



Moderating role of audit quality in ESG performance and capital financing dynamics: insights in China

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Abstract

This study uncovers the relationship of company's Environmental, Social, and Governance (ESG) performance and capital structure in Chinese corporate sector. Additionally, we investigated if audit quality intervenes this ESG—capital structure nexus. Using panel regressions with fixed effects, we chose Chinese A-Listed companies giving 6295 firm-year observations from 2010 to 2019. The results support the legitimacy theory, suggesting that a company's ESG disclosure and overall progress is a crucial factor in determining their financing decisions. The results suggest that firms with better ESG performance found to have less debt financing and easier access to equity capital from stock markets. However, the results did not show a significant impact of audit quality on this relationship. Sensitivity tests, such as alternate parameter estimation measures, techniques to address endogeneity issues (sysGMM), and lagged regressions, were conducted and did not change the key conclusions of the study.

Keywords Environment · Social · Governance · ESG · Capital structure · Financial leverage

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1 Introduction

The rise of responsible investment worldwide has been sparked by a focus on Environmental, Social, and Governance (ESG) performance, which refers to a firm's non-financial parameters. Stakeholders in the corporate world are urging companies to go beyond the minimum legal ESG standards and strive for a better environment and a better society (Zhang et al., 2022). Despite well-known recognition of the importance of ESG practices and the numerous programs aimed at promoting social and environmental responsibility, the world continues to face issues such as social inequality, violence, and environmental degradation (Deegan, 2017). This indicates a failure on the part of corporations and governments to meet their obligations. Governments often view environmental and social responsibility as voluntary and market-driven (Deegan & Shelly, 2014), aligning themselves with commercial enterprises in debates about expanding corporate responsibility. Market-based research suggests that effective implementation of ESG practices improves performance (Adeneye & Ahmed, 2015; Akben-Selcuk, 2019; Alareeni & Hamdan, 2020; Cho et al., 2019; Friede et al., 2015; Zahid et al., 2022) develops and maintains corporate advantage (Aragón-Correa, 1998; Russo & Perrini, 2010) and strengthens relationships with key business stakeholders (Freeman, 2010). Several studies have argued that ESG reporting can reduce a company's cost of capital and improve its value (Eliwa et al., 2021).

China's ESG and sustainability reporting has rapidly developed, driven in part by the government's focus on green financing. As the world's second-largest economy, China is striving to align economic and environmental performance and has set the ambitious goal of achieving carbon neutrality by 2060. To support this, authorities and stock exchange regulators are expected to introduce mandatory ESG disclosure requirements for publicly listed companies. Given the importance of ESG in the UNPRI,¹ the Chinese capital market is opening up to global investors. These investors are drawn to better financial reporting by Chinese firms (Zhang et al., 2022).

Firms adopt one of the two strategies in reporting environmental and social concerns: (1) a substantive tactics, where environmental and social disclosures reflect the actual actions taken by the firm, or (2) a symbolic approach, where the firm appears to conform to societal norms even though its practices and policies remain unchanged (Ashforth & Gibbs, 1990). Firms employ the second strategy primarily to convince their key stakeholders to think that they are committed to environmental and social standards, regardless of the actual status of these standards (Michelon et al., 2015). There hasn't been much empirical research on which approach (substantive vs. symbolic) firms adopt to disclose their environmental and social performance. Some studies based on the social accounting literature associate environmental and social disclosure with the symbolic approach (Cho & Patten, 2007), while other market-based research associates it with the substantive approach (Clarkson et al., 2008; Erragragui, 2018; Khan et al., 2021). ESG performance and disclosure have a significant impact on capital financing decisions (Kempf & Osthoff, 2007; Kim & Li, 2021; Zhang et al., 2022). However, previous research on the relationship between ESG performance and capital financing decisions focused on a limited area, which produced inconsistent findings (Cantino et al., 2017; Lindkvist & Saric, 2020). Additionally, it is unclear whether the impact of ESG performance is purely symbolic and does not significantly affect capital financing decisions.

¹ Read the detail report of United nation Principles for Responsible Investment on ESG.

Furthermore, investing in ESG ventures provides companies with a stronger position in the context of social reputation, which can potentially be hampered by moral hazards and opportunistic behaviour of executives (Lemma et al., 2022). One of the key control points of avoiding such personal interest on the part of management is through audit quality (Barnea & Rubin, 2010; Borghesi et al., 2014), which builds trust among investors, lenders, and other external stakeholders, and reduces the agency conflicts. This study attempts to explore the relationship between the firm's ESG performance and how it affects the firm's fundraising decisions and financial leverage management for the selected dataset of publicly listed companies in China. Firms that adhere to ESG investment principles are seen to have greater risk-mitigation skills and can generate consistent, long-term financial returns (Limkriangkrai et al., 2017). Moreover, this relationship was examined in the presence of audit and assurance to see how opportunistic behaviour is curbed with audit quality.

Current research empirically investigates the effects of ESG performance on capital financing decisions and whether audit quality moderates this relationship using a sample of A-listed enterprises in China from 2010 to 2019. The results demonstrate that companies exhibiting stronger ESG and E/S/G performance display a reduced propensity to pursue debt financing. This suggests that financial institutions and investors consider ESG practices as a crucial factor in assessing the credibility of the organization. From an audit quality perspective, however, the negative impact of the ESG score and its sub-components on capital financing decisions is indifferent. On the basis of the legitimacy theory, we propose that ESG reporting increases the legitimacy of an organization, which increases its access to cheaper sources of capital financing. It also increases investor confidence in organizations, leading organizations to choose equity financing over debt financing.

This study aims to contribute to the current body of literature in several meaningful ways. Firstly, it builds upon previous research by examining the influence of companies' ESG performance and transparency on their capital structure—a topic that has garnered limited attention in the past and yielded inconsistent findings. By doing so, it seeks to provide additional insights and clarity to this area of inquiry. Secondly, this study benefits from the utilization of a rare and exclusive dataset sourced from the renowned Bloomberg database. This exceptional dataset offers a valuable opportunity to empirically analyse the dynamics of a transitioning economy, with a specific focus on China. Furthermore, the impact of the ESG sub-score, i.e. (Environment, Social, and Governance) E/S/G on capital financing decisions is examined. Finally, audit and assurance quality is also essential and could legitimately support the two theoretical approaches, i.e. symbolic or substantive. Therefore, we extend the contribution of this paper by exploring the moderating influence of audit quality on the relationship between ESG and capital financing decisions.

The present paper is structured as follows: Sect. 2 highlights the introduction and the institutional background of ESG performance, Sect. 3 presents the theoretical viewpoints on ESG practices, analyses the work done so far and proposes hypotheses to be examined. Section 4 describes the empirical study design. Section 5 summarizes the tests and findings and robustness tests are conducted. Finally, Sect. 6 is the conclusion of the study.

2 Relevant literature and hypothesis development

The literature review section is divided into three parts. The first part explores the dynamics of ESG performance in the context of the Chinese corporate sector, tracing the link between ESG performance and capital financing strategies, and finally discussing the moderating effect of audit quality.

2.1 ESG performance and drivers in China

The remarkable growth of ESG assets in China can be attributed to two key factors. Firstly, Chinese regulators are actively promoting green finance to achieve a harmonious economic and environmental development in one of the world's largest economies. Secondly, as part of its opening-up policy, China is attracting global investment by mandating ESG disclosure for its listed companies (Zhang et al., 2022). This has led to a rapid increase in ESG disclosure in the corporate sector in China.

