implications for regulators, policy makers, investors, financial analysts, researchers, and firms, given the recent impetus for climate change disclosures.

The remainder of the paper proceeds as follows. Section 2 presents the review of 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 last section (Section 6) concludes the paper.

2 | LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 | Managerial ability and climate change disclosures

According to the predictions of upper echelons theory, organizational outcomes are significantly influenced by managerial ability, a term which encapsulates a diversified set of characteristics possessed by corporate managers (Hambrick, 2007). Collectively, managerial ability encompasses a set of managerial skills, together with managers' understanding of technology and industry trends and the experiential progress made throughout their careers. Therefore, managerial ability critically depends on managers' understanding of the dynamics of the market in which they operate, the strategies implemented by their firms, a competent understanding of their firms' products and the competition encountered by their firms, and their ability to adapt to advancements in modern technology (Demerjian et al., 2012; Sun, 2017). Managers with these capabilities develop expertise and become veterans in their specific field. They are aware of their domain, as well as being efficient and knowledgeable, and, consequently, achieve the goal of maximizing shareholders' wealth while accumulating other financial and nonfinancial gains for their firms (Demerjian et al., 2013; Holcomb et al., 2009).

Corporate executives make a significant contribution to the firm's strategic decisions (Hambrick, 2007). One of the key characteristics that influences these strategic decisions is managerial career concern. Holmstrom (1999) argues that a manager's worry about his or her future career may affect incentives to exert effort or make choices on the job, while Holmstrom (1982) notes that these career concerns could distort decisions made by managers. Narayanan (1985) finds that when managers are motivated to improve their reputation, they have the incentive to make suboptimal decisions that boost the firm's short-term profits, to which their remuneration is attached, at the expense of shareholders' long-term interests. Graham et al. (2005) find similar evidence that managers motivated by career prospects forsake long-term value to increase short-term profits. Due to the inherent uncertainty involved in climate change issues (Stern, 2008), any investment in climate change risk management requires a long-term commitment by managers, with these projects being risky investments that do not generally provide quick pay-offs (Krueger et al., 2020). Therefore, one could conjecture that career-concerned managers have an aversion to invest in climate change projects.

However, the argument that managerial career concerns lead to short termism in decision making may only be applicable to less capable managers. The reason is that managers with a high level of ability earn better assessments, both within their own firm and from the labor market, and therefore are in high demand from competing firms (Ali et al., 2019; Fee & Hadlock, 2003). Fee and Hadlock (2003) find that top executives in well-performing firms are likely to be hired with offers of better remuneration packages by competing firms, while Rajgopal et al. (2006) find that CEO talent is correlated with explicit recognition of CEOs by external parties and with these CEOs receiving offers of appointment from outside their firm. Yuan et al. (2019) argue that the more able managers do not suffer from short-term career concerns due to their belief that their abilities will reward them with future career prospects. Bertrand and Schoar (2003) find manager fixed effects to be important determinants of a wide range of corporate decisions: in particular, managers who hold an MBA degree appear to follow more aggressive strategies. Several studies have established a strong link between managerial ability and corporate social responsibility (CSR)[3] investments for which returns are uncertain and take a longer time to come to fruition (Chatjuthamard et al., 2016; Yuan et al., 2019). The more capable managers can use these CSR initiatives strategically to increase the value of their firms by, for example, reducing the amount of labor-related litigation, improving the loyalty of customers and the quality of products, gaining recognition among community members, and promoting the morale of their employees (Bénabou & Tirole, 2010). Climate change projects are highly uncertain projects that require a long-term commitment from management. Managerial ability mitigates short termism arising from career concerns, thereby motivating more capable managers to invest in long-term strategic investments, such as climate change risk management projects. It is also argued that the market uses voluntary disclosures as a signal of superior managerial ability (Ferreira & Rezende, 2007). Climate change disclosures are considered voluntary actions (Bui et al., 2020; Cotter & Najah, 2012), with voluntary disclosures influenced by managerial characteristics (Bamber et al., 2010). Based on this evidence, it can be conjectured that managerial ability has a positive influence on both investments in climate risk management projects and disclosure of climate change information. We therefore propose and test the following hypothesis in alternative form:

> **H1.** : *A positive association exists between managerial ability and climate change disclosures.*

2.2 | Managerial ability and climate change disclosures: Moderating role of corporate governance

Managers of firms with weak corporate governance could pursue their own personal objectives at the expense of shareholders' wealth (Elyasiani & Zhang, 2015; Shleifer & Vishny, 1989). Studies associate weak corporate governance with negligence of stakeholder demands, reduction of CSR activities, and weak climate change and environmental policies (Hill & Jones, 1992; Jo & Harjoto, 2012). Hill and Jones (1992) document evidence that managers of firms with weak corporate governance make strategic decisions to reduce stakeholder power, with this affecting corporate efficiency negatively. While Ferreira and Laux (2007) contend that weak corporate governance leads to a drop in the transparent disclosure of information to capital markets and external parties, Armstrong et al. (2012) suggest that firms with weak corporate governance withhold adverse financial information without releasing it to the outside world. Ulupinar (2018) finds that entrenched managers use nonpublic information privy only to themselves to pressure analysts and investment banks to create biased optimistic research as they seek to cover up their value-destroying actions. Aggarwal and Dow (2012) find that weakly governed firms pursue short-term investments; therefore, they may not favor activities addressing climate change and that are environmentally friendly if these activities are stakeholder-focused and/or long-term investments with high initial costs, greater uncertainty, and no quick pay-offs. Similarly, Jo and Harjoto (2012) find that weak governance has a negative influence on the decision to engage in CSR activities, with Cong and Freedman (2011) finding that good governance has a positive influence on pollution disclosures. Based on this evidence, it can be contended that weak governance curtails the motivation of capable managers to disclose information including that relating to climate change. Therefore, we propose and test the following hypothesis in alternative form:

> **H2.** : *The positive association between managerial ability and climate change disclosures is weaker for firms with weak governance.*

3 | RESEARCH METHODOLOGY

3.1 | Sample and data

Our initial sample includes all US firms that responded to the CDP questionnaire from 2004 to 2019. We select 2004 as the initial year as the CDP started to report climate change disclosure data from that year.[4] The managerial ability data were available only up to 2018. Due to our lead–lag approach to analysis, the climate change disclosure data covered from 2005 to 2019, while the data for managerial ability and other independent variables were for the period from 2004 to 2018. Table 1, Panel A, shows that 5406 firm-year observations were in our initial sample. However, 958 observations were excluded as they were from financial firms and another 1182 observations were dropped due to the unavailability of managerial ability data. A further 968 observations were disregarded as they lacked the necessary data for the control variables used in the regression models (see Section 3.4 for the analytical models used in the current study). This screening process provided us with a usable sample of 412 unique firms with 2298 firm-year observations.

Table 1, Panels B and C, shows industry and yearly distributions of the firms in our sample, respectively. The computer industry contributes the highest percentage of observations (17.49%); however, a fair distribution can be observed of firms in our sample across a wide variety of industries. The highest number of observations is shown in 2018 followed by 2019, while the lowest number is in 2005.

We use the following sources to collect the necessary data: climate change disclosure data from the CDP database, financial data from the Compustat North America database, stock prices from the CRSP database, and corporate governance data from the Institutional Shareholder Services (ISS) (previously, Risk Metrics) database.

3.2 | Measures of climate change disclosures

We measure the extent of climate change disclosures using the CDP climate change score. Every year, CDP (an independent global not-for-profit organization running the global environmental disclosure system) collects firms' responses through questionnaires regarding their activities to address climate change and translates these responses into scores. The CDP scoring system is considered one of the most credible ratings in the world (GlobeScan & SustainAbility, 2014).[5] Furthermore, this score is also reported in the Key Stats and Ratio section of Google Finance.[6] These climate change disclosure scores encapsulate a large spectrum of climate change

TABLE 1 Sample selection and distribution

Panel A: sample selection		
Climate change score data available from CDP (2005–2019)		5406
Less: Exclusion of financial firms due to nonavailability of managerial ability score		(958)
Less: Firms having nonavailable managerial ability score		(1182)
Less: Firms dropped due to insufficient control variables		(968)
Final test sample from 2005 to 2019		**2298**
Panel B: Industry-wise distribution of sample firms		
Name of industry	**Number of firms**	**% of sample**
Mining/construction	59	2.57
Food	186	8.09
Textiles/printing/publishing	145	6.31
Chemicals	151	6.57
Pharmaceuticals	108	4.70
Extractive	140	6.09
Manufacturing: rubber/glass/etc.	38	1.65
Manufacturing: metal	49	2.13
Manufacturing: machinery	85	3.70
Manufacturing: electrical equipment	57	2.48
Manufacturing: transport equipment	110	4.79
Manufacturing: instruments	162	7.05
Manufacturing: miscellaneous	26	1.13
Computers	402	17.49
Transportation	173	7.53
Retail: wholesale	65	2.83
Retail: miscellaneous	181	7.88
Retail: restaurant	31	1.35
Services	103	4.48
Others	27	1.17
Total sample	**2298**	**100**
Panel C: Year-wise distribution of sample firms		
Year	**Number of firms**	**% of sample**
2005	42	1.83
2006	45	1.96
2007	95	4.13
2008	121	5.27
2009	134	5.83
2010	148	6.44
2011	158	6.88
2012	158	6.88
2013	147	6.40
2014	203	8.83

(Continues)

TABLE 1 (Continued)

Panel C: Year-wise distribution of sample firms		
Year	**Number of firms**	**% of sample**
2015	190	8.27
2016	182	7.92
2017	199	8.66
2018	246	10.70
2019	230	10.01
Total	**2298**	**100**

Abbreviation: CDP, Carbon Disclosure Project.

activities including: firm-level climate governance, climate change-related risk and opportunities, business strategy, climate change-related targets and performance, firms' initiatives for the reduction of carbon emissions, verification of carbon emissions, carbon pricing, and firm-level engagement with value chain partners regarding climate change-related activities (Carbon Disclosure Project [CDP], 2017). Until 2014, CDP allocated a score to each participating firm that ranged from 0 to 100; in 2015, however, the score was replaced with a climate change performance band. This change in reporting practice makes it difficult for us to use the scores and bands as the change occurs during our sample period. Therefore, we convert climate change performance bands for 2015–2019 into scores by assigning values that range from 1 to 8 and convert these scores,[7] together with the CDP scores available for 2005–2014, into percentile ranks. More specifically, following the prior disclosure literature (Barth et al., 2017), we compute the percentile rank of climate change disclosures as: (firm rank−1)/(number of firms−1). The percentile ranks for climate change disclosure range between 0 for the lowest ranked firm and 1 for the highest ranked firm. Additionally, we use the propensity to respond to the CDP climate change questionnaire (*CDP*) as an alternative proxy to measure firm-level climate change disclosure to assess the robustness of our findings. More specifically, we develop an indicator variable for climate change disclosure that takes the value of 1 if the firm responds to the CDP climate change questionnaire and allows its response to be publicly available and 0 otherwise.

