RESEARCH ARTICLE

ESG performance, capital financing decisions, and audit quality: empirical evidence from Chinese state-owned enterprises

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Abstract

We study the nexus between environmental, social, and governance (ESG) performance and corporate capital financing decisions. Further, we also analyze the effect of audit quality and type of ownership (state-owned enterprises (SOEs) vs non-state-owned enterprises (non-SOEs), local vs central SOEs in this relationship. By applying panel regression (fixed effects) on 6295 firm-year observations of Chinese A-listed enterprises data for 2010–2019, we conclude that firms' ESG information is crucial to their financing decisions. In particular, firms with superior ESG performance have lower debt financing. The findings suggest that enterprises with strong ESG performance have easy access to equity funding via stock markets. Further, this relationship is more pronounced in SOE compared to non-SOEs and in central SOEs compared to local SOEs. These results demonstrate that the market may promote desired social outcomes by rewarding ESG performance; however, we find no significant effect of audit quality in this relationship. Findings are robust to different sensitivity tests, including an alternative estimation, sysGMM regression to address endogeneity issues, and lagged regressions to address reverse causality.

Keywords Capital structure · ESG · Environment · Governance · Social · SOEs

Introduction

Responsible investment has increased all across the world as people become more aware of the importance of a company's environmental, social, and governance (ESG) performance. ESG disclosures measure how well a company operates in areas other than its financial success. Stakeholders in firms are pushing for higher ESG requirements

from businesses, which is also required by law (Zhang et al. 2022). Despite widespread recognition of ESG disclosures, a plethora of global programs was developed to promote ESG policies and practices. However, the world continues to suffer from social disparities, violence, a lack of fundamental requirements, and an ecosystem that looks to be worsening (Deegan 2017). Overall, the current deterioration in environmental and social conditions demonstrates the inability of corporations and governments to meet their responsibilities. In addition, majority of governments perceive that people's environmental and social habits are best left to be determined by the free market (Deegan and Shelly 2014). As a result, they support corporations to put efforts into broadening corporate responsibility. According to the majority of recent market-based research, implementing effective ESG practices increases profits for businesses (Alareeni and Hamdan 2020; Zahid et al. 2022a, b, c). This is because these practices create and maintain a competitive advantage for companies (Russo and Perrini 2010) by building lasting connections with important business stakeholders (Freeman 2010). Some researchers argued that ESG reporting decreases the cost of capital and increases the overall firm value (Eliwa et al. 2021).

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The theoretical discussion of ESG performance can be explained by the organizational legitimacy theory. According to Ashforth and Gibbs (1990), firms adopt two approaches to environmental and social reporting: (1) the substantive approach, which depicts changes in environmental and social disclosure reflecting actual activities of the firms; and (2) the symbolic approach, which depicts the firms' behavior adopting societal standards while their actual functioning and policies remain unchanged. Companies adopt the second technique largely to persuade their important stakeholders, regardless of their actual standing, which they are committed to environmental and social norms (Michelon et al. 2015). As per recent ESG literature, limited attention is given to which reporting approach (substantive versus symbolic) is adopted by the companies to exhibit social and environmental performance. On the other hand, market-based studies relate environmental and social disclosure to the substantive approach (Khan et al. 2021).

These two contradictory viewpoints have inspired much research on the economic implications of ESG practices. Nevertheless, a few research assess the impact of ESG guidelines on capital financing patterns (Kempf and Osthoff 2007; Zhang et al. 2022), and little is known about the capital structure decisions of firms in relation to their ESG performance. Especially, under different ownership types such as state-owned enterprise(s) (hereafter SOEs) and non-state-owned enterprise(s) (hereafter non-SOEs). If the impact of ESG performance is merely symbolic, it has no impact on capital financing decisions or vice versa. Prior studies examining the relationship between ESG practices and capital structure are more concentrated on a specific region without yielding meaningful results (Cantino et al. 2017; Lindkvist and Saric 2020). In addition, to the best of our knowledge, no study focused on the different types of ownership structures (SOEs and non-SOEs) and audit quality.

Recently, the Chinese market has also seen rapid development in the realm of ESG reporting. At the beginning, it turned out to be the top priority of Chinese regulators, who wants to instigate an eco-friendly financial policy. Furthermore, the governmental efforts to balance economic growth and environmental sustainability are significant. In line with governmental interest, regulatory bodies and the stock exchange commission in China are preparing to introduce a mandated ESG disclosure framework for publicly listed enterprises to become carbon neutral by 2060. Additionally, foreign investors now have easier access to China's capital market, considerable impressive financial reporting by Chinese corporations is appealing to overseas investors because ESG factors heavily into the UN Principles for Responsible Investment (UNPRI) (Zhang et al. 2022). Furthermore, China has the biggest state asset system in the world. State-owned enterprises are the economic and political foundations

of the Communist Party of China and the Chinese state. China's SOEs have gone through several changes during the 1980s, and both good and bad effects have been seen on their performance. A "dual governance system" has formed throughout this time (Wang 2014). In the management and operation of SOEs, this structure entails the cohabitation of corporate and political governance (Wang 2014). According to Shleifer and Vishny (1997), corporate governance is concerned with how firms' financial suppliers ensure themselves of obtaining a return on their investment, with the goal of resolving the agency issues that result from the separation of ownership and control. Therefore, China provides the perfect empirical conditions to analyze our research question.

This study empirically explores the influence of ESG performance on capital financing patterns by using a sample of A-listed Chinese companies from 2010 to 2019. Further, it explores how ownership structure and audit quality intervene in this relationship. We suggest that a company's ESG policies are an important factor for financial institutions and investors to consider when evaluating the company's creditworthiness. The results show that firms performing well in ESG and its subcomponents E/S/G are less likely to rely on debt funding. In addition, this relationship is stronger in SOEs than non-SOEs and in local SOEs than central SOEs. Moreover, audit quality does not have any significant impact on this relationship. Based on legitimacy theory and research findings, we conclude ESG reporting boosts a company's credibility that increases access to cheap sources of capital financing. As a result, businesses prefer equity funding versus debt financing because the former inspires greater faith among investors.

