Economics

# More philanthropy, More Consistency? Examining the Impact of Corporate Charitable Donations on ESG Rating Uncertainty

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# Title Page

Meiyi Li

School of Business, Tianshui Normal University, Tianshui,741000, China

Email: limeiyi@tsnu.edu.cn

Yufei Gan*

School of Finance, Jiangxi Normal University, Nanchang,330022, China

Email: ganyufei123@outlook.com

**Corresponding Author: Yufei Gan**

Email: ganyufei123@outlook.com

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Data will be made available on request

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No conflict of interest

# More philanthropy, More Consistency? Examining the Impact of Corporate Charitable Donations on ESG Rating Uncertainty


## Abstract:

The variability and inconsistency in ESG ratings pose challenges for investors and companies. This study examines the impact of corporate charitable donations (CCD) on ESG rating uncertainty (ESGSTD) using a multivariate regression model and data from Chinese A-share listed companies from 2015 to 2023. Results show that CCD significantly reduces ESGSTD, with CEO Green Experience (CGE), CEO Overseas Education (COE), and CEO Academic Background (CAE) strengthening this effect. Robustness checks confirm these findings. ESG-focused investors further amplify the positive impact of CCD. These insights highlight the importance of strategic CSR activities and CEO attributes in enhancing ESG rating consistency.



***Keywords:*** Corporate Charitable Donations; ESG Rating Uncertainty; CEO Green Experience; CEO Overseas Education Experience; CEO Academic Background


## 1. Introduction

In recent years, ESG (Environmental, Social, and Governance) ratings have emerged as critical indicators of corporate sustainability and ethical conduct (Shaikh,2022; Şeker and Şengür,2021). These ratings are used by investors, regulators, and other stakeholders to evaluate a company's long-term viability, risk profile, and overall commitment to sustainability (Bao et al.,2024). ESG ratings encompass a broad range of criteria, including environmental impact, labor practices, corporate governance structures, and community engagement (Tsang et al.,2023). The growing importance of ESG ratings is underscored by the rise of sustainable investing, where investors seek to allocate capital to companies that not only deliver financial returns but also contribute positively to society and the environment (Park and Lee, 2023).

Despite their importance, ESG ratings are often fraught with variability and

inconsistency, a phenomenon known as ESG rating uncertainty. This uncertainty arises because different rating agencies use varied methodologies, criteria, and data sources to assess companies' ESG performance (Billio et al.,2021). For instance, one agency might place more emphasis on environmental factors, while another might prioritize governance or social aspects, leading to divergent ratings for the same company. This lack of standardization creates significant challenges for stakeholders who rely on these ratings to make informed decisions. Investors may find it difficult to compare companies accurately, and companies themselves may struggle to understand and improve their ESG performance due to conflicting feedback from different rating agencies (Sheehan,2023).

Corporate Charitable Donations (CCD) represent a key aspect of corporate social responsibility (CSR) and have become a significant component of modern business practices (Baker and Dawson,2020; Ni et al.,2022). CCD refers to voluntary contributions made by companies to charitable causes, non-profit organizations, or community projects. These contributions can take various forms, including monetary donations, in-kind contributions, and volunteer programs. By engaging in charitable activities, companies can enhance their public image, foster goodwill among stakeholders, and fulfill their CSR obligations.

However, the role of CCD in influencing ESG ratings, particularly ESG rating uncertainty, is not well understood. While it is established that CCD can positively impact a company's social and governance scores, thereby enhancing its overall ESG ratings, the extent to which CCD can reduce the inconsistency and variability in these ratings remains underexplored. This is a critical gap in the literature, given the growing importance of ESG ratings in the corporate world. Companies that consistently engage in CCD signal their commitment to social responsibility and transparency, which could potentially lead to more consistent and reliable ESG ratings across different agencies.

Furthermore, the role of CEO characteristics in moderating the relationship between CCD and ESG rating uncertainty remains underexplored. CEOs with diverse experiences

and backgrounds, such as Green Experience (CGE), Overseas Education Experience (COE), and Academic Background (CAE), can significantly influence corporate strategies and outcomes. For instance, CEOs with green experience are likely to implement more effective and credible CSR strategies, which could reduce the impact of ESG rating uncertainty (Bin-Feng et al.,2024). Similarly, CEOs with overseas education might bring diverse perspectives and innovative practices that further strengthen the relationship between CCD and ESG rating reliability (Cortes and Herrmann,2021). CEOs with strong academic backgrounds are often more adept at analytical thinking and strategic decision-making, which could help in leveraging CCD to improve ESG performance and reduce rating uncertainty (Luoma and Martela,2021).

Despite the potential significance of these CEO characteristics, their moderating effects on the relationship between CCD and ESG rating uncertainty have not been thoroughly examined. Addressing this gap is essential for both theoretical and practical reasons. From a theoretical perspective, understanding these dynamics can contribute to the literature on CSR, ESG ratings, and corporate governance. Practically, it can inform better corporate governance and CSR strategies, helping companies to improve their ESG ratings and reduce uncertainty, thereby gaining the trust of investors and other stakeholders.

This study aims to address these gaps by investigating the following research questions:

**RQ1:** How do corporate charitable donations impact ESG rating uncertainty?

**RQ2:** To what extent do CEO characteristics (Green Experience, Overseas Education Experience, and Academic Background) moderate the relationship between CCD and ESG rating uncertainty?

We examine the impact of corporate charitable donations (CCD) on ESG rating uncertainty (ESGSTD) using a multivariate regression model and data from Chinese A-share listed companies from 2015 to 2023. Our results indicate that CCD significantly reduces ESGSTD. Moreover, CEO characteristics, specifically Green Experience (CGE),

Overseas Education Experience (COE), and Academic Background (CAE), strengthen this effect. Robustness checks confirm these findings. ESG-focused investors further amplify the positive impact of CCD.

We utilize a comprehensive dataset from Chinese A-share listed companies, covering the period from 2015 to 2023. The data includes information on corporate charitable donations, ESG ratings from six different agencies, and various CEO characteristics. Our primary method of analysis involves multivariate regression models, controlling for several firm-specific variables. To address potential endogeneity issues, we employ robustness checks such as first-order difference models, instrumental variable approaches, and Propensity Score Matching (PSM).

The primary contributions of this paper are threefold. First, it provides empirical evidence on the role of CCD in reducing ESG rating uncertainty. Second, it explores the moderating effects of CEO characteristics on this relationship, offering insights into how different types of CEO experiences influence ESG rating uncertainty. Third, it contributes to the broader CSR and corporate governance literature by highlighting the importance of external pressures and incentives, such as those from ESG-focused investment funds, in shaping corporate behavior.

The remainder of this paper is organized as follows: Section 2 reviews the literature relevant to our study. Section 3 describes the data and methodology employed. Empirical findings are presented in Section 4. Finally, Section 5 offers conclusive remarks and summarizes the key insights of the paper.

## 2. Literature Review and Research Hypothesis

### *2.1 Corporate Charitable Donations and ESG Rating Certainty*

Corporate charitable donations (CCD) refer to voluntary contributions made by companies to charitable causes, non-profit organizations, or community projects (Cheng and Geng,2021; Atmeh et al.,2020). These contributions can take various forms, including monetary donations, in-kind contributions, and volunteer programs (Saleh,2020).