3.3 | Measures of managerial ability

We measure managerial ability following Demerjian et al. (2012). To evaluate the relative efficacy of managers in converting resource inputs into outputs, Demerjian et al. (2012) use data envelopment analysis (DEA) to estimate firm efficiency within industries, comparing the sales generated by each firm, conditional on five stock variables ("net property," "plant and equipment," "net operating leases," "net research and development," "purchased goodwill," and "other intangible assets") and two flow variables ("cost of inventory" and "selling, general, and administrative [SG&A] expenses") as inputs.

Demerjian et al. (2012) regress firm efficiency on influential firm characteristics (firm size, market share, positive free cash flow, firm age, complex multisegment, and international operations) and use the residual term generated from this regression as the element reflecting managerial ability. They argue that the managerial ability measure according to this approach is based on the idea that more capable managers have a better understanding of technology and industry trends, more reliably predict product demand, invest in higher-value projects, and more effectively manage employees than their less capable counterparts. This managerial ability measure is widely used in empirical studies due to its superior power to capture managerial ability (e.g., Bonsall et al., 2017; Demerjian et al., 2013).

However, in the current study, we use a modified version of Demerjian et al.'s (2012) model by adding some board characteristics in estimating the firm-level managerial ability score. If not controlled for, the effect of these variables will be captured by the residual term of the model, thus distorting the managerial ability measure.[8] Therefore, we include board size, board independence, and CEO duality as additional control variables in the model in addition to the six firm characteristics used by Demerjian et al. (2012). More specifically, we estimate the following Tobit regression model by applying Fama and French's (1997) industry classifications:

$$\begin{aligned} \textit{Firm Efficiency}_{i,t} = {} & \beta_0 + \beta_1 Ln(\textit{Total Assets}_{i,t}) + \beta_2 \textit{Market Share}_{i,t} \\ & + \beta_3 \textit{Positive Free Cash Flow Indicator}_{i,t} \\ & + \beta_4 Ln(\textit{Firm Age}_{i,t}) \\ & + \beta_5 \textit{Business Segment Concentration}_{i,t} \\ & + \beta_6 \textit{Foreign Currency Indicator}_{i,t} + \beta_7 Ln(\textit{Board Size}_{i,t}) \\ & + \beta_8 \textit{Board Independence}_{i,t} + \beta_9 \textit{CEO Duality}_{i,t} \\ & + \textit{Year Indicators}_t + \varepsilon \end{aligned} \tag{1}$$

where *Firm Efficiency* is the efficiency measure generated by Demerjian et al. (2012) using the DEA process; *Ln (Total Assets)* is the natural logarithm of total assets; *Market Share* is the percentage of sales revenues earned by the firm within its industry; *Positive Free Cash Flow Indicator* is an indicator variable that takes the value of 1 if the firm has positive free cash flow, and 0 otherwise[9]; *Ln (Firm Age)* is the natural logarithm of the firm's age (i.e., the number of years that the firm has been listed on Compustat); *Business Segment Concentration* is the ratio of individual business segment sales to total sales, summed across all business segments; *Foreign Currency Indicator* is an indicator variable that takes the value of 1 if the firm has nonzero value for foreign currency adjustment; *Ln (Board Size)* is the natural logarithm of the total number of board members; *Board Independence* is the ratio of independent board members to total board members; and *CEO duality* is an indicator variable that takes the value of 1 if the CEO and chairperson is the same person, and 0 otherwise. The residual term obtained by estimating regression Equation (1) is our measure of managerial ability *(MABILITY)*. To assess the robustness of our findings, we also use the managerial ability score computed by Demerjian et al. (2012).

3.4 | Measure of corporate governance

We measure corporate governance using the entrenchment index (or E-Index) following prior studies (e.g., Bebchuk et al., 2013; Li & Li, 2018). The E-Index comprises six entrenchment provisions: staggered boards, poison pills, golden parachutes, supermajority requirements for charter amendments, supermajority requirements for bylaw amendments, and supermajority requirements for mergers. Therefore, the maximum value that E-Index can have is six (6), while the minimum value is zero (0). A higher E-Index value indicates weaker governance, while a lower value indicates stronger governance. We use the entrenchment index (*EINDEX*) to divide firms into two groups based on the yearly median *EINDEX* as the cut-off point. Accordingly, *HIGH_EINDEX* takes the value of 1 if the firm's *EINDEX* is greater than or equal to the yearly median *EINDEX* value and 0 otherwise; *HIGH_EINDEX* = *1* indicates weaker corporate governance, while *HIGH_EINDEX* = *0* indicates stronger corporate governance.

3.5 | Empirical models

We employ the following lead–lag regression model to test Hypothesis 1 (H1):

$$\begin{aligned} CCDS_{i,t+1} = {} & \beta_0 + \beta_1 MABILITY_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 MB_{i,t} + \beta_4 LEV_{i,t} \\ & + \beta_5 SGROWTH_{i,t} + \beta_6 FIN_{i,t} + \beta_7 LITG_{i,t} + \beta_8 ROA_{i,t} \\ & + \beta_9 CAPIN_{i,t} + \beta_{10} ENV\_STR_{i,t} + \beta_{11} ENV\_CON_{i,t} \\ & + \sum INDUSTRY_{i,t} + \sum YEAR_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{2}$$

where *CCDS* is the percentile rank of the climate change disclosure score and *MABILITY* is the managerial ability score, as discussed in Section 3.3. To support our Hypothesis 1 (H1), we expect a positive and significant coefficient for the *MABILITY* variable.

To test Hypothesis 2 (H2), we represent weak governance with the categorical variable *HIGH_EINDEX* (defined in Section 3.4), adding this variable and its interaction with the *MABILITY* variable to Equation (2) and estimate the following model:

$$\begin{aligned} CCDS_{i,t+1} = {} & \beta_0 + \beta_1 MABILITY_{i,t} + \beta_2 MABILITY_{i,t} \times HIGH\_EINDEX_{i,t} \\ & + \beta_3 HIGH\_EINDEX_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 MB_{i,t} + \beta_6 LEV_{i,t} \\ & + \beta_7 SGROWTH_{i,t} + \beta_8 FIN_{i,t} + \beta_9 LITG_{i,t} + \beta_{10} ROA_{i,t} \\ & + \beta_{11} CAPIN_{i,t} + \beta_{12} ENV\_STR_{i,t} + \beta_{13} ENV\_CON_{i,t} \\ & + \sum INDUSTRY_{i,t} + \sum YEAR + \varepsilon_{i,t} \end{aligned} \tag{3}$$

To support our Hypothesis 2 (H2), we expect a negative and significant coefficient for the *MABILITY*×*HIGH_EINDEX* variable.

3.6 | Control variables

We include several control variables in Equations (2) and (3) for reasons explained below. We control for firm size (*SIZE*) as larger firms have a greater tendency to disclose more climate change information, as they have additional resources for measuring and reporting carbon emissions (Ben-Amar et al., 2017; Bose et al., 2018; Bose, Khan, et al., 2021). We include financial leverage (*LEV*) to capture the influence of capital structure on the firm's disclosure policy. While some studies find that higher financial leverage leads to more frequent disclosures (Debreceny & Rahman, 2005), other studies find that highly leveraged firms experience a reduction in climate change-related activities due to their firm's tightened financial position and the pressure exerted by debtholders to take a short-term perspective in investment decisions (Haque, 2017; Tauringana & Chithambo, 2015). Following Haque (2017), we control for capital intensity *(CAPIN)*, profitability (*ROA*), and market-to-book ratio (*BM*). Haque (2017) suggests that firms with higher capital intensity *(CAPIN)* and asset newness utilize cleaner and more energy efficient technologies, thus achieving energy efficiency and better carbon performance. Moreover, while highly profitable *(ROA)* firms can possess economic resources to act more proactively in social and environmental matters, firms with high market-to-book ratios *(MB)* are expected to have more potential investment opportunities and, therefore, are likely to have better environmental performance that results in long-term competitive advantage. Bui et al. (2020) find that litigation-prone firms are subject to increased public and stakeholder scrutiny and, thus, are likely to pursue extensive disclosures to manage their credibility and the risk to their legitimacy. We therefore use a dummy variable to control for firms that operate in highly litigious industries (*LITG*). We control for sales growth (*SGROWTH*) as it increases a firm's disclosure ranking (Jiao, 2011) while being an influential factor in shaping the firm's environmental policy (Carrión-Flores & Innes, 2010). Firms that approach the markets for new financing tend to expand their coverage of voluntary environmental disclosures in advance (Clarkson et al., 2008; Dhaliwal et al., 2011). We therefore control for new financing (*FIN*) in the above model. In addition, we control for the firm's environmental strengths (*ENV_STR*) and environmental concerns (*ENV_CON*) as these two characteristics could influence the disclosure of the firm's climate change information (Matsumura et al., 2014). Finally, we control for industry and year effects to account for influences stemming from industry and time-period specific factors. Appendix A provides the definitions of all the variables used in Equations (2) and (3).

We employ the OLS regression method to estimate the above models. Robust standard errors clustered at the firm-level are applied to address heteroscedasticity and serial correlation in all these models.

4 | EMPIRICAL RESULTS

4.1 | Descriptive statistics

The descriptive statistics are reported in Table 2, Panel A. The mean (median) of managerial ability (*MABILITY*) for firms in our sample is 0.171 (0.123) which is consistent with Demerjian et al. (2013). The average (median) climate change disclosure score (*CCDS*) is 0.637 (0.643). Furthermore, the average entrenchment index (*EINDEX)* score, measuring weak governance, is 3.702. The average market capitalization of firms in our sample is US$38.91 billion (the natural logarithm of market capitalization is 9.778), thus implying that our sample contains relatively large firms. The financial leverage of 27.20% implies that an average firm in our sample uses debt capital to finance about a quarter of its assets base. As reflected by sales growth *(SGROWTH)* of 5.70% and the market-to-book *(MB)* value of 5.402, the sample comprises growing firms that possess future growth opportunities valued by the market. This is further assured by the positive figure reported for average capital intensity *(CAPIN)*. The mean (median) value of the new financing variable *(FIN)* is −0.016 (−0.024), implying that these firms reduce debt or repurchase shares more than they raise new financing. Their ability to generate the required funds internally can be justified on the basis of their profitability performance, as reflected by the *ROA* of 6.80%. Furthermore, about 32.30% of firms in our sample operate in highly litigious industries *(LITG)*. The mean values of their environmental strengths *(ENV_STR)* and environmental concerns *(ENV_CON)* are 0.178 and 0.060, respectively.

As shown in Table 2, Panel B, we split the sample into two groups, one of high managerial ability firms *(HIGH_MABILITY)* and the other of low managerial ability firms *(LOW_MABILITY)*, using the industry-year median as the cut-off point and compare mean/median values of the above variables between the two groups. We find that high managerial ability firms report a significantly higher *CCDS* score and lower managerial entrenchment. Furthermore, firms in that group are larger in size, more profitable, have faster growth, are less capital intensive, and are more environmentally concerned than firms in the low managerial ability group.

