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Institutional investors' corporate site visits and firm-level climate change risk disclosure

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ABSTRACT

This study examines whether and how institutional investors' site visits affect firm-level discretionary disclosure of climate change risk. Using a sample of Chinese listed companies on the Shenzhen Stock Exchange from 2013 to 2021, we find that site visits by institutional investors significantly promote corporate climate change risk disclosure (CCRD). This positive correlation is robust to a series of sensitivity tests, including alternative measures of institutional investors' site visits and corporate CCRD, alternative samples, a firm fixed effects model, one-year lag of the independent variable, an instrumental variable method, and a propensity score matching procedure. Mechanism analyses indicate that the positive impact of institutional investors' site visits on corporate CCRD is primarily driven by increased corporate information exposure. Further analyses demonstrate that the effect of site visits on firm-level CCRD is more pronounced in firms with weaker internal corporate governance or external governance. This study extends the existing literature on the economic consequences of institutional investors' site visits and the driving factors of corporate discretionary disclosure regarding climate change risk, providing insightful implications for corporate managers, investors, and regulators.

1. Introduction

Climate change, a pressing global challenge in the 21st century, not only affects the human living environment but also poses significant risks to financial systems and economic activities (Battiston, Mandel, Monasterolo, Schütze, & Visentin, 2017; Jung & Song, 2023). At the firm level, climate change exposes firms to major transition risks associated with the shift to a low-carbon economy and physical risks, such as extreme climate events (Li, Shan, Tang, & Yao, 2020). For corporate managers, climate change risk disclosure (CCRD) reveals corporate financial vulnerabilities and potential hazards to stakeholders, which could lead to negative market reactions and poor financial performance in the short run (Javadi & Masum, 2021; Wu, Xiao, Liu, & Zhang, 2022). Therefore, without mandatory disclosure requirements, managers may be reluctant to disclose risk information regarding climate change (Flammer, Toffel, & Viswanathan, 2021). By contrast, corporate stakeholders, including institutional investors, attach great importance to such information (Cohen, Kadach, & Ormazabal, 2023; Ilhan, Krueger, Sautner, & Starks, 2023). In this context, the discussion on the drivers of corporate CCRD is of paramount significance, and this study revolves around this focal point.

The existing literature exploring the factors influencing corporate CCRD primarily concentrates on internal corporate factors. Hampton and Li (2022) suggest that financial characteristics, such as fixed asset intensity, profitability, and operating cash flows, may influence climate risk disclosure at the firm level. Management features, including board size, the ratio of independent directors, the ratio of female directors, board capital, and managerial abilities, also affect corporate CCRD (Charumathi & Rahman, 2019; Daradkeh, Shams, Bose, & Gunasekarage, 2023; Nathalia & Setiawan, 2022; Ooi, Amran, Yeap, & Jaaffar, 2019). Concerning external driving factors, Ilhan et al. (2023) propose that institutional investors could contribute to an increased level of corporate CCRD. However, this research neglects how institutional investors acquire firm-specific information and how they affect corporate CCRD. In this paper, we use a unique dataset of institutional investors' corporate site visits to examine their impact on firm-level CCRD.

Corporate site visits are crucial interactive activities for companies and institutional investors. Through site visits, visitors can gain access to corporate headquarters or production facilities and engage with company managers and employees (Guo, Li, & Lin, 2023). We propose that institutional investors' site visits may enhance firm-level CCRD by increasing corporate information exposure. The main reasons are

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twofold. First, during site visits, institutional investors may seek out certain detailed and valuable private information, making it difficult and costly for managers to withhold such information (Cheng, Du, Wang, & Wang, 2016; Su, Feng, & Tang, 2021). Second, institutional investors' site visits play a vital monitoring role on managers, restraining their opportunistic incentives to conceal climate risk information (Yang & Ma, 2022; Zhou & Gan, 2022). Both of these would improve the corporate information environment, leading managers to disclose more discretionary information, particularly climate change risk information that investors value highly (Chen, Khoo, & Peng, 2023; Ilhan et al., 2023).

Using a sample of Chinese listed firms on the Shenzhen Stock Exchange (SZSE) from 2013 to 2021, this study tests whether institutional investors' site visits are a driving force behind corporate CCRD. Our baseline results document the significantly positive impact of institutional investors' site visits on firm-level CCRD. Moreover, we identify the improved corporate information environment as the potential channel for this effect. In additional analyses, we consider the moderating roles of external corporate governance (measured by institutional investors' shareholding and audit quality) and internal corporate governance (measured by agency costs and the corporate governance index). These results suggest that the relationship between institutional investors' site visits and corporate CCRD is stronger (weaker) for firms with weaker (stronger) external or internal governance.

Our main findings are robust to a battery of robustness tests, including using alternative proxies for corporate site visits, changing the measurements of firm-level CCRD, excluding companies situated in metropolitan cities where many institutional investors are located, and removing companies that disclose climate-related information in site-visit details on the SZSE web portal. Furthermore, we adopt several methods to tackle potential endogeneity problems. First, we include firm-fixed effects to control for time-invariant unobservables at the firm level. Second, we adopt an instrumental variable method and lag the independent variable by one period to address reverse causality concerns. Third, a propensity score matching method is employed to alleviate sample selection issues.

This study contributes to existing literature in the following ways. First, as the drivers of firm-level CCRD are yet to be sufficiently studied, our paper enriches the literature by introducing an important and novel driving factor: institutional investors' site visits. Prior studies have predominantly focused on the impact of internal corporate factors, such as financial and management characteristics, on firm-level CCRD (Charumathi & Rahman, 2019; Daradkeh et al., 2023; Hampton & Li, 2022; Nathalia & Setiawan, 2022; Ooi et al., 2019), while giving less consideration to external factors. Ilhan et al. (2023) propose that institutional investors, as important external monitors, enhance corporate CCRD. However, empirical evidence on how institutional investors acquire firm-specific information and how they affect corporate discretionary CCRD is lacking. In this study, we fill in this gap by exploring the impact of institutional investors' site visits on corporate CCRD.

Second, we contribute to the literature on the effects of institutional investors' site visits on corporate information disclosure, particularly discretionary information disclosure. Previous literature shows that an information-acquisition role is the main mechanism through which investors' site visits affect corporate social responsibility (Liu & Hou, 2022; Zhou & Gan, 2022), environmental performance (Hu, Shan, & Zhan, 2020; Jiang, Wang, Li, & Wan, 2022), innovation (Jiang and Yuan, 2018), investment efficiency (Zhao, Li, & Wu, 2023), dividends payout policy (Cao, Wang, & Zhou, 2022; Yang & Ma, 2022), cost stickiness (Yao, Xu, Fan, & Xu, 2023), and management earnings forecasts (Gao, Wang, & Zhang, 2023) However, it is worth noting that the aforementioned information primarily derives from investors' site visits, rather than proactive information disclosure activities conducted by listed firms. While one study examines the link between site visits and corporate information disclosure (Lin, Song, & Tan, 2017), it focuses solely on mandatory information disclosure required by regulators. Our research, conversely, explores how investors' site visits affect discretionary risk information disclosure, which lacks regulations.

Third, our paper centers its attention on China, which provides an ideal research environment for examining the link between investors' site visits and corporate CCRD. To the best of our knowledge, the data of investors' site visits are seldom available outside the SZSE in China (Su et al., 2021). China is the world's largest emerging market with high carbon emissions and aggressive decarbonization goals.[1] However, climate risk disclosure by Chinese companies remains voluntary (Borghei, 2021), making corporate CCRD more important for stakeholders. Therefore, our findings not only provide insights for China's policymakers in monitoring CCRD but also provide important reference values for other emerging markets with similar issues.

The remainder of this paper is organized as follows: Section 2 provides the institutional background; Section 3 provides the theoretical framework; Section 4 reviews the empirical literature and develops our hypotheses; Section 5 introduces the research design; Section 6 reports our main findings, robustness checks, endogeneity tests, and additional analyses; and Section 7 concludes the paper.