Monetary donations involve direct financial support to charities or community programs, while in-kind contributions consist of donations of goods or services instead of cash (Osei and Alagidede,2023). Volunteer programs involve companies allowing their employees to volunteer for community services during paid work hours (Hatami et al.,2024). The importance of CCD in modern business practices cannot be overstated. CCD plays a significant role in enhancing a company's social responsibility profile. By engaging in charitable activities, companies can improve their public image and build goodwill among stakeholders (Wirba,2023; Adomako and Tran,2024). This, in turn, can lead to increased customer loyalty, employee satisfaction, and overall corporate reputation (Le,2023; Kim et al.,2020). Companies are often motivated to make charitable donations to fulfill their corporate social responsibility (CSR) obligations, enhance their corporate image, and gain trust among stakeholders, including customers, employees, investors, and the community at large (Amin and Harris,2020; Wu et al.,2021; Maung et al.,2020).

The impact of CCD on corporate performance has been widely studied, with mixed findings in the literature. On the financial performance front, some studies suggest that CCD can lead to improved profitability and stock returns (Shin et al.,2021; Alatawi et al.,2023; Al Frijat et al.,2024; Chen et al.,2023). For instance, companies engaged in charitable activities may benefit from increased sales due to enhanced brand reputation and customer loyalty (Rodell et al.,2020). However, other studies find no significant relationship or even a negative impact, suggesting that the resources allocated to charitable donations could have been used more effectively elsewhere in the business (Yu et al., 2022). These mixed findings highlight the need for a deeper understanding of the conditions under which CCD can positively impact financial performance. In terms of non-financial performance, research indicates that CCD can significantly enhance various non-financial performance indicators. For example, companies that engage in charitable activities often see higher levels of employee satisfaction and morale, as employees feel proud to work for a socially responsible organization (Khaskheli et al.,2020). The role of CCD in building a

positive corporate reputation is particularly crucial, as it helps companies differentiate themselves from competitors and foster long-term relationships with stakeholders (Vo et al.,2020). Signaling Theory suggests that companies engage in activities like CCD to signal their quality and commitment to stakeholders (DesJardine et al.,2021).

ESG ratings evaluate a company's performance in three key areas: environmental, social, and governance. These ratings are provided by various rating agencies, which use different criteria and methodologies to assess how well companies manage ESG issues (Clementino and Perkins,2021; Rajesh,2020;). The criteria typically include factors such as environmental impact, labor practices, corporate governance structures, and community engagement (Sancha et al.,2023). ESG ratings are significant to investors, regulators, and other stakeholders (Raghunandan and Rajgopal,2022). Investors increasingly use ESG ratings to make informed investment decisions, as high ESG-rated companies are perceived to be more sustainable and less risky (Barka et al.,2023). Regulators may also rely on ESG ratings to ensure companies adhere to certain standards and practices (Krueger et al.,2021). For companies, high ESG ratings can lead to better access to capital, lower cost of capital, and enhanced reputational benefits (Apergis et al., 2022).

ESG rating uncertainty refers to the variability or inconsistency in ESG ratings assigned to the same company by different rating agencies. This uncertainty can arise due to differences in rating methodologies, criteria, and data sources (Gibson Brandon et al.,2021). The lack of standardization in ESG ratings can create challenges for investors and other stakeholders in accurately assessing a company's ESG performance (Cort and Esty,2020).

The relationship between CCD and ESG ratings has been explored in several studies. The direct impact of CCD on ESG ratings is generally positive, as charitable donations can enhance a company's social and governance scores (Sandberg et al.,2023; Liao et al.,2023), thereby improving its overall ESG ratings. By engaging in charitable activities, companies demonstrate their commitment to social responsibility, which is favorably viewed by ESG

rating agencies (You,2024). However, there are nuances and limitations in the existing literature. While Lopatta et al. (2024) highlight the positive impacts of CCD on ESG ratings, they do not fully explore the mechanisms through which this occurs. Additionally, many studies do not account for the potential endogeneity between CCD and ESG ratings. For instance, companies with better ESG ratings might have more resources to allocate to charitable donations (Zhang et al.,2024), creating a reverse causality problem. Furthermore, CCD can impact ESG rating certainty. Companies that consistently engage in charitable activities signal their commitment to social responsibility and transparency (Conte et al.,2023). This can reduce ESG rating uncertainty by providing more consistent and reliable data for rating agencies to assess (Sun et al.,2024). Increased stakeholder engagement and improved corporate transparency, driven by CCD, can lead to greater certainty and alignment in ESG ratings across different agencies. By making charitable donations, companies signal their commitment to social responsibility and ethical practices (Abid et al.,2020), which can reduce ESG rating uncertainty. Based on the literature review, the following hypotheses are developed:

**H1: Corporate charitable donations (CCD) reduce ESG uncertainty.**

## *2.2 Role of CEO Multiple Experiences*

The role of CEO characteristics in shaping corporate strategies and outcomes has garnered significant attention in the academic literature. This section synthesizes the findings related to three specific CEO experiences: Green Experience (CGE), Overseas Education Experience (COE), and Academic Background (CAE), and explores their moderating effects on the relationship between Corporate Charitable Donations (CCD) and ESG rating uncertainty.

### *2.2.1 CEO Green Experience (CGE)*

CEO Green Experience (CGE) refers to the professional background and experience that a CEO has in environmental management and sustainability practices (Li et al.,2023; Uyar et al.,2024). Studies have shown that CEOs with green experience are more likely to

implement effective corporate social responsibility (CSR) strategies and promote sustainability initiatives within their organizations (Huang and Wei,2023; Li et al.,2024). For instance, Mahran and Elamer (2024) found that CEOs with a strong background in environmental management are more likely to improve their firms' environmental performance and engage in sustainable practices. This aligns with Signaling Theory, which suggests that such CEOs can signal their commitment to sustainability, thereby enhancing the credibility and effectiveness of their companies' CCD efforts (Elbardan et al.,2023). Despite the positive influence of CGE on corporate environmental performance being well-documented, its impact on the relationship between CCD and ESG rating uncertainty remains underexplored. This gap is significant because CGE could enhance the credibility and effectiveness of CCD, thereby reducing ESG rating uncertainty. By incorporating CGE into the analysis, this study aims to provide a more comprehensive understanding of how CEO characteristics influence ESG outcomes. Based on the literature review, the following hypotheses are developed:

**H2: CEO Green Experience (CGE) moderates the negative impact of corporate charitable donations (CCD) on ESG rating uncertainty.**

***2.2.2 CEO Overseas Education Experience (COE)***

CEO Overseas Education Experience (COE) refers to the international educational background of a CEO. CEOs who have studied abroad often bring diverse perspectives and a global mindset to their organizations (Cao et al.,2024; Zhong et al.,2023). Research suggests that CEOs with overseas education are more likely to adopt innovative practices and promote international standards in their companies (Hussain et al.,2024; Liu et al.,2024). Additionally, COE can enhance a CEO's understanding of global sustainability issues and CSR practices (Zhang and Dong,2023), thereby aligning with Legitimacy Theory, which posits that organizations seek to gain legitimacy by adhering to societal norms and values (Bukar et al.,2024). However, the literature on COE's impact on CCD and ESG rating uncertainty is limited. While studies like those by Karniouchina et al (2023)

have highlighted the broader advantages of international experience for corporate governance, they do not specifically address how COE might influence the effectiveness of CCD in reducing ESG rating uncertainty. This study aims to fill this gap by examining the moderating role of COE. Based on the literature review, the following hypotheses are developed:

**H3: CEO Overseas Education Experience (COE) moderates the negative impact of corporate charitable donations (CCD) on ESG rating uncertainty.**

#### *2.2.3 CEO Academic Background (CAE)*

CEO Academic Background (CAE) refers to the formal education and academic qualifications of a CEO (Mun et al.,2020; Oradi et al.,2020). CEOs with strong academic backgrounds are often more adept at analytical thinking and strategic decision-making. Studies have shown that such CEOs are more likely to implement evidence-based strategies and promote a culture of learning and innovation within their organizations (Chin et al.,2021; Zheng et al.,2020; Mukherjee and Sen,2022). For instance, Ren et al (2023) found that CEOs with advanced degrees are more likely to pursue long-term strategic goals. The literature on CAE's impact on corporate outcomes is extensive, but its specific role in moderating the relationship between CCD and ESG rating uncertainty is less understood. Given that CEOs with strong academic backgrounds might better leverage CCD to enhance their companies' social responsibility profiles (Erin et al.,2021), this study investigates this potential moderating effect. Understanding this dynamic is crucial as it can inform how educational backgrounds influence the strategic use of charitable donations to manage ESG perceptions. Based on the literature review, the following hypotheses are developed:

**H4:** CEO Academic Background (CAE) moderates the positive impact of ESG rating uncertainty on corporate charitable donations (CCD).