With climate change, financial stress, and environmental pollution among major concerns, sustainable and responsible investment has become increasingly important worldwide. The concept of responsible investment has undergone a paradigm shift in the approach to asset allocation decisions. Contemporary methodologies now encompass a comprehensive evaluation that goes beyond financial data. It also includes a comprehensive assessment of the long-term environmental, social, and governance (collectively referred to as ESG) impacts. The United Nations' Principles for Responsible Investment (UNPRI) report a marked escalation in the number of companies integrating Environmental, Social, and Governance (ESG) considerations into their investment decision-making processes. For example, according to UNPRI, 63 companies signed the environmental and social disclosure policy in 2006, which grew to a staggering 3826 institutions in 2020 and there is still a huge margin for growth. This growing interest in the responsible investment performance of companies has led to a surge in ESG assets; for instance, total value of ESG assets in China in 2006 was recorded at US\$ 6.5 trillion rising to US\$ 121 trillion in 2021. The Asia–Pacific is the leader in terms of the size of ESG assets under management. In particular, the capital market in China has proliferated in ESG and sustainability responsible investing.

The China's governing and regulatory bodies are actively undertaking initiatives to foster and advance the principles of green and responsible finance. The several factors have contributed to promoting environmental concerns in the corporate sector in China, such as economic liberalization and attracting global investment (Zhang et al., 2022). As a result, there has been a rapid increase in ESG reporting in Chinese firms. However, acquiring reliable ESG data source set is still a challenge. For instance, companies may choose to disclose selective information for ESG practices, which is likely to provide misleading and unreliable information to the investors (Jin & Myers, 2006). The existing research on ESG research has been a complex landscape, with conflicting outcomes regarding the financial performance of companies. Some studies argue in favour of the advantages for shareholders through the promotion of ESG disclosure (Cormier & Magnan, 2015), while contrasting viewpoints suggest that ESG disclosure has given rise to insider trading and the looming threat of bankruptcy (Tian & Wang, 2017). This dichotomy within existing research leaves us with a diverse range of perspectives on the relationship between ESG disclosure and financial outcomes. Conversely, a growing number of studies have attempted

to find a connection between ESG practices and their impact on the financial performance of the firms, but have failed to produce in-lined results (Masulis & Reza, 2015; Servaes & Tamayo, 2013; Wong et al., 2018).

2.2 ESG integration in capital financing: understanding the linkages and implications

The capital structure of firms is crucial for both their financial and non-financial performance, including their social well-being. Research indicates that firms engaging in socially responsible investments tend to rely more on stock equity and maintain a lower level of leverage (Pijourlet, 2013). Moreover, social and environmental aspects have a positive impact on lower leverage, while the governance aspect is also supported by the agency theory, which suggests that improving the quality of governance can reduce agency costs and subsequently lower debt levels (Jiraporn & Gleason, 2007). Although there is a growing body of academic literature on the relationship between Environmental, Social, and Governance (ESG) disclosure and its impact on a company's financial leverage, research in this area still remains limited.

Two main financial theories provide theoretical support for ESG and capital financing decisions. The first is the trade-off theory, which directs the management to decide how to structure a firm's equity capital and determines the financial leverage levels (Modigliani & Miller, 1958). On the other hand, the pecking order hypothesis explains the preference for using internal funds in adverse conditions (Myers, 1984). Extensive research has revealed that the capital structure of companies is influenced by a multitude of factors, encompassing the internal dynamics of the firms themselves (Öztekin & Flannery, 2012), as well as the expenses associated with financing and transactions (Liao et al., 2015). Furthermore, the presence of strong governance practices is anticipated to bring forth advantageous outcomes for stakeholders by fine-tuning leverage and aligning the firm's capital structure (Kieschnick & Moussawi, 2018). Studies have shown that the capital structure of companies depends on several factors, including the firms' internal environment (Öztekin & Flannery, 2012), and financing or transactional expenses (Liao et al., 2015). Quality governance is expected to benefit stakeholders by optimizing the leverage and adjusting the firm's capital structure (Kieschnick & Moussawi, 2018). Moreover, when confronted with the peril of insolvency, the company refrains from infusing funds to salvage its standing and repute (Maksimovic & Titman, 1991), but to address social issues, since a firm that takes care of its employees and its goodwill would not operate with high leverage but rather with higher equity. It is pertinent to mention that companies are more inclined to consider social, governance, and environmental issues when it comes to investment. This motivates them to commit to ESG disclosures which ultimately affects their equity capital financing dynamics.

Hoepner et al. (2016) argue that corporate social factors and environmental influence the cost of financing as well as the firm's debt structure. However, the impact is not symmetrical with the availability of capital through stocks. It is noteworthy that the debt structure depends on the type of credit a firm can access, which can include bank loans, bonds, or debentures. The availability of funds mainly depends on the company's relationship with its counterparts, i.e. banks and other lenders (Nandy & Lodh, 2012). Conversely, firms are more likely to use debt financing to improve their reputation or cover financial inconsistencies, which will help them meet debt liabilities associated with socially and environmentally responsible deeds (Bacha et al., 2020). Bhuiyan and Nguyen (2019)

suggested that the lenders classify firms with ESG disclosure as prime (low risk) customers who can obtain financings at a cheaper rate. Also, companies with higher leverage engage in ESG as a hedging tool to protect stakeholders' interests and address bankruptcy risk (Huang & Ye, 2021).

However, previous research has consistently found that organizations that are environmentally and socially trustworthy, tend to maintain lower debt-to-equity ratios (Pijourlet, 2013). Furthermore, an argument for socially responsible firms is that due to lower leverage, the free cash flow is utilized for the social benefit of investors (Jensen, 1986). ESG disclosure requires firms to perform in a way that protects the interests of all stakeholders (Freeman et al., 2010). In particular, the cost of equity decreases which is considered a positive effect of ESG policies. However, the reduction in equity costs is due to the reduction in the asymmetric information among stakeholders as an effect of adopting ESG investments (Ferris et al., 2017). Similarly, another rationale for the benefits of ESG for firms in terms of capital structures is to increase transparency which helps to reduce equity costs (Armitage & Marston, 2007). From a theoretical point of view, efforts to mitigate environmental risks are rewarded by low-cost financing, which in practice leads to a negative association between ESG performance and the financial leverage of the firm (Crifo & Forget, 2015). Based on the above discussion, we postulate the following hypothesis.

H1 There exists a significant negative relationship between ESG performance and financial leverage of firms.

2.3 The link between audit and assurance in ESG and capital structure

Over-investment in ESG activities may entice firms to enjoy easy access to equity funds. However, over-investment in ESG also reflects the interest of executives to gain personal benefits as a result of the established social reputation of the firm (Barnea & Rubin, 2010; Borghesi et al., 2014), which helps management to extract personal/private benefits at expense of shareholders' funds. One of the most powerful control techniques to monitor managerial activities, constrain their opportunistic behaviour and provide rational assurance of the quality of financial reporting is the audit by a quality auditor. By reducing financial frictions such as moral hazard and adverse selection between management and other stakeholders, it could improve resource allocation and contracting efficiency (Watts & Zimmerman, 1983), particularly debt contracting efficiency (Causholli & Knechel, 2012). Furthermore, the auditing theory implies that external audit effectiveness depends on the quality of the audit (Francis & Yu, 2009; Knechel et al., 2013; Lin & Hwang, 2010) which can be influenced by the size of the auditor or its brand identity (DeAngelo, 1981). The Big Four auditing companies are more independent and provide quality financial services because their reputation is on stake in the event of a misstatement. Consequently, large, well-known auditing firms (e.g. the Big 4) provide superior audit services (Francis & Wang, 2008). In addition, Pae and Yoo (2001) suggest that the Big Four auditors provide quality auditing and assurance services because they spend more resources in terms of human capital and use of technology to enhance the control of service quality, management of associated risks, independence in decision quality, and overall quality of audit services. Moreover, Xiao et al. (2020) claim that the Big Four auditors are more likely to support the proliferation of new reporting aspects (such as CSR reporting) which may strengthen their information and assurance responsibilities. Finally, Kausar et al. (2016) assert that

audit firm selection provides external stakeholders with additional information regarding a company's prospects and that the Big Four auditing firms are associated with greater audit value in the eyes of the stakeholders.