2. Institutional background

2.1. Corporate site visits in China

Investor relations management has always been a key topic in capital markets. In 2006, the SZSE in China issued Article 41 of the *Guidelines for the Investor Relations Management*, encouraging listed companies to fulfill the requests of investors and market participants to conduct site visits. Through site visits, investors can tour corporate headquarters or manufacturing facilities and participate in meetings with company executives and other employees. These interactions enable investors to gain a deeper understanding of the companies' business and operating conditions, as well as assess the competence and trustworthiness of management.

In 2009, the SZSE mandated its listed firms to disclose basic information about corporate site visits in annual reports, including the identities of the visitors, date, and location of these visits. To ensure the complete and timely disclosure of site visits to the public, the SZSE introduced new regulations in July 2012. These regulations require firms to disclose detailed information about site visits on the stock exchange web portal[2] within two trading days following the visits. By means of site visits, institutional investors can not only play a role in obtaining company information but also supervise corporate behaviors.

2.2. China's policies and actions on climate change

As the world's largest emitter, China is responsible for over a quarter of the annual global carbon emissions, significantly contributing to climate change. According to McKinsey's report, if emissions continue to increase at the current pace, the climate change risk in China will profoundly affect the human living environment and reshape the way business is conducted.

To address climate risk and achieve green economic development, the Chinese government has released a series of environmental guidelines and regulations. In January 2012, the China Banking Regulatory Commission (CBRC) introduced the Green Credit Guidelines (GCG), mandating policy banks, commercial banks and rural cooperative banks to restrict their bank credit flow to companies with excessive pollution and energy consumption. In April 2014, the Chinese government promogulated the New Environmental Protection Law (NEPL), the most rigorous environmental law in China's history. The NEPL discourages

[1] The Chinese government has set targets to reach carbon peak by 2030 and achieve carbon neutrality by 2060.

[2] Official website: http://irm.cninfo.com.cn/.

firms from engaging in pollution-related violations by introducing new enforcement tools and strict penalties. Furthermore, at the 2015 Paris Climate Conference, China put forward to reach carbon peak, install sufficient solar and wind power generators, and boost forest coverage by approximately six billion cubic meters before 2030. In 2020, the Chinese government reaffirmed the carbon peak goal and pledged to achieve carbon neutrality by 2060.

Although the Chinese government has made efforts to deal with climate risk and has increased its commitment to reduce carbon emissions, climate change risk disclosure by Chinese companies remains voluntary, with no unified standards in place to enhance its credibility and comparability (Borghei, 2021; Khalid, Ye, Voinea, & Naveed, 2022; Situ & Tilt, 2018). The climate-related financial disclosure recommendations issued by the Task Force on Climate-related Financial Disclosures (TCFD) offer Chinese companies the opportunity to report their climate-related information in a standardized and regulatory manner. Currently, China is actively endeavoring to incorporate these disclosure recommendations into its annual reports of Chinese banking sectors. However, China still has a long way to go to require all listed companies to disclose their annual reports per these recommendations.

3. Theoretical framework

While exploring the relationship between institutional investors' site visits and corporate CCRD, we can draw insights from the stakeholder-agency theory, an integrated theory built on the foundations of agency theory and stakeholder theory (Frynas & Yamahaki, 2016; Hill & Jones, 1992), forming a socio-economic theoretical framework for our analyses.

From the agency perspective of the stakeholder-agency theory, companies consist of a nexus of contracts between stakeholders who control or provide economic resources and managers who are charged with using these resources (Hill & Jones, 1992; Jensen & Meckling, 1976). Given managers' possession of superior information relative to stakeholders, the resulting information asymmetry engenders openings for self-interested behaviors on the part of managers, potentially harming the interests of the stakeholders (Adams, 1994; Panda & Leepsa, 2017). In this light, stakeholders would establish or implement internal and external corporate governance mechanisms to alleviate information asymmetry and address agency concerns (Frynas & Yamahaki, 2016; Ntim, Lindop, & Thomas, 2013; Shankman, 1999). Adapting this theoretical perspective to our study, we posit that institutional investors' site visits may mitigate agency problems and enhance corporate CCRD because of their critical role in acquiring information. When faced with climate risk disclosure, institutional investors and managers exhibit contrasting attitudes. Institutional investors value and demand corporate CCRD (Cohen et al., 2023; Ilhan et al., 2023), whereas managers are reluctant to disclose such information because of self-interest concerns (Alatawi, Ntim, Zras, & Elmagrhi, 2023; Flammer et al., 2021; Ntim et al., 2013). As an effective external governance mechanism, corporate site visits offer institutional investors great opportunities to observe a company's infrastructure, facilities, and working environment, interact with management and staff, and acquire first-hand information about the company's day-to-day operations (Gao, Cao, & Liu, 2017; Guo et al., 2023). To some extent, these information discovery activities can narrow the information gap between investors and managers (Jiang & Bai, 2022; Wu et al., 2022), making it difficult or costly for managers to withhold risk information regarding climate change.

From the stakeholder perspective of the stakeholder-agency theory, corporations are accountable to a broader range of stakeholders, including, but not limited to, shareholders, creditors, employees, customers, suppliers, and communities (Freeman, 1984). These stakeholders exert a significant monitoring role over corporate decision-making processes (Hill & Jones, 1992; Zolotoy, O'Sullivan, Martin, & Wiseman, 2021), ensuring that managerial decisions and behaviors align with wider environmental, societal, and ethical considerations, thereby promoting sustainable enterprise development (Ibrahim, Hussainey, Nawaz, Ntim, & Elamer, 2022; Laplume, Sonpar, & Litz, 2008). Applying this theoretical perspective to our research, we contend that institutional investors' site visits can bolster corporate CCRD by their inherent monitoring role. As global climate issues become increasingly urgent, corporate climate risk has become closely linked to stakeholder well-being (Orazalin, Ntim, & Malagila, 2024; Sautner, Van Lent, Vilkov, & Zhang, 2023). To ensure green and sustainable enterprise development, stakeholders may expect a firm to prioritize environmental governance and disclose climate risk information in a timely, accurate, and complete manner (Cohen et al., 2023; Flammer et al., 2021). Institutional investors, a group of stakeholders with specialized knowledge, have the ability to exert invisible pressure on management through random or continuous site visits (Ferreira & Matos, 2008; Zhou & Gan, 2022), prompting them to disclose discretionary information related to climate risk.

Taken together, the stakeholder-agency theory suggests that institutional investors' site visits may affect corporate CCRD through their crucial roles in information acquisition and external oversight (Freeman, 1984; Hill & Jones, 1992; Jensen & Meckling, 1976).

4. Literature review and hypotheses development

Drawing on the stakeholder-agency theory, there are several possible reasons why institutional investors' site visits could enhance discretionary CCRD at the firm level.

First, taking the agency perspective of the stakeholder-agency theory as a point of departure, institutional investors' site visits could alleviate information asymmetry and address agency problems between stakeholders and managers, thereby improving corporate CCRD in financial reports. Serving as a pivotal means of information acquisition (Bushee, Gerakos, & Lee, 2018), corporate site visits can help fund managers obtain unique tacit knowledge (Barker, Hendry, Roberts, & Sanderson, 2012), enable investors to make informed trading decisions (Solomon & Soltes, 2015), and benefit analysts in their earnings forecasts and stock recommendations (Brown, Call, Clement, & Sharp, 2015). Furthermore, through their role in uncovering information, site visits can further influence corporate decisions and behaviors in various aspects, including CSR performance (Liu & Hou, 2022; Zhou & Gan, 2022), environmental performance (Hu et al., 2020; Jiang et al., 2022), innovation (Jiang & Bai, 2022; Jiang and Yuan, 2018), investment efficiency (Zhao et al., 2023), dividend payout policy (Cao et al., 2022; Yang & Ma, 2022), and management earnings forecasts (Gao et al., 2023). Specifically, during site visits, institutional investors have the opportunity to visit corporate headquarters, gain access to firms' production facilities (Guo et al., 2023), and engage in in-depth meetings with firm managers and employees regarding corporate strategy, competitive advantages, operating risks, and financial performance (Gao et al., 2017). Moreover, institutional investors conducting site visits can assess or infer additional information from managers' facial expressions, body language, and vocal tones (Hobson, Mayew, & Venkatachalam, 2012). Collectively, these diverse forms of visits can assist institutional investors in gaining a better understanding of the firm-level climate change risk to which they attach great importance (Chen et al., 2023; Ilhan et al., 2023), rendering these pieces of information no longer private (Cheng et al., 2016). Therefore, it would be more challenging and costly for managers to conceal risk information associated with climate change.