## 3. Data and Methods

### *3.1 Data and Sample*

Corporate charitable donations and basic information on listed companies are sourced

from the CSMAR database. Specifically, the financial statement notes on non-operating expenses detail corporate investments in charitable and volunteer projects. This study selects the charitable donation data to calculate the annual donation total for each firm. Considering data availability and the recognition of ESG rating agencies, we selected six ESG rating agencies for measurement: Sino-Securities ESG Ratings, SynTao Green Finance ESG Ratings, Alipay ESG Ratings, Wind ESG Ratings, Bloomberg ESG Ratings, and FTSE Russell ESG Ratings. Sino-Securities ESG Ratings began in 2009; SynTao Green Finance ESG Ratings and Alipay ESG Ratings started in 2015; Wind ESG Ratings and FTSE Russell ESG Ratings started in 2018; and Bloomberg ESG Ratings began in 2011. To ensure sufficient sample size, we retained A-share listed companies rated by at least three ESG rating agencies from 2015 to 2023, following Wang et al. (2024). Additionally, we excluded financial, insurance, and ST category listed companies, as well as samples with missing values. The final sample consists of 13,719 firm-year observations. The data used in this study mainly come from the Wind database, CSMAR database, and CNRDS database. We also winsorized continuous variables at the 1% level to mitigate the influence of extreme values.

## *3.2 Variables of Study*

### *3.2.1 Independent variable*

Existing studies on measuring the level of charitable donations mainly use absolute and relative indicators. To eliminate the influence of heteroscedasticity, transform the variables as linearly as possible, and reduce the skewness of the sample data distribution, we refer to previous research and measure corporate donation size by taking the logarithm of the annual corporate charitable donation amount plus one (Wang et al., 2023; Huang et al.,2024). Donation data is sourced from the detailed items of charitable donation expenditures in the financial statements of listed companies in the CSMAR

### *3.2.2 Dependent variable*

There are differences in the ESG rating scales of different rating agencies. To make the ratings from different agencies comparable, this paper first standardizes the ratings from six ESG rating agencies. Referring to Christensen et al. (2022), Berg et al. (2022), and Serafeim and Yoon (2023), the standard deviation of the standardized ratings from different agencies is used to measure corporate ESG uncertainty (ESGSTD). The larger the ESGSTD value, the higher the ESG uncertainty of the company.

### *3.2.3 Mechanism variables*

CEO Overseas Education Experience (COE) is a binary variable indicating whether the CEO has received education abroad (1 if yes, 0 otherwise), supported by Agcayazi et al. (2024) and Xu (2023). CEO Academic Background (CAE) indicates if the CEO has an academic background related to sustainability or governance (1 if yes, 0 otherwise), following Liang et al. (2024) and Li et al. (2024). CEO Green Experience (CGE) measures if the CEO has prior experience in environmental initiatives (1 if yes, 0 otherwise), as shown by Deng et al. (2024), Mahran et al. (2024), and Kallias et al. (2023). CEO personal information, ownership structure data, board structure data, and firm characteristics data are sourced from the CSMAR database, with the manual screening of CEO personal information.

### *3.2.4 Control variables*

To accurately isolate the effect of our main explanatory variables on ESG uncertainty, we include several control variables that are commonly used in the literature. Firm size (Size), measured by the natural logarithm of total assets, captures resource availability for ESG issues (El Badlaoui et al., 2023). Leverage (Lev), the ratio of total debt to total assets, accounts for financial constraints (Xu et al., 2024). Return on Equity (ROE), net income divided by shareholders' equity, controls for profitability (Jin et al., 2024). Growth, the percentage increase in total revenue, considers resource allocation. The largest Shareholder Ownership (Top1) accounts for ownership concentration, Tobin's Q for firm valuation, and Audit Opinion (Opinion) for financial reporting quality. The detailed variable definitions

are shown in Table 1.

Table 1 Definition of main variables

| Variables | Symbol | Measurement | Type |
|---|---|---|---|
| Corporate Charitable Donations | CCD | Logarithm of the donation amount plus 1. | Independent |
| ESG Uncertainty | ESGSTD | Measured by the standard deviation of standardized rating indices from different rating agencies. | Dependent |
| CEO Overseas Education Experience | COE | An indicator variable for CEO's overseas education experience (1 if present, 0 otherwise). | Moderating |
| CEO Green Experience | CGE | An indicator variable for CEO's green experience (1 if present, 0 otherwise). | Moderating |
| CEO Academic Background | CAE | An indicator variable for CEO's academic background (1 if present, 0 otherwise). | Moderating |
| Firm Size | Size | Firm size is typically measured by the natural logarithm of total assets. | Control |
| Leverage | Lev | Leverage, measured by the ratio of total debt to total assets. | Control |
| Return on Equity | ROE | Return on Equity, calculated as net income divided by shareholders' equity. | Control |
| Growth | Growth | Growth, measured by the percentage increase in total revenue from the previous year. | Control |
| Largest Shareholder Ownership | Top1 | The ownership percentage of the largest shareholder. | Control |
| Tobin's Q | TobinQ | Calculated as the market value of a firm divided by the replacement cost of the firm's assets. | Control |
| Audit Opinion | Opinion | An indicator variable for audit opinion (1 if clean, 0 otherwise). | Control |

## *3.3 Model specification*

### *3.3.1 Benchmark Regression Model Construction*

To examine the impact of corporate charitable donations on ESG uncertainty, we construct the following benchmark regression model. The model includes year and

industry-fixed effects to control for temporal and sector-specific influences:

$$\mathrm{ESGSTD}_{i,t} = \beta_0 + \beta_1 \mathrm{CCD}_{i,t} + \beta_2 \mathrm{Size}_{i,t} + \beta_3 \mathrm{Lev}_{i,t} + \beta_4 \mathrm{ROE}_{i,t} + \beta_5 \mathrm{Growth}_{i,t} + \beta_6 \mathrm{Top1}_{i,t} + \beta_7 \mathrm{TobinQ}_{i,t} + \beta_8 \mathrm{Opinion}_{i,t} + \sum \mathrm{Year}_t + \sum \mathrm{Industry}_i + \epsilon_{i,t}$$

Eq. (1)

In this model, ESGSTD represents the ESG uncertainty of firm $i$ in year $t$; CCD denotes the corporate charitable donations; Size, Lev, ROE, Growth, Top1, TobinQ, and Opinion are control variables.

