DO SUSTAINABILITY-DRIVEN IMPROVEMENTS IN ESG PERFORMANCE REDUCE FINANCING COSTS? EVIDENCE FROM CHINESE A-SHARE LISTED COMPANIES

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Abstract

The consideration of environmental, social, and governance (ESG) has become an integral part of the financing of companies. The ESG scores indicate sustainability, which is integral for maintaining the goodwill of the company and also showing long-term resilience in the financial markets. Hence, this ESG score allows for the alteration of the cost of financing for firms. This particular research analyses whether the improvements in ESG factors lead to a reduction in the financing cost of Chinese A-listed firms. The timeline of the study is between 2009 and 2023, and it is conducted across 4704 firms. A firm fixed effects model (FEM) with standard errors clustered by firm is considered for the analysis. The results show that ESG impacts total financing cost (TFC) negatively by -0.21 percent. Moreover, the cost of debt (COD) is also negatively impacted by -0.06 percent, and the cost of equity (COE) is impacted by -0.04 percent. Impact on TFC and COD is statistically significant. However, the same on COE is not significant. The debt-market result is consistent with signalling and information-asymmetry channels. This is because ESG reduces perceived default risk and improves creditor terms (Huang, 2022). Based on these findings, policy recommendations on ESG disclosure have been suggested to the Chinese government.

Keywords: Chinese A-Listed Firms, ESG, Panel Data Analysis, Financing Cost, FEM, REM

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1. INTRODUCTION

Environmental, social, and governance (ESG) performance has emerged as a critical non-financial indicator in the decision-making processes of investors. As per Zumente and Bistrova (2021), the ESG indicates the sustainability parameter of the particular firm. Hence, it indicates to the institutional investors whether the firms would be able to handle the modern global dynamics and provide returns to the investors. Therefore, ESG has evolved as a major criterion for risk assessments, credit ratings, and financing conditions.

Given the background of the research, it has been found that the capital market in China has undergone rapid institutional and structural reforms. As per Zhang et al. (2023), ESG disclosures were made mandatory for firms established in China. This led to Chinese regulators and investors placing growing emphasis on ESG compliance. As a result, the impact of the ESG on total financing cost (TFC), cost of debt (COD), and cost of equity (COE) became integral. ESG also evolved as a major criterion for risk assessments, credit ratings, and financing conditions (Oanh et al., 2025; Debnath et al., 2024; Kumar et al., 2025). Other research by Gonçalves et al. (2022) has found that ESG parameters have a substantial impact on the channels of cost of capital of firms. This makes firms take up sustainability practices to ensure steady cost of capital (Kulkarni & Belavadi, 2025; Ktit & Abu Khalaf, 2024). Therefore, this study seeks to fill these research gaps by empirically examining whether improvements in ESG performance reduce the financing costs of Chinese A-share listed companies between 2009 and 2023.

There is a substantial gap in the literature, as existing studies have primarily focused on developed markets such as the United States and Europe (Piechocka-Kałużna et al., 2021). Moreover, very limited empirical evidence is available for emerging countries like China. Finally, Tang (2022) examines the relationship between ESG and the COE. Hence, the literature lacks comprehensive evidence covering multiple financing channels. As a result, this shows there is a literature gap in understanding how ESG performance influences the structure of financing costs for Chinese A-share listed firms.

In line with the research problem, this study seeks to examine whether enhanced ESG ratings contribute to lower financing costs for Chinese A-share listed firms. The primary research question for the study is to analyse whether stronger ESG performance reduces the overall financing costs of Chinese A-share listed firms. Additionally, the study aims to assess whether firm-specific financial factors such as leverage, return on assets (ROA) and asset turnover (ATO).

The research aim is to analyse whether improvements in ESG performance reduce the financing costs of Chinese A-share listed companies. This explicitly addresses the central questions:

RQ1: Does a higher ESG score lead to a lower TFC?