Contemporary studies have revealed that customers of the Big Four audit firms have a lower cost of debt and easier access to finance in secondary markets (Causholli & Knechel, 2012). Lin and Hwang (2010) suggest that the Big Four auditors have an essential role in governance by ensuring the accuracy, reliability and consistency in financial reports. They act as trusted observers or monitors of corporate behaviour. Furthermore, customers of the Big Four audit firms show improved trading patterns, better communication, and greater openness in disclosure.

Organizations frequently turn to the Big Four auditing companies to improve the credibility of their disclosures and provide additional assurance to their stakeholders. The audit's objectivity and comprehensiveness demonstrate a company's commitment to transparent financial reporting and improved disclosure practices (Kausar et al., 2016). The use of reputable audit firms enhances the reliability of the information contained in a company's annual report, including any additional information voluntarily disclosed (such as ESG reporting). Chen et al. (2016) assert that the Big Four audit firms play a crucial role in improving the reliability and credibility of financial disclosures, especially when a company demonstrates strong corporate social responsibility. By using audit firms with a strong commitment to environment responsibility and maintaining high standards in their reporting, organizations signal they value transparency and honesty in their operations. This builds confidence among lenders and investors, making it easier to obtain financing (Trpeska et al., 2017).

As a result, we expect that audits by the Big Four audit firms, due to higher audit quality, will play a significant role in the capital financing decisions of ESG firms. We expect that higher audit quality (Big4 Auditor) will substantially moderate the relation between ESG and financing.

H2 Audit quality (Big4 auditor) significantly positively moderates the ESG-Financial leverage relationship.

3 Materials and methods

3.1 Data selection brief description

The present study employs a panel dataset of all Chinese A-listed firms traded on the Shanghai and Shenzhen stock exchanges. The analysis covers the period from 2010 to 2019 consisting an unbalanced panel dataset. After 2009, Chinese A-listed firms were required to submit ESG reports, and 2019 was chosen as the end year so that the effects of the Covid-19 epidemic could be evaluated (Broadstock et al., 2021). The (ESG) data was derived from the Bloomberg data-stream, while the financial and corporate governance data were got from the Chinese Stock Market and Accounting Research Database (CSMAR), which offers an organized dataset on the Chinese economy. However, we excluded the companies in the banking and insurance industry, companies with missing observations and special treatment. To minimize the influence of outliers or extreme values, continuous variables

Table 1 Sample distribution

| Sample selection process | Observation | |
|--|-------------|--------------------------|
| <i>Panel A: Data sample</i> | | |
| Initial Sample listed on the Shanghai and Shenzhen stock exchanges | | 10,021 |
| Less: Firms with Special Treatment status | | (639) |
| Less: Financial companies | | (928) |
| Less: Observations with missing Data | | (2261) |
| Total A-shares SOE Firm-Year observation from 2010 to 2019 | | 6193 |
| Year | | Total count (<i>N</i>) |
| <i>Panel B: Sample distribution by year</i> | | |
| 2 × 10 | | 8 |
| 2 × 11 | | 488 |
| 2 × 12 | | 579 |
| 2 × 13 | | 614 |
| 2 × 14 | | 602 |
| 2 × 15 | | 769 |
| 2 × 16 | | 772 |
| 2 × 17 | | 781 |
| 2 × 18 | | 788 |
| 2 × 19 | | 792 |
| Total sample by year (2010–2019) | | 6193 |
| Industry | Obs | Percentage (%) |
| <i>Panel C: Industry distribution</i> | | |
| Agriculture, farming, forestry, fishing | 107 | 1.73 |
| Mining and Coal | 301 | 4.86 |
| Beverage and Food | 218 | 3.52 |
| Textile and Clothing | 38 | 0.61 |
| Timber, Furniture | 62 | 1.00 |
| Printing and Paper | 101 | 1.63 |
| Petroleum, Plastic, Rubber, and Chemical | 365 | 5.89 |
| Electronics | 390 | 6.30 |
| Non-Metal and Metal | 742 | 11.98 |
| Machinery, equipment and instrument | 460 | 7.43 |
| Health care and Medicine | 317 | 5.12 |
| Other manufacturing | 236 | 3.81 |
| Production, Supply, Water and Gas | 461 | 7.44 |
| Construction | 37 | 0.60 |
| Road and Air Transport Warehousing | 427 | 6.89 |
| IT, Computer, Communication, News & Media and Tech | 872 | 14.08 |
| Wholesale and retail | 320 | 5.17 |
| Real estate | 227 | 3.67 |
| Business, Social and Accommodation Services | 89 | 1.44 |
| Culture & Art | 35 | 0.57 |
| Conglomerates | 98 | 1.58 |
| Civil Engineering | 290 | 4.68 |

Table 1 (continued)

| Industry | Obs | Percentage (%) |
|--------------------------------|-------|----------------|
| Total Observations (2010–2019) | 6,193 | 100.00 |

were winsorized at the 1% level. The final dataset consisted of 6193 firm-year observations. Table 1 sections A, B & C show the sample distribution by year and industry, respectively.

3.2 Variable measurements

3.2.1 Dependent variable

Following previous research (Ezeani et al., 2022; Öztekin, 2015), two metrics of capital structure dynamics are used as proxies, i.e. financial Leverage based on book value and financial Leverage representing the market-based approach. The following Eq. (1) illustrates the Market-based measure of financial leverage:

$$Mklev_{it} = FD_{it}/MkCap_{it} \quad (1)$$

In Eq. (1), the market-based financial leverage of firm (i) at time t is represented by $Mklev_{it}$, while the combination of short- and long-term financial obligations of the firm (i) at time (t) is denoted by FD_{it} . The total market capitalization of firm (i) at time (t) is represented by $MkCap_{it}$.

$$Bklv_{it} = STD_{it} + LTD_{it}/TA_{it} \quad (2)$$

In this study, Eq. (2) determines the book-based financial leverage, $Bklv_{it}$, of firm (i) at time (t). The calculation takes into account the short-term debt and long-term debt $STD_{it} + LTD_{it}$ for firm (i) at the same time (t). Additionally, it includes the total assets TA_{it} for firm (i) at time (t).

3.2.2 Independent variables

The current study uses Bloomberg's ESG score and its three components (Environmental, Social, and Governance) as independent variables. The ESG disclosure ratings serve as a method for compiling sustainability reports from many companies and incorporating the findings of ESG research into the study. The ESG score is a multi-dimensional index comprising several financial and non-financial indicators.

Bloomberg collects ESG information published by companies through their annual reports, CSR reports, company websites, and other public sources. They also contact companies directly to gather information. More than 120 data items are used in Bloomberg's ESG rating methodology and are checked, combined, and standardized to provide a comprehensive ESG score and on its three components (Environmental, Social, and Governance). The ESG scores of companies are measured on a scale that ranges from 0 to 100. The lower end of the scale represents companies that disclose minimal or no ESG information, while the upper end represents organizations that provide the maximum 120 data points required by the rating agency (e.g. Bloomberg). Previous studies only considered a binary variable (dummy variable with 0 and 1) indicating whether a firm disclosed ESG-related information in its financial statements (categorized as 1 if yes and zero otherwise). However, the Bloomberg

ESG rating provides a more comprehensive assessment by taking into account both financial and non-financial information based on established rules and principles. The separate data for each sub-component (Environmental (E), Social (S), and Governance (G)) is critical, as the impact of one dimension on another can sometimes offset the overall effect. The ESG score and its components help us to understand how ESG factors influence capital structure choices. (Buallay et al., 2020).