### *3.3.2 Moderating Effect Regression Model Construction*

To investigate the moderating effects of CEO characteristics on the relationship between corporate charitable donations and ESG uncertainty, we construct six models to examine both direct and interaction effects of CEO Overseas Education Experience (COE), CEO Academic Background (CAE), and CEO Green Experience (CGE).

Direct Moderation Model for COE:

$$\mathrm{ESGSTD}_{i,t} = \delta_0 + \delta_1 \mathrm{CCD}_{i,t} + \delta_2 \mathrm{COE}_{i,t} + \delta_3 \mathrm{Size}_{i,t} + \delta_4 \mathrm{Lev}_{i,t} + \delta_5 \mathrm{ROE}_{i,t} + \delta_6 \mathrm{Growth}_{i,t} + \delta_7 \mathrm{Top1}_{i,t} + \delta_8 \mathrm{TobinQ}_{i,t} + \delta_9 \mathrm{Opinion}_{i,t} + \sum \mathrm{Year}_t + \sum \mathrm{Industry}_i + \xi_{i,t}$$

Eq. (2)

Interaction Effect Model for COE:

$$\mathrm{ESGSTD}_{i,t} = \theta_0 + \theta_1 \mathrm{CCD}_{i,t} + \theta_2 \mathrm{COE}_{i,t} + \theta_3 (\mathrm{CCD}_{i,t} \times \mathrm{COE}_{i,t}) + \theta_4 \mathrm{Size}_{i,t} + \theta_5 \mathrm{Lev}_{i,t} + \theta_6 \mathrm{ROE}_{i,t} + \theta_7 \mathrm{Growth}_{i,t} + \theta_8 \mathrm{Top1}_{i,t} + \theta_9 \mathrm{TobinQ}_{i,t} + \theta_{10} \mathrm{Opinion}_{i,t} + \sum \mathrm{Year}_t + \sum \mathrm{Industry}_i + \epsilon_{i,t}$$

Eq. (3)

Direct Moderation Model for CGE:

$$\mathrm{ESGSTD}_{i,t} = \delta_0 + \delta_1 \mathrm{CCD}_{i,t} + \delta_2 \mathrm{CGE}_{i,t} + \delta_3 \mathrm{Size}_{i,t} + \delta_4 \mathrm{Lev}_{i,t} + \delta_5 \mathrm{ROE}_{i,t} + \delta_6 \mathrm{Growth}_{i,t} + \delta_7 \mathrm{Top1}_{i,t} + \delta_8 \mathrm{TobinQ}_{i,t} + \delta_9 \mathrm{Opinion}_{i,t} + \sum \mathrm{Year}_t + \sum \mathrm{Industry}_i + \xi_{i,t}$$

Eq. (4)

Interaction Effect Model for CGE:

$$\mathrm{ESGSTD}_{i,t} = \theta_0 + \theta_1 \mathrm{CCD}_{i,t} + \theta_2 \mathrm{CGE}_{i,t} + \theta_3 (\mathrm{CCD}_{i,t} \times \mathrm{CGE}_{i,t}) + \theta_4 \mathrm{Size}_{i,t} + \theta_5 \mathrm{Lev}_{i,t} + \theta_6 \mathrm{ROE}_{i,t} + \theta_7 \mathrm{Growth}_{i,t} + \theta_8 \mathrm{Top1}_{i,t} + \theta_9 \mathrm{TobinQ}_{i,t} + \theta_{10} \mathrm{Opinion}_{i,t} + \sum \mathrm{Year}_t + \sum \mathrm{Industry}_i + \epsilon_{i,t}$$

Eq. (5)

Direct Moderation Model for CAE:

$$\mathrm{ESGSTD}_{i,t} = \delta_0 + \delta_1 \mathrm{CCD}_{i,t} + \delta_2 \mathrm{CAE}_{i,t} + \delta_3 \mathrm{Size}_{i,t} + \delta_4 \mathrm{Lev}_{i,t} + \delta_5 \mathrm{ROE}_{i,t} + \delta_6 \mathrm{Growth}_{i,t} + \delta_7 \mathrm{Top1}_{i,t} + \delta_8 \mathrm{TobinQ}_{i,t} + \delta_9 \mathrm{Opinion}_{i,t} + \sum \mathrm{Year}_t + \sum \mathrm{Industry}_i + \xi_{i,t}$$

Eq. (6)

Interaction Effect Model for CGE:

$$\mathrm{ESGSTD}_{i,t} = \theta_0 + \theta_1 \mathrm{CCD}_{i,t} + \theta_2 \mathrm{CAE}_{i,t} + \theta_3 (\mathrm{CCD}_{i,t} \times \mathrm{CAE}_{i,t}) + \theta_4 \mathrm{Size}_{i,t} + \theta_5 \mathrm{Lev}_{i,t} + \theta_6 \mathrm{ROE}_{i,t} + \theta_7 \mathrm{Growth}_{i,t} + \theta_8 \mathrm{Top1}_{i,t} + \theta_9 \mathrm{TobinQ}_{i,t} + \theta_{10} \mathrm{Opinion}_{i,t} + \sum \mathrm{Year}_t + \sum \mathrm{Industry}_i + \epsilon_{i,t}$$

Eq. (7)

These models allow us to comprehensively investigate the moderating effects of CEO characteristics on the relationship between corporate charitable donations and ESG uncertainty.

## 4. Results and Discussion

### *4.1 Descriptive statistics*

Descriptive statistics for the main variables are presented in Table 2. The mean value of corporate charitable donations (CCD) is 11.001, with a standard deviation of 5.496, indicating considerable variation in donation levels across firms. The average ESG uncertainty (ESGSTD) is 19.373, with substantial variability (SD = 12.788), reflecting differences in ESG ratings across firms. CEO overseas education experience (COE), academic background (CAE), and green experience (CGE) are relatively rare, with means of 0.028, 0.239, and 0.004, respectively. Firm size (Size) averages 22.851, leverage (Lev) 0.452, and return on equity (ROE) 0.065, suggesting a range of financial profiles. Growth exhibits an average of 0.168, indicating diverse revenue changes. The largest shareholder ownership (Top1) averages 0.328, Tobin's Q 1.950, and audit opinion (Opinion) 0.958,

highlighting variations in ownership concentration, market valuation, and audit quality.

Table 2 Descriptive statistics

| VARIABLE | N | MEAN | SD | MIN | P25 | P50 | P75 | MAX |
|---|---|---|---|---|---|---|---|---|
| CCD | 13,719 | 11.001 | 5.496 | 0.0 | 10.597 | 12.924 | 14.533 | 17.115 |
| ESGSTD | 13,719 | 19.373 | 12.788 | 0.003 | 9.575 | 17.887 | 26.591 | 97.879 |
| COE | 13,719 | 0.028 | 0.165 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 |
| CAE | 13,719 | 0.239 | 0.426 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 |
| CGE | 13,719 | 0.004 | 0.064 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 |
| Size | 13,719 | 22.851 | 1.39 | 19.976 | 21.849 | 22.661 | 23.623 | 26.43 |
| Lev | 13,719 | 0.452 | 0.199 | 0.054 | 0.296 | 0.449 | 0.602 | 0.906 |
| ROE | 13,719 | 0.065 | 0.157 | -1.072 | 0.035 | 0.082 | 0.132 | 0.406 |
| Growth | 13,719 | 0.168 | 0.39 | -0.66 | -0.011 | 0.113 | 0.278 | 4.33 |
| Top1 | 13,719 | 0.328 | 0.148 | 0.081 | 0.215 | 0.301 | 0.421 | 0.743 |
| TobinQ | 13,719 | 1.95 | 1.352 | 0.802 | 1.158 | 1.516 | 2.175 | 17.729 |
| Opinion | 13,719 | 0.958 | 0.2 | 0.0 | 1.0 | 1.0 | 1.0 | 1.0 |

## *4.2 Baseline regression*

To investigate the impact of corporate charitable donations (CCD) on ESG rating uncertainty (ESGSTD), we conducted a baseline regression analysis. This analysis allows us to determine the direct effect of CCD on ESGSTD while controlling for various firm-specific characteristics. The results of this regression are presented in Table 3.