RQ2: Does ESG performance affect the COD and the COE?

RQ3: How do firm-specific financial characteristics moderate this relationship?

The research considers three substantial frameworks of signalling theory, stakeholder theory and resource-based view as a baseline theoretical approach. Furthermore, a quantitative research design using panel data is also considered for the empirical analysis. Using a fixed effects model (FEM), it is found that ESG performance significantly reduces the TFC and COD. However, the effect on the COE is negative but statistically insignificant. The paper contributes to the literature by offering assessments of how ESG performance impacts financing advantages in an emerging-market context. Moreover, the findings are relevant to policymakers, investors, and corporate managers.

This research paper is organised into six sections. Section 1 outlines the background and clearly states the research question. Section 2 presents a review of the relevant literature. Section 3 details the research methodology. Section 4 provides the empirical analysis. Section 5 presents the findings and discusses the results. Section 6 concludes the study.

2. LITERATURE SYNTHESIS AND THEORETICAL FOUNDATIONS

2.1. Theoretical background

2.1.1. Signalling theory

Signalling theory posits that firms with superior ESG performance send positive signals to the capital market regarding their sustainability. As per the research by Huang (2022), it has been understood that ESG activity acts as a signal to shareholders and stakeholders regarding the true characteristics of a firm. It is also indicative of the fact that the management is accountable for the sustainability concerns and operational efficiency of a firm. Hence, this helps in creating confidence among the shareholders and stakeholders. Research by Egorova et al. (2024) argues that ESG indicators positively affect the financial stability of firms. Moreover, this positive impact also holds during economic shocks. This could be understood through the components of environmental restoration initiatives, climate risk assessment, human rights score, and board size. These factors indicate better debt management and improved market performance for firms. As a result, in capital markets, investors interpret high non-financial performance indicator scores as a proxy for good governance, operational transparency, and lower default risk. This allows the companies to leverage their sustainability score factor and bargain for lower capital financing costs from the institutional financiers or stakeholders. This shows that the signalling theory is important to understand why the ESG impacts the financial costs of Chinese A-listed companies.

2.1.2. Stakeholder theory

The stakeholder theory argues that firms engaging in responsible sustainability behaviour are more likely to satisfy the stakeholders. Mahajan et al. (2023) have revealed that stakeholder theory encourages organisations to understand the needs of stakeholders and prompts them to act on the same. As a result, the businesses adopt the best corporate practices required for operation. This leads to an improved reputation for the firm, which eventually helps in driving down the cost of capital.

Firm reputation with respect to ESG ratings is important for gaining traction over the cost of capital. Baah et al. (2021) argued that stakeholder theory posits that the alignment of firm practices with stakeholder expectations leads to improved firm reputation. This enhances the goodwill of the company, which helps the firm to secure lower financing costs, as such practices make it more sustainable.

Talan et al. (2024) also offer a comprehensive critique of how the Stakeholder theory shapes non-financial performance Indicators. The research argues that stakeholder theory allows firms to propose a holistic value addition (HVA) framework, which accounts for mutual well-being, social cohesion, and ecological balance. These are key components of the ESG parameter, which are responsible for the creation of tangible and intangible value for the firm. As a result, such a value could be leveraged towards securing lower financing costs. Overall, the stakeholder theory argues that improving stakeholder relationships leads to lower reputational risks and allows a reduction in financing costs.

2.1.3. Resource-based view

The resource-based view is another integral theory that has been considered in this research. As per Freeman et al. (2021), the resource-based perspective argues that the internal resources of a firm are key to the decision-making process. The internal resources hold greater leverage for the goodwill and operational efficiency of the firm compared to external resources. Therefore, by accounting for the normative factors, sustainability factors, and human factors, a company can maximise its resource base internally. This leads to better management, which is integral for operational and reputational efficiency. Another paper by Hussain et al. (2024) reveals that strong internal capabilities lead to improved investor confidence. As a result of this, the firms are exposed to better access to external finance. Moreover, this also helps to determine the financing costs, as a firm that has stronger internal capabilities would lead to lower risk indexing. As a result, the finance cost would also be reduced by the same amount. Overall, this shows the importance of the resource-based view under this paper.