This work contributes to the existing body of knowledge in multiple ways. First, it extends the inconsistent findings of the few previous studies that have evaluated the effect of firms' ESG performance and choice of financing (Cantino et al. 2017; Lindkvist and Saric 2020). Second, the current research is aided by an exclusive data set obtained from the Bloomberg database, which permits empirical analysis of an economy in transition. In addition, the impact of subcomponents of E/S/G on financing decisions is investigated. Third, we investigated this relationship for different ownership types, i.e., SOEs vs non-SOEs and local SOEs vs central SOEs. Lastly, the quality of auditing and assurance is vital in support of a symbolic or substantive approach to legitimacy. In order to extend the contribution of this work, we also investigate the moderating effect of audit quality in this relationship.

This paper's remaining sections are organized as follows. The "Literature review and hypothesis development" section focuses on the prior research and presents researchable hypotheses. The "Data and methodology" section discusses the design of the empirical study. The "Results

and discussions" section summarizes tests and results. The "Conclusions" section concludes the investigation.

Literature review and hypothesis development

ESG and capital structure

Global attention has been drawn to the rise of sustainable and responsible investing in the response to climate change, economic distress, and serious environmental concerns. The awareness of responsible investment has transformed the dynamics of asset allocation decisions, which are not only dependent on financial information but also consider the long-term impact on non-financial information, which mainly consists of environmental, society, and governance (hereafter referred to ESG). According to the UN's Principles of Responsible Investment (UNPRI), the globe has experienced an enormous expansion in firms adopting ESG as a crucial driver in investment decision-making. For instance, 63 companies started to join the UNPRI disclosure policy in 2006, which rose to 3826 institutions in 2020, and the numbers are constantly increasing.[1] Similarly, ESG assets increased from US$ 6.5 trillion in 2006 to US$ 121 trillion in 2021 as a result of investors' interest in the successful growth of companies' responsible investments. Asia–Pacific is the leader with a growing number of assets monitored under the umbrella of ESG. Particularly, the Chinese capital market has witnessed tremendous growth in ESG and sustainable investment. The increasing trend of ESG in China is due to two main reasons. Firstly, regulatory bodies in China are pushing hard to encourage green finance. As one of the greatest economies in the world, China is committed to harmonizing the economic and environmental challenges. Secondly, with its opening-up policy, China seeks to invite the world to invest in Chinese listed firms by making ESG disclosure mandatory (Zhang et al. 2022). Despite the exponential growth of ESG disclosure in China's corporate sector, finding a reliable source of ESG data remains an issue. For instance, firms choose selective information for ESG disclosure to provide investors with misleading and incorrect information (Jin and Myers 2006). However, existing studies on ESG have produced inconsistent results in favor of the financial success of the companies. Some of the results advocate for the shareholder's benefit by supporting ESG disclosures (Cormier and Magnan 2015),

whereas others suggest that ESG disclosure increased the likelihood of insider trading and insolvency (Tian and Wang 2017). In contrast, an increasing number of studies attempt to establish a relationship between ESG and financial performance, but unable to provide similar results (Wong et al. 2018).

The capital structure has a significant impact on the financial, corporate, and social health of the firms. It has been studied that the more socially responsible a company is, the more it relies on equity financing compared to debt financing (Pijourlet 2013). In addition, the firms' inclination towards social elements benefitted from reliable equity finance; also, environmental considerations influenced the capital structure (Pijourlet 2013). Moreover, the agency theory supports the governance component, claiming that the greater the quality of governance, the fewer disputes are likely to occur that ultimately results in reduced agency costs and level of debt (Jiraporn and Gleason 2007). There is an increasing number of yet relatively few research on ESG disclosure and its effect on organizations' financial leverage. This study aims to investigate the relationship between ESG performance and the financial leverage of Chinese publicly traded companies. It is considered that firms adhering to ESG investment principles have greater risk mitigation capabilities and can generate consistent, sustainable financial returns (Limkriangkrai et al. 2017). Two fundamental financial theories are being used to pave the theoretical ground. First is the trade-off hypothesis, which determines the firm's capital structure and degree of financial leverage (Modigliani and Miller 1958). In contrast, the pecking order theory emphasizes the propensity of utilizing internal money under unfavorable and adverse circumstances (Myers 1984). As per recent studies, the capital structure of the firms is influenced by various factors, including the institutional environment (Öztekin and Flannery 2012), transactional costs (Liao et al. 2015), and macroeconomic conditions (Cook and Tang 2010). Good governance can benefit stakeholders by helping to optimize leverage and adjust a firm's capital structure (Kieschnick and Moussawi 2018). Furthermore, in the event of bankruptcy risk, a firm may choose not to inject additional funds to protect its reputation (Maksimovic and Titman 1991), as a company that values its employees and reputation is likely to operate with higher equity rather than high leverage. It is worth noting that companies tend to prioritize social, governance, and environmental considerations when making investments, which can motivate them to disclose ESG information and ultimately affect their capital structure.

According to Hoepner et al. (2016), environmental and social factors can affect the loan structure and cost of financing. However, the effect is not symmetrical in relation to the equity's availability. It is important to note that the loan structure of a firm may depend on the type of credit it has access to, such as bank credit, bonds, or debentures, and

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[1] Launched in April 2006 with support from the UN, this is an international investor network that works to promote the incorporation of ESG factors into investment decision-making. Source of PRI members' data: https://dwtyzx6upklss.cloudfront.net/Uploads/m/d/t/globalaumandaoaumexternaluse2_406229.xlsx

this can depend on the company's relationships with lenders and other borrowers (Nandy and Lodh 2012). In contrast, corporations are more likely to fund their company assets with debt in order to improve their brand or conceal financial inconsistencies, so allowing them to pay for socially responsible activities (Bacha et al. 2021). Bhuiyan and Nguyen (2019) found that lenders tend to view firms with ESG disclosures as low-risk clients and offer them loans at lower rates. In addition, organizations with greater leverage utilize ESG as a hedge against bankruptcy risk and to preserve shareholder interests (Huang and Ye 2021).