4.2 | Regression results

In this section, we report the outputs generated by estimating Equations (2) and (3) which are designed to test H1 and H2. Table 3 presents the results. The coefficients for *MABILITY* are positive in both Models 1 and 2 (0.220 and 0.162, respectively) and statistically significant at the 1% level, implying that managerial ability has a significant positive impact on firm-level climate change disclosures. Clearly, firms with more capable managers tend to make a higher level of climate change disclosures. Considering the *MABILITY* coefficient in Model 2, we infer that if managerial ability increases by one standard deviation (coefficient = 0.231 in Table 2), the percentile ranking of climate change disclosure increases by 3.70% (0.231 × 0.162). These findings therefore provide strong support for H1.

Hypothesis 2 (H2) predicts that the positive effect of managerial ability on climate change disclosures is weaker for firms with weak governance mechanisms. This hypothesis is tested by estimating Equation (3), with the results reported in Table 3, Model 3. In this model, our variable of interest is *MABILITY×HIGH_EINDEX* which captures the interactive influence of managerial ability and weak governance on climate change disclosures. This variable captures the difference in the effects of managerial ability on climate change disclosures between firms with weak governance mechanisms (i.e., highly entrenched boards) and those with strong governance

TABLE 2 Descriptive statistics

Panel A: descriptive statistics						
	Observations	Mean	Std. dev.	Median	First quartile	Third quartile
CCDS	2298	0.637	0.252	0.643	0.444	0.846
MABILITY	2298	0.171	0.231	0.123	−0.003	0.325
EINDEX	1713	3.702	1.066	4.000	3.000	4.000
HIGH_EINDEX	1713	0.633	0.482	1.000	0.000	1.000
SIZE	2298	9.778	1.284	9.696	8.952	10.589
MB	2298	5.402	53.129	3.007	1.917	4.866
LEV	2298	0.272	0.164	0.251	0.161	0.364
SGROWTH	2298	0.057	0.168	0.049	−0.009	0.112
FIN	2298	−0.016	0.107	−0.024	−0.057	0.008
LITG	2298	0.323	0.468	0.000	0.000	1.000
ROA	2298	0.068	0.070	0.067	0.039	0.101
CAPIN	2298	0.078	0.126	0.042	0.027	0.069
ENV_STR	2298	0.178	0.184	0.143	0.063	0.250
ENV_CON	2298	0.060	0.131	0.000	0.000	0.000

Panel B: mean and median tests						
	HIGH_MABILITY (*N* = 1211)		*LOW_MABILITY* (*N* = 1222)			
	Mean	Median	Mean	Median	Mean test (*p*-value)	Median test (*p*-value)
CCDS	0.683	0.708	0.591	0.600	0.000***	0.000***
HIGH_EINDEX	0.589	1.000	0.676	1.000	0.000***	0.000***
SIZE	10.022	9.886	9.537	9.491	0.000***	0.000***
MB	5.935	3.196	4.874	2.867	0.633	0.000***
LEV	0.260	0.237	0.284	0.262	0.000***	0.000***
SGROWTH	0.067	0.053	0.048	0.043	0.008***	0.002***
FIN	−0.022	−0.027	−0.009	−0.019	0.003***	0.000***
LITG	0.336	0.000	0.311	0.000	0.198	0.198
ROA	0.081	0.075	0.055	0.060	0.000***	0.000***
CAPIN	0.073	0.043	0.083	0.041	0.046**	0.632
ENV_STR	0.172	0.143	0.184	0.143	0.140	0.624
ENV_CON	0.066	0.000	0.054	0.000	0.031**	0.368

Note: This table reports descriptive statistics for the variables used in the study. All variables are defined in Appendix A.
***Statistical significance at 1% level.
**Statistical significance at 5% level.
*Statistical significance at 10% level.

mechanisms (i.e., low entrenched boards). The coefficient for the *MABILITY* variable captures the above effect for strongly governed firms. Consistent with our expectation, the *MABILITY*×*HIGH_EINDEX* variable enters the model with a negative coefficient which is significant at the 1% level (coefficient = −0.242, *p*-value < 0.01), revealing that the average increase in climate change disclosures led by managerial ability is lower for firms with weak governance mechanisms. In economic terms, a one standard deviation increase in managerial ability leads to a 5.08% (0.233 × 0.218) increase in the percentile ranking of climate change disclosures for better governed firms, while a similar increase in managerial ability leads to a decrease of 0.56% (0.233 × (−0.242 + 0.218)) in the percentile ranking of climate change disclosures for poorly governed firms.[10] Accordingly, support is found for H2 with its proposal that poor governance weakens the positive relationship between managerial ability and climate change disclosure. This finding suggests that firms with entrenched boards are less likely to be active in climate change risk mitigation actions, leading them to have a weak relationship between managerial ability and climate change disclosures.

Turning to control variables, we find that climate change disclosures are positively associated with firm size *(SIZE)*, litigation risk *(LITG)*, capital expenditures *(CAPIN)*, and environmental strengths

TABLE 3 Regression results of association between managerial ability and climate change disclosures

	Dependent variable = *CCDS*		
	Model (1)	**Model (2)**	**Model (3)**
MABILITY	0.220***	0.162***	0.218***
	(7.020)	(5.187)	(5.971)
MABILITY×*HIGH_EINDEX*			−0.242***
			(−4.727)
HIGH_EINDEX			0.009
			(0.573)
SIZE		0.052***	0.039***
		(6.214)	(5.083)
MB		−0.000	0.000
		(−0.396)	(0.791)
LEV		0.026	−0.003
		(0.439)	(−0.061)
SGROWTH		0.008	0.053*
		(0.234)	(1.676)
FIN		0.052	0.074
		(1.070)	(1.512)
LITG		0.167**	0.133**
		(2.474)	(2.228)
ROA		0.103	0.015
		(0.936)	(0.164)
CAPIN		0.115*	0.127**
		(1.700)	(2.414)
ENV_STR		0.125***	0.113**
		(2.597)	(2.220)
ENV_CON		−0.025	−0.007
		(−0.341)	(−0.095)
Intercept	0.687***	0.042	0.037
	(10.609)	(0.325)	(0.218)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Observations	2298	2298	1713
R-squared	0.056	0.139	0.132

Note: This table reports the regression results for the association between managerial ability and climate change disclosures. Models (1) and (2) present the regression output of Equation (2), respectively, while Model (3) presents regression outputs for Equation (3). Robust two-tailed *t*-statistics clustered by firm are presented in parentheses. All variables are defined in Appendix A.

Abbreviation: CCDS, climate change disclosure score.

***Statistical significance at 1% level.

**Statistical significance at 5% level.

*Statistical significance 10% level.

performance *(ENV_STR)*. These findings are consistent with the evidence revealed in prior studies (Bui et al., 2020; Jiao, 2011; Reid & Toffel, 2009).

4.3 | Firm fixed-effect regressions

Controlling for several firm-specific variables that could be related to climate change disclosures may not be successful in addressing the omitted time-invariant variable bias due to unknown firm characteristics. Therefore, firm fixed-effect regressions are used to mitigate this omitted time-invariant variable concern. Firm fixed-effect regressions remove the cross-sectional variation and analyze only the variation within a firm over time; they also remove the influence of omitted time-invariant firm characteristics that could potentially cause a spurious correlation between climate change disclosures and managerial ability (Kim et al., 2020).

Table 4 reports the firm fixed-effect regression output. In Model 1, the coefficient for *MABILITY* is positive and statistically significant (coefficient = 0.097, p-value < 0.01). In Model 2, the coefficient for *MABILITY*×*HIGH_EINDEX* is negative and significant (coefficient = −0.115, p-value < 0.10). Even though the magnitudes of these coefficient values are smaller than those reported in Table 3, probably due to the removal of possible omitted time-invariant variable bias, the firm fixed-effect regression results corroborate the evidence reported in the previous section. More importantly, the study's main findings do not appear to be significantly affected by time-invariant variable bias.

4.4 | PSM analysis

The relationship between managerial ability and climate change disclosures may be affected by observable heterogeneity bias (Lennox et al., 2012) and functional misspecification bias (Shipman et al., 2017). To mitigate this bias, we apply PSM analysis. For this purpose, we split the sample into two groups, namely, high *MABILITY (HIGH_MABILITY)* score firms and low *MABILITY (LOW_MABILITY)* score firms, using, as the cut-off point, the industry median *MABILITY* in a given year. We then create a dummy variable assigning the value of 1 to those in the former group and 0 to those in the latter group and estimate a logistic model (first-stage model) using this categorical variable as the dependent variable. We use the propensity scores obtained from the first-stage logistic regression model to select the optimal match, based on the caliper matching, in an attempt to control for the differences in characteristics between firms with high *MABILITY* scores (treatment group) and those with low *MABILITY* scores (control group). This is done to ensure that each high *MABILITY* firm is paired with a low *MABILITY* firm in the same industry and year to have the lowest difference in propensity scores. We employ the caliper matching method in this process and matching within a caliper of 3%.

Table 5 reports the findings. In Panel A, the first-stage regression estimates reveal that several firm-specific characteristics, namely, firm size, leverage, growth, litigation, and profitability play significant roles in determining the probability of a firm having high-ability managers. Panel B reveals that none of the deterministic variables differs between the treatment group and control group in a statistically

TABLE 4 Firm fixed-effect regression results of association between managerial ability and climate change disclosures

	Dependent variable = *CCDS*	
	Model (1)	Model (2)
MABILITY	0.097***	0.111***
	(3.164)	(2.889)
MABILITY×HIGH_EINDEX		−0.115*
		(−1.681)
HIGH_EINDEX		−0.030
		(−1.404)
SIZE	0.026	0.018
	(1.475)	(1.042)
MB	0.000	0.000
	(0.715)	(1.142)
LEV	0.132	0.076
	(1.514)	(0.694)
SGROWTH	−0.007	0.005
	(−0.205)	(0.123)
FIN	0.041	0.023
	(0.806)	(0.378)
ROA	0.025	−0.020
	(0.247)	(−0.172)
CAPIN	0.019	0.089
	(0.179)	(1.046)
ENV_STR	0.044	0.026
	(0.853)	(0.463)
ENV_CON	0.053	−0.000
	(0.598)	(−0.002)
Intercept	0.371**	0.390**
	(2.075)	(2.122)
Year fixed effects	Yes	Yes
Industry fixed effects	No	No
Observations	2298	1713
R-squared	0.560	0.530

Note: This table reports the firm fixed-effect regression results for Equations (2) and (3). Robust two-tailed t-statistics clustered by firm are presented in parentheses. All variables are defined in Appendix A.
Abbreviation: CCDS, climate change disclosure score.
***Statistical significance at 1% level.
**Statistical significance at 5% level.
*Statistical significance 10% level.

significant fashion. In Panel C, the regression model estimated on the propensity score-matched samples produces results similar to those reported in Table 3. The coefficient for *HIGH_MABILITY* is positive and statistically significant (coefficient = 0.052, p-value < 0.01) in Model 1, and the coefficient for *HIGH_MABILITY×HIGH_EINDEX* is negative and statistically significant (coefficient = −0.077, p-value <0.01) in Model 2. Therefore, the PSM analysis results confirm our main findings regarding the significant positive relationship between