2.2. Literature review

2.2.1. ESG and cost of capital

The ESG ratings of a firm have a substantial impact on the cost of capital. Piechocka-Kałużna et al. (2021) concluded that greater ESG ratings lead to a negative impact on the cost of capital of firms in the United States. The results are concluded by using a quantitative study that uses regression analysis as an econometric model. The research uses fragmented sustainability data according to the weighted average cost of capital (WACC). Piechocka-Kałużna et al. (2021) found that there is a 3.8% adverse impact through social parameters (SOC) and a 12.8% detrimental impact of governance parameters (GOV). Furthermore, in 2016, the environmental component (ENV) also provided for an 11.2% adverse impact.

Debnath et al. (2024) presented an outlook on the impact that individual components of ESG parameters have on the ROA of a company. In order to analyse the same, the study uses data from 32 companies during the 2022 financial year in India. The results indicated that ENV have a 12.08% age point positive impact on ROA. This is followed by a -5.04% age point impact for SOC on ESG. Finally, GOV impacts the ESG by 3.76% age points. However, none of the relationships is statistically significant in this case.

Furthermore, other studies from emerging markets have also shown similar insights. Dwomor and Mensah (2024) reported a negative correlation between ESG reporting and the cost of capital. This conclusion has been drawn by analysing data of 146 emerging market firms from 18 emerging economies, spanning between 2019 and 2022. This is because positive non-financial performance indicator scores have a positive impact on the performance of firms across such emerging nations. Dwomor and Mensah (2024) revealed a 35.5% impact on firm performance because of positive ESG scores. As a result, this signifies that Firms with strong ESG practices perform better, which makes them less risky in the financial markets. As a result, this drives down the cost of capital.

2.2.2. ESG and cost of debt

The non-financial performance indicators component also has a substantial impact on the COD. As per the research by Lavin and Montecinos-Pearce (2022), it has been understood that there is a diminishing relationship between ESG ratings and the borrowing cost under emerging markets. The paper by Lavin and Montecinos-Pearce (2022) reveals that an increase in the lagged value of sustainability ratings leads to a 0.219% fall in the COD. The paper uses firm-level data from the Chilean Stock Market between 2015 and 2020 and uses FEM as an econometric approach.

Piechocka-Kałużna et al. (2021) revealed that the environmental component represented a negative impact of 14.3% on the borrowing cost across the 6.393 US firms. The same trend for the environmental component to have an adverse impact on the COD was also observed for the years between 2016 and 2020. However, the social and governance component had a positive impact on the COD across US companies. Furthermore, another study held in India also found a diminishing impact of ESG rating disclosures on the yield on debt. As per the paper by Arora and Sharma (2022), it has been realised that there is a 0.02% fall with a growth in sustainable performance scores for Indian firms. This analysis has been conducted using 260 companies from the NIFTY500 Index. Using a fixed-effects model across 1560 firm-year datapoints, the conclusion has been drawn.

2.2.3. EGS and cost of equity

Equity is another important source of financing for corporate organisations. However, the ESG indicators also impact the equity cost of firms. As per the research by Tang (2022), it is realised that there is a negative impact of ESG ratings on the COE for Chinese firms. Tang (2022) uses a panel data regression analysis on the Chinese A-listed firms to understand the impact of sustainable performance scores on the equity cost. Moreover, the controls for financial constraints, as well as using an intermediate variable, are used. Also, researchers found an adverse impact of 0.22% on the COE with an increase in the ESG rating. This

paper used a consolidated ESG parameter to test the hypotheses. Furthermore, Piechocka-Kałużna et al. (2021) revealed that the ESG component had a negative impact on the COE of US firms. However, the research does not indicate the presence of a consolidated parameter to understand the overall impact on the return on equity. Another paper by La Rosa and Bernini (2022) was also considered within the literature. The research segregated the ESG performance for European firms into positive impact and adverse impact. La Rosa and Bernini (2022) concluded in the analysis that an adverse ESG performance score increases the COE. Negative sustainability performance increases the equity capital cost because it signals higher firm-specific and systematic risk to investors. As a result, this effect is grounded in signalling theory, where the market responds adversely to the detrimental ESG disclosures.