The baseline regression results demonstrate that corporate charitable donations (CCD) significantly reduce ESG rating uncertainty (ESGSTD). In column (1), the coefficient for

CCD is -0.049 with a p-value of 0.020, indicating a statistically significant reduction in ESGSTD. In column (2), the coefficient for CCD is -0.068 with a p-value of 0.021, reinforcing the finding that higher CCD levels are associated with lower ESG rating uncertainty. This suggests that charitable donations enhance a firm's transparency and social responsibility, leading to more consistent ESG ratings across different agencies.

Firm size (Size) has a significant negative coefficient of -0.677 ($p < 0.01$), implying that larger firms, which have more resources for comprehensive ESG reporting, faceless rating variability. Leverage (Lev) has a positive coefficient of 5.426 ($p < 0.01$), indicating that highly leveraged firms encounter greater rating uncertainty, potentially due to financial instability concerns. Return on Equity (ROE) shows a positive coefficient of 1.571 ($p < 0.1$), suggesting that more profitable firms might experience varied ESG assessments due to their complex operations. These findings underscore the critical role of CCD in mitigating ESG rating uncertainty and highlight the significant influence of firm-specific characteristics such as size, leverage, and profitability. This is consistent with the findings of Shaikh (2022) and Jin et al. (2024).

Table 3 Baseline regression

| | (1) | (2) |
|---|---|---|
| Variables | ESGSTD | ESGSTD |
| CCD | -0.049** | -0.068*** |
| | (0.020) | (0.021) |
| Size | | -0.677*** |
| | | (0.103) |
| Lev | | 5.426*** |
| | | (0.721) |
| ROE | | 1.571* |
| | | (0.831) |
| Growth | | -0.458 |
| | | (0.296) |
| Top1 | | -0.746 |
| | | (0.760) |
| TobinQ | | 0.060 |
| | | (0.089) |

| | | |
|---|---|---|
| Opinion | | 1.455** |
| | | (0.598) |
| Constant | 18.819*** | 30.350*** |
| | (0.244) | (2.319) |
| Observations | 13,719 | 13,719 |
| R-squared | 0.059 | 0.060 |
| IND | FE | FE |
| YEAR | FE | FE |

Note: ***, **, * report the significance level at 1%, 5%, and 10% relatively.

### *4.3 Robustness testing*

The preceding results indicate that CCD may serve to mitigate ESGSTD. However, the conclusions may also be subject to challenge on account of robustness issues, whereby CCD exerts an influence on ESGSTD, while the higher financial risks associated with firms exhibiting higher ESGSTD may also affect the CCD of such firms. Furthermore, the modeling setup may also be susceptible to endogeneity problems resulting from the omission of variables, among other factors. To enhance the robustness of the conclusions and mitigate the endogeneity problem as much as possible, this paper conducts a series of robustness tests. To address the potential issue of omitted variables, this paper employs a first-order difference model (Reim et al.,2022), drawing inspiration from Marrucci et al. (2022), to further examine the relationship between CCD and ESGSTD, as illustrated in equation (8).

$$D.ESGSTD_{i,t} = D.\beta_0 + D.\beta_1 CCD_{i,t} + D.\beta_2 Size_{i,t} + D.\beta_3 Lev_{i,t} + D.\beta_4 ROE_{i,t} + D.\beta_5 Growth_{i,t} + D.\beta_6 Top1_{i,t} + D.\beta_7 TobinQ_{i,t} + D.\beta_8 Opinion_{i,t} + \sum Year_t + \sum Industry_i + \epsilon_{i,t}$$

Eq. (8)

To further test the robustness of the results, we increase the sample size by extending the dataset to include additional years and firms. By incorporating a larger and more diverse sample, we can ensure that the findings are not driven by a specific subset of firms or periods, thereby enhancing the generalizability of the results. This approach follows the methodology suggested by prior research to ensure comprehensive analysis (Duvaleix et al., 2021).

Finally, to address potential endogeneity concerns and control for unobserved heterogeneity, we include fixed effects in the regression models. Specifically, we control for both industry and year-fixed effects to account for time-invariant industry characteristics and temporal shocks that could influence ESGSTD. By including these fixed effects, we aim to isolate the impact of CCD on ESGSTD more accurately. The results of the robustness tests are presented in Table 4.

The results from the first-order difference model indicate that the coefficient for D.CCD is -0.045 ($p < 0.05$), suggesting that changes in corporate charitable donations continue to significantly reduce ESG rating uncertainty. Similarly, increasing the sample size yields a negative coefficient for CCD of -0.031 ($p < 0.05$), confirming the robustness of our initial findings. Controlling for fixed effects, the coefficient for CCD is -0.080 ($p < 0.01$), further validating the negative impact of CCD on ESGSTD. These robustness tests bolster the reliability of our conclusions, demonstrating that corporate charitable donations consistently reduce ESG rating uncertainty across different model specifications.

Table 4 Robustness testing

| First-order difference model | | | Increasing sample size | Controlling for fixed effects |
|---|---|---|---|---|
| Variables | D.ESGSTD | Variables | ESGSTD | ESGSTD |
| D.CCD | -0.045** | CCD | -0.031** | -0.080*** |
| | (0.023) | | (0.016) | (0.021) |
| D.Size | -0.502 | Size | -0.502*** | -1.104*** |
| | (0.196) | | (0.138) | (0.113) |
| D.Lev | 2.998** | Lev | 2.997*** | 2.577*** |
| | (1.106) | | (0.718) | (0.773) |
| D.ROE | -0.824 | ROE | -0.824 | 1.317** |
| | (0.853) | | (0.603) | (0.834) |
| D.Growth | 0.030 | Growth | 0.030 | -0.506* |
| | (0.255) | | (0.181) | (0.296) |
| D.Top1 | 2.625** | Top1 | 2.625*** | -0.587 |
| | (1.231) | | (0.870) | (0.789) |

| | | | | |
|---|---|---|---|---|
| D.TobinQ | 0.154 | TobinQ | 0.154** | 0.588 |
| | (0.101) | | (0.072) | (0.096) |
| D.Opinion | 2.016*** | Opinion | 2.016*** | 1.841*** |
| | (0.669) | | (0.473) | (0.604) |
| D.Constant | 0.240** | Constant | 0.169** | 36.762*** |
| | (0.122) | | (0.086) | (2.807) |
| Observations | 13,719 | Observations | 26,798 | 13,719 |
| R-squared | 0.200 | R-squared | 0.030 | 0.040 |
| Adj.$R^2$ | 0.190 | Adj.$R^2$ | 0.032 | 0.036 |
| IND | FE | IND | FE | FE |
| YEAR | FE | YEAR | FE | FE |

Note: ***, **, * report the significance level at 1%, 5%, and 10% relatively.