3.2.3 Moderating variables

In this study, Audit Quality was included as a moderator variable. To determine Audit Quality, we used the Big Four audit firms as proxies, as they are considered to be the most reputable external auditors in the world. The Big Four refer to the four leading global audit service providers, namely KPMS, Ernst and Young, Deloitte, and Price Waterhouse Coopers. These firms are associated with a well-known brand name and thus have a reputation to maintain, which encourages them to provide high-quality audit services (Angelo, 1988; Bacha et al., 2020; Watkins et al., 2004). To reflect this, Audit Quality was defined as a binary variable with a value of "1" if the company's financial accounts were audited by one of the Big Four auditors, and "0" otherwise.

3.2.4 Control variables

There are a number of variables to consider when determining the optimal capital structure. At the company level, different Financial characteristics were added as control factors following previous research (Ezeani et al., 2022; Öztekin, 2015). We adjusted for firm size since smaller and younger enterprises are more likely than their larger counterparts to seek diversity and visibility via CSR efforts (Lin et al., 2019); however, they are more likely to face budgetary constraints. In order to account for the impact on capital structure decisions, we also consider firm performance through return on assets (ROA) (Berger & Di Patti, 2006), as well as financial flexibility (Zscore) and net operating assets (NOA).

Corporate governance and firm characteristics affect capital structure choices. Thus, board independence, board size, and the concentration of shares held by the largest shareholder (HHI), which serves to mitigate agency costs, are included as control variables (Chow et al., 2018). Given that CEO characteristics can impact capital structure choices, the retired CEO and CEO duality variables were also included as control variables (Ezeani et al., 2022). The duality variable (DUAL) is a binary indicator that indicates the chief executive officer and the chairperson are the same individual or not. All of these factors are assessed annually. Table 2 shows the definitions, measurement, expected impact and data sources of the variables.

3.2.5 Empirical models

In the regression analysis, we considered the impact of fixed effects at industry and year levels. Based on the Hausman test, we rejected the null and chose the Fixed effects regression as the p-value was less than 5%. The industry and year fixed effects account for unobservable industry and time aspects. In order to evaluate the connection between ESG performance and equity Capital funding, we will do the following regression model.

Table 2 Variables definitions

| Type | Definition | Expected impact | Data source |
|---------|--|----------------------|-------------|
| Mklev | Mklev (market-based financial leverage) is the dependent variable measured as the ratio of financial debts and market capitalization (details Eq. 1) | DV | CSMAR |
| Bklev | Bklev (Book-based financial leverages) is also dependent variable of study measured as ratio of total debts to total assets(details Eq. 2) | DV | |
| ESG | Environment, Social and Governance (ESG) score is independent variable of study having values from 0 to 100 | Negative | Bloomberg |
| E | Environment pillar of ESG score ranging from 0 to 100 | Negative | |
| S | Social pillar of ESG score ranging from 0 to 100 | Negative | |
| G | Governance pillar of ESG score ranging from 0 to 100 | Negative | |
| Big4 | Big4 represents the audit quality, a dummy variable having the value "1" if financial are audited by Big 4 audit companies and "0" otherwise | Positively moderates | |
| BS | BS represents the Board Size measured as natural logarithm of the total number of directors on the corporate board | | |
| BI | BI denotes the Board Independence measured as natural logarithm of total number of independent directors at board. | | |
| HHI | HHI represents the Herfindahl–Hirschman Index; a measure of market concentration and market competition measured as follows: $HHI = \sum_{i=1}^N \lambda_i^2$ where λ_i^2 is the market share of the i-th firms; N = total firms in the market. [for details (Rhoades, 1993)] | | |
| RCEO | RCEO denotes the retiring CEO, a dummy variable having the value "1" if CEO's age is equal to or more than 63 years, "0" otherwise | | CSMAR |
| CEOD | CEOD represents the CEO Duality, a dummy variable equals to "1" if CEOs also serve as the chairman of the board, "0" otherwise | | |
| ROA | ROA is return on assets calculated as a ratio of earnings before interest & tax to total assets | | |
| Size | Size is the total size of a firm measured as natural logarithm of firm total assets | | |
| NOA | NOA represents the Net operating Assets of firm | | |
| Z-score | Altman's Z-score of financial distress vs. flexibility calculated as follows: $ZScore = 6.56 Z1 + 3.26 Z2 + 6.72 X3 + 1.05 X4$ where Z1 = (current assets - current liabilities) / total assets; Z2 = retained earnings / total assets; Z3 = earnings before interest and taxes / total assets; Z4 = book value of equity / total liabilities [for details (Altman et al., 2017)] | | |

$$\begin{aligned}
 FLev_{it} = & \alpha + \beta_1 ESG_{it} + \beta_2 BS_{it} + \beta_3 BI_{it} + \beta_4 HHI_{it} + \beta_4 RCEO_{it} + \beta_5 CEOD_{it} + \beta_6 ROA_{it} \\
 & + \beta_7 Size_{it} + \beta_8 NOA_{it} + \beta_9 Z - score_{it} + \sum_{i=1}^n \beta_n Industry_Dummies_{it} + \sum_{i=1}^n \beta_n Year_Dummies_{it} + \epsilon_{it}
 \end{aligned} \quad (3)$$

In Eq. 3, both book-based financial leverage (represented by $Bklev_{it}$) and market-based financial leverage (represented by $Mklev_{it}$) are combined into a single variable called $FLev_{it}$. The word "it" in brackets refers to both the companies and the time. The ratings on Bloomberg's Environment, Social, and Governance categories, along with each category's sub-components, form the independent variable known as ESG.

BS and BI denote the corporate board size and board meetings, respectively. HHI refers to the Herfindahl Hirschman Index. $RCEO$ and $CEOD$ refer to the retiring CEO and CEO duality, respectively. ROA refers to Return on Assets, and $size$ refers to the log of the firm's total assets. NOA is the net operating assets, and $Z-score$ is financial flexibility. In order to deal with possible endogeneity issues arising from the industry and across the sector over time, we controlled the model with year and industry dummies, which give the industry and year fixed effect. Furthermore, the error term is represented by ϵ .

In the second model, we proposed a novel interaction term ($Big4 * ESG$) to assess the effect of Audit Quality as a moderator in the ESG–capital structure nexus. $Big4 * ESG$ refers to how Big4 audit and ESG affect each other. The explanation of the model is detailed in Equation #4.

$$\begin{aligned}
 FLev_{it} = & \alpha + \beta_1 ESG_{it} + \beta_2 Big4_{it} + \beta_3 Big4_{it} * ESG_{it} + \beta_4 BS_{it} + \beta_5 BI_{it} \\
 & + \beta_6 HHI_{it} + \beta_7 RCEO_{it} + \beta_8 CEOD_{it} + \beta_9 ROA_{it} \\
 & + \beta_{10} Size_{it} + \beta_{11} NOA_{it} + \beta_{12} Z - score_{it} + \sum_{i=1}^n \beta_n Industry_Dummies_{it} \quad (4) \\
 & + \sum_{i=1}^n \beta_n Year_Dummies_{it} + \epsilon_{it}
 \end{aligned}$$

Equation (4), interaction term $Big4 * ESG$, captures the effect of Audit Quality (Big4) as moderator, whereas all the variables are the same as in Equation # 3.

4 Results and discussion

4.1 Descriptive statistics and correlation results

The descriptive statistics for the variables that were used in the regression analysis are shown in Table 3, which provides a summary. The ESG scores range from a minimum value of 1.24 to a maximum value of 64.11, demonstrating a significant disparity in the ESG methods implemented by Chinese firms. Compared to firms in the United States and Europe, Chinese firms have lower ESG scores, revealing a general dearth of emphasis and incentive for ESG disclosure in the country (Zhang et al., 2022). The average ESG score was 20.021. Among the ESG sub-components, the mean score for Environmental practices was 8.65, which was lower than the scores for Social (22.29) and Governance (44.34). Average Financial Leverage scores were 0.317 (based on market value) and 0.466 (based on book value). According to this data Average debt financing for a company is 32%.