2.2.4. Determinants of financing cost beyond ESG

Factors like ROA, leverage, and asset-turnover ratio are financial indicators that are equally responsible for understanding the impact of ESG on financing cost. Tang (2022) reveals a positive impact of leverage value on the COE. Study reveals that an increase in the leverage value of firms leads to a 3.15% rise in the equity capital cost. A higher leverage ratio means a firm is using more debt relative to equity. Hence, this leads to a pay-off structure between debts and equity, eventually pushing for a greater financing cost for equities. Thus, high leverage also signals distress to investors, increasing equity cost. Another study by Gholami et al. (2023) revealed that a rise in leverage led to a rise in idiosyncratic risk by 10.38% while controlling for ESG. Leverage raises a firm's idiosyncratic risk by magnifying how earnings variability affects its performance. As a result, the firm becomes more fragile, leading to greater financing costs.

Corporate financial parameters like Tobin's Q ratio, leverage and size also impact the ESG of firms. Research by Kumar et al. (2025) uses data from 304 firm-year observations across the Indian Stock Exchange. Using a regression analysis, the results show that there is a negative impact of 0.01% points on ESG. Moreover, the size of a company has a 7.028% impact on ESG, whereas Tobin's Q ratio has a 0.18% impact on ESG.

The consideration of ROA is also integral for calculating the impact on the COE. As per Alduais (2023), the ROA shows a detrimental impact on the COE. Using panel data from 474 Chinese firms, the study employs a random effects model in the analysis. The research found that an increase in ROA leads to a fall in the COE by 0.054%. An increase in ROA signals that the firm is using its assets efficiently to generate profit. This boosts investor confidence and reduces perceived equity risk. As a result, the equity cost is reduced.

The ATO ratio also has a substantial impact on the cost of capital financing for firms. Huo et al. (2021) have revealed that the ATO growth has a 3.2% growth in the cost of capital for Chinese firms in the Shanghai and Slenzen market between 2014 and 2019. A panel data regression was considered using the FEM. This is relevant as high-ATO firms often have thin margins for operations. As a result, this causes financial fragility, which eventually increases the cost of capital.

Studies by Ktit and Abu-Khalaf (2024) analyse the impact that ESG performance has on the capital structure of firms. The sample covers data from 450 non-financial organisations listed on the stock exchanges of ten European countries between 2014 and 2023. Using a generalized method of moments econometrics model (GMMM), the results indicate that ESG has a 0.084% impact on the leverage of a firm. Hence, this means that strong ESG performance offsets the risk premium, leading to a lower overall COD. Thus, this provides important insights into the impact of ESG on the capital structure of firms, as the COD would also be reduced under such circumstances.

2.3. Research gap and hypotheses development

Piechocka-Kałużna et al. (2021) affirm that ESG performance is negatively associated with financing costs. La Rosa and Bernini (2022) consider developed markets such as Europe and the United States. Other studies by Alduais (2023) and Huo et al. (2021) use data from Chinese markets but look into either of the financing parameters, like equity return. Moreover, empirical evidence on Chinese A-share listed firms remains limited, especially regarding disaggregated impacts on the debt return and COE. As a result, this study fills the gap by examining the differential effects of ESG scores on total, debt, and equity financing costs using robust fixed effects panel regressions with firm-level controls in China.

The study develops the following hypotheses:

H1: Sustainability performance is associated with a lower TFC for Chinese A-share listed firms.