Second, taking the stakeholder perspective of the stakeholder-agency theory as a point of departure, institutional investors' site visits could restrain managers' incentives to withhold climate risk information by their inherent monitoring role. As mentioned in the theoretical framework, institutional investors and managers hold divergent attitudes towards corporate CCRD. For institutional investors, climate issues represent a critical determinant of corporate sustainable development, increasing their emphasis on climate risk disclosure (Cohen et al., 2023; Ilhan et al., 2023). By contrast, managers might be reluctant to disclose

this information because of its potential downsides, such as short-term negative market reactions to the company and possible declines in management compensation (Flammer et al., 2021; Javadi & Masum, 2021; Wu et al., 2022). As an external governance mechanism, corporate site visits could exert strong supervisory role over managers' opportunistic behaviors that conflict with stakeholder interests. This supervisory effect is evident in the reduction of corporate fraud risk (Su et al., 2021), the restraints of tax avoidance (Guo et al., 2023), the mitigation of earnings management (Qi, Zhou, & Chen, 2021), and the inhibition of share pledging (Xiao, Chen, & Chen, 2023). Similarly, the monitoring role of institutional investors' site visits applies to restraining opportunistic managerial motives to conceal climate risk information. This is because corporate site visits, regulated by the stock exchange, possess supervisory features such as being obligatory, unpredictable, and continuous. Furthermore, the institutional investors who conduct these visits are perceived as a group of stakeholders with specialized knowledge focusing on long-term corporate development, thereby imposing implicit supervisory pressure on companies (Ferreira & Matos, 2008; Yang & Ma, 2022; Zhou & Gan, 2022). Additionally, corporate site visits would attract other external forces, such as social media, to collectively monitor a company's disclosing behavior (Cheng, Du, Wang, & Wang, 2019).

Overall, both the information acquisition and monitoring roles of institutional investors' site visits would promote a company's information environment and further lead to an increase in discretionary CCRD at the firm level. Therefore, we develop the main hypothesis as follows:

H1. . Institutional investors' site visits will enhance corporate CCRD.

5. Research design

5.1. Data and samples

The initial research sample for this paper is A-share listed firms on the SZSE in China from 2013 to 2021. Our sample period starts in 2013 because corporate site-visit information before that year is incomplete. Our research data, including corporate site visits and other financial data, are obtained from the China Stock Market Accounting Research (CSMAR) database, Chinese Research Data Services Platform (CNRDS), and Wind database. Consistent with previous studies, the following filtering criteria are applied to the initial sample: First, we categorize industries based on industry classification guidelines, excluding firms in the financial industry. Second, we exclude ST and *ST companies because of significant information changes. Third, we further delete samples with missing values. Finally, we obtain 14,762 firm-year observations and winsorize all continuous variables at the 1% and 99% levels to eliminate extreme outliers. All standard errors are clustered at the firm level. The process of sample selection is illustrated in Appendix Table 1.

5.2. Main variables

5.2.1. Dependent variable

Following Jiang and Yuan (2018), the frequency of institutional investors' corporate site visits (*INS_Visit*) is calculated as the natural logarithm of one plus the number of site visits that a listed firm being visited by all institutional investors during a given calendar year. For firms that do not provide any information regarding institutional investors' site visits, the value of *INS_Visit* is assigned as zero.

5.2.2. Independent variable

Inspired by Li et al. (2020) and Sautner et al. (2023), and referring to Li and Zhang (2023) and Lin and Wu (2023), we construct the firm-level CCRD by calculating the frequency of keywords disclosed regarding climate change risk in the "Management Discussion and Analysis (MD&A)" texts of financial reports. Firstly, we obtain seed words from the aforementioned literature and the Chinese Government Work Report. Secondly, we use Python's Jieba to segment MD&A texts of financial reports from 2013 to 2021, apply Genism's Word2Vec model to gain similar words, and invite experts to review and filter a final list of keywords composed of climate-related physical risk and transition risk. Thirdly, we measure the firm-level CCRD by counting the frequency of climate risk-related keywords and multiplying it by 100. The detailed construction process of a corporate CCRD is presented in Appendix 1.

5.2.3. Control variables

Following Ilhan et al. (2023) and Ghafoor, Šeho, and Sifat (2023), we include a series of control variables that could affect a firm's CCRD. The control variables can be divided into three categories, namely financial characteristic variables, corporate governance variables, and other corporate attribute variables. Regarding financial characteristic controls, we include firm size (*Size*), financial leverage (*Lev*), return on asset (*ROA*), book-to-market ratio (*BM*), assets turnover (*Turnover*), tangible assets (*CAPEX*), operating cash flow (*CFO*), research and development expenditure (*R&D*), dividends payouts (*Dividend*), annual stock return (*RET*) and annual stock return volatility (*VOL*). Regarding corporate governance controls, we include board size (*Board*), board independence (*Indep*), ownership held by the largest shareholder (*Top1),* and institutional ownership (*INST*). Regarding other corporate attribute controls, we include indicators for SOE (*SOE*) and firm age (*FirmAge*). Detailed definitions of the control variables are presented in Appendix Table 2.

5.3. Methods

To explore how institutional investors' site visits affect firms' CCRD, we estimate the following regression:

$$CCRD_{i,t} = \alpha + \beta_1 INV\_Visit_{i,t} + \beta_2 CV_{i,t} + YearFE + IndustryFE + \varepsilon_{i,t} \quad (1)$$

where i refers to the listed firm, t refers to the year, and $\varepsilon_{i,t}$ refers to a random error. The dependent variable is $CCRD_{i,t}$, proxied by the frequency of keywords related to climate change risk in MD&A texts of financial reports. $INS\_Visit_{i,t}$ is the key independent variable calculated as the natural logarithm of one plus the number of institutional investors' site visits during a given calendar year. *CV* is a vector of the control variables that may have significant impacts on firm-level CCRD. In addition, we include year and industry dummies to control for year- and industry-fixed effects, and cluster standard errors at the firm level.

6. Empirical results

6.1. Descriptive statistics

Table 1 displays the results of the descriptive statistics. The independent variable *CCRD* has a maximum value of 6.994, a minimum value of 0, and a standard deviation of 1.345, indicating a wide variation in CCRD among Chinese listed companies. *INS_Visit* is a logarithmic transformation with minimum and maximum values of 0 and 3.296, respectively, suggesting that the visit times of listed firms vary from 0 to 26. The mean value of *INS_Visit* is 1.007, indicating that one firm in the SZSE averagely undertakes three site-visit events each year. The mean value of *INS* is 3.42%, indicating a low level of institutional ownership in China. Institutional investors should increase their shareholdings to effectively carry out monitoring activities. The distribution of the control variables is within a reasonable range and is consistent with the existing research.

6.2. Correlation analyses

Table 2 reports the Pearson and Spearman correlation matrix for the variables used in the main regression. We can find that the Pearson and Spearman correlation between *CCRD* and institutional *INS_Visit* is 0.037,

Table 1
Descriptive statistics.