TABLE 5 Propensity score matching (PSM) analysis

Panel A: first-stage logistic regression results			
	Coefficient	z-stat	p-value
SIZE	0.293	6.370	0.000***
MB	0.000	0.080	0.939
LEV	−0.697	−2.160	0.030**
SGROWTH	0.874	2.750	0.006***
FIN	−0.428	−0.950	0.345
LITG	1.713	3.090	0.002***
ROA	4.779	5.580	0.000***
CAPIN	−0.298	−0.610	0.543
ENV_STR	−0.268	−0.810	0.418
ENV_CON	0.698	1.490	0.137
Intercept	−3.694	−5.050	0.000***
Year fixed effects		Yes	
Industry fixed effects		Yes	
Observations		2298	
Pseudo R-squared		0.085	
Log likelihood		−1457.69	

Panel B: mean test between treatment and control groups			
	HIGH_MABILITY (treatment)	*LOW_MABILITY* (control)	t-test (p-value)
SIZE	9.771	9.778	0.895
MB	4.061	5.583	0.547
LEV	0.274	0.274	0.984
SGROWTH	0.057	0.057	0.911
FIN	−0.014	−0.014	0.908
LITG	0.302	0.313	0.638
ROA	0.068	0.067	0.738
CAPIN	0.077	0.075	0.654
ENV_STR	0.180	0.181	0.910
ENV_CON	0.061	0.060	0.842

Panel C: second-stage regression results of association between climate change disclosures and managerial ability		
	Dependent variable = *CCDS*	
	Model (1)	Model (2)
HIGH_MABILITY	0.052***	0.000
	(3.510)	(0.020)
HIGH_MABILITY×HIGH_EINDEX		−0.077***
		(−3.022)
HIGH_EINDEX		−0.103***
		(−4.769)
SIZE	0.047***	0.046***
	(4.657)	(4.380)
MB	−0.000	−0.000
	(−0.599)	(−0.620)

(Continues)

TABLE 5 (Continued)

Panel C: second-stage regression results of association between climate change disclosures and managerial ability		
	Dependent variable = *CCDS*	
	Model (1)	Model (2)
LEV	−0.008	−0.007
	(−0.127)	(−0.123)
SGROWTH	0.018	0.033
	(0.404)	(0.721)
FIN	0.048	0.046
	(0.865)	(0.817)
LITG	0.142***	0.141***
	(3.262)	(3.099)
ROA	0.096	0.043
	(0.673)	(0.313)
CAPIN	0.078	0.098
	(0.968)	(1.217)
ENV_STR	0.152***	0.148***
	(2.846)	(2.723)
ENV_CON	−0.006	0.004
	(−0.077)	(0.046)
Intercept	0.118	0.220
	(0.878)	(1.534)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	1720	1677
R-squared	0.102	0.122

Note: This table presents the results of the propensity score matching (PSM) analysis. Panel A reports the first-stage regression results where the *MABILITY* categorical variable is regressed on several firm-specific characteristics. Panel B tests the differences in firm characteristics between treatment (*HIGH_MABILITY*) and control (*LOW_MABILITY*) group of firms. Panel C reports the regression models estimated on propensity score-matched samples. Robust two-tailed *t*-statistics clustered by firm are presented in parentheses in Panel C. All variables are defined in Appendix A.
Abbreviation: CCDS, climate change disclosure score.
***Statistical significance at 1% level.
**Statistical significance at 5% level.
*Statistical significance 10% level.

managerial ability and climate change disclosures and the moderating role of corporate governance mechanisms in this association.

4.5 | Heckman's (1979) two-stage analysis

Although we address the observable differences between the treatment and control firms using PSM, our sample may demonstrate a systematic bias if firms that voluntarily respond to the CDP climate change questionnaire differ systematically from those that do not respond. More specifically, factors affecting a firm's CDP disclosure decisions may be correlated with climate change disclosures. To correct for this possible sample selection bias, we employ Heckman's (1979) two-stage selection model.[11] In the first stage (selection model), we develop a model for a firm's decision to respond to the CDP questionnaire by augmenting our sample with firms that were sent the CDP questionnaire but did not respond over our sample period. To be specific, we develop the following probit regression model (first-stage model):

$$\begin{aligned}Pr\,(DISC\_CDP=1)_{i,,t} = {} & \beta_0+\beta_1 PROPDISC_{i,t}+\beta_2 CDP\_LAG_{i,t}+\beta_3 SIZE_{i,t}\\ & +\beta_4 MB_{i,t}+\beta_5 LEV_{i,t}+\beta_6 SGROWTH_{i,t}+\beta_7 FIN_{i,t}\\ & +\beta_8 LITG_{i,t}+\beta_9 ROA_{i,t}+\beta_{10} CAPIN_{i,t}\\ & +\beta_{11} ENV\_STR_{i,t}+\beta_{12} ENV\_CON+\sum Year_{i,t}\\ & +\sum Industry_{i,t}+\varepsilon_{i,t}\end{aligned} \tag{4}$$

where *DISC_CDP* = *1*, the dependent variable, is an indicator variable that takes the value of 1 if the firm responds to the CDP questionnaire and 0 otherwise. Lennox et al. (2012) emphasize the importance of imposing "exclusion restrictions" when applying Heckman (1979) procedure. This is because the lack of "exclusion restrictions" in the selection model can produce biased coefficients in the second-stage model due to multicollinearity. The exclusion restriction requires the inclusion of at least one variable in the selection model (first stage) that is conceptually excluded from the second-stage model. To satisfy the exclusion restriction, we include two variables in the first-stage model in addition to including several control variables following prior studies (Bose, Minnick, et al., 2021; Matsumura et al., 2014). These two variables are as follows: *PROPDISC* (the proportion of firms in an industry that respond to the CDP questionnaire) and *CDP_LAG* (a firm's response to the CDP questionnaire in the previous year). The objective of including *PROPDISC* is to capture industry pressure; if more firms in an industry respond to the CDP questionnaire, nonresponding firms come under greater pressure to respond to the CDP to minimize the negative perceptions of external capital providers (Bose, Minnick, et al., 2021; Matsumura et al., 2014). Furthermore, we include *CDP_LAG* in Equation (4) as a firm's decision to respond to the CDP questionnaire tends to be sticky. We predict positive signs on the coefficients of both variables, *PROPDISC* and *CDP_LAG*. Appendix A provides the definition of these variables. We generate the inverse Mills ratio (*IMR*) from the first-stage model and include it in the second-stage models as stated in Equations (2) and (3) to account for selection bias.

Table 6 presents the results. Panel A reports the first-stage regression results, with the coefficients for *PROPDISC* and *CDP_LAG* both positive (3.238 and 2.307, respectively) and significant at the 1% level. The model has a pseudo-R^2 value of 56.90% and partial R^2 values (unreported) for *PROPDISC* and *CDP_LAG* of 3.22% and 32.13%, respectively, which are statistically significant at a 1% level, suggesting that *PROPDISC* and *CDP_LAG* are reasonably exogenous variables. In Panel B, which reports the second-stage regression results, the coefficient for *MABILITY* is positive and statistically significant (coefficient = 0.183, p-value < 0.01) in Model 1, while the coefficient for *MABILITY*×*HIGH_EINDEX* is negative and statistically

TABLE 6 Heckman's (1979) two-stage analysis

Panel A: Heckman's (1979) First-stage probit regression results			
	Dependent variable = *CDP response*		
	Coefficient	*z*-stat	*p*-value
PROPDISC	3.238	9.896	0.000***
CDP_LAG	2.307	24.931	0.000***
SIZE	0.236	7.026	0.000***
MB	−0.001	−0.300	0.764
LEV	−0.176	−0.797	0.426
SGROWTH	−0.286	−1.544	0.123
FIN	−0.301	−1.200	0.230
LITG	−0.030	−0.122	0.903
ROA	0.140	0.355	0.723
CAPIN	−0.359	−1.645	0.100*
ENV_STR	1.420	5.171	0.000***
ENV_CON	−1.011	−2.781	0.005***
Intercept	−4.979	−10.430	0.000***
Year fixed effects		Yes	
Industry fixed effects		Yes	
Observations		3603	
Pseudo *R*-squared		0.569	
Log likelihood		−913.83	

Panel B: Heckman's (1979) second-stage regression results		
	Dependent variable = *CCDS*	
	Model (1)	Model (2)
MABILITY	0.183***	0.236***
	(5.732)	(6.405)
MABILITY×*HIGH_EINDEX*		−0.240***
		(−4.700)
HIGH_EINDEX		0.008
		(0.519)
SIZE	0.055***	0.038***
	(6.162)	(4.739)
MB	−0.000	0.000
	(−0.378)	(0.774)
LEV	0.029	−0.011
	(0.482)	(−0.209)
SGROWTH	0.021	0.086**
	(0.524)	(2.166)
FIN	0.054	0.064
	(1.065)	(1.262)
LITG	0.144**	0.113*
	(2.033)	(1.821)
ROA	0.101	−0.016
	(0.894)	(−0.174)
CAPIN	0.123	0.145**
	(1.618)	(2.377)
ENV_STR	0.121**	0.112**
	(2.524)	(2.154)
ENV_CON	−0.078	−0.040
	(−0.985)	(−0.547)
IMR	−0.013	−0.025
	(−0.831)	(−1.646)
Intercept	0.009	−0.039
	(0.073)	(−0.243)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	2119	1603
R-squared	0.155	0.151

Note: This table presents the results of Heckman (1979) two-stage analysis. Panel A reports Heckman (1979) first-stage regression results. Panel B reports Heckman (1979) second-stage regression results. Robust two-tailed *t*-statistics clustered by firm are presented in parentheses in Panel B. All variables are defined in Appendix A.
Abbreviations: CCDS, climate change disclosure score; CDP, Carbon Disclosure Project.
***Statistical significance at 1% level.
**Statistical significance at 5% level.
*Statistical significance 10% level.

significant (coefficient = −0.240, *p*-value < 0.01) in Model 2. However, the coefficient for *IMR* is not statistically significant, which suggests that sample selection bias is not a significant concern.[12]

4.6 | Instrumental variable (IV) analysis

The potential endogenous relationship between managerial ability and climate change disclosures can be a concern in our regression models. Even though we expect managerial ability to influence climate change disclosures, the possibility exists that the more capable managers are attracted to firms that have a higher level of climate change disclosures, hence, bringing a reverse causality to the relationship. We employ IV-based two-stage least squares (2SLS) regressions to overcome concerns that our results may be affected by reverse causality. The IV-based 2SLS technique is advanced as a suitable regression approach for assessing the possible reverse causality inherent in the main model (Wooldridge, 2010). This approach requires the identification of an IV that is (or IVs that are) highly correlated to a firm's managerial ability but without influencing climate change disclosures except through managerial ability. Following Demerjian et al. (2020), we use the average industry-adjusted managerial ability in the same county where a firm is headquartered *(MABILITY_AVG)* as the instrument to identify the first-stage equation. Demerjian et al. (2020, p. 432) argue that "firms operating in geographic areas with a greater supply of high-ability managers are more likely to have these high-ability managers in their networks and are thus, ceteris paribus, more likely to employ a high-ability manager." We, therefore, expect *MABILITY_AVG* to be positively correlated with our endogenous variable, *MABILITY*. However, it is very unlikely that the average ability of managers within a region would influence firm-level climate change disclosures. Thus, we believe that the essential requirements of the instrument are satisfied.