H2: Sustainability performance is associated with a lower COD.

H3: Sustainability performance is associated with a lower COE.

H4a: Firms with higher leverage experience higher financing costs.

H4b: Firms with higher ROA experience lower financing costs.

H4c: Firms with higher ATO experience higher financing costs.

3. EMPIRICAL METHODOLOGY

3.1. Research approach and research design

The research on whether higher ESG performance scores reduce financing costs for firms based in China uses a quantitative research design. The regression analysis is not limited to statistical computation only. Moreover, it also ensures that the relationship between ESG performance and financing costs within the Chinese institutional and capital-market environment is captured. This would ensure that the findings are economically meaningful and contextually grounded rather than purely technical.

As per the empirical study by Mahat et al. (2024), a quantitative research design helps systematically collect data to analyse a particular research question. This form of quantitative research design focuses on quantifiable variables (Barroga & Matanguihan, 2022). This specific

research adopts a research philosophy of positivism. As per Ali (2024), positivism is a realist view, positing that there is an objective truth present. Given the aim of the paper to analyse whether ESG performance reduces financing cost, the research philosophy holds. Moreover, the paper also follows a deductive research approach. Kumar (2024) defines the deductive research approach as a forward methodology that aims at testing a hypothesized theory. Based on the literature review, the research hypothesis has been formed. As a result, this deductive research approach validates the testing of such a hypothesis.

3.2. Data, sample, and variables

The research uses quantitative data regarding financing cost and ESG performance from Chinese A-share listed companies (China Stock Market and Accounting Research [CSMAR], https://data.csmar.com/). It spans between 2009 and 2023, covering 4.704 firms and 38.817 firm-year observations. The variables include multiple dependent, independent, and control variables. The variables used in the research are provided in Table 1.

Table 1. Variables and proxies

Variable	*Type*	*Proxy*
Total financing cost	Dependent	*TFC*
Cost of debt	Dependent	*COD*
Cost of equity	Dependent	*COE*
Annual average ESG score of the firm	Independent	*ESG*
Firm size	Control	*SIZ*
Leverage	Control	*LEV*
Return on assets	Control	*ROA*
Asset turnover	Control	*ATO*

Source: Authors' elaboration.

The research uses all the samples from the Chinese A-share firms between 2009–2023. This excludes firms operating as financial institutions, as they would have a different financial overview compared to other firms. Hence, this helps in comparability in capital cost and ESG determinants. Moreover, special treatment firms are also removed from the dataset sample. Missing data on *ESG, ROA, LEV,* or *ATO* prevents the correct estimation of coefficients. These are also excluded from the sample. Finally, continuous variables are winsorised at the 1% and 99% to mitigate the influence of extreme values.

In addition to the financial indicators, the study also accounts for several firm-level characteristics that describe the operational context of Chinese A-share companies. However, these factors were not directly added to the regression model due to data limitations. The contextual framework of these firm-level characteristics was used for the discussion of the results.

3.3. Model selection and estimation strategy

The research adopts a panel data regression approach to examine how ESG performance influences the financing costs of firms listed on China's A-share market. According to Abdullah et al. (2022), panel data is a format where repetitive observations for the same set of firms are measured over a period of time. Moreover, researchers also emphasise that panel data analysis is integral as it helps to account for unobserved heterogeneity. This enables the research to obtain more reliable estimates of the causal effects. This study intends to apply both FEM and REM models to evaluate the proposed hypothesis. Dettori et al. (2022) define FEM as an approach where one true effect size is assumed within the model. As a result, this indicates the importance of variance accounted for within the study. For the REM, the true effect of an estimator could vary across various periods. Hence, it is necessary to study the variances within and between the periods under such circumstances. In this research, both the FEM and the REM will be tested. Based on the results of the Hausman test, the selection of the models would be done (Naylah et al., 2021).