On the contrary, according to several studies, socially and environmentally responsible organizations tend to have lower debt-to-equity ratios (Pijourlet 2013). This benefits the social contribution from the firms where lower leverage allows the firms to utilize their free cash flow for the benefit of stakeholders (Jensen 1986). ESG disclosures, which require firms to consider and safeguard the financial and non-financial interests of all stakeholders (Freeman et al. 2010), may also lead to a decrease in the cost of equity (Ferris et al. 2017) due to increased transparency and reduced asymmetric information among stakeholders (Ferris et al. 2017). It is pertinent to mention that efforts made by firms to address environmental risk may also be rewarded by a reduction in the cost of equity (Crifo and Forget 2015). Theoretically, the reduction in the cost of equity resulted in a negative relationship between ESG disclosure and financial leverage; there are consistent results in the context which can be found in various studies (see Cantino et al. (2017)). Based on these findings, the following hypothesis can be formulated.

H1: Firms with higher ESG disclosure have lower financial leverage.

Firm's ownership, ESG, and capital structure

Next, we consider how SOEs and non-SOEs interact between ESG and capital structure. In today's global economy, the type of ownership including SOEs and non-SOEs gained significant importance. For instance, in 2000, there were 27 SOEs in the Fortune Global 500 (FG500); by 2017 the number increased to 102, accounting for 20% of the FG500. Notably, 9 of the 27 FG500 SOEs were from China in 2000; however, by 2017 75 out of 102 were from China. Furthermore, on the global front, China has around 150,000 SOEs, including 75 FG500 companies. Since China's economic reform started in 1978, SOEs have grown in number and were successful in capturing market value. The given stats demonstrate China's SOEs are important for the local and global markets. Therefore, numerous studies on SOEs in academic circles are based on the Chinese market (see Jiang and Kim 2020; Lu and Zhu 2020). Although state-owned

firms are the government's extension, it also has a substantial influence on the firm's objectives, executives' pay, resource allocation, transparency to the public, and overall performance (Lin et al. 2020; Wong et al. 2016; Xin et al. 2019). Some hold the opinion that environmental or social concerns should be handled by governments rather than companies as the governments have stronger problem-solving ability. According to Hart and Zingales (2017), state-owned enterprises may be better positioned to cope with market failures. On the other hand, the governments and the companies may have other motives that discourage ESG or CSR activity. However, the empirical evidence is more compatible with the first assumption, though not uniformly Boubakri et al. (2019) found that before privatization, privatized enterprises had higher ESG/CSR ratings in aggregate, and on both the environmental and social dimensions, than comparable publicly owned firms. Additionally, the authors found that state ownership and the government's political climate have a role in affecting this relationship. Hence, based on the above argument, we contend that compared to another type of ownership (non-state-owned enterprise), the state-owned enterprise has lower financial leverage due to government involvement in environmental and social concerns. Thus, we proposed following hypothesis H2:

H2: Compared to firm-type ownership, the negative impact of ESG on financial leverage is more pronounced in SOEs than non-SOEs.

One distinguishing feature of Chinese SOEs is concentrated ownership, with the central or local governments serving as the main shareholder. However, after 2003, the system of managing state-owned assets has been reformed. This wave of reform attempts to address the issue of ambiguous ownership rights, such as to know the actual ownership of SOEs; the report of the communist party of China (CPC's) 16th National Congress, issued in November 2002, stressed that the government needed to establish a system for managing state-owned assets, through which the central and local governments could assume the responsibilities of shareholders on behalf of the state in terms of interests, rights, duties, and obligations. Moreover, the report clearly outlined the central and local governments' duties in controlling various kinds of SOEs (local and central). For example, the central government should be the owner of big SOEs in areas deemed critical to the nation's economic and national security (such as infrastructure building or natural resource production), while local governments should be the owners of smaller and less essential SOEs.

As a result, China formed the State-owned Assets Supervision and Administration Commission (SASAC) in March 2003 to act as the central government's shareholder for major and significant SOEs. SASAC is an agency

that reports directly to the State Council and acts as the state's stakeholder in SOEs. However, unlike the executive branch, SASAC does not perform any public administrative functions. SASAC oversaw 189 SOEs known as "central SOEs" at the time of its inception, with RMB6.9 trillion (about US$1 trillion) in assets by the end of 2002. SASAC initiated central SOE board reform in 2003 in order to expand the number of outside directors and strengthen their monitoring role in business operations. Prior to the board reform, the boards of directors of central SOEs overlapped with their top management, undermining their function in monitoring and advising the management team. The board reform mandates all parent businesses of central SOEs to employ independent directors to serve on corporate boards. SASAC-2 standards provide that outside directors must participate in strategy, finance, and investment choices, as well as select and assess SOE's management. Furthermore, 90% of the central SOEs had finished or were in the process of completing this board reform by the end of 2018.

Therefore, based upon SASAC initiated toward central SOEs, we argue that due to the strong monitoring function in central SOEs businesses, the impact of ESG on financial leverage is higher than local SOEs. Hence, the following hypothesis (H3) has been developed:

> H3: Compared to the type of SOEs, the impact of ESG on financial leverage is higher on central SOEs business than local SOEs

Data and methodology

Data description and sample selection

A sample of Chinese A-listed companies was assembled based on data from 2010 to 2019. This period is selected because Chinese A-listed companies started disclosing ESG-related information after 2009, and 2019 is the final year to get impartial findings from COVID-19 effects (Broadstock et al. 2021). We did not include firms in the finance and insurance industries, firms with special treatment or transfers, or firms whose key information variable was missing. Finally, we "winsorized" continuous variables at the 1% levels to reduce bias from outliers or extreme values. The final data included 6295 firm-year observations.

ESG disclosure information was gleaned from the Bloomberg database, and corporate finance and accounting statistics come from the China Stock Market and Accounting Research Database (CSMAR), a centralized repository concentrating on the Chinese economy and finance.