(Calculated based on market value), while the book-based financial leverage value of debt is slightly higher. This is inconsistent to the findings of Raimo et al. (2021). Table 3, panel B provides the descriptive results for the categorical variables. The majority of Chinese companies get audited by non-Big4 auditors, while just 7.7% are audited by Big4 auditors, suggesting a usually lower standard of audits (Bacha et al., 2020). 1.86% of the CEOs fall within the retirement age criteria and 21.08% of the CEOs hold dual board positions.

Table 4 shows the correlations between all the variables included in this study. It is expected that ESG and its components (E/S/G) would show a high degree of relationship. Leverage (both market and book based) is also highly correlated with Size and Z-score (i.e. 0.68 and 0.57). However, this correlation is not particularly strong. If the estimated coefficient had been above 70%, it would have been more challenging to include Size and Z-scores in the regression model. Therefore, it is acceptable to incorporate Size and Z-scores in the regression model.

4.2 The effect of ESG performance on Capital financing decisions

Capital structure dynamics and their relationship with ESG/E/S/G disclosure were studied using both the ESG composite score and sub-scores of Environmental (E), Social (S), and Governance (G), individually. The findings from eight panel regression models, which include fixed effects for year and industry, are presented in Table 5. Columns 2 to 5 in Table 5 provide the main ESG Models (1) to (4), which show the correlation of ESG performance and individual pillars E/S/G scores with market-based financial leverage. However, ESG performance and sub-scores affect the financial leverage based on book value (Bklev) in Models (1) to (4) in columns 6–9 of Table 3. The first regression model, as shown in column 2, presents evidence of a significant negative relationship between the Environmental, Social, and Governance (ESG) score and market-based financial leverage, with an R-squared of 0.33. This means that the ESG score represents around 33% of the variation in market-based financial leverage. The coefficient estimates of ESG composite score and Environmental (E), Social (S), and Governance (G) sub-scores for both leverage measures are statistically significant but negative in direction, implying the companies that pay attention to social, environmental, and governance aspects, tend to have lower financial leverage and prefer to rely on capital stock. This implies that firms with higher ESG scores are less risky from an investor perspective as they have lower leverage. This can also be attributed to the fact that investors are more inclined in the ESG stocks of Chinese listed companies, making it easier for these companies to raise funds from the capital market.

The impact of ESG disclosure on debt financing is significant. For each increase in ESG disclosure, debt financing potential decreases by 2.8 percent. The relationship between the control variables and capital structure is as follows: Firm size, board size, and profitability (ROA) appear to have a positive effect on financial leverage, while Z-Score (financial flexibility) has a negative effect on financial leverage (both market and book value based). The findings suggest that companies with greater financial flexibility are more inclined to opt for equity financing rather than debt financing, as the latter is usually associated with higher costs. On the other hand, well-organized companies with a larger size, high returns, and larger boards are more likely to secure debt financing. Together with our finding, the study suggests that retiring CEOs and board independence do not have any impact on the capital structure of Chinese firms. On the other hand, the ownership concentration measured by the Herfindahl–Hirschman Index (HHI) appears to have a statistically negative effect on market-based financial leverage, while it has a positive effect on book-based

Table 3 Descriptive statistics

| Variable | <i>N</i> | Average (Mean) | SD | Min | Max |
|---------------------------------------|----------|----------------|---------|--------|--------|
| <i>Panel A: Variable of interest</i> | | | | | |
| ESG | 6193 | 20.021 | 6.436 | 1.24 | 64.115 |
| E | 6193 | 8.653 | 7.664 | 0 | 65.625 |
| S | 6193 | 22.294 | 9.915 | 0 | 71.93 |
| G | 6193 | 44.344 | 5.024 | 3.571 | 64.539 |
| Mklev | 6061 | 0.317 | 0.22 | 0.002 | 0.913 |
| Bklev | 6193 | 0.466 | 0.206 | 0.059 | 0.89 |
| BS | 6193 | 9.063 | 1.886 | 4 | 20 |
| BI | 6193 | 0.372 | 0.053 | .333 | .571 |
| HHI | 6193 | 0.305 | 0.26 | 0 | 1 |
| ROA | 6193 | 0.044 | 0.058 | −.19 | 0.212 |
| Size | 6193 | 22.903 | 1.233 | 20.403 | 26.331 |
| NOA | 6193 | 2.096 | 2.287 | .108 | 43.829 |
| Z-score | 6193 | 0.996 | 0.786 | −1.886 | 3.2 |
| | | Freq | Percent | | Cum |
| <i>Panel B: Categorical variables</i> | | | | | |
| Big4 | | | | | |
| 0 | | 5810 | 92.30 | | 92.30 |
| 1 | | 485 | 7.70 | | 100.00 |
| RCEO | | | | | |
| 0 | | 6178 | 98.14 | | 98.14 |
| 1 | | 117 | 1.86 | | 100.00 |
| CEOD | | | | | |
| 0 | | 4968 | 78.92 | | 78.92 |
| 1 | | 1327 | 21.08 | | 100.00 |

financial leverage The findings also indicate a negative relationship between book-based financial leverage and Net Operating Assets (NOA).

4.3 Audit quality as moderator in ESG—capital financing nexus

The significance of audit and assurance in attracting capital to a company cannot be overstated, which is why the interaction term of Big4*ESG/E/S/G was introduced to investigate the moderating role of audit quality on the ESG and capital financing dynamics.

Table 6 shows the results of all 8 models in which we fixed the year and industry by using dummy variables. Furthermore, by including control variables we introduced the interaction term to capture the intervening effect flow from audit quality to the ESG–capital financing relationship. For market-based leverage, the moderating effect of ESG and related sub-scores (E/S/G) is shown in Table 6 from model (1) to (4) in columns 2–5. Similarly, for book-based leverage, the moderating effect of audit quality is shown in columns 6 to 9 of model (1) to (4). The regression analysis results in columns 2 to 9 indicate a statistically significant negative relationship between ESG and its sub-components Environmental

Table 4 Pairwise correlations

| | ESG | E | S | G | Mklev | Bklev | Big4 | BS | BI | HHI | RCEO | CEOD | ROA | Size | NOA | Zscore |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|---------|---------|---------|---------|---------|---------|--------|
| ESG | 1 | | | | | | | | | | | | | | | |
| E | 0.918* | 1 | | | | | | | | | | | | | | |
| S | 0.828* | 0.628* | 1 | | | | | | | | | | | | | |
| G | 0.513* | 0.326* | 0.306* | 1 | | | | | | | | | | | | |
| Mklev | 0.210* | 0.179* | 0.155* | 0.206* | 1 | | | | | | | | | | | |
| Bklev | 0.148* | 0.117* | 0.109* | 0.179* | 0.855* | 1 | | | | | | | | | | |
| Big4 | 0.242* | 0.236* | 0.154* | 0.189* | 0.115* | 0.086* | 1 | | | | | | | | | |
| BS | 0.110* | 0.093* | 0.076* | 0.114* | 0.197* | 0.150* | 0.058* | 1 | | | | | | | | |
| BI | 0.025 | 0.018 | 0.022 | 0.023 | 0 | 0.004 | 0.035* | -0.369* | 1 | | | | | | | |
| H HI | -0.133* | -0.138* | -0.124* | -0.013 | 0.057* | 0.099* | 0.032* | 0.042* | -0.002 | 1 | | | | | | |
| RCEO | 0.025 | 0.038* | -0.007 | 0.002 | -0.058* | -0.052* | 0.004 | -0.052* | 0.016 | -0.029* | 1 | | | | | |
| CEOD | -0.106* | -0.092* | -0.069* | -0.095* | -0.132* | -0.110* | -0.072* | -0.204* | 0.098* | -0.034* | 0.168* | 1 | | | | |
| ROA | -0.034* | -0.031* | -0.021 | -0.061* | -0.427* | -0.458* | 0.036* | -0.063* | -0.001 | -0.019 | 0.056* | 0.080* | 1 | | | |
| Size | 0.374* | 0.331* | 0.286* | 0.307* | 0.681* | 0.548* | 0.262* | 0.252* | 0.043* | 0.002 | -0.029* | -0.132* | -0.117* | 1 | | |
| NOA | -0.045* | -0.069* | -0.014 | 0.028* | 0.061* | 0.025 | 0.008 | 0.008 | 0.014 | 0.066* | -0.014 | -0.001 | -0.158* | 0.102* | 1 | |
| Z-score | -0.054* | -0.047* | -0.031* | -0.095* | -0.574* | -0.648* | 0.021 | -0.088* | -0.01 | -0.040* | 0.065* | 0.087* | 0.948* | -0.219* | -0.144* | 1 |