As an alternative approach, the study could also adhere to a dynamic GMMM. As per Ullah et al. (2018), a dynamic GMMM is helpful as it helps to control for potential endogeneity, which could arise from the reverse causality between ESG performance and financing costs. Therefore, by using lagged variables as internal instruments, the GMMM would be a robust alternative approach.

3.4. Research model and analytical style

The research will consider modelling using three proxies for financing cost. The first one would consider TFC, followed by the COD, as well as the COE. The research model equations are as follows:

Model 1

$$TFC_{it} = \beta_0 + \beta_1(ESG\ Score)_{it} + \beta_2(SIZ)_{it} + \beta_3(LEV)_{it} + \beta_4(ROA)_{it} + \beta_5(ATO)_{it} + \varepsilon_{it} \quad (1)$$

Model 2

$$COD_{it} = \beta_0 + \beta_1(ESG\ Score)_{it} + \beta_2(SIZ)_{it} + \beta_3(LEV)_{it} + \beta_4(ROA)_{it} + \beta_5(ATO)_{it} + \varepsilon_{it} \quad (2)$$

Model 3

$$COE_{it} = \beta_0 + \beta_1(ESG\ Score)_{it} + \beta_2(SIZ)_{it} + \beta_3(LEV)_{it} + \beta_4(ROA)_{it} + \beta_5(ATO)_{it} + \varepsilon_{it} \quad (3)$$

Based on the empirical methodology and the research design, a statistical analysis is done in the paper using STATA 14.

4. EMPIRICAL ANALYSIS

This section of the research presents the empirical analysis for the study examining the impact of ESG

performance on financing costs. The empirical analysis section first provides a preliminary data analysis and is followed by the findings of the panel data regression.

4.1. Preliminary data analysis

The summary of the data used in the research is presented in Table 2.

Table 2. Preliminary data analysis

Variable	*TFC*	*COD*	*COE*	*ESG*	*SIZ*	*LEV*	*ROA*	*ATO*
N	38818	38818	38818	35365	38818	38818	38817	38817
Mean	4.1539	0.0038	0.0181	0.0644	22.2428	0.4239	0.0391	0.6487
SD	0.9213	0.0394	0.0146	0.1263	1.2956	0.2032	0.0645	0.4357
Min	1	-0.4455	-0.0218	-0.0313	19.4149	0.0274	-0.375	0.057
Max	8	0.088	0.0901	2.1849	26.4438	0.9246	0.2552	2.9066

Source: Authors' elaboration.

Table 2 shows that there are 38.818 firm-year observations in total. *TFC*, *COD, COE, SIZ*, and *LEV* have 38,818 observations, and ESG has 35.365. *ROA* and *ATO* have 38.817 observations. The mean for *TFC* is 4.1539, *COD* is 0.0038, and *COE* is 0.0181. The SDs for all three variables are 0.9213, 0.0394, and 0.0146, respectively. ESG shows a mean of 0.0644 and an SD of 0.1263. The *SIZ, LEV, ROA*, and *ATO* have mean values of 22.2428, 0.4239, 0.0391, and 0.6487, respectively. The SDs are 1.2956, 0.2032, 0.0645, and 0.4357. For *TFC*, the range is between 1.0000 and 8.0000, suggesting differences in creditworthiness and risk exposure of firms. The range for *COD* is between -0.4455 and 0.0880. Finally, the range for *COE* is between -0.0218 and 0.0901.

With the preliminary statistics shown, the study will present the panel data regression results in the subsequent section.

4.2. Panel data regression

The research section uses FEM and REMs based on empirical methodology. This is done for all three models. In the three scenarios, the model accounts for potential heteroskedasticity and serial correlation by clustering standard errors at the firm level.

4.2.1. Model 1: Total financing cost

Table 3 of the research paper uses the TFC as the dependent variable to find the impact of ESG on financing cost parameters. The FEM and REM are considered for understanding the impact.