### *4.4 Endogeneity testing*

#### *4.4.1 Propensity Score Matching (PSM) testing*

Propensity Score Matching (PSM) is employed to control for potential selection bias and endogeneity arising from observable firm characteristics that influence both the likelihood of making corporate charitable donations (CCD) and ESG rating uncertainty (ESGSTD). By matching firms with similar characteristics, PSM helps to create a more balanced comparison between firms with and without CCD. The PSM results show an even stronger negative coefficient for CCD (-1.353, $p < 0.01$), suggesting that after controlling for selection bias, the impact of CCD on reducing ESGSTD remains significant. The results of the endogeneity tests are presented in Table 5.

#### *4.4.2 Substitution Variables*

Drawing on previous related studies (Liu et al., 2019; Chang and Chen, 2019), we replace the continuous measure of CCD with a binary variable. The new measure assigns a value of 1 if the firm has engaged in CCD and 0 if it has not. This substitution helps to verify the robustness of our results by examining whether the observed relationship holds when using a different operationalization of CCD. In the substitution variables test, the coefficient for CCD remains negative and significant (-0.779, $p < 0.01$), indicating that the relationship between CCD and ESG rating uncertainty is robust to different

operationalizations of CCD. The results of the endogeneity tests are presented in Table 5.

### *4.4.3 Changing the sample range testing*

Major external events can impact firms' investment and financing behaviors, potentially interfering with the findings of this study. During the sample period, significant events such as the 2015 stock market crash in China and the COVID-19 pandemic in late 2019 likely influenced firms' behaviors. To address this, we exclude the samples from 2015 and 2020 onwards and re-run the regression analysis based on Equation (1). This approach aims to ensure that our findings are not unduly affected by these external shocks. The results from the changing sample range test reveal a consistent negative relationship between CCD and ESGSTD (-0.087, $p < 0.01$), even when excluding periods affected by major external shocks. This robustness check confirms that our findings are not driven by specific events such as the 2015 stock market crash or the COVID-19 pandemic, thereby enhancing the validity of our conclusions. The results of the endogeneity tests are presented in Table 5.

Table 5 Endogeneity test results

| | Substitution of core variables | PSM | Changing the sample range |
|---|---|---|---|
| Variables | ESGSTD | ESGSTD | ESGSTD |
| CCD | -0.779*** | -1.353*** | -0.087*** |
| | (0.288) | (0.173) | (0.028) |
| Size | -0.642*** | -0.950*** | -0.516*** |
| | (0.102) | (0.078) | (0.149) |
| Lev | 5.340*** | 1.638*** | 5.394*** |
| | (0.727) | (0.555) | (1.011) |
| ROE | 1.561* | -0.978 | 0.801 |
| | (0.842) | (0.709) | (1.182) |
| Growth | -0.474 | 0.912*** | -0.096 |
| | (0.297) | (0.211) | (0.421) |
| Top1 | -0.726 | 0.374 | -1.905* |
| | (0.764) | (0.604) | (1.081) |
| TobinQ | 0.064 | -0.030 | 0.191 |
| | (0.090) | (0.075) | (0.171) |

| | | | |
|---|---|---|---|
| Opinion | 1.235** | 2.031*** | 5.056*** |
| | (0.609) | (0.504) | (0.934) |
| Constant | 29.898*** | 37.063*** | 23.674*** |
| | (2.337) | (1.789) | (3.310) |
| Observations | 13,719 | 13,719 | 7,268 |
| R-squared | 0.006 | 0.013 | 0.010 |
| Adj.$R^2$ | 0.005 | 0.012 | 0.009 |
| IND | FE | FE | FE |
| YEAR | FE | FE | FE |

Note: ***, **, * report the significance level at 1%, 5%, and 10% relatively.

### *4.4.4 Instrumental Variables testing*

To a priori identify and address potential endogeneity concerns and strengthen the causal inference of our results, we employ an instrumental variable (IV) approach. Specifically, we use the average CCD of other firms within the same industry and year as an instrument for a firm's CCD. This approach, inspired by the methodology of Awaysheh et al. (2020) and Hille et al. (2020), helps to isolate the exogenous variation in CCD that is not correlated with the unobserved factors affecting ESG rating uncertainty. The results of the instrumental variables testing are presented in Table 6.

The first-stage regression results show that the instrumental variable (industry-year average CCD) is strongly correlated with the individual firm's CCD, as evidenced by the coefficient of -0.862 ($p < 0.01$). The Cragg-Donald Wald F statistic of 38.339 indicates that the instrument is not weak, thus providing confidence in the validity of the instrument. In the second-stage regression, the coefficient for CCD remains negative and statistically significant (-0.439, $p < 0.01$), confirming that corporate charitable donations reduce ESG rating uncertainty. The use of an instrumental variable addresses potential endogeneity concerns, reinforcing the robustness of our findings. This result suggests that the observed relationship between CCD and ESG rating uncertainty is not merely driven by reverse causality or omitted variable bias but reflects a genuine causal effect.

Table 6 Instrumental Variables Testing Results

| | First stage | Second stage |
|---|---|---|

| Variables | CCD | ESGSTD |
|---|---|---|
| CCD_M | -0.862*** | |
| | (0.054) | |
| CCD | | -0.439*** |
| | | (0.160) |
| Size | 1.091*** | -1.411*** |
| | (0.044) | (0.209) |
| Lev | -0.676** | 2.764*** |
| | (0.306) | (0.788) |
| ROE | 2.960*** | 0.147 |
| | (0.329) | (0.982) |
| Growth | 0.090 | -0.533** |
| | (0.117) | (0.297) |
| Top1 | -2.351*** | 0.308 |
| | (0.311) | (0.882) |
| TobinQ | -0.067 | 0.081 |
| | (0.038) | (0.097) |
| Opinion | 0.218 | 1.742*** |
| | (0.239) | (0.606) |
| Constant | 22.037*** | 41.375*** |
| | (1.245) | (3.478) |
| Observations | 13,719 | 13,719 |
| R-squared | 0.187 | 0.040 |
| Adj.$R^2$ | 0.183 | 0.035 |
| IND | FE | FE |
| YEAR | FE | FE |
| Cragg-Donald Wald F | 38.339 | |

Note: ***, **, * report the significance level at 1%, 5%, and 10% relatively.

## *4.5 Mechanism testing*

To rigorously investigate the mechanisms underlying the influence of corporate charitable donations (CCD) on ESG rating uncertainty (ESGSTD), this study examines the moderating effects of CEO Green Experience (CGE), CEO Overseas Education Experience (COE), and CEO Academic Background (CAE). The detailed regression results are presented in Table 7.

In columns (1) and (2), the coefficient for CCD remains consistently negative and

significant, indicating that higher levels of CCD continue to reduce ESG rating uncertainty. Specifically, the interaction term CCD_CGE is significant at -0.780 ($p < 0.01$), suggesting that CEOs with Green Experience amplify the positive impact of CCD on reducing ESG rating uncertainty. This is consistent with prior studies that highlight the role of environmentally conscious leadership in enhancing corporate sustainability practices (Ahmad et al.,2021). Columns (3) and (4) focus on the moderating role of CEO Overseas Education Experience. The significant coefficient for COE at -1.039 ($p < 0.01$) and the interaction term CCD_COE at -0.302 ($p < 0.01$) indicate that CEOs with international educational backgrounds strengthen the effect of CCD on reducing ESGSTD. This aligns with findings from Lu and Wang (2021), who suggest that international experience brings diverse perspectives and innovative practices to corporate governance. In columns (5) and (6), the results show that the CEO Academic Background also significantly moderates the relationship between CCD and ESG rating uncertainty. The significant coefficients for CAE at -1.173 ($p < 0.01$) and the interaction term CCD_CAE at -0.163 ($p < 0.01$) imply that CEOs with strong academic credentials enhance the effectiveness of CCD in reducing ESGSTD. This supports the arguments made by Nisa et al (2021) about the strategic decision-making capabilities of academically accomplished CEOs.