*Represents where $p < 0.1$

Table 5 Main regression results on ESG—Capital structure nexus

| Variables | (Mk-Lev) | | | | (Bk-Lev) | | | |
|-----------|------------------------|------------------------|-----------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (1) | (2) | (3) | (4) |
| ESG | -0.029*** (0.00322) | | | | -0.015*** (0.00261) | | | |
| E | | -0.013*** (0.00266) | | | | -0.0069*** (0.0020) | | |
| S | | | -0.020*** (0.0019) | | | | -0.0061*** (0.0015) | |
| G | | | | -0.019*** (0.0037) | | | | -0.025*** (0.0028) |
| BS | 0.034*** (0.013) | 0.038*** (0.013) | 0.034*** (0.013) | 0.039*** (0.013) | 0.033*** (0.010) | 0.035*** (0.010) | 0.033*** (0.011) | 0.034*** (0.099) |
| BI | 0.039 (0.036) | 0.041 (0.036) | 0.041 (0.036) | 0.038 (0.036) | 0.011 (0.028) | 0.012 (0.028) | 0.012 (0.028) | 0.0074 (0.028) |
| HHI | -0.016*** (0.0046) | -0.014*** (0.0046) | -0.017*** (0.0046) | -0.011** (0.0046) | 0.014*** (0.0036) | 0.015*** (0.0036) | 0.015*** (0.0036) | 0.016*** (0.0354) |
| RCEO | -0.0136 (0.0106) | -0.0147 (0.0107) | -0.0138 (0.0106) | -0.0156 (0.0107) | 0.00322 (0.00834) | 0.00264 (0.00835) | 0.00261 (0.00835) | 0.00262 (0.00830) |
| CEOD | -0.053 (0.0412) | -0.050 (0.0414) | -0.052 (0.0411) | -0.043 (0.0414) | -0.074** (0.0322) | -0.072** (0.0323) | -0.073** (0.0323) | -0.068** (0.0321) |
| ROA | 1.669*** (0.090) | 1.707*** (0.090) | 1.648*** (0.089) | 1.694*** (0.090) | 3.796*** (0.069) | 3.815*** (0.068) | 3.801*** (0.070) | 3.789*** (0.069) |
| Size | 0.803*** (0.0248) | 0.768*** (0.0245) | 0.810*** (0.0244) | 0.749*** (0.0237) | 0.477*** (0.0192) | 0.459*** (0.0190) | 0.464*** (0.0190) | 0.466*** (0.0182) |
| NOA | -0.0093 (0.00913) | -0.0104 (0.00918) | -0.0073 (0.00910) | -0.0078 (0.00918) | -0.021*** (0.00705) | -0.022*** (0.00706) | -0.020*** (0.00706) | -0.018*** (0.00702) |
| Z-score | -0.204*** | -0.208*** | -0.203*** | -0.206*** | -0.406*** | -0.408*** | -0.407*** | -0.405*** |

Table 5 (continued)

| Variables | (Mk-Lev) | | (Blk-Lev) | |
|---------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) | (4) |
| Constant | (0.0785) -1.374*** | (0.0787) -1.341*** | (0.0782) -1.402*** | (0.0788) -1.228*** |
| Firm effect | (0.0595) Y | (0.0601) Y | (0.0594) Y | (0.0590) Y |
| Year effect | Y | Y | Y | Y |
| Observations | 6061 | 6061 | 6061 | 6061 |
| R-squared | 0.33 | 0.33 | 0.34 | 0.33 |
| Number of ids | 934 | 934 | 934 | 934 |
| | (0.0605) -0.392*** | (0.0604) -0.376*** | (0.0606) -0.379*** | (0.0602) -0.287*** |
| | (0.0461) Y | (0.0465) Y | (0.0462) Y | (0.0454) Y |
| | Y | Y | Y | Y |
| | 6193 | 6193 | 6193 | 6193 |
| | 0.56 | 0.55 | 0.55 | 0.56 |
| | 934 | 934 | 934 | 934 |

Table 5 shows the estimation of Model 1 presented in Eq. (3), *** indicates when $p < 0.01$, ** indicates when $p < 0.05$, * indicates when $p < 0.1$. Y represents Yes. () represents the standard errors. The definitions of the variables are given in Table 2

(E), Social (S), and Governance (G) factors and financial leverage. This relationship remains significant even when the moderating effect of audit quality is not considered (as shown in Table 3). Table 4 confirms that except for the impact on the governance pillar, which is small, the relationship between audit quality and the relationship between ESG/E/S/G and financial leverage is not significant. Based on the findings, the audit quality does not play a mediating impact between ESG ratings and capital financing choices. In other words, the results suggest that the impact of ESG ratings on capital financing decisions remains consistent regardless of the level of audit quality. Therefore, audit quality does not appear to significantly influence or moderate the relationship between ESG ratings and the choices companies make regarding their capital financing. This is probably due to the prevalence of non-Big4 audit firms in the Chinese market. ESG disclosures, however, continue to indicate a firm's performance and value.

4.4 Robustness check and alternative analyses

To ensure the validity of our findings, we conducted multiple sensitivity analyses. The results of these analyses were consistent with those of the original analysis. This is indicated by the absence of significant differences. Tables 7 and 8 illustrate the findings obtained from doing sensitivity analyses and endogeneity tests, respectively. In order to evaluate the consistency of ESG performance and the three sub-pillars that make up ESG: Environmental (E), Social (S), and Governance (G) on financial leverage, we applied a dynamic sys GMM regression estimator (Panel 1, Table 7). By taking into account the dynamic connections that exist among explaining variables and addressing the potential biases that might arise from unobserved time-invariant heterogeneity, this methodology effectively mitigates the risk of omitted-variable bias and endogeneity issues. As a result, the approach employed in this study enhances the reliability and validity of the findings. The results of the GMM estimator, shown in Table 7, confirm our initial results that the coefficient of ESG is significantly negative.

To address the issue of reverse causality in our regression models, we additionally included lagged independent variables (at time $t-1$) to investigate the effect of ESG (Environmental, Social, and Governance) on financial leverage. The initial analysis was supported by the data reported in Panel 2 of Table 7, which reveal a significant negative relationship between ESG and both measures of financial leverage. Our results from this analysis are consistent with those obtained from the primary regression model.

Finally, to further test the robustness of our findings, we included the audit quality moderator term (Big4 * ESG) in our analysis. We re-estimated Eq. (4) using both sysGMM and reverse causality (lagged regressions) techniques, including the audit quality moderator. Although not shown for the sake of brevity, the new estimates are virtually identical to the previous ones. The results presented in Table 8 also confirm our primary findings. We found that the robustness checks, evidence of reverse causality, sample selection, and endogeneity test are in favour of our main findings and that the given results are provide a valid estimate free from statistical problems.