Variable measurements

Key variables

Following Ezeani et al. (2022), market-based financial leverage (Mklev) and book-based financial leverage (Bklev) are utilized as proxies for capital structure dynamics. As both represent the entire capital structure dynamics, book-based financial leverage alone is not the optimal indicator for capital structure decisions (Kieschnick and Moussawi 2018).

The current research is examining the relationship between a company's environmental (E), social (S), and governance (G) performance, as measured by its ESG score and its three sub-scores (E/S/G), and financial outcomes. The ESG score is a composite index created by Bloomberg that includes various financial and non-financial indicators and is used to evaluate a company's sustainability reporting and support the incorporation of ESG analysis into investment decisions.

In order to gather data for the ESG score and its subcategories (environmental, social, and governance), Bloomberg uses a variety of public sources including annual reports, sustainability reports, company websites, and other publicly available information. In addition, Bloomberg may directly contact companies for additional data. The assessment methodology includes over 120 data elements, which are standardized and combined to create a cumulative ESG score and three sub-scores. Scores for the ESG score range from 0 for companies that disclose minimal ESG data to 100 for companies that disclose all the data points requested by Bloomberg. Previous research has only included a dummy variable to indicate whether a company publishes an ESG report, but the Bloomberg ESG disclosure score assesses these reports and statements quantitatively, considering established rules and principles to provide a more comprehensive understanding. It is important to consider the separate subcomponents of the ESG score (environmental, social, and governance) because the influence of one aspect, such as the environment, on another, such as sustainability, may cancel out the overall effect (Buallay et al. 2021). By analyzing the overall ESG score and its subcomponents, we can determine which elements of the ESG score are the key drivers of capital structure decisions.

Three variables are used as moderators, i.e., SOEs vs non-SOEs, local SOEs vs central SOEs, and audit quality. Table 1 presents the definitions of the variables.

Control variables

There are several factors that must be considered while determining the optimal capital structure for a company. In line with Berger and Di Patti (2006) and Ezeani et al. (2022), this study included a wide range of financial characteristics

Table 1 Descriptive statistics ($N = 6117$)

Type	Definition	Mean	Median	St. dev	p25	p75
Independent variable						
ESG	Bloomberg total score of ESG from 0 to 100	0.201	0.194	0.065	0.157	0.227
E	Bloomberg total score of environment activity from 0 to 100	0.088	0.078	0.077	0.031	0.116
S	Bloomberg total score of social activity from 0 to 100	0.224	0.228	0.099	0.175	0.281
G	Bloomberg total score of governance activity from 0 to 100	0.443	0.446	0.05	0.393	0.482
Dependent variable						
Mklev	$Mklev_{it} = FD_{it} / MkCap_{it}$ $Mklev_{it}$ denotes the firm's i market-based financial leverage at time t, and FD_{it} represents the composite of short-term and long-term financial debts (STFD + LTFD) for the firm i at time t. $MkCap_{it}$ refers to the market capitalization of firm i for the time t	0.316	0.267	0.22	0.128	0.479
Bklev	$Bklv_{it} = STD_{it} + LTD_{it} / TA_{it}$ $Bklev_{it}$ (book-based financial leverages) for the firm's i at time t. $STD_{it} + LTD_{it}$ denotes the short-term and long-term debts, respectively, for firm's i at time t. Moreover, TA_{it} is total assets for the firm i and time t	0.464	0.47	0.206	0.302	0.628
Firm-level control variable						
Board size	Natural logarithm of the number of directors on the board	9.061	9	1.866	8	9
Board inde	Logarithm of total number of independent directors	0.372	0.333	0.054	0.333	0.4
HHI	Herfindahl–Hirschman Index of market concentration to measure the market competition	0.305	0.312	0.26	0.052	0.502
Retiring CEO	A dummy variable equals 1 if CEO's age is equal to or more than 63 years	0.019	0	0.137	0	0
CEO duality	A dummy variable = 1 if CEO serves as the chairman of the board	0.206	0	0.405	0	0
ROA	The ratio of earnings before interest and tax and total assets	0.045	0.038	0.057	0.015	0.073
Size (TA)	The natural logarithm of firm total assets	22.907	22.812	1.237	22.005	23.702
NOA	Net operating assets	2.05	1.519	2.161	0.989	2.339
Z-score	Altman's Z-score of financial distress vs. flexibility	1.005	0.946	0.782	0.558	1.432
Interaction variable						
AuditbyBig4	It is a dummy variable in which the Big4 auditor is counted as "1" if they have audited the company's financial accounts and "0" otherwise	0.079	0	0.27	0	0
SOE vs non-SOE	A dummy variable takes value 1 if firm is controlled by government, 0 otherwise	0.03	0	0.17	0	0
Local SOEs vs central SOEs	A dummy variable takes value 1 if firm is controlled by local government, 0 otherwise	0.308	0	0.462	0	1

The entire sample of variable definition and descriptive statistics for the primary variables utilized in this study are presented in Table 2 panels A and B. Each variable's first three columns of panel B show the values of (mean, median, and standard deviation) and the last three columns show the (lowest, highest value, and number of observations) accordingly

as control variables which include company size, which has been found to influence the capital structure decisions of smaller and younger firms that may be seeking greater visibility through CSR efforts but may also be constrained by budget limitations. The study is also controlled for business performance using the return on assets (ROA) and included financial flexibility (Z-score) and net operating assets (NOA) as control variables as they also have an impact on capital structure decisions.

In addition to firm characteristics, there are certain aspects of corporate governance that can also affect capital structure decisions. Therefore, board size, board independence, and the percentage of shares held by the largest shareholder (HHI) are also included as control variables to account for potential agency costs (Chow et al. 2018). Furthermore, the influence of CEO characteristics on capital structure decisions is also considered the control variable by including variables such as retiring CEOs and CEO duality (Ezeani et al. 2022). A dummy variable called Duality (DUAL) is used to indicate whether the CEO and chairman are the same person. All of the given factors are evaluated on an annual basis.