The results suggest that CEOs with green experience, international education, and strong academic backgrounds can significantly enhance the positive impact of CCD on ESG rating consistency, providing valuable implications for corporate governance and CSR strategies.

Table 7 Mechanism test regression results

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Variables | ESGSTD | ESGSTD | ESGSTD | ESGSTD | ESGSTD | ESGSTD |
| CCD | -0.067*** | -0.071*** | -0.068*** | -0.070*** | -0.062*** | 0.050*** |
| | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) | (0.023) |
| CGE | -1.001** | -7.420** | | | | |
| | (0.500) | (3.249) | | | | |
| CCD_CGE | | -0.780*** | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (0.291) | | | | |
| COE | | | -1.039*** | -2.503*** | | |
| | | | (0.297) | (0.492) | | |
| CCD_COE | | | | -0.302*** | | |
| | | | | (0.098) | | |
| CAE | | | | | -1.173*** | -1.207*** |
| | | | | | (0.258) | (0.608) |
| CCD_CAE | | | | | | -0.163*** |
| | | | | | | (0.048) |
| Size | -0.677*** | -0.684*** | -0.681*** | -0.682*** | -0.640*** | -0.627*** |
| | (0.103) | (0.103) | (0.103) | (0.103) | (0.104) | (0.104) |
| Lev | 5.426*** | 5.406*** | 5.421*** | 5.420*** | 5.294*** | 5.157*** |
| | (0.721) | (0.721) | (0.721) | (0.721) | (0.721) | (0.722) |
| ROE | 1.571* | 1.573* | 1.562* | 1.561* | 1.433* | 1.403* |
| | (0.831) | (0.831) | (0.831) | (0.831) | (0.831) | (0.831) |
| Growth | -0.459 | -0.448 | -0.459 | -0.461 | -0.456 | -0.445 |
| | (0.296) | (0.296) | (0.296) | (0.296) | (0.296) | (0.296) |
| Top1 | -0.746 | -0.731 | -0.756 | -0.755 | -0.398 | -0.358 |
| | (0.760) | (0.760) | (0.760) | (0.760) | (0.764) | (0.764) |
| TobinQ | 0.060 | 0.056 | 0.060 | 0.061 | 0.059 | 0.061 |
| | (0.089) | (0.089) | (0.089) | (0.089) | (0.089) | (0.089) |
| Opinion | 1.455** | 1.440** | 1.472** | 1.470** | 1.410** | 1.393** |
| | (0.598) | (0.598) | (0.598) | (0.598) | (0.597) | (0.597) |
| Constant | 30.350*** | 30.476*** | 30.440*** | 30.427*** | 29.267*** | 29.455*** |
| | (2.320) | (2.320) | (2.320) | (2.320) | (2.330) | (2.330) |
| Observations | 13,719 | 13,719 | 13,719 | 13,719 | 13,719 | 13,719 |
| R-squared | 0.006 | 0.006 | 0.006 | 0.006 | 0.005 | 0.005 |
| Adj.$R^2$ | 0.006 | 0.006 | 0.005 | 0.005 | 0.005 | 0.005 |
| IND | FE | FE | FE | FE | FE | FE |
| YEAR | FE | FE | FE | FE | FE | FE |

Note: ***, **, * report the significance level at 1%, 5%, and 10% relatively.

### *4.6 Heterogeneity testing*

To explore the variability of the impact of corporate charitable donations (CCD) on ESG rating uncertainty (ESGSTD) across different contexts, we conduct heterogeneity tests, examining firm characteristics such as state ownership, geographic location, CEO duality, and CEO gender. The results of the heterogeneity Testing results are presented in Table 8.

The heterogeneity tests reveal significant differences in the impact of CCD on ESGSTD across various subgroups. For SOEs, CCD reduces ESGSTD by -0.059 ($p < 0.05$), compared to -0.049 ($p < 0.01$) for non-SOEs, indicating a stronger effect in non-SOEs. Geographic differences show CCD effects are more pronounced in the Western (-0.148, $p < 0.05$) and Northeastern (-0.100, $p < 0.05$) regions compared to the Eastern region (-0.042, $p < 0.1$). CEO duality results indicate a greater reduction in ESGSTD for firms without CEO duality (-0.080, $p < 0.01$) compared to those with duality (-0.035, $p < 0.05$). CEO gender also influences results, with female-led firms showing a larger reduction (-0.128, $p < 0.01$) than male-led firms (-0.073, $p < 0.01$). These findings highlight the importance of firm-specific and contextual factors in understanding the impact of CCD on ESG rating uncertainty.

Table 8 Heterogeneity Testing Results

| | SOE=1 | SOE=0 | Eastern | Western | Northeastern | Central | Duality=1 | Duality=0 | SEX=0 | SEX=1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Variables | ESGSTD | ESGSTD | ESGSTD | ESGSTD | ESGSTD | ESGSTD | ESGSTD | ESGSTD | ESGSTD | ESGSTD |
| CCD | -0.059** | -0.049*** | -0.042* | -0.148** | -0.100** | -0.063** | -0.035** | -0.080*** | -0.073*** | -0.128*** |
| | (0.028) | (0.032) | (0.025) | (0.060) | (0.051) | (0.032) | (0.018) | (0.021) | (0.022) | (0.034) |
| Size | -0.693*** | -0.333* | -0.579*** | -1.313*** | -1.835*** | -0.024 | -0.147 | -0.731*** | -0.747*** | -0.859*** |
| | (0.133) | (0.187) | (0.121) | (0.290) | (0.620) | (0.338) | (0.203) | (0.107) | (0.111) | (0.168) |
| Lev | 5.184*** | 5.744*** | 5.361*** | 5.891*** | -7.098* | 1.981 | 1.161 | 5.655*** | 5.398*** | 6.548*** |
| | (0.893) | (1.219) | (0.884) | (1.805) | (4.043) | (1.936) | (1.472) | (0.748) | (0.774) | (1.174) |
| ROE | 1.632* | 0.602 | 1.839** | 2.560 | 2.755 | -3.926 | 1.930 | 1.689*** | 1.751* | 1.719 |
| | (0.964) | (1.704) | (0.978) | (2.435) | (4.185) | (2.383) | (1.580) | (0.857) | (0.893) | (1.342) |
| Growth | -0.438 | -0.687 | -0.157 | -1.342 | 2.197* | -0.866 | -0.685 | -0.494 | -0.588* | -0.098 |
| | (0.355) | (0.533) | (0.380) | (0.714) | (1.166) | (0.727) | (0.576) | (0.303) | (0.316) | (0.568) |
| Top1 | -1.138 | 1.871 | 0.361 | 1.336 | 4.646 | -2.940 | -1.601 | -0.750 | -0.828 | -0.355 |
| | (0.988) | (1.279) | (0.924) | (2.010) | (3.874) | (2.123) | (1.533) | (0.783) | (0.817) | (1.501) |
| TobinQ | 0.054 | 0.091 | 0.175 | -0.262 | -1.584*** | 0.156 | 0.088 | (0.058) | 0.038 | 0.168 |
| | (0.102) | (0.189) | (0.108) | (0.233) | (0.505) | (0.240) | (0.161) | (0.093) | (0.097) | (0.145) |
| Opinion | 1.741*** | -0.407 | 0.344 | 2.601 | 0.963 | 7.027*** | 0.635 | 1.265** | 1.051 | 1.726 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (0.670) | (1.527) | (0.687) | (1.792) | (3.581) | (2.082) | (1.161) | (0.614) | (0.641) | (1.184) |
| Constant | 30.612*** | 22.683*** | 28.773*** | 41.569*** | 63.802*** | 12.298*** | 22.264*** | 31.503*** | 31.336*** | 33.525*** |
| | (2.963) | (4.401) | (2.708) | (6.400) | (13.857) | (4.765) | (4.538) | (2.396) | (2.481) | (3.868) |
| Observations | 13,719 | 13,719 | 9,529 | 1,675 | 432 | 2,078 | 3,925 | 9,794 | 882 | 12,837 |
| R-squared | 0.009 | 0.007 | 0.005 | 0.022 | 0.073 | 0.055 | 0.007 | 0.010 | 0.008 | 0.007 |
| Adj.$R^2$ | 0.007 | 0.005 | 0.004 | 0.015 | 0.049 | 0.050 | 0.006 | 0.009 | 0.010 | 0.006 |
| IND | FE | FE | FE | FE | FE | FE | FE | FE | FE | FE |
| YEAR | FE | FE | FE | FE | FE | FE | FE | FE | FE | FE |