Table 7 reports the 2SLS regression results. In Model 1, the coefficient for *MABILITY_AVG*, as expected, is positive and statistically significant (coefficient = 0.793, p-value < 0.01). Furthermore, Shea's partial R^2 value is 26.10%, while the partial F-statistic is 896.15 in the first-stage model. Based on the analysis by Stock et al. (2002), this high value for the F-statistic suggests that our instrument is not weak. Additionally, the Durbin–Wu–Hausman test is statistically significant (in the second-stage model), thus suggesting that managerial ability has an endogenous relationship with climate change disclosures. Overall, these test statistics suggest that our instruments fulfill the conditions of exogeneity and relevance. More importantly, the coefficient for the *MABILITY_PREDICTED* variable is negative and statistically significant (coefficient = 0.090, p-value < 0.05) in Model 2, thus corroborating our main findings. Therefore, our 2SLS regression output provides further assurance of the main evidence revealed in our study on the influence of managerial ability on climate change disclosures.[13]

TABLE 7 Two-stage least squares (2SLS) regression results

	First stage DV = *MABILITY* Model (1)	Second stage DV=*CCDS* Model (2)
MABILITY_PREDICTED		0.090**
		(2.074)
SIZE	0.009***	0.054***
	(2.600)	(10.704)
MB	0.001	−0.000
	(1.020)	(−0.359)
LEV	−0.032	0.018
	(−1.290)	(0.497)
SGROWTH	0.054*	0.015
	(1.980)	(0.520)
FIN	0.015	0.050
	(0.320)	(1.141)
LITG	0.005	0.008
	(0.250)	(0.560)
ROA	−0.022	0.173***
	(−0.400)	(4.787)
CAPIN	0.087*	0.111
	(1.870)	(1.378)
ENV_STR	0.104***	0.121**
	(3.480)	(2.421)
ENV_CON	0.076*	0.124***
	(1.760)	(3.259)
MABILITY_AVG	0.793***	−0.009
	(29.910)	(−0.185)
Intercept	−0.032	−0.021
	(−0.500)	(−0.246)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	2298	2298
R-squared	0.381	0.135
Durbin–Wu–Hausman statistic (test of endogeneity)		3.30*
Shea's partial R^2	0.261	
Weak instrument test: partial F-statistic	896.15	

Note: This table presents the results of two-stage least squares (2SLS) regression results. Model (1) shows the first-stage regression results. Model (2) shows the second-stage regression results. All variables are defined in Appendix A.

***Statistical significance at 1% level.

**Statistical significance at 5% level.

*Statistical significance 10% level.

5 | ADDITIONAL ANALYSES

5.1 | Quasi-experimental analysis: Significance of "blue" and "red" states

As firms provide climate change disclosures to meet stakeholder demands and expectations, we further examine whether the external pressures faced by firms for climate change disclosures have any influence on the association between firm-level managerial ability and climate change disclosures. Studies find that firm-level social and environmental disclosures are affected by the preferences of the communities in which firms are located (Deng et al., 2013; Di Giuli & Kostovetsky, 2014). In the context of the United States, prior studies argue that firms operating in states that are controlled by the Democratic Party are more likely to have good social responsibility ratings, as Democratic Party voters prefer more emphasis on social and environmental issues (e.g., Deng et al., 2013; Di Giuli & Kostovetsky, 2014).

To test this phenomenon, we split the firms in our sample into two groups based on whether their headquarters are located in states controlled by the Democratic Party (Blue) or Republican Party (Red) and estimate regressions for these two groups separately. The regression results are reported in Table 8. In Models 1 and 2, the *MABILITY* coefficient is significant for the Blue group. This confirms the positive relationship between managerial ability and climate change disclosures for firms headquartered in Democratic Party-controlled states; that is, the pressure exerted by Democratic Party governments pushes the more able managers to disclose more climate change information. Similarly, we find that coefficients for the interaction variable,

TABLE 8 Regression results of association between managerial ability and climate change disclosures: democratic party states versus republican party states

	Dependent variable = *CCDS*			
	Blue Model (1)	Red Model (2)	Blue Model (3)	Red Model (4)
MABILITY	0.180***	0.108*	0.245***	0.046
	(4.973)	(1.914)	(5.828)	(0.721)
MABILITY×*HIGH_EINDEX*			−0.262***	−0.042
			(−4.410)	(−0.549)
HIGH_EINDEX			0.015	−0.046**
			(0.828)	(−2.100)
SIZE	0.046***	0.066***	0.030***	0.050***
	(3.940)	(5.582)	(2.775)	(4.749)
MB	−0.000	0.000	0.000	0.001
	(−1.086)	(0.949)	(0.479)	(1.579)
LEV	−0.059	0.146*	−0.063	0.017
	(−0.758)	(1.729)	(−1.078)	(0.219)
SGROWTH	0.022	0.022	0.069	0.044
	(0.494)	(0.543)	(1.598)	(1.113)
FIN	0.082	−0.024	0.076	0.031
	(1.460)	(−0.329)	(1.286)	(0.370)
LITG	0.127	0.238***	0.101	0.230***
	(1.411)	(3.152)	(1.253)	(3.436)
ROA	0.126	0.056	0.027	−0.061
	(0.714)	(0.508)	(0.181)	(−0.618)
CAPIN	0.735***	0.079	0.675***	0.106**
	(4.130)	(1.343)	(3.674)	(2.249)
ENV_STR	0.114**	0.153*	0.111**	0.172*
	(2.077)	(1.659)	(1.995)	(1.869)
ENV_CON	0.019	−0.204**	−0.002	−0.038
	(0.207)	(−2.073)	(−0.024)	(−0.396)
Intercept	−0.023	0.081	−0.113	0.235
	(−0.136)	(0.509)	(−0.500)	(1.188)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	1488	810	1080	633
R-squared	0.166	0.209	0.172	0.189
Test of equality of coefficients	31.11***		35.14***	

Note: This table presents the regression results of the association between managerial ability and climate change disclosures separately for firms headquartered in Democratic Party (Blue) states and those headquartered in Republican Party (Red) states. Robust two-tailed *t*-statistics clustered by firm are presented in parentheses. All variables are defined in Appendix A.
Abbreviation: CCDS, climate change disclosure score.
***Statistical significance at 1% level.
**Statistical significance at 5% level.
*Statistical significance 10% level.

MABILITY×*HIGH_EINDEX*, are highly significant for firms headquartered in Democratic Party-controlled states while it is statistically insignificant for firms headquartered in Republican Party-controlled states. It appears that our main conclusions are more applicable to firms headquartered in states controlled by Democratic Party governments.

5.2 | Alternative measures of climate change disclosures

In our main analysis, we use climate change disclosure scores as a measure of climate change disclosures to capture the quality and comprehensiveness of firm-level climate change disclosures. In this section, we use the propensity of a firm to respond to the CDP questionnaire as an alternative proxy of climate change disclosures. More specifically, we augment our sample by adding firms that were sent the CDP questionnaire but did not respond over our sample period. Therefore, our dependent variable is an indicator variable that takes the value of 1 if a firm participates in the CDP questionnaire and 0 otherwise, and consequently, we estimate a logistic regression model.

Table 9, Panel A, reports the regression results. Model 1 reports the regression results of the association between managerial ability and the propensity to respond to the CDP climate change questionnaire, while Model 2 reports the moderating role of corporate governance in this association. In Model 1, the coefficient for *MABILITY* is positive and statistically significant (coefficient = 4.480, p-value < 0.01), suggesting that firms with a higher managerial ability score have a higher propensity to respond to the CDP climate change questionnaire. In Model 2, the coefficient for *MABILITY*×*HIGH_EINDEX* is negative and statistically significant (coefficient = −2.677, p-value < 0.01), suggesting that the positive association between the managerial ability score and the propensity to respond to the CDP climate change questionnaire is less pronounced for firms with weak corporate governance. Overall, our main findings remain robust to the use of this alternative proxy of climate change disclosures.

In this study, we assign a percentile rank of climate change disclosures to each firm by using the CDP scores (2005–2014) and CDP bands (2015–2019). We use the available CDP scores and CDP bands for the above respective periods as alternative measures of climate change disclosures and estimate baseline regression models. The findings are presented in Table 9, with Panel B reporting the regression results using CDP scores for 2005–2014 and Panel C reporting the regression results using CDP bands for 2015–2019. Our findings hold for each of these classification schemes; therefore, the main findings remain robust to the use of these alternative climate change disclosure measures.

In Table 9, Panel D, we use Demerjian et al.'s (2012) measure of managerial ability (i.e., excluding the board governance variables as additional controls in Equation (1)) and estimate Equations (2) and (3). We find that the *MABILITY* coefficient is positive and significant in Model 1 (coefficient = 0.096, p-value < 0.05), while the *MABILITY*×*HIGH_EINDEX* coefficient is negative and significant (coefficient = −0.094, p-value < 0.01) confirming the insensitivity of our main findings to the use of the original managerial ability measure of Demerjian et al. (2012).

5.3 | Managerial ability, climate change disclosures, and firm valuation: The mediation effect

The evidence thus far suggests that firms with higher managerial ability have higher climate change disclosures. Prior studies show that the more capable managers are positively associated with firm value (e.g., Yung & Chen, 2018). Moreover, Demerjian et al. (2013) find that managerial ability improves a firm's operating performance. Conversely, Mishra (2014) argues that more able managers have greater mobility in the job market, with their personal goals different from

TABLE 9 Additional analyses of association between managerial ability and climate change disclosures

Panel A: Regression results based on the propensity to respond CDP climate change questionnaire		
	Dependent variable = *CDP_RESPOND*	
	Model (1)	Model (2)
MABILITY	4.480***	5.974***
	(9.270)	(7.812)
MABILITY×*HIGH_EINDEX*		−2.677***
		(−3.062)
HIGH_EINDEX		0.214
		(1.386)
Intercept	−4.784***	−3.784**
	(−3.514)	(−2.311)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	4130	3067
Pseudo R-squared	0.278	0.235

Panel B: Regression results based on CDP scores for the period 2005–2014		
	Dependent variable = *CCDS*	
	Model (1)	Model (2)
MABILITY	8.069***	10.654***
	(3.871)	(4.257)
MABILITY×*HIGH_EINDEX*		−6.025*
		(−1.796)
HIGH_EINDEX		−0.950
		(−0.831)
Intercept	19.682**	25.707***
	(2.500)	(2.968)
Control variables	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	1251	922
R-squared	0.505	0.580

Panel C: Regression results based on CDP bands for the period 2015–2019		
	Dependent variable = *CCDS*	
	Model (1)	Model (2)
MABILITY	0.720***	1.079***
	(3.055)	(4.008)
MABILITY×*HIGH_EINDEX*		−1.432***
		(−3.644)
HIGH_EINDEX		−0.008
		(−0.071)
Intercept	1.192	1.802**
	(1.316)	(2.137)

(Continues)

TABLE 9 (Continued)

Panel C: Regression results based on CDP bands for the period 2015–2019		
	Dependent variable = *CCDS*	
	Model (1)	Model (2)
Control variables	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	1047	791
R-squared	0.441	0.486