Variable	N	Mean	p50	SD	p25	p75	Max	Min
CCRD	14,762	1.039	0.540	1.345	0.207	1.245	6.994	0.000
INS_Visit	14,762	1.007	0.693	0.935	0.000	1.792	3.296	0.000
Size	14,762	22.004	21.855	1.141	21.178	22.667	25.602	19.987
Lev	14,762	0.380	0.366	0.190	0.225	0.518	0.834	0.053
ROA	14,762	0.057	0.047	0.046	0.023	0.079	0.232	0.002
BM	14,762	0.796	0.525	0.855	0.309	0.923	5.345	0.083
Turnover	14,762	0.637	0.551	0.401	0.378	0.779	2.460	0.097
CAPEX	14,762	0.191	0.164	0.141	0.081	0.272	0.639	0.002
CFO	14,762	0.050	0.048	0.066	0.012	0.087	0.239	−0.145
R&D	14,762	0.020	0.017	0.020	0.001	0.029	0.101	0.000
Dividend	14,762	0.288	0.209	0.318	0.098	0.375	1.938	0.000
VOL	14,762	0.142	0.121	0.084	0.090	0.166	0.582	0.045
RET	14,762	0.021	0.013	0.051	−0.012	0.043	0.232	−0.070
Board	14,762	2.097	2.197	0.191	1.946	2.197	2.565	1.609
Indep	14,762	0.378	0.364	0.054	0.333	0.429	0.571	0.333
Top1	14,762	0.322	0.301	0.137	0.215	0.410	0.697	0.087
INS	14,762	0.342	0.333	0.232	0.132	0.521	0.840	0.000
SOE	14,762	0.216	0.000	0.411	0.000	0.000	1.000	0.000
FirmAge	14,762	2.888	2.944	0.319	2.708	3.135	3.526	1.946

significant at the 1% level. The preliminary pairwise correlation results indicate a positive relation between institutional investors' site visits and corporate CCRD. It is worth noting that the correlation coefficient between *INS* and *CCRD* is also significantly positive at the 1% level, consistent with the findings of Ilhan et al. (2023). Furthermore, most of the correlation coefficients in Table 2 are less than 0.3, indicating that there is no severe multicollinearity concern.

6.3. Baseline results

Table 3 presents the baseline results of Model (1). We control for the control variables in Column (1) and add year- and industry-fixed effects to Column (2). We find that both coefficients of *INS_Visit* are positive and significant at the 1% level in Columns (1) and (2), respectively. The regression results confirm our main hypothesis that institutional investors' site visits significantly enhance corporate CCRD. Most of the control variable regression results are consistent with the previous literature.

6.4. Robustness checks

6.4.1. Alternative measures for institutional investors' site visits

In the main regression, we quantify the level of institutional investors' site visits by taking the logarithm of one plus the number of visits to a specific firm in a given year. However, our findings may be influenced by extreme firms visited frequently by institutional investors, even after winsorizing the *INS_Visit* measure. To address this concern, we refer to Gao et al. 's (2017) method and construct a dummy variable *INS_Visit1*, which equals 1 when a firm is visited by institutional investors in a calendar year and 0 otherwise.

Furthermore, the measure *INS_Visit* in our main regression may not capture the entire interaction between investors and firms. In an extreme case, a company may have only one site visit per year but invite all possible institutional investors. The interaction between managers and institutional investors in this scenario is not necessarily poorer than when a company arranges multiple site visits but invites only a limited number of institutional investors each time (Gao et al., 2017). To address this concern, we substitute *INS_Visit* with *INS_Visit2*, the logarithm of one plus the number of institutional investors conducting visits to a specific firm in a year.

Columns (1) and (2) of Table 4 present the results when *INS_Visit1* and *INS_Visit2* are introduced. The coefficients of *INS_Visit1* and *INS_Visit2* are 0.033 and 0.011, respectively, and are significantly positive at the 5% and 1% levels, respectively. This suggests that institutional investors' site visits positively affect corporate CCRD. These results are consistent with those obtained using *INS_Visit*, strengthening the robustness of our main conclusions.

6.4.2. Alternative measures for corporate CCRD

Following Li et al. (2020) and Sautner et al. (2023), we use two alternative proxies for corporate CCRD to enhance the robustness of our analyses. The first is *CCRD1*, calculated as the ratio of the number of sentences containing keywords related to climate change risk to the total number of sentences in MD&A texts. The second is *CCRD2*, the logarithm of one plus keywords related to climate change risk in MD&A texts. Columns (1) and (2) of Table 5 present the regression results when *CCRD1* and *CCRD2* are adopted. The coefficients of *INS_Visit* are both significant and positive at the 1% level, indicating that alternative corporate CCRD measures do not drive our main results.

6.4.3. Alternative samples

In China, a significant concentration of institutional investors and listed companies is observed in specific cities, notably Beijing and Shanghai. Thus, listed companies in these cities are more likely to be visited by institutional investors. To eliminate the possibility that our findings are driven by the location of firms rather than site visits, we alternate our research samples. First, we rerun our main regressions, excluding firms headquartered in Beijing or Shanghai. Second, because the three Chinese stock exchanges are located in Shanghai, Shenzhen, and Beijing, where numerous institutional investors and listed firms are concentrated, we exclude observations headquartered in Beijing, Shanghai, or Shenzhen to address this concern. Columns (1) and (2) of Table 6 report the results. In Column (1), we exclude observations headquartered in Beijing or Shanghai, and in Column (2), we further exclude observations headquartered in Shenzhen. The coefficients on *INS_Visit* in both columns are positive and statistically significant at the 1% level. Our findings remain robust even after conducting these alternative tests, indicating that the locations of listed firms do not influence our results.

Given that listed companies on the SZSE are required to disclose detailed information about site visits on the stock exchange web portal, another concern arises: Is it the case that only companies revealing climate issues in their site-visit details would disclose more climate risk in their financial reports? To better address this concern, we exclude samples that disclose climate-related information in site-visit details on the SZSE web portal and retest our main regression Model (1) on the remainder. The regression results are presented in Columns (3) and (4) of Table 6. We control for the control variables in Column (3) and add year- and industry-fixed effects to Column (4). The coefficients of *INS_Visit* in both columns are positive and statistically significant,

Table 2
Correlation analyses.

	CCRD	INS_Visit	Size	Lev	ROA	BM	Turnover	CAPEX	CFO	R&D	Dividend	VOL	RET	Board	Indep	Top1	INS	SOE	FirmAge
CCRD	1																		
INS_Visit	0.037***	1																	
Size	0.163***	0.139***	1																
Lev	0.194***	−0.003	0.547***	1															
ROA	−0.114***	0.172***	−0.093***	−0.366***	1														
BM	0.116***	−0.079***	0.633***	0.580***	−0.339***	1													
Turnover	−0.097***	0.071***	0.062***	0.187***	0.169***	−0.003	1												
CAPEX	0.204***	0.002	0.055***	0.037***	−0.100***	0.074***	0.040***	1											
CFO	−0.056***	0.065***	0.037***	−0.172***	0.437***	−0.109***	0.118***	0.236***	1										
R&D	−0.124***	0.142***	−0.213***	−0.199***	0.181***	−0.244***	0.086***	−0.109***	0.115***	1									
Dividend	−0.035***	0.053***	−0.058***	−0.159***	0.014*	−0.047***	0.001	0.046***	0.103***	0.044***	1								
VOL	0.023***	0.036***	−0.218***	−0.087***	0.087***	−0.258***	−0.014*	−0.061***	−0.020**	0.057***	−0.024***	1							
RET	0.034***	0.121***	−0.117***	−0.043***	0.152***	−0.236***	0.033***	0.000	0.061***	0.047***	−0.019**	0.724***	1						
Board	0.040***	0.072***	0.230***	0.136***	−0.031***	0.162***	0.031***	0.090***	0.026***	−0.052***	0.011	−0.055***	−0.017**	1					
Indep	−0.040***	−0.030***	−0.040***	−0.028***	0.011	−0.027***	−0.033***	−0.031***	0.002	0.030***	−0.007	0.014*	0.005	−0.610***	1				
Top1	−0.018**	0.028***	0.086***	0.046***	0.077***	0.067***	0.069***	0.086***	0.076***	−0.069***	0.104***	−0.010	0.006	−0.024***	0.041***	1			
INS	0.051***	0.107***	0.420***	0.225***	0.015*	0.209***	0.095***	0.106***	0.103***	−0.080***	−0.011	−0.128***	0.012	0.187***	−0.073***	0.300***	1		
SOE	0.058***	−0.053***	0.320***	0.234***	−0.137***	0.326***	0.044***	0.166***	0.011	−0.135***	−0.058***	−0.109***	−0.060***	0.230***	−0.082***	0.159***	0.345***	1	
FirmAge	0.023***	−0.185***	0.227***	0.171***	−0.083***	0.241***	0.020**	0.029***	0.027***	−0.183***	−0.060***	−0.140***	−0.122***	0.083***	−0.001	−0.028***	0.131***	0.245***	1

Table 3
Baseline regression results.