Table 6 Audit quality and ESG—Capital Structure nexus

| Variables | Mk-Lev | | Bk-Lev | |
|---------------|-----------------------|-----------------------|-----------------------|------------------------|
| | (1) | (2) | (3) | (4) |
| ESG | -0.027*** (0.0034) | | -0.016*** (0.0027) | |
| E | | -0.013*** (0.0029) | | -0.0087*** (0.0023) |
| S | | | -0.021*** (0.0020) | -0.0064*** (0.0025) |
| G | | | | -0.035*** (0.0029) |
| Big4 | 0.00371 (0.0189) | -0.00536 (0.0117) | -0.0139 (0.0159) | 0.0123 (0.0905) |
| Big4*ESG | -0.0064 (0.0075) | | | 0.0134 (0.0124) |
| Big4*E | | -0.0057 (0.0058) | | 0.0093 (0.0059) |
| Big4*S | | | 0.0011 (0.0051) | 0.0075 (0.0046) |
| Big4*G | | | | 0.0022 (0.0040) |
| CG controls | Y | Y | Y | 0.0012 (0.0091) |
| Firm Controls | Y | Y | Y | Y |
| Firm effect | Y | Y | Y | Y |
| Year effect | Y | Y | Y | Y |
| Observations | 6061 | 6061 | 6061 | 6193 |
| R-squared | 0.33 | 0.33 | 0.34 | 0.56 |
| Number of IDs | 934 | 934 | 934 | 934 |

Table 6 shows the estimation of Model 1 presented in Eq. (3). *** indicates when $p < 0.01$, ** indicates when $p < 0.05$, * indicates when $p < 0.1$. Y represents Yes. () represents the standard errors. The definitions of the variables are given in Table 2

5 Discussion of results: “insight and findings”

A growing emphasis on ESG (Environmental, Social, and Governance) in China (Zhang et al., 2022) has encouraged researchers to examine the interrelationship between ESG and capital financing. The findings suggest that companies with higher ESG performance tend to be apparent to rely more on equity financing and less on debt financing, and this shows a significant negative relationship between ESG performance and financial leverage. This implies that companies with better ESG performance are favoured by investors and they do not have to struggle for debt financing at a higher cost. The results are consistent with one of the seminal previous studies (Ross & Wood, 2008), which suggests the greater influence of mandatory (regulatory) ESG disclosure on capital investment decisions. In addition, the implication of this suggests to policy makers and board of directors to formulate the strategies in a way that promotes the environmental performance of the firms (Aslam et al, 2021). It shows the commitment of the firms to ESG concerns as a substantive approach proposed by Ashforth and Gibbs (1990). The substantive approach is also validated by the findings of (Rikhardsson & Holm, 2008), who inferred that qualitative information may affect the perception of the investors. However, concrete steps taken by the firms that ultimately manifest environmental progress in quantitative data, influence investors’ decision to a greater extent. Furthermore, the results show that the actual measures taken and disclosed by Chinese companies regarding ESG activities make them more transparent. Therefore, ESG transparency represents the long-term orientation of firms and differentiates them from those with lower ESG scores (Benabou & Tirole, 2010; Dhaliwal et al., 2011; Spence, 1978).

From a theory perspective, our findings are also consistent with the Resource Based View (RBV) theory (Hart, 1995), according to which the improvement of ESG disclosure strategically expands the environmental concerns that contribute to the achievement of sustainable growth by allocating resources from free-cash to ESG measures, which ultimately reduces information asymmetry (Ali et al., 2022). In addition, allocating funds to environmental concerns also complements the agency theory, which benefits firms to gain competitive advantage and enhance transparency among stakeholders, and is conducive to reduce cost of debt (Hmiden et al., 2022). Moreover, our findings are also consistent with previous studies that found a negative relationship between ESG performance and financial risk (Guo et al., 2023; Hmiden et al., 2022; Khan & Serafeim, 2016) and capital structure (Zahid et al., 2023). However, our results conflict with part of the findings of Guo’s et al. (2023) in the context of categorized institutional isomorphism (as suggested by DiMaggio and Powell (1983). according to which firms with regulatory/mandatory CSR disclosure did not benefit from the reduced cost of debt compared with the voluntary disclosures. In addition to our findings, this research emphasized the significance of analysing each ESG pillar separately because of their impact on the association between ESG performance and capital financing choices. These results highlight the importance of considering individual ESG pillars as they contribute to the overall relationship between ESG performance and equity financing decisions. This is also supported by our findings. This suggests that companies that perform well in specific ESG factors, such as environmental management or social responsibility, are more likely to use equity financing.

The moderating impact of Big4 audit quality on the relationship among ESG performance and capital financing decisions was also investigated in this study, and the

researchers came to the conclusion that there was no significant effect. This is contrary to previous research which suggests that audit quality can indicate a firm's commitment to ESG issues (Fernandez-Feijoo et al., 2014). However, it is important to note that the study only examined the role of audit quality as a moderating variable and did not directly measure the quality of the ESG disclosures or the extent to which ESG issues are integrated into the business strategy. The information gap, which can lead to agency problems (Jiraporn & Gleason, 2007), is likely to be curbed by the transparency of firms with higher commitment to ESG performance (Dhaliwal et al., 2011). According to the agency theory, enhanced transparency as a result of the substantive approach entices firms to reduce the information asymmetry, which leads firms to choose equity financing over debt financing (Benlemlih, 2017a, 2017b). Moreover, the higher interest in ESG activities tends to establish and maintain a relationship of mutual trust between management and key stakeholders (Eccles et al., 2014), resulting in reduced agency conflicts and cost of debt (Benabou & Tirole, 2010). Some recent additions to the literature also support the agency theory whereby ESG performance reduces the use of debt and makes firms more likely to rely on equity funds, while the relationship is not the same in societies with a higher degree of power distance (Lemma et al., 2022). In line with prior arguments, reduced information asymmetry decreases the likelihood of agency disputes, thereby reducing transaction cost and enhances mutual trust that help the firms to be less reliant on debt financing. In addition to quantitative disclosures, qualitative ESG information seems to affect short-term financing decisions, thus reflecting the possibility of using environmental information to reduce risk (Rikhardsson & Holm, 2008).

The results for the control variables were also consistent with previous findings with a few exceptions. For instance, larger firms appeared to have a positive relationship with financial leverage and the results were consistent with previous findings (Rajan & Zingales, 1995; Pandey, 2004). A positive relationship implies that large firms are better at diversifying risk and there are less likely to go bankrupt. Furthermore, larger firms tend to enjoy a lower cost of debt and to operate with a higher level of debt compared to small companies (Ferri & Jones, 1979). Board characteristic, such as board size, were found to be positively associated with financial leverage in this study. However, the result is in contrast with the findings of Berger (1997), Hussainey and Aljifri (2012), and Abor and Biekpe (2005) and consistent with the findings of Jensen (1986). The positive affect of board size is twofold (Wen et al., 2002): first, larger board size is most likely to pursue strategies of operating with higher leverage to enhance firm value specially when there is a chance of greater regulatory scrutiny. Second, larger board size indirectly affects the quality of corporate governance as it is difficult to reach a consensus within the board itself and is likely to raise agency problems. Previous studies (Harford et al., 2008; Zhou et al., 2021) also do not support the results on profitability and financial leverage. However, a possible explanation for this positive impact on financial leverage is the existence of a risk-return trade-off (Amit & Livnat, 1988), which implies that firms with higher profits can take higher risks. In addition, we found that firms that are more financially flexible are more likely to operate at higher debt ratios, which is an important indicator of a firm's risk-taking capacity (Bhagat et al., 2015). However, in the context of the Chinese market, the independence of the board and retiring CEOs do affect capital structure decisions. We identified an issue with the concentration of ownership that was assessed by the HHI index. This concentration of ownership has a negative impact on market-based leverage, but it has a positive effect on book-based leverage. The results show that market share has a direct influence on maintaining a lower leverage as the concentration of shares reached a larger group of investors.