Econometric model

The study employed a panel regression model considering the impact of the fixed effect on the year and industry levels. The *p*-value of less than 0.05 from the Hausman test indicates that the fixed-effect model should be selected over the random-effect model in this study. Further, industry- and year-fixed impacts captured the industry- and time-unobservable aspects. To evaluate predicted correlations between ESG and capital structure decisions, the following multivariate regression model is estimated.

$$Lev_{i.t} = \alpha_{i.t} + \delta_1 ESG_{i.t} + \delta_{CG} CG_{i.t} + \delta_x X_{i.t} + \theta_i + \xi_t + \varepsilon_{i.t} \tag{1}$$

In Eq. 1, the left-hand side of the equation $Lev_{i.t}$ denotes the market-based financial leverage (Mklev) and book-based financial leverage (Bklev), respectively. The subscript *i* represents the firms and *t* the time in the year throughout current research. ESG represents Bloomberg's Environment, Social, and Governance scores and is alternatively subcomponents. CG represents corporate governance-related control variables (i.e., corporate board size, number of meetings, Herfindahl Henriksen Index (HHI), retiring CEO, and CEO duality). X represents the company-specific control variables, i.e., return on assets (ROA), size (TA), net operating assets (NOA), and financial flexibility (Z-score). We include the industry and year dummies to prevent frequent endogeneity difficulties arising across sectors and nations over time. ϵ is the residual or error term.

Results and discussions

Descriptive statistics

The descriptive statistics for the variables used in the analysis are presented in Table 1. The range of values for the ESG score is 1.24 to 64.11, indicating a significant variation in ESG practices among Chinese firms. In addition, the mean ESG score is 20.021, which is lower than those typically seen in the USA and Europe, suggesting a general lack of awareness and incentives for greater transparency and disclosure of ESG practices in China (Zhang et al. 2022). The mean values of the subcomponents of the ESG score are 8.65 for the environmental (E) score, 22.29 for the social (S) score, and 44.34 for the governance (G) score. On the other hand, the mean value of financial leverage is 0.32/0.47 (market/book-based), indicating that on average, 47% of a firm's capital is financed through debt according to the book-based measure, and 32% according to the market-based measure (Raimo et al. 2021). The mean value of 0.07 for Big4 auditors indicates that most

firms are audited by non-Big4 auditors, which may suggest a lower overall audit quality (Bacha et al. 2021).

ESG and capital financing

We run panel regression analysis with year- and industry-fixed effects to examine the relationship between the combined ESG score and its individual components (environmental, social, and governance) and capital structure dynamics, as measured by market-based and book-based financial leverage. Table 2 presents the results of eight models. Models I to IV in columns 2 to 5 examine the relationship between the combined ESG score and its individual components and market-based financial leverage, while models V to VIII in columns 6 to 9 examine the relationship between these variables and book-based financial leverage. The coefficient in column 2 of the first regression model, which examines the relationship between the combined ESG score and market-based financial leverage, shows a significant negative relationship with an *R*-squared of 0.33, indicating that it explains approximately 33% of the variance in the selected model. The coefficients for the combined ESG score and its individual components in columns 2 to 9 are all negative and statistically significant, indicating that companies with higher levels of ESG disclosure tend to have lower levels of debt financing. This may be because investors have greater confidence in the shares of Chinese listed companies with higher levels of ESG disclosure, enabling these companies to more easily access funding through the stock market.

In terms of economic significance, the increment in ESG disclosure of one standard deviation is associated with a 2.8% reduction in the potential for debt financing. The control variables are found to be significantly related to capital structure dynamics as follows: board size, return on assets (ROA), and size are positively correlated with both types of financial leverage, while financial flexibility (measured by the Z-score) is negatively related to both types of financial leverage. This indicates that companies with higher financial flexibility tend to choose equity financing over debt financing (which tends to be more costly). Companies that are well-organized, are larger in size, have higher returns, and have a large board are more likely to have confidence in the debt market and be able to access credit more easily. Board independence and retiring CEOs do not have a significant impact on financial leverage. Ownership concentration (measured by the HHI) is negatively related to market-based financial leverage and positively related to book-based financial leverage. Net operating assets (NOA) are negatively correlated with book-based financial leverage

Table 2 ESG and capital structure relationship

Variables	Financial leverage (market value based)				Financial leverage (book value based)			
	I	II	III	IV	V	VI	VII	VIII
ESG	−0.028***				−0.014***			
	(0.0032)				(0.0025)			
E		−0.014***				−0.069***		
		(0.0026)				(0.0020)		
S			−0.020***				−0.061***	
			(0.0019)				(0.0015)	
G				−0.019***				−0.025***
				(0.0037)				(0.0028)
Board size	0.034***	0.038***	0.034***	0.039***	0.033***	0.035***	0.034***	0.034***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.010)	(0.010)	(0.010)	(0.099)
Board inde	0.039	0.041	0.041	0.038	0.011	0.012	0.012	0.0074
	(0.036)	(0.036)	(0.036)	(0.036)	(0.028)	(0.028)	(0.028)	(0.028)
HHI	−0.016***	−0.014***	−0.017***	−0.011**	0.014***	0.015***	0.015***	0.016***
	(0.0046)	(0.0046)	(0.0046)	(0.0046)	(0.0036)	(0.0036)	(0.0036)	(0.0354)
Retiring CEO	−0.0136	−0.0147	−0.0138	−0.0156	0.0322	0.0264	0.0261	0.0262
	(0.0106)	(0.0107)	(0.0106)	(0.0107)	(0.0834)	(0.0835)	(0.0835)	(0.0830)
CEO duality	−0.053	−0.050	−0.052	−0.043	−0.074**	−0.072**	−0.073**	−0.068**
	(0.0412)	(0.0414)	(0.0411)	(0.0414)	(0.0322)	(0.0323)	(0.0323)	(0.0321)
ROA	1.669***	1.707***	1.648***	1.694***	3.796***	3.815***	3.801***	3.789***
	(0.0900)	(0.0902)	(0.0897)	(0.0903)	(0.0693)	(0.0693)	(0.0695)	(0.0690)
Size (TA)	0.0803***	0.076***	0.081***	0.075***	0.047***	0.046***	0.046***	0.046***
	(0.0248)	(0.0245)	(0.0244)	(0.0237)	(0.0192)	(0.0190)	(0.0190)	(0.0182)
NOA	−0.0093	−0.0104	−0.0073	−0.0078	−0.021***	−0.022***	−0.020***	−0.018***
	(0.00913)	(0.00918)	(0.00910)	(0.00918)	(0.00705)	(0.00706)	(0.00706)	(0.00702)
Z-score	−0.204***	−0.208***	−0.203***	−0.206***	−0.406***	−0.408***	−0.407***	−0.405***
	(0.0785)	(0.0787)	(0.0782)	(0.0788)	(0.0605)	(0.0604)	(0.0606)	(0.0602)
Constant	−1.374***	−1.341***	−1.402***	−1.228***	−0.392***	−0.376***	−0.379***	−0.287***
	(0.0595)	(0.0601)	(0.0594)	(0.0590)	(0.0461)	(0.0465)	(0.0462)	(0.0454)
Firm effect	YES	YES	YES	YES	YES	YES	YES	YES
Year effect	YES	YES	YES	YES	YES	YES	YES	YES
Obs	6,166	6,166	6,166	6,166	6,294	6,294	6,294	6,294
R-squared	0.337	0.331	0.342	0.331	0.560	0.558	0.559	0.564