	(1)	(2)
	CCRD	CCRD
INS_Visit	0.032***	0.026***
	(3.64)	(2.96)
Size	0.178***	0.147***
	(6.20)	(5.35)
Lev	0.386***	0.423***
	(4.05)	(4.71)
ROA	0.203	0.075
	(0.86)	(0.34)
BM	−0.048***	−0.022
	(−2.69)	(−1.14)
Turnover	−0.047	−0.051
	(−1.10)	(−1.38)
CAPEX	0.969***	0.818***
	(6.95)	(6.60)
CFO	−0.302***	−0.283***
	(−2.94)	(−2.80)
R&D	−5.459***	0.647
	(−12.98)	(1.22)
Dividend	−0.034	−0.032
	(−1.61)	(−1.57)
VOL	0.540***	0.219**
	(5.20)	(2.07)
RET	−0.003	0.342**
	(−0.02)	(2.05)
Board	−0.182**	−0.124
	(−2.26)	(−1.64)
Indep	−0.286	−0.297
	(−1.26)	(−1.37)
Top1	−0.191	−0.147
	(−1.27)	(−1.09)
INS	0.013	0.008
	(0.27)	(0.18)
SOE	0.015	−0.005
	(0.30)	(−0.10)
FirmAge	0.246***	−0.079
	(4.01)	(−1.16)
Constant	−3.283***	−2.252***
	(−5.47)	(−3.57)
Year fixed effects	No	Yes
Industry fixed effects	No	Yes
N	14,762	14,762
Adjusted R^2	0.080	0.126

Notes: Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

suggesting that institutional investors' site visits can significantly enhance corporate CCRD in financial reports, even when detailed information on site visits on the web portal does not include any climate-related content.

6.5. Endogeneity tests

6.5.1. Firm fixed effects

To address the potential endogeneity problem resulting from omitted variables, firm fixed effects are further controlled for in addition to the baseline regression. The results are shown in Table 7. We only control for firm- and year-fixed effects in Column (1) and add all control variables in Column (2). After controlling for firm fixed effects, the coefficients of *INS_Visit* are positive and significant in both columns at the 1% significance level, supporting our main hypothesis that institutional investors' site visits can enhance corporate CCRD.

6.5.2. Lag the independent variable by one period

To reduce the endogeneity problem caused by reverse causality, we lag the independent variable *INS_Visit* by one period and rerun our baseline regressions. The regression results are presented in Table 8. In Column (1) of Table 8, we only control for year- and industry-fixed effects. Column (2) of Table 8 further includes all the control variables.

Table 4
Alternative measures for site visits.

	(1)	(2)
	CCRD	*CCRD*
INS_Visit1	0.033**	
	(2.55)	
INS_Visit2		0.011***
		(2.64)
Size	0.149***	0.147***
	(5.44)	(5.34)
Lev	0.424***	0.422***
	(4.73)	(4.71)
ROA	0.103	0.078
	(0.47)	(0.35)
BM	−0.024	−0.022
	(−1.23)	(−1.13)
Turnover	−0.052	−0.051
	(−1.39)	(−1.38)
CAPEX	0.817***	0.821***
	(6.59)	(6.62)
CFO	−0.284***	−0.281***
	(−2.81)	(−2.79)
R&D	0.676	0.646
	(1.27)	(1.22)
Dividend	−0.032	−0.032
	(−1.58)	(−1.55)
VOL	0.215**	0.215**
	(2.02)	(2.03)
RET	0.360**	0.345**
	(2.17)	(2.08)
Board	−0.123	−0.125*
	(−1.63)	(−1.65)
Indep	−0.301	−0.302
	(−1.39)	(−1.39)
Top1	−0.147	−0.145
	(−1.09)	(−1.07)
INS	0.014	0.008
	(0.31)	(0.18)
SOE	−0.006	−0.005
	(−0.12)	(−0.10)
FirmAge	−0.083	−0.080
	(−1.22)	(−1.16)
Constant	−2.270***	−2.234***
	(−3.61)	(−3.55)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
N	14,762	14,762
Adjusted R^2	0.126	0.126

Notes: Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 5
Alternative measures for corporate CCRD.

	(1)	(2)
	CCRD1	*CCRD2*
INS_Visit	0.263***	0.053***
	(2.88)	(4.88)
Size	1.296***	0.186***
	(4.83)	(7.93)
Lev	3.849***	0.279***
	(4.13)	(2.82)
ROA	−0.779	−0.775***
	(−0.33)	(−2.70)
BM	−0.327*	−0.024
	(−1.69)	(−1.01)
Turnover	−0.465	0.032
	(−1.17)	(0.72)
CAPEX	7.608***	0.760***
	(5.93)	(6.54)
CFO	−2.946***	−0.322**
	(−2.63)	(−2.49)
R&D	5.791	−1.015
	(1.04)	(−1.40)
Dividend	−0.323	−0.028
	(−1.50)	(−1.22)
VOL	0.508	−0.317**
	(0.45)	(−2.45)
RET	4.003**	0.116
	(2.23)	(0.54)
Board	−1.247	−0.088
	(−1.60)	(−0.93)
Indep	−2.648	−0.024
	(−1.14)	(−0.09)
Top1	−1.976	−0.323**
	(−1.44)	(−2.20)
INS	−0.017	0.031
	(−0.03)	(0.51)
SOE	−0.187	−0.035
	(−0.39)	(−0.79)
FirmAge	−0.594	−0.089
	(−0.84)	(−1.23)
Constant	−16.962***	−1.023*
	(−2.76)	(−1.77)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
N	14,762	14,762
Adjusted R^2	0.148	0.388

Notes: Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

The coefficients of INS_Visit_{t-1} are both significantly positive, indicating a significant positive effect of institutional investors' site visits in year t on corporate CCRD in year t + 1. Overall, our results hold even after lagging the independent variables by one year.

6.5.3. Instrumental variable method

To further mitigate endogeneity issues caused by reverse causality, we adopt the instrumental variable (IV) method using 2SLS analyses. Following Jiang and Yuan. (2018) and Yang and Ma. (2022), we construct two instrumental variables: *Ind_INS_Visit* and *Distance*. The first instrument, *Ind_INS_Visit*, measures the average number of industry-level institutional investors' site visits, excluding the firm itself. The second instrument, *Distance*, is the mean geographical distance between the corporate headquarters and three stock exchanges in Shanghai, Shenzhen, and Beijing. These instrumental variables are exogenous in this study.

The results of the IV tests are presented in Table 9. In Column (1), *Ind_INS_Visit* is significantly and positively correlated with *Ind_INS* at the 1% level in the first stage, whereas *Distance* is significantly and negatively associated with *Ind_INS* at the 1% level. This suggests that our instrumental variables correlate highly with institutional investors' site visits. For the second-stage results, the coefficient of predicted *INS_Visit* (*Instrmented_INS_Visit*) is positively and significantly related to corporate CCRD at the 1% level, suggesting that our main result still holds after using the instrumental variable method.

6.5.4. Propensity score matching method

Listed companies visited by institutional investors may have characteristics that affect the institutional investors' choice of firm and corporate CCRD. Therefore, we use the propensity score matching (PSM) method (Pana, Vitzthum, & Willis, 2015; Zhou & Gan, 2022) to alleviate this possible self-selection bias. First, we employ logit regression to regress *INS_Visit1*, a dummy variable equal to one if a given firm is visited by institutional investors in a calendar year and zero otherwise, on all control variables consistent with the baseline regression to obtain the propensity scores. Second, we select one control firm with the closest propensity scores from the samples without institutional investors' site visits as the control group. Third, using matched samples, we examine the effects of institutional investors' site visits on corporate CCRD.