Panel D: Regression results using the managerial ability score developed by Demerjian et al. (2012)		
	Dependent variable = *CCDS*	
	Model (1)	Model (2)
MABILITY	0.096**	0.096**
	(1.995)	(2.102)
MABILITY×*HIGH_EINDEX*		−0.094*
		(−1.814)
HIGH_EINDEX		−0.008
		(−0.703)
Intercept	0.049	0.073
	(0.390)	(0.625)
Control variables	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	2298	1713
R-squared	0.124	0.091

Note: This table presents the regression results for several additional analyses. Panel A shows the regression results using firms' propensity to respond CDP questionnaire as a proxy for climate change disclosures. Panel B uses CDP scores over the period 2005–2014, while Panel C uses CDP performance bands over the period 2015–2019. Panel D presents the regression results using the managerial ability score computed by Demerjian et al. (2012) as a proxy for managerial ability. Robust two-tailed *t*-statistics clustered by firm are presented in parentheses. All variables are defined in Appendix A.
Abbreviations: CCDS, climate change disclosure score; CDP, Carbon Disclosure Project.
***Statistical significance at 1% level.
**Statistical significance at 5% level.
*Statistical significance 10% level.

those of shareholders; thus, these managers engage in more risk-taking activities that are detrimental to shareholders' wealth. Therefore, our study next examines the mediating role of climate change disclosures in the association between managerial ability and firm valuation. We develop the following set of equations to conduct our mediation test:

$$TOBINQ_{i,t} = \beta_0 + \beta_1 MABILITY_{i,t} + \sum Controls_{i,t} + \sum YEAR_{i,t} + \sum INDUSTRY_{i,t} + \varepsilon_{i,t} \tag{5.1}$$

$$CCDS_{i,t} = \gamma_0 + \gamma_1 MABILITY_{i,t} + \sum Controls_{i,t} + \sum YEAR_{i,t} + \sum INDUSTRY_{i,t} + \varepsilon_{i,t} \tag{5.2}$$

$$TOBINQ_{i,t} = \omega_0 + \omega_1 MABILITY_{i,t} + \omega_2 CCDS_{i,t} + \sum Controls_{i,t} + \sum YEAR_{i,t} + \sum INDUSTRY_{i,t} + \varepsilon_{i,t} \tag{5.3}$$

where *TOBINQ* is Tobin's Q, measured as the sum of the market value of common equity plus the book value of total debt scaled by total assets (Bose et al., 2017; Bose, Khan, et al., 2021). We use Tobin's Q as a measure of firm value. Appendix A provides the definition of all variables.

We begin with Equation (5.1) to examine the overall effect of *MABILITY* on a firm's *TOBINQ*, denoted by coefficient β_1. The effect of *MABILITY* on *CCDS* is captured by γ_1 in Equation (5.2), whereas ω_1 in Equation (5.3) denotes the direct effect of *MABILITY* on *TOBINQ* after controlling for the mediator variable, *CCDS*. We consider *CCDS* as a mediator following Baron and Kenny (1986) and Wen and Ye (2014) if (a) *MABILITY* is significantly related to *TOBINQ* ($\beta_1 \neq 0$) in Equation (5.1), (b) *MABILITY* is significantly related to *CCDS* ($\gamma_1 \neq 0$) in Equation (5.2), and (c) *CCDS* is significantly related to *TOBINQ* after controlling for *MABILITY* ($\omega_1 \neq 0$) in Equation (5.3).[14] Once the relationships are established, it is essential to test whether the average causal mediation effect is statistically significant. We use the bootstrapped Sobel–Goodman test (Preacher & Hayes, 2004) to analyze whether a mediator carries the influence of the treatment variable to a dependent variable. This test is useful as we simultaneously run three equations, Equations (5.1) to (5.3), to assess the potential links between the variables of interest: *MABILITY*, *CCDS*, and *TOBINQ*. Figure 1 shows the procedure for the mediation test.

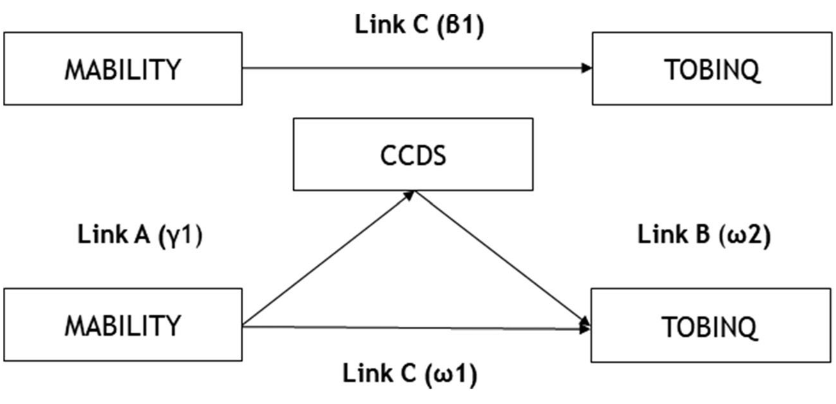

FIGURE 1 Paths between climate change disclosure score (CCDS), managerial ability, and firm value

TABLE 10 Mediation regression results of association between managerial ability, climate change disclosures, and firm value

	DV = *TOBINQ* Model (1)	DV = *CCDS* Model (2)	DV = *TOBINQ* Model (3)
MABILITY	0.239*	0.182***	0.187
	(1.890)	(5.440)	(1.470)
CCDS			0.288***
			(3.130)
SIZE	0.174***	0.521***	0.159***
	(7.400)	(8.390)	(6.650)
LEV	0.818***	0.080*	0.795***
	(4.970)	(1.840)	(4.840)
SGROWTH	0.163	0.004	0.162
	(1.070)	(0.090)	(1.070)
FIN	−0.594**	0.066	−0.614**
	(−2.480)	(1.050)	(−2.570)
LITG	0.678***	0.185***	0.624***
	(3.550)	(3.680)	(3.260)
ROA	5.940***	0.320***	5.848***
	(14.780)	(3.020)	(14.550)
CAPIN	−0.546***	0.205***	−0.605**
	(−3.440)	(2.940)	(−2.280)
ENV_STR	−0.586***	−0.185***	−0.639***
	(−3.440)	(−2.730)	(−3.740)
ENV_CON	−0.892***	−0.009	−0.838***
	(−3.460)	(−0.160)	(−3.250)
Intercept	0.143	−0.247**	0.214
	(0.370)	(−2.430)	(0.560)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Observations	1737	1737	1737
R-squared	0.379	0.161	0.383
Mediating effects			
Indirect effect – *CCDS*×*MABILITY*		0.053***	
z-statistic for indirect effect – *CCDS*×*MABILITY*		(2.716)	
Direct effect		0.187	
Total effect		0.239	
% of the total mediated effect		21.86%	

Note: This table presents the regression results on the mediation role of climate change disclosures in the association between managerial ability and firm valuation. The mediation effect test statistics are reported in the bottom section of the table. All variables are defined in Appendix A.
***Statistical significance at 1% level.
**Statistical significance at 5% level.
*Statistical significance 10% level.

We report the regression results in Table 10. Model 1 shows that the coefficient for *MABILITY* is positive and statistically significant when the dependent variable is firm value *(TOBINQ)*, suggesting that firms with a higher managerial ability are awarded higher valuations by the market. In Model 2, as also observed in Table 4, when an OLS model was estimated, the coefficient for *MABILITY* is positive and statistically significant, suggesting that firms with a higher managerial ability make a higher level of climate change disclosures. However, in Model 3, the coefficient for *MABILITY* is statistically insignificant, while the coefficient for *CCDS* is significant at a 1% level when the dependent variable is firm value *(TOBINQ).* These findings support full mediation: Once the influence of *CCDS* is controlled for, the influence of *MABILITY* on firm valuation disappears.

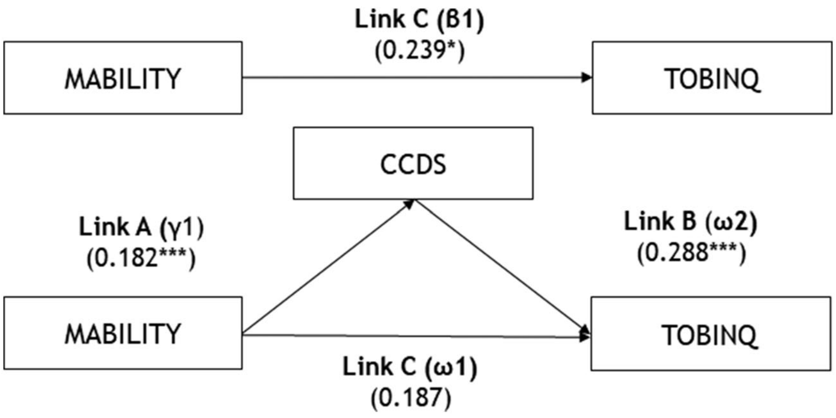

FIGURE 2 Paths between climate change disclosure score (CCDS), managerial ability, and firm value

We report the mediation-related statistics at the bottom of Table 10. These statistics suggest that the direct and total effects of *CCDS* on firm value are 0.187 and 0.239, respectively, giving rise to a mediation effect (i.e., indirect effect) of 0.053. As revealed by the reported *z*-statistic, this mediation effect is statistically significant; the mediated portion of firm value attributed to *CCDS* is 21.86% of the total effect. We also graphically present the results in Figure 2. In summary, the mediation analysis provides evidence that climate change disclosures are the channel through which managerial ability affects firm value.

6 | CONCLUSION

In this study, we investigate the association between managerial ability and firm-level climate change disclosures. We find that firms with more capable managers make a higher level of climate change disclosures. Furthermore, the positive association between managerial ability and climate change disclosures is weakened when the firm suffers from weak corporate governance. Our results remain robust to addressing omitted time-invariant variable bias, observable heterogeneity bias, sample selection bias, and reverse causality and to separation of firms in the sample into different groups based on disclosure characteristics. We also find evidence that climate change disclosures have a significant mediating influence on the association between managerial ability and firm valuation.

Our findings suggest that more able managers are less concerned about the short-term performance of their firms and tend to engage in climate change activities that require long-term commitments from management and are beneficial to a wider group of stakeholders. Thus, our findings provide insights into an important internal mechanism of the firm—managerial ability—that could play a significant role not only in disclosing climate change information but also in preparing firms to manage the risk of climate change, a threat to the existence of mankind. The study's findings are timely given the importance placed by the TCFD on climate change actions by firms, with firms expected to demonstrate the resilience of their strategies and operations under different scenarios of future global warming. Our study is a US-based study; future research covering diverse jurisdictions would enrich the debate by providing new evidence on the association between managerial ability and climate change disclosures. Future research could explore the underlying mechanisms through which managerial ability affects climate change disclosures.

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DATA AVAILABILITY STATEMENT

All data are publicly available from the sources mentioned in the paper.

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NOTES

[1] In this study, we refer to carbon disclosures and greenhouse gas disclosures as climate change disclosures. Some researchers refer to climate change disclosures as carbon disclosures (e.g., Bui et al., 2020), while some refer to them as greenhouse gas (GHG) disclosures (e.g., Liao et al., 2015; Tauringana & Chithambo, 2015) and to the transparency of GHG disclosures (e.g., Peters & Romi, 2014).