Table 7 Robustness check

| Variables | (Mk-Lev) | (Bk-Lev) |
|--|-------------------------|------------------------|
| <i>Panel 1: sysGMM model</i> | | |
| ESG | -0.0054*** (0.0117) | -0.0078*** (0.0114) |
| E | -0.0061*** (0.00141) | -0.0063*** (0.0013) |
| S | -0.0013 (0.0031) | -0.0022** (0.00087) |
| G | | -0.071*** (0.0023) |
| Mk_lev(<i>t</i> -1) | 0.583*** (0.00779) | 0.585*** (0.0798) |
| Bk_lev(<i>t</i> -1) | | 0.501*** (0.0688) |
| CG controls | Y | Y |
| Firm controls | Y | Y |
| N | 4991 | 5198 |
| ID | 885 | 887 |
| <i>Panel 2: Reverse causality estimation</i> | | |
| ESG(<i>t</i> -1) | -0.012*** (0.0041) | -0.014*** (0.0038) |
| E(<i>t</i> -1) | -0.0041 (0.0034) | -0.0034 (0.0032) |
| S(<i>t</i> -1) | -0.012*** (0.0023) | -0.0056*** (0.0021) |
| G(<i>t</i> -1) | 0.025 (0.044) | -0.031*** (0.041) |
| Firm and CG controls | Y | Y |
| | | Y |
| | | Y |
| | | Y |
| | | 5198 |
| | | 887 |
| | | 0.501*** |
| | | (0.0695) |
| | | Y |
| | | Y |
| | | 5198 |
| | | 887 |
| | | 0.499*** |
| | | (0.0691) |
| | | Y |
| | | Y |
| | | 5198 |
| | | 887 |
| | | 0.503*** |
| | | (0.0687) |
| | | Y |
| | | Y |
| | | 5198 |
| | | 887 |
| | | -0.011*** |
| | | (0.0016) |

Table 7 (continued)

| Variables | (Mk-Lev) | | (Bk-Lev) | |
|----------------------------|----------|------|----------|------|
| | Y | Y | Y | Y |
| Firm and year fixed effect | 5093 | 5093 | 5189 | 5189 |
| N | 5093 | 5093 | 5189 | 5189 |
| R-squared | 0.14 | 0.15 | 0.18 | 0.18 |
| ID | 881 | 881 | 883 | 883 |

***indicates when $p < 0.01$, ** indicates when $p < 0.05$, * indicates when $p < 0.1$. Y represents Yes. () represents the standard errors. The definitions of the variables are given in Table 2

Table 8 Robustness analysis-moderating effect of audit quality

| Variables | GMM estimation | | Reverse causality | |
|-----------------|-----------------------|------------------------|----------------------|-----------------------|
| | Mklev | Bklev | Mklev ($t+1$) | Bklev ($t+1$) |
| ESG | -0.0018 (0.0019) | -0.0079*** (0.0015) | -0.010** (0.0044) | -0.015*** (0.0039) |
| Big4 Auditor | 0.0281** (0.0114) | 0.00965 (0.00908) | -0.0222 (0.0251) | -0.0150 (0.0230) |
| Big4*ESG | -0.015*** (0.0043) | -0.0015 (0.0034) | -0.0032 (0.0010) | 0.0010 (0.0095) |
| Mk_lev($t-1$) | 0.585*** (0.00799) | | | |
| Bk_lev($t-1$) | | 0.502*** (0.00689) | | |
| CG Controls | Y | Y | Y | Y |
| Firm Controls | Y | Y | Y | Y |
| Firm Effect | - | - | Y | Y |
| Year Effect | - | - | Y | Y |
| Observations | 4974 | 5190 | 5085 | 5190 |
| R-squared | | | 0.14 | 0.18 |
| Number of ids | 885 | 887 | 887 | 888 |

***indicates when $p < 0.01$, ** indicates when $p < 0.05$, * indicates when $p < 0.1$. Y represents Yes. () represents the standard errors. The definitions of the variables are given in Table 2

Overall, the present study contributes to the growing body of research on the relationship between ESG performance and capital financing decisions, particularly in emerging markets such as China. The results highlight the importance of improving financing decisions and reducing financial risk by promoting ESG disclosure and transparency and integrating ESG issues into the business strategy. The complex and dynamic relationships between ESG performance, financing decisions, and other firm-level factors require further research.

6 Conclusion

Over the past few years, China's engagement with sustainable development has improved, which has led to an increased interest in ESG issues. For this, we used the Bloomberg ESG score as an indicator for a firm's ESG in order to analyse its effect on capital financing decisions among Chinese firms. A large sample and a long period of analysis underpin our research. The key results are as follows: First, we found that ESG performance is significantly negatively related to financial leverage, meaning that better ESG performance is associated with a lower use of debt financing. Second, our findings show that the individual ESG pillars also contribute to this relationship. This suggests that companies with good ESG performance are more likely to rely on equity financing rather than debt financing. Finally, we examined the role of Big4 audit quality as a moderating variable in

the dynamics of ESG capital financing. However, the results show that audit quality does not have a significant effect on this relationship.

The key implications of our study are as follows. First, companies operating in China, a developing country, need to be aware of the importance of integrating ESG principles into their business models. This not only contributes to economic growth, but also increases access to low-cost financing. ESG-focused shares are becoming increasingly popular among investors, who prefer companies that prioritize sustainability. However, despite the importance of ESG indicators, the impact of Big4 audit on ESG performance remains insignificant. This emphasizes the need for companies to improve their ESG scores to reduce financing costs and increase equity financing. Both high and low ESG-rated equities have the potential to generate substantial returns. Second, as an emerging economy, the government of China should take steps to promote the disclosure and standardization of ESG information. The trend towards sustainable development has led to an increased demand for accurate ESG reporting. It is, therefore, important for the government to enforce strict disclosure requirements. This will allow financial markets to appropriately price responsible behaviour and reward the green revolution. Currently, there is a lack of standardization among ESG index providers in the Chinese market, causing confusion among investors. To address this issue, the government should establish an official rating system to ensure impartial and trustworthy ESG information.

In an international context, the study provides insights into the relationship between ESG performance and financing decisions in emerging markets such as China. The findings of the study are consistent with prior research (Ali et al., 2022; Guo et al., 2023; Hmiden et al., 2022) conducted in developed markets, indicating that the negative relationship between ESG performance and financial risk may be universal. The study also highlights the importance of integrating ESG issues into corporate strategy to improve financing decisions and reduce financial risk, with implications for businesses operating in both developed and emerging markets.

Overall, the theoretical contributions of the study provide insights into the complex relationship between ESG performance and financing decisions and highlight the importance of considering individual ESG factors and other company-specific factors in shaping this relationship. The international context of the study provides insights into the relationship between ESG performance and financing decisions in emerging markets, which has implications for businesses operating in these markets.

In China, the accessibility and standardization of ESG data is a significant limitation. Due to the country's immature ESG infrastructure, ESG ratings from various sources are inconsistent and do not cover all publicly traded companies. While data from Bloomberg was used, it was not sufficient for evaluating portfolio performance due to gaps in the information. Future studies on ESG investing in China will be required as the quality and breadth of ESG data continues to rise. In addition, the connection between ESG and capital structure dynamics is the primary area of investigation in this work, rather than the connection between ESG practises and corporate behaviour, which is left mostly unexplored. In the future, researchers should look into how factors like budgetary restraints and investments in environmental governance affect the operational and investment decisions of companies that engage in ESG practises.

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Data availability This study is based on secondary dataset. All the data are available on CSMAR (<https://cn.gtadata.com>), and Bloomberg (<https://data.bloomberg.com/>).

Declarations

Ethics approval and consent to participate This is an observational study. We confirmed that no ethical approval is required. Consent to participate is not applicable.

Consent for publication Not applicable.

Competing interests The authors have no relevant financial or non-financial interests to disclose.

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