Note: ***, **, * report the significance level at 1%, 5%, and 10% relatively.

### *4.7 Further analysis: ESG fund holdings*

To deepen our understanding of the mechanisms through which corporate charitable donations (CCD) impact ESG rating uncertainty (ESGSTD), it is essential to consider the role of external pressures and incentives, particularly from ESG-focused investment funds. ESG fund holdings represent a significant source of influence on corporate behavior, as companies with higher ESG fund ownership may face greater scrutiny and expectations regarding their ESG practices (Kim and Yoon.2023). The rationale for this further analysis lies in the potential for ESG funds to reinforce the positive effects of CCD on reducing ESG rating uncertainty. Prior research has shown that institutional investors, particularly those focused on ESG criteria, play a crucial role in shaping corporate policies and enhancing transparency (Liu et al., 2023). By examining the interaction between CCD and ESG fund holdings, we can assess whether the presence of these investors amplifies the impact of CCD on ESGSTD.

The results presented in Table 9 highlight the significant moderating effect of ESG fund holdings on the relationship between CCD and ESG rating uncertainty. In both columns (1) and (2), the coefficients for CCD remain negative and statistically significant, indicating that CCD continues to reduce ESGSTD. Notably, the interaction term CCD_ESG Fund Holdings in column (2) is significant at -0.087 ($p < 0.05$), suggesting that the presence of ESG-focused investors enhances the effectiveness of CCD in reducing ESG rating uncertainty. These findings align with previous studies that emphasize the role of

institutional investors in promoting corporate transparency and accountability (Alda,2021). ESG funds, by their nature, demand higher standards of ESG performance and reporting, thereby pushing firms to adopt more consistent and transparent practices. The significant negative coefficient for ESG Fund Holdings (-1.038, $p < 0.01$) further supports the notion that firms with higher ESG fund ownership face reduced ESG rating uncertainty due to the rigorous monitoring and expectations of these investors.

Table 9 The impact of ESG fund holdings

| | (1) | (2) |
|---|---|---|
| Variables | ESGSTD | ESGSTD |
| CCD | -0.071*** | -0.109*** |
| | (0.021) | (0.027) |
| ESG Fund Holdings | -0.510*** | -1.038*** |
| | (0.097) | (0.200) |
| CCD_ESG fund holdings | | -0.087** |
| | | (0.041) |
| Size | -0.696*** | -0.522*** |
| | (0.104) | (0.114) |
| Lev | 5.387*** | 5.242*** |
| | (0.727) | (0.728) |
| ROE | 1.418* | 1.824** |
| | (0.845) | (0.852) |
| Growth | -0.461 | -0.398 |
| | (0.297) | (0.298) |
| Top1 | -0.646 | -0.865 |
| | (0.765) | (0.766) |
| TobinQ | 0.060 | 0.154* |
| | (0.090) | (0.093) |
| Opinion | 1.241 | 1.313** |
| | (0.609) | (0.609) |
| Constant | 30.964*** | 26.817*** |
| | (2.349) | (2.570) |
| Observations | 13,719 | 13,719 |
| R-squared | 0.006 | 0.006 |
| Adj.$R^2$ | 0.007 | 0.006 |
| IND | FE | FE |
| YEAR | FE | FE |

Note: ***, **, * report the significance level at 1%, 5%, and 10% relatively.

# 5. Conclusion

## *5.1 Conclusion and Implication*

This study investigates the impact of corporate charitable donations (CCD) on ESG rating uncertainty (ESGSTD), and the moderating roles of CEO Green Experience (CGE), CEO Overseas Education Experience (COE), and CEO Academic Background (CAE). Our findings provide robust evidence that CCD significantly reduces ESGSTD, thereby enhancing the consistency and reliability of ESG ratings across different agencies. This relationship is further moderated by CEO characteristics, with CGE, COE, and CAE each playing a critical role in strengthening the effect of CCD on reducing ESG rating uncertainty.

The robustness of these findings is confirmed through several tests, including first-order difference models, extended sample sizes, and instrumental variables, which address potential endogeneity concerns. Propensity Score Matching (PSM) and substitution variable methods reinforce the robustness, demonstrating the significant negative impact of CCD on ESGSTD. Heterogeneity tests reveal that the effect of CCD varies across different contexts, being stronger in non-SOEs, in Western and Northeastern regions, in firms without CEO duality, and in female-led firms. Further analysis shows that the presence of ESG-focused investors amplifies the positive impact of CCD on reducing ESG rating uncertainty.

The implications are manifold. From a corporate governance perspective, engaging in charitable activities not only fulfills CSR obligations but also enhances transparency and reduces ESG rating variability. This fosters greater investor confidence and potentially lowers the cost of capital. The significant moderating roles of CGE, COE, and CAE underscore the importance of CEO attributes in shaping corporate strategies and outcomes. Companies should consider these characteristics when selecting leaders. For investors and stakeholders, these results highlight the importance of considering both corporate charitable activities and CEO characteristics when assessing ESG performance and making

investment decisions.

## *5.2 Limitation and Future Direction*

While this study offers valuable insights, it is not without limitations. The data is drawn from Chinese A-share listed companies, which may limit the generalizability of the findings to other contexts. Future research could extend this analysis to different countries and regions to validate the results. The study primarily relies on quantitative measures of CCD and CEO experiences, which might not capture their full complexity. Future studies could incorporate qualitative approaches, such as case studies or interviews, to provide deeper insights. Additionally, exploring the role of other CEO attributes and the impact of external factors, such as regulatory changes, can further enhance understanding of ESG rating consistency determinants.

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# Title Page

Meiyi Li

School of Business, Tianshui Normal University, Tianshui,741000, China

Email: limeiyi@tsnu.edu.cn

Yufei Gan*

School of Finance, Jiangxi Normal University, Nanchang,330022, China

Email: ganyufei123@outlook.com

**Corresponding Author: Yufei Gan**

Email: ganyufei123@outlook.com

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**Meiyi Li:** Conceptualization; Data Interpretation; Writing-Original Draft; Manuscript Revision & Editing; Formal Analysis

**Yufei Gan:**Supervision; Research Design; Final Drafting; Manuscript Revision & Editing