Table 10 presents the PSM results. We control for the control variables in Column (1) and add year- and industry-fixed effects to Column (2). The results show that the coefficients of *INS_Visit* are positive and significant at the 1% level, indicating that our main conclusions are robust after considering sample selection bias.

Table 6
Alternative samples.

	(1)	(2)	(3)	(4)
	CCRD	*CCRD*	*CCRD*	*CCRD*
INS_Visit	0.025***	0.031***	0.024***	0.022**
	(2.62)	(2.96)	(2.81)	(2.51)
Size	0.155***	0.156***	0.174***	0.148***
	(5.03)	(4.66)	(5.81)	(5.15)
Lev	0.416***	0.412***	0.363***	0.385***
	(4.21)	(3.90)	(3.78)	(4.23)
ROA	0.001	0.064	−0.011	−0.113
	(0.00)	(0.24)	(−0.05)	(−0.51)
BM	−0.025	−0.018	−0.042**	−0.024
	(−1.20)	(−0.76)	(−2.34)	(−1.21)
Turnover	−0.043	−0.057	−0.042	−0.043
	(−1.08)	(−1.38)	(−0.97)	(−1.12)
CAPEX	0.797***	0.747***	1.005***	0.871***
	(6.09)	(5.27)	(7.02)	(6.82)
CFO	−0.283**	−0.326***	−0.219**	−0.205**
	(−2.57)	(−2.68)	(−2.15)	(−2.04)
R&D	0.308	0.416	−4.954***	0.517
	(0.49)	(0.58)	(−11.83)	(0.97)
Dividend	−0.026	−0.037	−0.027	−0.025
	(−1.19)	(−1.57)	(−1.36)	(−1.30)
VOL	0.235**	0.180	0.449***	0.198*
	(2.05)	(1.44)	(4.49)	(1.94)
RET	0.453**	0.557***	−0.002	0.261
	(2.53)	(2.84)	(−0.02)	(1.61)
Board	−0.126	−0.139	−0.186**	−0.135*
	(−1.45)	(−1.47)	(−2.36)	(−1.79)
Indep	−0.339	−0.432	−0.278	−0.307
	(−1.39)	(−1.63)	(−1.27)	(−1.46)
Top1	−0.156	−0.179	−0.196	−0.169
	(−1.08)	(−1.14)	(−1.32)	(−1.24)
INS	0.012	−0.008	0.009	0.004
	(0.24)	(−0.14)	(0.19)	(0.09)
SOE	−0.004	0.020	0.019	−0.002
	(−0.07)	(0.36)	(0.40)	(−0.03)
FirmAge	−0.072	−0.087	0.207***	−0.101
	(−0.98)	(−1.10)	(3.34)	(−1.48)
Constant	−2.405***	−2.302***	−3.083***	−2.139***
	(−3.43)	(−3.08)	(−5.06)	(−3.37)
Year fixed effects	Yes	Yes	No	Yes
Industry fixed effects	Yes	Yes	No	Yes
N	12,950	11,210	13,481	13,481
Adjusted R^2	0.129	0.129	0.074	0.119

Notes: Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 7
Firm fixed effects.

	(1)	(2)
	CCRD	*CCRD*
INS_Visit	0.036***	0.025***
	(3.84)	(2.73)
Size		0.163***
		(4.25)
Lev		0.296***
		(2.90)
ROA		0.146
		(0.59)
BM		−0.013
		(−0.65)
Turnover		−0.013
		(−0.25)
CAPEX		0.798***
		(5.06)
CFO		−0.190*
		(−1.83)
R&D		1.242**
		(2.03)
Dividend		−0.029
		(−1.36)
VOL		0.238**
		(2.20)
RET		0.258
		(1.53)
Board		−0.166*
		(−1.87)
Indep		−0.151
		(−0.64)
Top1		0.064
		(0.34)
INS		0.013
		(0.26)
SOE		0.022
		(0.34)
FirmAge		−0.129
		(−0.60)
Constant	0.804***	−2.261**
	(31.91)	(−2.18)
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
N	14,762	14,762
Adjusted R^2	0.099	0.120

Notes: Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

6.6. Mechanism analyses

Thus far, we have found that site visits by institutional investors have a robust effect on corporate CCRD. In this section, we further explore the underlying mechanism behind this effect.

In the Hypothesis development section, we argue that an improved information environment is the main channel through which institutional investors' site visits would enhance corporate CCRD. From an information acquisitive perspective, institutional investors may discover certain private information to which they attach great importance, rendering it difficult and costly for management to withhold such information (Cheng et al., 2016; Su et al., 2021). From a monitoring perspective, institutional investors' site visits serve as a means of monitoring managers, curbing their opportunistic incentives to hide bad news (Yang & Ma, 2022; Zhou & Gan, 2022) and motivating them to disclose true information promptly. Both the information acquisition and monitoring roles of institutional investors' site visits improve the information environment of companies, thereby pushing or inducing management to disclose more discretionary information, especially climate change risk information, that investors value highly.

Following Zhao et al. (2023) and Jones (1991), we use the absolute value of discretionary accruals calculated using the modified Jones model to measure the corporate information environment (*InformationEnvironment*). A higher value of *InformationEnvironment* indicates a higher level of corporate information asymmetry and a worse information environment for companies. We first construct Model (2) to examine the association between the institutional investors' site visits and the corporate information environment, showing that site visits do influence potential channel. Next, we combine the mediator variable with our independent measure (*INV_Visit*) in Model (3) to examine their joint effects on corporate CCRD.

$$InformationEnvironment_{i,t} = \alpha + \beta_1 INV\_Visit_{i,t} + \beta_2 CV_{i,t} + YearFE + IndustryFE + \varepsilon_{i,t} \quad (2)$$

$$CCRD_{i,t} = \alpha + \beta_1 INV\_Visit_{i,t} + \beta_2 InformationEnvironment_{i,t} + \beta_3 CV_{i,t} + YearFE + IndustryFE + \varepsilon_{i,t} \quad (3)$$

Table 11 presents empirical results for how *InformationEnvironment* mediates the effect of *INV_Visit* on corporate CCRD. The result of Column (1) is congruent to our baseline regression. In Column (2), the coefficient on *INV_Visit* is negative and significant at the 1% level, suggesting that higher *INV_Visit* is associated with lower information asymmetry and better information environment. The result of Column (3) shows that the coefficient on *InformationEnvironment* is significantly negative and the coefficient on *INV_Visit* is significantly positive, indicating that improved

Table 8
Lag the independent variable.

	(1)	(2)
	CCRD	*CCRD*
INS_Visit $_{t-1}$	0.024***	0.016**
	(2.83)	(1.97)
Size		0.161***
		(5.55)
Lev		0.389***
		(4.20)
ROA		0.178
		(0.76)
BM		−0.005
		(−0.24)
Turnover		−0.033
		(−0.86)
CAPEX		0.812***
		(6.30)
CFO		−0.352***
		(−3.31)
R&D		0.721
		(1.32)
Dividend		−0.030
		(−1.46)
VOL		0.336***
		(2.60)
RET		0.477***
		(2.59)
Board		−0.104
		(−1.32)
Indep		−0.297
		(−1.31)
Top1		−0.081
		(−0.60)
INS		−0.030
		(−0.59)
SOE		−0.024
		(−0.48)
FirmAge		−0.108
		(−1.41)
Constant	0.760***	−2.392***
	(5.57)	(−3.56)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
N	13,716	13,716
Adjusted R^2	0.105	0.124

Notes: Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

information environment explains the relationship between institutional investors' site visits and corporate CCRD. In addition, the significant Sobel test, Goodman test 1, and Goodman test 2 also support the mediating roles of *InformationEnvironment*. These results are consistent with our prediction that institutional investors' site visits improve the corporate information environment, thus further motivating managers to voluntarily disclose more information about climate change risk.