The estimated coefficients from OLS panel regressions of ESG and its component (E/S/G) on financial leverage variables based on market and book value are shown in Table 2. The findings for financial leverage (market value based) are shown in columns 1 to 4 and findings for financial leverage (book value based) are present in columns 5 to 8. Year- and firm-fixed effects are included in all models. The standard errors are displayed in parentheses. Statistical significance is indicated at 1%, 5%, and 10% levels, by ***, **, and *, respectively. At the 1% level, continuous variables are winsorized

SOEs vs non-SOEs, ESG, and capital structure

Since, the ownership concentration among enterprises is very common in an economy like China, because the government is a major stakeholder in state-owned enterprises and more involved in environmental and social concerns than non-SOEs; thus, we analyzed the relationship between ESG and financial leverage at different types of ownership SOEs vs non-SOEs. Table 3 (sub-component of ESG is not reported for brevity) depicts the finding for a subsample of SOEs and non-SOEs from columns 1–4. Where the coefficient of ESG with two variables of financial leverage (Mklev and Bklev) −0.260 and −0.157, significant at 1%, while the coefficient of ESG at the non-SOE sample is −0.212 and −0.070, significant at 1% and 5%. The result indicates that state-owned enterprises are more concerned with environmental and social initiatives than non-SOEs, resulting in lower financial leverage. However, comparing the outcomes of state and non-state-owned enterprises revealed that state-owned enterprises invest more and favorably in ESG than non-state corporations, which confirms our second hypothesis (H2).

Table 3 Firm ownership (SOEs vs non-SOEs), ESG, and capital structure

Variable	SOEs		Non-SOEs	
	Mklev	Bklev	Mklev	Bklev
	I	II	III	IV
ESG	−0.260***	−0.157***	−0.212***	−0.070*
	(0.043)	(0.030)	(0.048)	(0.040)
Board size	0.005***	0.003***	0.003	0.004**
	(0.002)	(0.001)	(0.002)	(0.002)
Board inde	0.058	−0.040	0.036	0.108**
	(0.044)	(0.032)	(0.062)	(0.051)
HHI	−0.027***	0.017***	−0.008	0.002
	(0.007)	(0.005)	(0.006)	(0.005)
Retiring CEO	−0.038	−0.015	−0.001	0.010
	(0.024)	(0.017)	(0.011)	(0.010)
Duality	0.002	−0.004	−0.008	−0.008*
	(0.007)	(0.005)	(0.005)	(0.004)
ROA	2.631***	4.404***	1.570***	4.139***
	(0.143)	(0.098)	(0.130)	(0.108)
Size (TA)	0.091***	0.041***	0.076***	0.052***
	(0.004)	(0.003)	(0.003)	(0.003)
NOA	−0.002	−0.001	−0.002*	−0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Z-score	−0.300***	−0.476***	−0.190***	−0.424***
	(0.013)	(0.009)	(0.011)	(0.009)
Constant	−1.584***	−0.173**	−1.298***	−0.538***
	(0.098)	(0.069)	(0.083)	(0.068)
Firm effect	YES	YES	YES	YES
Year effect	YES	YES	YES	YES
Obs	3125	3125	2986	2986
R-squared	0.345	0.593	0.367	0.584

Table 3 shows the result of ESG and financial leverage at different types of firm ownership. The findings of SOEs for financial leverage (market and book value based) are shown in columns 1 and 2 and the findings of non-SOEs for financial leverage (market and book value based) are present in columns 3 and 4. Year- and firm-fixed effects are included in all models. The standard errors are displayed in parentheses. Statistical significance is indicated at 1%, 5%, and 10% levels, by ***, **, and *, respectively. At the 1% level, continuous variables are winsorized

Type of SOEs, ESG, and capital structure

In this section, we examine whether the effect of ESG on capital structure varies at different types of SOEs. Since the state-owned enterprise is the main extension of the Chinese government, to operate efficiently, the Chinese government divides them into central and local SOEs, which give the right to the central and local governments to take responsibility on behalf of the state, by considering the major stakeholder of the central government in SOEs. Table 4 (sub-component of ESG is not reported for brevity) shows