[2] Source: Task Force on Climate-Related Financial Disclosures (TCFD) (2017).

[3] The term "corporate social responsibility (CSR)" refers to the engagement of an organization in areas where the benefit is mainly accrued by society. This includes taking responsibility for actions for protection of the environment, contribution to the community, relationship with customers, issues with labor, and diversification of employment (Cho & Lee, 2019).

[4] CDP2005 corresponds to the financial year 2004, while CDP2020 corresponds to the financial year 2019.

[5] After surveying 702 qualified sustainability experts across 70 countries, GlobeScan and SustainAbility (2014) report that the CDP rating is the most credible environmental disclosure rating system globally. See https://globescan.com/wp-content/uploads/2017/07/Rate_the_Raters_2013-Polling_the_Experts-GlobeScan_SustainAbility-3.pdf (accessed on 20 September 2021).

[6] For example, see https://www.google.com/finance/quote/BHP:ASX (accessed on 20 September 2021).

[7] The CDP provides eight performance bands (i.e., A, A-, B, B-, C, C-, D, and D-) based on firms' disclosure of climate change information. We assign 8 for performance band A, 7 for A-, 6 for B, 5 for B-, 4 for C, 3 for C-, 2 for D, and 1 for D-, respectively.

[8] We thank an anonymous reviewer for suggesting the re-computation of managerial ability scores after controlling for the effect of board governance variables.

[9] Free cash flow is defined as earnings before depreciation and amortization less the change in working capital (receivables + inventory + other current assets + other current liabilities – trade accounts payable) less capital expenditures. See Demerjian et al. (2012) for more details about the calculation.

[10] The standard deviation of managerial ability *(MABILITY)* is 0.233 for Model (3) sample.

[11] We thank an anonymous reviewer for suggesting the analysis of the self-selection bias.

[12] An alternative explanation for the insignificant *IMR* is that our selection model is misspecified. Nevertheless, we further calculate the Variance Inflation Factor (VIF) for *IMR* to confirm that the insignificant coefficient for *IMR* is not caused by multicollinearity. The unreported VIF for *IMR* is 1.19 and 1.18 in Model (1) and Model (2), respectively, thus indicating that multicollinearity is not an issue.

[13] We run only Equation (2) using two-stage instrumental variable analysis where we instrumented *MABILITY* through using *MABILITY_AVG* as an instrumental variable. We do not estimate Equation (3) using this approach because if we do so using the instrumented *MABILITY* and include *MABILITY*×*HIGH_EINDEX* in the second-stage regression the coefficient for *MABILITY*×*HIGH_EINDEX* does not capture the influence of instrumented *MABILITY*.

[14] A variable acts as a mediator if the following criteria are met: (i) the treatment (managerial ability) is significantly associated with the mediator (climate change disclosures); (ii) the treatment (managerial ability) is significantly associated with the dependent variable (firm value) in the absence of the mediator (climate change disclosures); and (iii) the mediator (climate change disclosures) has a significant unique effect on the dependent variable, and when this mediation effect is controlled for, the effect that the treatment variable (managerial ability) has on the dependent variable (firm value) is weakened. If the treatment (managerial ability) is no longer significant when the mediator (climate change disclosures) is controlled for, the findings support full mediation. If the treatment (managerial ability) is still significant when the mediator (climate change disclosures) is controlled for, the finding supports partial mediation.

REFERENCES

Aggarwal, R., & Dow, S. (2012). Corporate governance and business strategies for climate change and environmental mitigation. *The European Journal of Finance*, *18*(3–4), 311–331. https://doi.org/10.1080/1351847X.2011.579745

Ali, A., Li, N., & Zhang, W. (2019). Restrictions on managers' outside employment opportunities and asymmetric disclosure of bad versus good news. *The Accounting Review*, *94*(5), 1–25. https://doi.org/10.2308/accr-52314

Andreou, P. C., Karasamani, I., Louca, C., & Ehrlich, D. (2017). The impact of managerial ability on crisis-period corporate investment. *Journal of Business Research*, *79*(1), 107–122. https://doi.org/10.1016/j.jbusres.2017.05.022

Armstrong, C. S., Balakrishnan, K., & Cohen, D. (2012). Corporate governance and the information environment: Evidence from state antitakeover laws. *Journal of Accounting and Economics*, *53*(1–2), 185–204. https://doi.org/10.1016/j.jacceco.2011.06.005

Bamber, L. S., Jiang, J., & Wang, I. Y. (2010). What's my style? The influence of top managers on voluntary corporate financial disclosure. *The Accounting Review*, *85*(4), 1131–1162. https://doi.org/10.2308/accr.2010.85.4.1131

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Barth, M. E., Cahan, S. F., Chen, L., & Venter, E. R. (2017). The economic consequences associated with integrated report quality: Capital market and real effects. *Accounting, Organizations and Society*, *62*, 43–64. https://doi.org/10.1016/j.aos.2017.08.005

Bebchuk, L., Cohen, A., & Ferrell, A. (2009). What matters in corporate governance? *The Review of Financial Studies*, *22*(2), 783–827. https://doi.org/10.1093/rfs/hhn099

Bebchuk, L. A., Cohen, A., & Wang, C. C. (2013). Learning and the disappearing association between governance and returns. *Journal of Financial Economics*, *108*(2), 323–348. https://doi.org/10.1016/j.jfineco.2012.10.004

Bénabou, R., & Tirole, J. (2010). Individual and corporate social responsibility. *Economica*, *77*(305), 1–19. https://doi.org/10.1111/j.1468-0335.2009.00843.x

Ben-Amar, W., Chang, M., & McIlkenny, P. (2017). Board gender diversity and corporate response to sustainability initiatives: Evidence from the carbon disclosure project. *Journal of Business Ethics*, *142*(2), 369–383. https://doi.org/10.1007/s10551-015-2759-1

Bertrand, M., & Schoar, A. (2003). Managing with style: The effect of managers on firm policies. *The Quarterly Journal of Economics*, *118*(4), 1169–1208. https://doi.org/10.1162/003355303322552775

Bonsall, S. B. IV, Holzman, E. R., & Miller, B. P. (2017). Managerial ability and credit risk assessment. *Management Science*, *63*(5), 1425–1449. https://doi.org/10.1287/mnsc.2015.2403

Bose, S., Khan, H. Z., & Monem, R. (2021). Does green banking performance pay off? Evidence from a unique regulatory setting in Bangladesh. *Corporate Governance: An International Review*, *29*(2), 162–187. https://doi.org/10.1111/corg.12349

Bose, S., Khan, H. Z., Rashid, A., & Islam, S. (2018). What drives green banking disclosure? An institutional and corporate governance perspective. *Asia Pacific Journal of Management*, *35*(2), 501–527. https://doi.org/10.1007/s10490-017-9528-x

Bose, S., Minnick, K., & Shams, S. (2021). Does carbon risk matter for corporate acquisition decisions? *Journal of Corporate Finance*, *70*(5), 1–24. https://doi.org/10.1016/j.jcorpfin.2021.102058

Bose, S., Saha, A., Khan, H. Z., & Islam, S. (2017). Non-financial disclosure and market-based firm performance: The initiation of financial inclusion. *Journal of Contemporary Accounting and Economics*, *13*(3), 263–281. https://doi.org/10.1016/j.jcae.2017.09.006

Bui, B., Houqe, M. N., & Zaman, M. (2020). Climate governance effects on carbon disclosure and performance. *The British Accounting Review*, *52*(2), 100880. https://doi.org/10.1016/j.bar.2019.100880

Carbon Disclosure Project (CDP) (The), (2017). About us: The carbon disclosure project [online], available at: https://www.cdp.net/en (accessed on 30 August 2020).

Carrión-Flores, C. E., & Innes, R. (2010). Environmental innovation and environmental performance. *Journal of Environmental Economics and Management*, *59*(1), 27–42. https://doi.org/10.1016/j.jeem.2009.05.003

Chatjuthamard, P., Jiraporn, P., Tong, S., & Singh, M. (2016). Managerial talent and corporate social responsibility (CSR): How do talented managers view corporate social responsibility? *International Review of Finance*, *16*(2), 265–276. https://doi.org/10.1111/irfi.12067

Cho, S. Y., & Lee, C. (2019). Managerial efficiency, corporate social performance, and corporate financial performance. *Journal of Business Ethics*, *158*(2), 467–486. https://doi.org/10.1007/s10551-017-3760-7

Clarkson, P. M., Li, Y., Pinnuck, M., & Richardson, G. D. (2015). The valuation relevance of greenhouse gas emissions under the European Union carbon emissions trading scheme. *European Accounting Review*, *24*(3), 551–580. https://doi.org/10.1080/09638180.2014.927782

Clarkson, P. M., Li, Y., Richardson, G. D., & Vasvari, F. P. (2008). Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis. *Accounting, Organizations and Society*, *33*(4–5), 303–327. https://doi.org/10.1016/j.aos.2007.05.003

Cong, Y., & Freedman, M. (2011). Corporate governance and environmental performance and disclosures. *Advances in Accounting*, *27*(2), 223–232. https://doi.org/10.1016/j.adiac.2011.05.005

Cotter, J., & Najah, M. M. (2012). Institutional investor influence on global climate change disclosure practices. *Australian Journal of Management*, *37*(2), 169–187. https://doi.org/10.1177/0312896211423945

Debreceny, R., & Rahman, A. (2005). Firm-specific determinants of continuous corporate disclosures. *The International Journal of Accounting*, *40*(3), 249–278. https://doi.org/10.1016/j.intacc.2005.06.002

Deegan, C. (2002). Introduction: The legitimising effect of social and environmental disclosures – A theoretical foundation. *Accounting, Auditing & Accountability*, *15*(3), 282–311. https://doi.org/10.1108/09513570210435852

Deegan, C. M. (2019). Legitimacy theory: Despite its enduring popularity and contribution, time is right for a necessary makeover. *Accounting, Auditing & Accountability*, *32*(8), 2307–2329. https://doi.org/10.1108/AAAJ-08-2018-3638

Demerjian, P., Lev, B., & McVay, S. (2012). Quantifying managerial ability: A new measure and validity tests. *Management Science*, *58*(7), 1229–1248. https://doi.org/10.1287/mnsc.1110.1487

Demerjian, P., Lewis-Western, M., & McVay, S. (2020). How does intentional earnings smoothing vary with managerial ability? *Journal of Accounting, Auditing & Finance*, *35*(2), 406–437. https://doi.org/10.1177/0148558X17748405

Demerjian, P. R., Lev, B., Lewis, M. F., & McVay, S. E. (2013). Managerial ability and earnings quality. *The Accounting Review*, *88*(2), 463–498. https://doi.org/10.2308/accr-50318

Deng, X., Kang, J.-K., & Low, B. S. (2013). Corporate social responsibility and stakeholder value maximization: Evidence from mergers. *Journal of Financial Economics*, *110*(1), 87–109. https://doi.org/10.1016/j.jfineco.2013.04.014