6.7. Further analyses

6.7.1. The moderating effects of internal corporate governance

In the above analyses, institutional investors' site visits may play a monitoring role in managers' opportunistic incentives to withhold bad news (Yang & Ma, 2022; Zhou & Gan, 2022), resulting in an increased level of corporate CCRD. According to this logic, the monitoring role of institutional investors' site visits in corporate CCRD is more pronounced for firms with weaker internal corporate governance. We examine whether the effects of institutional investors' site visits on corporate CCRD vary with corporate internal governance, as proxied by agency costs and the corporate governance index. Following Yang and Ma (2022), we choose *AgencyCost*, an indicator variable equal to one if the firm's management expense ratio is higher than the industrial average for the same year and zero otherwise, as the first internal governance

Table 9
Instrumental variable method.

	(1)	(2)
	First stage	*Second stage*
VARIABLES	*INS_Visit*	*CCRD*
Instrmented_INS_Visit		0.256***
		(2.65)
Ind_INS_Visit	0.828***	
	(13.00)	
Distance	−0.157***	
	(−6.35)	
Size	0.287***	0.045
	(29.99)	(1.44)
Lev	−0.035	1.059***
	(−0.65)	(13.85)
ROA	2.500***	−1.009***
	(12.46)	(−2.69)
BM	−0.158***	−0.032
	(−11.79)	(−1.32)
Turnover	0.007	−0.260***
	(0.34)	(−8.92)
CAPEX	0.158**	1.166***
	(2.53)	(13.17)
CFO	−0.264**	−1.110***
	(−2.08)	(−6.15)
R&D	5.942***	−3.664***
	(13.06)	(−4.22)
Dividend	0.128***	−0.025
	(5.64)	(−0.72)
VOL	−0.433***	0.456**
	(−3.13)	(2.29)
RET	1.286***	1.015***
	(5.15)	(2.68)
Board	0.097**	−0.117*
	(2.00)	(−1.70)
Indep	−0.049	−0.825***
	(−0.30)	(−3.58)
Top1	−0.181***	−0.264***
	(−3.28)	(−3.33)
INS	0.144***	0.029
	(3.93)	(0.53)
SOE	−0.151***	−0.092***
	(−7.58)	(−2.87)
FirmAge	−0.177***	−0.019
	(−7.06)	(−0.48)
Constant	−5.535***	−0.360
	(−21.32)	(−0.63)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
N	13,910	13,910
Adjusted R^2	0.244	0.273

Notes: Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

measurement. Referring to Larcker, Richardson, and Tuna (2007), we apply the principal component analysis (PCA) method to build a comprehensive corporate internal governance index that includes eight key internal governance variables: management compensation, management shareholdings, directors' shareholdings, board size, board independence, ownership held by the largest shareholder, and CEO/chairman duality. Next, we construct the second internal governance measurement, *GovernanceIndex*, an indicator variable equal to one if the firm's internal governance index is lower than the industrial average for the same year and zero otherwise.

Table 12 presents the moderating effects of internal corporate governance on the relationship between institutional investors' site visits and corporate CCRD. In Column (1), the standalone variable *AgencyCost* has a negative and significant coefficient, suggesting that agency costs significantly inhibit firm-level CCRD. The coefficient of the interaction term *INS_Visit*AgencyCost* is positive and significant, indicating that the monitoring effect of corporate site visits is stronger for firms with severe agency problems. In Column (2), the standalone variable *GovernanceIndex* also has a negative coefficient, demonstrating

Table 10
Propensity score matching method.

	(1)	(2)
	CCRD	*CCRD*
INS_Visit	0.047***	0.048***
	(3.40)	(3.44)
Size	0.217***	0.187***
	(6.00)	(5.44)
Lev	0.428***	0.452***
	(3.53)	(3.84)
ROA	−0.059	−0.250
	(−0.18)	(−0.78)
BM	−0.040	−0.033
	(−1.53)	(−1.21)
Turnover	−0.086*	−0.054
	(−1.79)	(−1.17)
CAPEX	1.146***	0.911***
	(6.95)	(5.51)
CFO	−0.337**	−0.340**
	(−2.07)	(−2.09)
R&D	−5.667***	0.020
	(−9.59)	(0.03)
Dividend	−0.042	−0.030
	(−1.18)	(−0.88)
VOL	0.530***	0.344*
	(2.97)	(1.88)
RET	0.194	0.410
	(0.76)	(1.37)
Board	−0.239**	−0.143
	(−2.25)	(−1.45)
Indep	−0.750**	−0.545*
	(−2.48)	(−1.92)
Top1	−0.586***	−0.423***
	(−3.56)	(−2.70)
INS	−0.064	−0.059
	(−0.93)	(−0.89)
SOE	0.061	0.014
	(0.97)	(0.23)
FirmAge	0.056	−0.182**
	(0.69)	(−2.21)
Constant	−3.174***	−2.626***
	(−4.60)	(−3.63)
Year fixed effects	No	Yes
Industry fixed effects	No	Yes
N	6436	6436
Adjusted R^2	0.088	0.134

Notes: Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 11
Channel tests.

	(1)	(2)	(3)
	CCRD	*InformationEnvironment*	*CCRD*
INS_Visit	0.026***	−0.003***	0.024***
	(2.96)	(−5.62)	(2.61)
InformationEnvironment			−0.264*
			(−1.90)
Size	0.147***	−0.001	0.150***
	(5.35)	(−0.94)	(5.31)
Lev	0.423***	0.041***	0.409***
	(4.71)	(11.01)	(4.48)
ROA	0.075	0.378***	0.240
	(0.34)	(24.34)	(1.02)
BM	−0.022	−0.003***	−0.013
	(−1.14)	(−3.64)	(−0.66)
Turnover	−0.051	0.004**	−0.041
	(−1.38)	(2.54)	(−1.08)
CAPEX	0.818***	−0.013***	0.846***
	(6.60)	(−3.08)	(6.66)
CFO	−0.283***	−0.228***	−0.407***
	(−2.80)	(−17.69)	(−3.91)
R&D	0.647	−0.080***	0.762
	(1.22)	(−2.82)	(1.41)
Dividend	−0.032	0.002	−0.028
	(−1.57)	(1.13)	(−1.37)
VOL	0.219**	0.014*	0.308**
	(2.07)	(1.71)	(2.58)
RET	0.342**	0.004	0.447**
	(2.05)	(0.24)	(2.43)
Board	−0.124	−0.005	−0.129*
	(−1.64)	(−1.54)	(−1.67)
Indep	−0.297	0.007	−0.289
	(−1.37)	(0.73)	(−1.31)
Top1	−0.147	0.000	−0.140
	(−1.09)	(0.04)	(−1.05)
INS	0.008	−0.004**	−0.007
	(0.18)	(−1.97)	(−0.15)
SOE	−0.005	0.002	−0.005
	(−0.10)	(1.41)	(−0.10)
FirmAge	−0.079	−0.002	−0.103
	(−1.16)	(−0.89)	(−1.39)
Constant	−2.252***	0.068***	−2.255***
	(−3.57)	(3.98)	(−3.44)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
N	14,762	14,051	14,051
Adjusted R^2	0.126	0.117	0.125

Notes: Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

that weaker internal governance may reduce corporate CCRD. The coefficient of *INS_Visit*AgencyCost* is significantly positive, suggesting that the monitoring effect of corporate site visits is stronger for firms with weak internal governance.

6.7.2. The moderating effects of external corporate governance

As mentioned above, corporate site visits would also play a stronger monitoring role when visited firms have weaker external corporate governance (Yang & Ma, 2022), thus leading managers to disclose more climate change risk of companies. We explore whether the impacts of institutional investors' site visits on corporate CCRD varies with external governance, as proxied by institutional ownership and audit quality. Following previous literature, we select *INS_Dummy*, a dummy variable equal to one if corporate institutional ownership is higher than the industrial average for the same year and zero otherwise, as the first external governance measurement. Furthermore, the second external governance measurement is *Big10*, a dummy variable equal to one if the firm is audited by Big10[3] and zero otherwise.