Table 4 Local SOEs vs central SOEs, ESG, and capital structure

Variable	Local-SOEs		Central-SOEs	
	Bklev	Mklev	Bklev	Mklev
	I	II	III	IV
ESG	−0.150***	−0.250***	−0.327***	−0.199
	(0.037)	(0.052)	(0.146)	(0.222)
Board size	0.001	0.003	0.003	0.003
	(0.001)	(0.002)	(0.005)	(0.007)
Board inde	−0.059	0.002	−0.046	0.104
	(0.039)	(0.053)	(0.154)	(0.234)
HHI	0.001	−0.057***	−0.001	−0.005
	(0.006)	(0.008)	(0.022)	(0.034)
Duality	−0.008	−0.014*	−0.009	0.046
	(0.006)	(0.008)	(0.021)	(0.033)
ROA	4.947***	3.132***	2.795***	1.124
	(0.135)	(0.189)	(0.380)	(0.746)
Size (TA)	0.038***	0.088***	0.059***	0.087***
	(0.004)	(0.005)	(0.010)	(0.015)
NOA	0.000	−0.001	0.009	0.006
	(0.001)	(0.001)	(0.010)	(0.015)
Z-score	−0.513***	−0.343***	−0.348***	−0.149**
	(0.012)	(0.017)	(0.037)	(0.072)
Constant	−0.066**	−1.421***	−0.620***	−1.712***
	(0.091)	(0.127)	(0.220)	(0.342)
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Obs	1886	1854	1083	1083
R-squared	0.616	0.396	0.612	0.349

Table 5 shows the result of ESG and capital structure at different types of SOEs. The standard errors are shown in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. At the 1% level, continuous variables are winsorized. Table 1 provides the definition of all variables

the finding of a subsample of local SOEs in columns 1 and 2 and central SOEs in columns 3 and 4. We find that the coefficient of ESG for central SOEs is stronger and more significant at the 1% level in both variables of capital structure (Bklev) respectively. However, the coefficient of ESG for local SOEs is less pronounced suggesting the effect of ESG on capital structure is more stringent in central SOEs when compared to local SOEs. These results support our H3. Other control variables in Table 5 carry the anticipated indications if significant.

Audit quality, ESG, and capital structure

Organizations engage one of the Big Four auditing firms to enhance the reliability of information provided to stakeholders. The rigor and objectivity of an audit may reveal a company's commitment to transparent financial reporting and

Table 5 Audit quality in ESG and capital structure

	SEOs		Non-SOEs		Local-SOEs		Central-SOEs	
	Bklev	Mklev	Bklev	Mklev	Bklev	Mklev	Bklev	Mklev
	I	II	III	IV	V	VI	VII	VIII
ESG	− 0.018***	− 0.025***	− 0.009**	− 0.030***	− 0.245***	− 0.184***	− 0.242	− 0.306**
	(0.003)	(0.005)	(0.004)	(0.005)	− 0.057	− 0.041	− 0.216	− 0.147
Big4Auditor	− 0.029*	− 0.013	− 0.002	− 0.008	0.016	− 0.034	− 0.045	0.209
	(0.017)	(0.023)	(0.028)	(0.034)	− 0.029	− 0.021	− 0.299	− 0.201
Big4 x ESG	0.014**	− 0.004	0.011	− 0.006	− 0.027	0.157**	− 0.488	− 1.058
	(0.006)	(0.009)	(0.011)	(0.013)	− 0.11	− 0.08	− 1.302	− 0.872
Constant	− 0.17**	− 1.59***	− 0.53***	− 1.31***	− 1.42***	− 0.07***	− 1.66***	− 0.64***
	(0.069)	(0.098)	(0.069)	(0.083)	− 0.128	− 0.091	− 0.333	− 0.223
CG control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year/firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	3125	3125	2986	2923	1854	1886	1077	1083
R-squared	0.593	0.346	0.584	0.368	0.396	0.617	0.402	0.619

Table 5 shows the moderating role of auditing quality in ESG and capital structure at different types of firm ownership and SOEs. "Big4" refers to the world's four major auditing service providers. The standard errors are shown in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. At the 1% level, continuous variables are winsorized. Table 1 provides the definition of all variables

the evolution of its disclosure policies (Kausar et al. 2016). Indeed, Chen et al. (2016) indicate that firms' non-financial disclosures (such as ESG reporting) benefit from higher quality financial data. The firms' commitment to high-quality auditors bolsters the credibility of the annual report's content, including supplementary data provided voluntarily (ESG reporting) (Zahid et al. 2022a, b, c). Firms with a strong commitment to environmental and social responsibility frequently use the "big four" auditing firms and maintain high reporting standards, indicating that they place a priority on openness and integrity in their operations. In addition, it fosters the faith of lenders and investors in organizations that offer easy financing (Trpeska et al. 2017).

Since audit quality is an important factor in attracting capital for a company. Following Zahid et al. (2022a, b, c), we use an interaction term between Big4 auditors and the combined ESG score to examine the moderating effect of audit quality on the relationship between ESG and capital financing. Table 5 presents the results of eight-panel regression models that include controls for corporate governance and firm characteristics, as well as year and industry fixed effects. Models I to IV in columns 2 to 5 examine the moderating effect of audit quality on the relationship between the combined ESG score and financial leverage with respect to the ownership type (i.e., SOEs vs non-SOEs), while models V to VIII in columns 6 to 9 examine the moderating effect of audit quality on the relationship between these variables with respect to the type of SOEs, i.e., local SOEs vs central SOEs.

The coefficients for the combined ESG score in columns 2 to 9 are all negative and statistically significant, indicating

a negative relationship with financial leverage, similar to the results obtained without introducing an audit quality moderator (see Tables 2, 3 and 4). As shown in Table 4, the interaction term between audit quality and ESG score does not appear to have a statistically significant effect on financial leverage, except for the book value-based leverage in SOEs and market-based leverage in local SOEs. However, this effect is small, so we can conclude that audit quality does not play a moderating role in the relationship between the ESG score and capital financing decisions. This may be because a large proportion of auditing in the Chinese market is performed by non-Big4 firms. Additionally, the ESG score is thought to signal the quality of a company's performance and value.