Dhaliwal, D. S., Li, O. Z., Tsang, A., & Yang, Y. G. (2011). Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting. *The Accounting Review*, *86*(1), 59–100. https://doi.org/10.2308/accr.00000005

Di Giuli, A., & Kostovetsky, L. (2014). Are red or blue companies more likely to go green? Politics and corporate social responsibility. *Journal of Financial Economics*, *111*(1), 158–180. https://doi.org/10.1016/j.jfineco.2013.10.002

Elyasiani, E., & Zhang, L. (2015). CEO entrenchment and corporate liquidity management. *Journal of Banking & Finance*, *54*, 115–128. https://doi.org/10.1016/j.jbankfin.2015.01.014

Fama, E. F., & French, K. R. (1997). Industry costs of equity. *Journal of Financial Economics*, *43*, 153–193. https://doi.org/10.1016/S0304-405X(96)00896-3

Fee, C. E., & Hadlock, C. J. (2003). Raids, rewards, and reputations in the market for managerial talent. *The Review of Financial Studies*, *16*, 1315–1357. https://doi.org/10.1093/rfs/hhg031

Ferreira, D., & Rezende, M. (2007). Corporate strategy and information disclosure. *The Rand Journal of Economics*, *38*(1), 164–184. https://doi.org/10.1111/j.1756-2171.2007.tb00050.x

Ferreira, M. A., & Laux, P. A. (2007). Corporate governance, idiosyncratic risk, and information flow. *The Journal of Finance*, *62*(2), 951–989. https://doi.org/10.1111/j.1540-6261.2007.01228.x

Finkelstein, S. (1992). Power in top management teams: Dimensions, measurement, and validation. *Academy of Management Journal*, *35*(3), 505–538. https://doi.org/10.2307/256485

Freedman, M., & Jaggi, B. (2005). Global warming, commitment to the Kyoto protocol, and accounting disclosures by the largest global public firms from polluting industries. *The International Journal of Accounting*, *40*(3), 215–232. https://doi.org/10.1016/j.intacc.2005.06.004

GlobeScan & SustainAbility. (2014). The 2013 ratings survey: Polling the experts, a GlobeScan/sustainability survey.

Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics*, *40*, 3–73. https://doi.org/10.1016/j.jacceco.2005.01.002

Grenadier, S. R. (2002). Option exercise games: An application to the equilibrium investment strategies of firms. *The Review of Financial Studies*, *15*(3), 691–721. https://doi.org/10.1093/rfs/15.3.691

Hambrick, D. C. (2007). Upper echelons theory: An update. *The Academy of Management Review*, *32*(2), 334–343. https://doi.org/10.5465/amr.2007.24345254

Haque, F. (2017). The effects of board characteristics and sustainable compensation policy on carbon performance of UK firms. *The British Accounting Review*, *49*(3), 347–364. https://doi.org/10.1016/j.bar.2017.01.001

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, *47*(1), 153–161. https://doi.org/10.2307/1912352

Hill, C. W., & Jones, T. M. (1992). Stakeholder-agency theory. *Journal of Management Studies*, *29*(2), 131–154. https://doi.org/10.1111/j.1467-6486.1992.tb00657.x

Holcomb, T. R., Holmes, R. M., & Connelly, B. L. (2009). Making the most of what you have: Managerial ability as a source of resource value creation. *Strategic Management Journal*, *30*(5), 457–485. https://doi.org/10.1002/smj.747

Holmstrom, B. (1982). Moral hazard in teams. *The Bell Journal of Economics*, *13*, 324–340. https://doi.org/10.2307/3003457

Holmstrom, B. (1999). Managerial incentive problems: A dynamic perspective. *The Review of Economic Studies*, *66*, 169–182. https://doi.org/10.1111/1467-937X.00083

Intergovernmental Panel on Climate Change (IPCC). (2014). Synthesis Report. Available at: https://www.ipcc.ch/report/ar5/syr/ (accessed on 12 October 2021).

Jiao, Y. (2011). Corporate disclosure, market valuation, and firm performance. *Financial Management*, *40*(3), 647–676. https://doi.org/10.1111/j.1755-053X.2011.01156.x

Jo, H., & Harjoto, M. A. (2012). The causal effect of corporate governance on corporate social responsibility. *Journal of Business Ethics*, *106*(1), 53–72. https://doi.org/10.1007/s10551-011-1052-1

Kim, S., Saha, A., & Bose, S. (2020). Do capital expenditures influence earnings performance: Evidence from loss-making firms. *Accounting & Finance*, *61*, 2539–2575. https://doi.org/10.1111/acfi.12675

Koester, A., Shevlin, T., & Wangerin, D. (2017). The role of managerial ability in corporate tax avoidance. *Management Science*, *63*(10), 3285–3310. https://doi.org/10.1287/mnsc.2016.2510

Kolk, A., Levy, D., & Pinkse, J. (2008). Corporate responses in an emerging climate regime: The institutionalization and commensuration of carbon disclosure. *European Accounting Review*, *17*(4), 719–745. https://doi.org/10.1080/09638180802489121

Krueger, P., Sautner, Z., & Starks, L. T. (2020). The importance of climate risks for institutional investors. *Review of Financial Studies*, *33*(3), 1067–1111. https://doi.org/10.1093/rfs/hhz137

Kumarasiri, J., & Gunasekarage, A. (2017). Risk regulation, community pressure and the use of management accounting in managing climate change risk: Australian evidence. *The British Accounting Review*, *49*(1), 25–38. https://doi.org/10.1016/j.bar.2016.10.009

Lee, C. C., Wang, C. W., Chiu, W. C., & Tien, T. S. (2018). Managerial ability and corporate investment opportunity. *International Review of Financial Analysis*, *57*(1), 65–76. https://doi.org/10.1016/j.irfa.2018.02.007

Lennox, C. S., Francis, J. R., & Wang, Z. (2012). Selection models in accounting research. *The Accounting Review*, *87*(2), 589–616. https://doi.org/10.2308/accr-10195

Li, D., & Li, E. X. (2018). Corporate governance and costs of equity: Theory and evidence. *Management Science*, *64*(1), 83–101. https://doi.org/10.1287/mnsc.2016.2570

Liao, L., Luo, L., & Tang, Q. (2015). Gender diversity, board independence, environmental committee and greenhouse gas disclosure. *The British Accounting Review*, *47*(4), 409–424. https://doi.org/10.1016/j.bar.2014.01.002

Matsumura, E. M., Prakash, R., & Vera-Muñoz, S. C. (2014). Firm-value effects of carbon emissions and carbon disclosures. *The Accounting Review*, *89*, 695–724. https://doi.org/10.2308/accr-50629

Mishra, D. R. (2014). The dark side of CEO ability: CEO general managerial skills and cost of equity capital. *Journal of Corporate Finance*, *29*(1), 390–409. https://doi.org/10.1016/j.jcorpfin.2014.10.003

Narayanan, M. (1985). Managerial incentives for short-term results. *The Journal of Finance*, *40*, 1469–1484. https://doi.org/10.1111/j.1540-6261.1985.tb02395.x

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. *Journal of Business Ethics*, *125*(4), 637–666. https://doi.org/10.1007/s10551-013-1886-9

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, *36*, 717–731. https://doi.org/10.3758/BF03206553

Rajgopal, S., Shevlin, T., & Zamora, V. (2006). CEOs' outside employment opportunities and the lack of relative performance evaluation in compensation contracts. *The Journal of Finance*, *61*, 1813–1844. https://doi.org/10.1111/j.1540-6261.2006.00890.x

Reid, E. M., & Toffel, M. W. (2009). Responding to public and private politics: Corporate disclosure of climate change strategies. *Strategic Management Journal*, *30*(11), 1157–1178. https://doi.org/10.1002/smj.796

Shipman, J. E., Swanquist, Q. T., & Whited, R. L. (2017). Propensity score matching in accounting research. *The Accounting Review*, *92*(1), 213–244. https://doi.org/10.2308/accr-51449

Shleifer, A., & Vishny, R. W. (1989). Management entrenchment: The case of manager-specific investments. *Journal of Financial Economics*, *25*(1), 123–139. https://doi.org/10.1016/0304-405X(89)90099-8

Stern, N. (2008). The economics of climate change. *American Economic Review*, *98*(2), 1–37. https://doi.org/10.1257/aer.98.2.1

Stock, J. H., Wright, J. H., & Yogo, M. (2002). A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business & Economic Statistics*, *20*, 518–529. https://doi.org/10.1198/073500102288618658

Sun, L. (2017). Managerial ability and chemical releases. *Sustainability Accounting, Management and Policy Journal*, *8*(3), 281–306. https://doi.org/10.1108/SAMPJ-09-2016-0062

Task Force on Climate-Related Financial Disclosures (TCFD). (2017). Recommendations of the Task Force on Climate-Related Financial Disclosures. In *Task Force on Climate-Related Financial Disclosures*. Available at: https://www.fsb-tcfd.org/publications/final-recommendations-report/. accessed on 20 September 2021

Tauringana, V., & Chithambo, L. (2015). The effect of DEFRA guidance on greenhouse gas disclosure. *The British Accounting Review*, *47*(4), 425–444. https://doi.org/10.1016/j.bar.2014.07.002

Ulupinar, B. (2018). The effect of managerial entrenchment on analyst bias. *Global Finance Journal*, *37*, 25–38. https://doi.org/10.1016/j.gfj.2018.04.001

United Nations (UN). (2020). Climate change. Available at: https://www.un.org/en/sections/issues-depth/climate-change/| (accessed on 12 October 2021).

Wen, Z., & Ye, B. (2014). Analyses of mediating effects: The development of methods and models. *Advances in Psychological Science*, *22*(5), 731–745. https://doi.org/10.3724/SP.J.1042.2014.00731

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT Press.

World Bank. (2010). Phase II: The challenge of Low-carbon development. Available at: https://www.oecd.org/derec/worldbankgroup/46992019.pdf (accessed on 15 October 2021).

Yuan, Y., Tian, G., Lu, L. Y., & Yu, Y. (2019). CEO ability and corporate social responsibility. *Journal of Business Ethics*, *157*(2), 391–411. https://doi.org/10.1007/s10551-017-3622-3

Yung, K., & Chen, C. (2018). Managerial ability and firm risk-taking behavior. *Review of Quantitative Finance and Accounting*, *51*, 1005–1032. https://doi.org/10.1007/s11156-017-0695-0

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APPENDIX A: VARIABLE DESCRIPTIONS

Notation	Variable name	Definition
CCDS	Climate change disclosure score	Percentile rank of climate change disclosure score/band.
MABILITY	Managerial ability	The managerial ability score estimated using a modified version of Demerjian et al. (2012).
HIGH_EINDEX	Managerial entrenchment index score	An indicator variable that takes the value of 1 if a firm's *EINDEX* score is greater than the year median score of EINDEX, and 0 otherwise. The *EINDEX* is the entrenchment index constructed according to Bebchuk et al. (2009).
SIZE	Firm size	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.
LEV	Leverage	The ratio of total debt to total assets.
SGROWTH	Sales growth	The changes in sales divided by the prior year's sales.
FIN	New financing	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.
LITG	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.
ROA	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_STR	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 ESG database.
ENV_CON	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.
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