Table 13 presents the moderating effects of external corporate governance on the association between site visits by institutional investors and corporate CCRD. In Column (1), the coefficient of the interaction term *INS_Visit*INS_Dummy* is significantly negative, suggesting that the monitoring effect of corporate site visits is less prominent for firms with greater institutional ownership. In Column (2), the coefficient of *INS_Visit*Big10* is significant and negative at the 5% level, indicating that corporate site visits have a weaker impact on corporate CCRD for firms audited by Big 10 auditors.

7. Conclusion

Previous research has largely examined how institutional investors' corporate site visits affect the visited firms' financial decisions and behaviors. However, little is known about whether these private interactions influence corporate information disclosure behavior, particularly discretionary risk information disclosure. Our study attempts to address this gap by exploring how institutional investors' site visits affect corporate disclosure of climate change risk. Using data on Chinese companies listed on the SZSE from 2013 to 2021, this paper concludes that institutional investors' site visits have a significantly positive impact on corporate CCRD. The impact channel of this relationship is the improved information environment of the visited

[3] The top ten accounting firms ranked by audit quality in China.

Table 12
Moderating effects of internal corporate governance.

	(1)	(2)
	CCRD	*CCRD*
INS_Visit	0.012	0.015
	(1.05)	(1.48)
*INS_Visit*AgencyCost*	0.028*	
	(1.94)	
AgencyCost	−0.073***	
	(−2.96)	
*INS_Visit*GovernanceIndex*		0.029*
		(1.85)
GovernanceIndex		−0.036
		(−1.14)
Size	0.142***	0.147***
	(5.19)	(5.31)
Lev	0.423***	0.419***
	(4.69)	(4.67)
ROA	0.046	0.079
	(0.21)	(0.35)
BM	−0.024	−0.022
	(−1.21)	(−1.11)
Turnover	−0.073*	−0.052
	(−1.92)	(−1.38)
CAPEX	0.823***	0.818***
	(6.65)	(6.59)
CFO	−0.285***	−0.282***
	(−2.82)	(−2.80)
R&D	0.741	0.634
	(1.39)	(1.19)
Dividend	−0.033	−0.033
	(−1.60)	(−1.62)
VOL	0.218**	0.223**
	(2.06)	(2.11)
RET	0.338**	0.340**
	(2.03)	(2.04)
Board	−0.119	−0.125*
	(−1.58)	(−1.65)
Indep	−0.288	−0.296
	(−1.33)	(−1.37)
Top1	−0.154	−0.156
	(−1.14)	(−1.16)
INS	0.006	0.010
	(0.13)	(0.22)
SOE	−0.003	−0.003
	(−0.06)	(−0.07)
FirmAge	−0.078	−0.077
	(−1.15)	(−1.13)
Constant	−2.102***	−2.236***
	(−3.35)	(−3.54)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
N	14,762	14,762
Adjusted R^2	0.127	0.127

Notes: This table presents the moderating effects of internal corporate governance on the relationship between site visits and corporate CCRD. The first moderating variable *AgencyCost* is an indicator variable equal to 1 if the firm's management expense ratio is higher than the industrial average for the same year and 0 otherwise. The second moderating variable *GovernanceIndex* is an indicator variable equal to 1 if the firm's internal governance index is lower than the industrial average for the same year and 0 otherwise. All of control variables are defined in Appendix Table 2. Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 13
Moderating effects of external governance.

	(1)	(2)
	CCRD	*CCRD*
INS_Visit	0.040***	0.043***
	(3.58)	(3.63)
*INS_Visit*INS_Dummy*	−0.027*	
	(−1.94)	
INS_Dummy	0.068***	
	(2.58)	
*INS_Visit*Big10*		−0.031**
		(−2.27)
Big10		0.007
		(0.31)
Size	0.146***	0.146***
	(5.32)	(5.32)
Lev	0.422***	0.424***
	(4.71)	(4.73)
ROA	0.072	0.070
	(0.33)	(0.32)
BM	−0.023	−0.022
	(−1.17)	(−1.10)
Turnover	−0.051	−0.052
	(−1.36)	(−1.39)
CAPEX	0.821***	0.815***
	(6.63)	(6.57)
CFO	−0.279***	−0.286***
	(−2.77)	(−2.84)
R&D	0.642	0.704
	(1.21)	(1.33)
Dividend	−0.033	−0.032
	(−1.62)	(−1.57)
VOL	0.210**	0.207*
	(1.97)	(1.95)
RET	0.357**	0.358**
	(2.13)	(2.15)
Board	−0.125*	−0.124
	(−1.65)	(−1.63)
Indep	−0.306	−0.302
	(−1.41)	(−1.39)
Top1	−0.146	−0.144
	(−1.09)	(−1.06)
SOE	−0.008	−0.005
	(−0.16)	(−0.10)
FirmAge	−0.079	−0.081
	(−1.15)	(−1.19)
Constant	−2.237***	−2.237***
	(−3.55)	(−3.55)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
N	14,762	14,761
Adjusted R^2	0.127	0.127

Notes: This table presents the moderating effects of external corporate governance on the relationship between site visits and corporate CCRD. The first moderating variable *INS_Dummy* is a dummy variable equal to 1 if the corporate institutional ownership is higher than the industrial average for the same year and 0 otherwise. The second moderating variable *Big10* is a dummy variable equal to 1 if the visited firm is audited by Big10 auditors and 0 otherwise. All of control variables are defined in Appendix Table 2. Firm-clustered t-statistics are presented in parenthesis. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

companies. Additional tests show that this effect is more pronounced in firms with poor external or internal governance. Our main conclusion still holds after using alternative measures, alternative samples, the firm fixed effects model, lagged period tests, the instrumental variable method, and the propensity score matching procedure.

Our research provides important and insightful implications for policymakers regarding the regulation of corporate site visits and the improvement of firm-level climate risk disclosure. Firstly, regulatory authorities in China and other emerging markets should bolster their oversight of investor site visits and further refine guidelines for disclosing information related to such visits. Presently, in China, only the SZSE has established specific disclosure requirements for site visits. In contrast, the Shanghai Stock Exchange (SSE) has yet to mandate companies to disclose the details of site visits. Moreover, the SZSE does not require companies to disclose sensitive information, such as the initiator, purpose, or complete audio recordings of site visits. In response, Chinese regulatory authorities should enhance the information disclosure requirements for site visits, extend these requirements to companies listed on the SSE, and impose more stringent regulatory penalties on companies that fail to cooperate with site visits or exhibit poor disclosure quality concerning site visits. Secondly, the Chinese

government, along with governments in other countries, should place greater emphasis on firm-level climate risk disclosure by integrating the climate-related financial disclosure recommendations proposed by the TCFD into the disclosure standards of corporate annual reports. Although significant efforts have been made to reduce carbon emissions and address climate risk, China is still in its infancy regarding corporate climate risk disclosure. Due to the absence of unified standards for climate risk disclosure, Chinese companies voluntarily disclose their firm-level climate risk, leading to certain problems in their credibility, comparability, and accuracy. The climate-related financial disclosure recommendations issued by the TCFD present companies with a great chance to report their climate information in a standardized and regulated manner. Therefore, governments in many countries should seize this opportunity to assist their companies in better disclosing climate risk and embarking on climate risk management.

This study opens several avenues for future research. First, future research could delve deeper into whether the type of institutional investors involved in site visits and the continuity of these visits have varying effects and corresponding mechanisms on corporate CCRD. Second, it is meaningful to explore how other stakeholders, such as retail investors, creditors, suppliers, and customers, perceive climate change risk and how this affects corporate CCRD. Finally, more diverse methods, including natural experiments, case studies, and surveys, could be employed in future studies to unlock the "black box" of the drivers behind corporate disclosures regarding climate change risk.

Authorship contribution statement

Yanheng Song: Conceptualization, Funding acquisition, Supervision, Validation, Writing – review & editing. **Rui Xian:** Conceptualization, Funding acquisition, Methodology, Data curation and analysis, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

None.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

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