Robustness analysis

We conducted several sensitivity analyses to determine the robustness of our primary findings. The results of these sensitivity tests did not differ significantly from the original analysis. Table 6 represents the results of the sensitivity analysis and endogeneity tests we conducted. To examine the effect of ESG/E/S/G on financial leverage, we used a dynamic sysGMM panel estimator that considers the dynamic interactions between the explanatory factors and any potential bias from unobserved time-invariant heterogeneity. This method is less prone to omitted-variable bias and endogeneity issues. The sysGMM results, shown in Table 6, support our main findings that the coefficient for ESG/E/S/G is significantly negative.

Table 6 Robustness analysis

Variables	Financial leverage (market value based)				Financial leverage (book value based)			
Panel A: GMM estimation								
ESG	−0.054***				−0.078***			
	(0.0017)				(0.0014)			
E		−0.061***				−0.063***		
		(0.0014)				(0.0011)		
S			−0.013				−0.022**	
			(0.0011)				(0.0087)	
G				−0.068***				−0.11***
				(0.0021)				(0.0016)
Mklev($t-1$)	0.584***	0.583***	0.585***	0.585***				
	(0.0798)	(0.0798)	(0.0798)	(0.0799)				
Bklev($t-1$)					0.50***	0.49***	0.50***	0.50***
					(0.0689)	(0.0689)	(0.0690)	(0.0689)
CG controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4971	4971	4971	4971	5194	5194	5194	5194
ID	886	886	886	886	888	888	888	888
Panel B: Reverse casualty-lag estimations								
ESG($t-1$)	−0.011***				−0.014***			
	(0.0041)				(0.0038)			
E($t-1$)		−0.0041				−0.0034		
		(0.0034)				(0.0032)		
S($t-1$)			−0.012***				−0.056***	
			(0.0023)				(0.0021)	
G($t-1$)				0.0025				−0.030***
				(0.0044)				(0.0041)
CG controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5083	5083	5083	5083	5193	5193	5193	5193
R-squared	0.143	0.142	0.148	0.142	0.183	0.181	0.182	0.190
ID	888	888	888	888	888	888	888	888

Table 6 shows the robustness analysis of the study. In panel A, we utilized GMM estimation, while panel B shows the result of reverse causality, all the result remains the same after changing the model specification and estimation techniques. The standard errors are shown in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Table 1 provides the definition of all variables

Secondly, to address the possibility of reverse causality in our regression equations, we analyzed the impact of ESG and independent E/S/G on financial leverage using independent variables from the previous time period ($t-1$). The results, shown in panel b of Table 6, demonstrate a significant negative correlation between ESG/E/S/G and financial leverage, consistent with our primary regression model. The new estimates are not included here as they are similar to the previous ones. Overall, our sensitivity analysis, endogeneity test, and sample selection test all support our primary findings and demonstrate that the results are robust in the face of these statistical issues.

Conclusions

China's public awareness of sustainable development has expanded in recent years, resulting in a growing interest in ESG-related concerns. This study used the Bloomberg ESG score as an indicator of corporate ESG performance to investigate how ESG investment influences Chinese firms' capital structure. The paper covered a considerable sample from A-listed firms in China taking into account a larger period under study. The following are the most significant findings from the investigation: First, we establish that ESG performance is inversely correlated with financial leverage, i.e., debt financing. Second, ESG pillars

supported the principal conclusions. A better ESG performance facilitates firms' access to stock markets and reduces their reliance on debt funding. Furthermore, we segregated the firms based on the types of ownership, i.e., SOEs and non-SOEs. The results showed that firms with state ownership have a better influence on ESG disclosures and showed better ESG performance resulting in a negative and significant effect on capital structure compared to non-SOEs. Interestingly, in the context of China, we further decomposed the sample of SOEs into two further types, i.e., central SOEs and local government SOEs. The results showed a pronounced effect of ESG on financial leverage in the case of central SOEs compared to local govt. SOEs. Finally, we employ the Big4 auditor as a moderating variable for audit quality to demonstrate how audit guarantees function in the ESG-capital financing dynamics. However, empirical research reveals that audit quality has no meaningful effect on this association.

The implication of this research is manyfold. Companies ought to acknowledge the necessity to integrate ESG into their operations in order to achieve economic benefits in China, a rising nation. Given the comprehensive character of ESG indicators and the fledgling stage of ESG development in developing nations, investors choose ESG shares (Zhang et al. 2022) that improve companies' access to low-cost financing. In addition, since the Big4 audit is insignificant, improving ESG performance is expected to strengthen the credibility of firms. In general, higher ESG scores cut firm finance costs by increasing equity financing. Consequently, both stocks with high and low ESG ratings may create spectacular returns. Second, governments in growing economies such as China should swiftly boost ESG information disclosure and provide legal standards to standardize ESG rating systems. Considering the worldwide movement toward sustainable development, our research indicates that financial markets may be useful for pricing responsibility and rewarding the green revolution. The market relies on accurate and exhaustive ESG reporting in order to accurately price responsible conduct. In this regard, the government should mandate further ESG-related performance disclosure obligations. In this context, the government's stake is uncovered with SOEs and their performance. SOEs, particularly central SOEs, showed better performance in ESG, which shed light on how well the governmental policies are aligned with regulatory bodies to encourage responsible investment. Moreover, several ESG index providers in Chinese markets have earned good ratings. This may lead to misunderstanding among investors throughout the investment process and make it more difficult for them to select good companies. To prevent this issue, the government should adopt an official grading system to ensure the impartiality and authority of ESG information.

Although this study provides fresh information on the relationship between ESG practices and capital financing dynamics, it has some limitations that imply additional research is necessary. The initial restriction pertains to ESG data. ESG is in its infancy in China, and there are no standard ESG ratings for publicly traded companies. ESG ratings from various sources vary, and none of them cover every A-share market business. Although we collect ESG data from the Bloomberg database, they do not cover all publicly traded companies, which reduces the effectiveness of investment performance back testing. As data dependability and completeness improve, more research on ESG investment in China will be required. Second, the relationship between ESG and corporate conduct is given minimal consideration in this study. We study the relationship between ESG and the capital structure dynamics of a company from start. Future research could shed more information on ESG's actual effects on firms' operational or investment decisions, such as financial limits and environment governance investment.

Declarations

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