Table 3. FEM for Model 1

Variable (TFC)	*ESG*	*SIZ*	*LEV*	*ROA*	*ATO*	*Constant*
Coefficient	-0.0021	0.0016	0.0829	-0.0319	0.0093	-0.0637
SE	0.0003	0.0005	0.0034	0.0043	0.0011	0.0115
T-stat	-6.61	3.23	24.5	-7.43	8.39	-5.55
P-value	0	0.001	0	0	0	0
Lower CI	-0.0027	0.0006	0.0763	-0.0404	0.0071	-0.0862
Upper CI	-0.0014	0.0026	0.0895	-0.0235	0.0115	-0.0412

Source: Authors' elaboration.

Table 3 shows that the *ESG* has a coefficient of -0.0021 on the *TFC*, and a p-value < 0.05. The *SIZ* has a coefficient impact of 0.0016 on *TFC* with a p-value < 0.05. The coefficient of *LEV* is 0.0829 on *TFC* and has a p-value < 0.05. *ROA* indicates a negative coefficient of -0.0319 on *TFC* and p-value < 0.05. *ATO* impacts *TFC* with a coefficient of 0.0093 and a p-value < 0.05.

Table 4 shows the results for Model 1, using the REM.

Table 4. REM for Model 1

Variable (TFC)	*ESG*	*SIZ*	*LEV*	*ROA*	*ATO*	*Constant*
Coefficient	-0.0024	0.0009	0.0893	-0.0314	0.008	-0.0492
SE	0.0003	0.0003	0.0027	0.0038	0.0008	0.0073
T-stat	-8.6	2.57	33.43	-8.15	9.96	-6.7
P-value	0	0.01	0	0	0	0
Lower CI	-0.0029	0.0002	0.0841	-0.0389	0.0064	-0.0636
Upper CI	-0.0018	0.0015	0.0946	-0.0238	0.0095	-0.0348

Source: Authors' elaboration.

Table 4 indicates that *ESG* has a negative coefficient of -0.0024 on *TFC*. The relation is statistically significant as the p-value < 0.05. *SIZ* and *LEV* have a positive impact on *TFC*. The coefficient impacts are 0.0009 and 0.0893, respectively. The p-value for both is less than 0.05. *ROA* has an adverse impact on *TFC* with an impact of -0.0314 and a p-value < 0.05. Finally, the *ATO* impacts *TFC* by 0.0080 units, p-value < 0.05.

4.2.2. Model 2: Cost of debt

Table 5 represents the FEM by using the *COD* as the dependent variable. The *ESG* has a negative coefficient of -0.0006 on the *COD* and is significant as p-value < 0.05. The *SIZ* has also shown a negative coefficient of -0.0010 on the *COD* and has a p-value < 0.05. The *LEV* indicates a coefficient of 0.0186 points' impact on *COD* and is significant. *ROA* and *ATO* have a detrimental effect on *COD*. The coefficients of both factors are -0.0223 and -0.0006, respectively.

Table 5. FEM for Model 2

Variable (COD)	*ESG*	*SIZ*	*LEV*	*ROA*	*ATO*	*Constant*
Coefficient	-0.0006	-0.001	0.0186	-0.0223	-0.0006	0.0355
SE	0.0001	0.0002	0.0011	0.0017	0.0005	0.0046
T-stat	-5.41	-4.61	17.22	-13.02	-1.22	7.77
P-value	0	0	0	0	0.222	0
Lower CI	-0.0008	-0.0014	0.0165	-0.0257	-0.0015	0.0266
Upper CI	-0.0004	-0.0006	0.0207	-0.019	0.0004	0.0445

Source: Authors' elaboration.

Table 6. REM for Model 2

Variable (COD)	*ESG*	*SIZ*	*LEV*	*ROA*	*ATO*	*Constant*
Coefficient	-0.0009	-0.0003	0.0203	-0.024	-0.0003	0.0198
SE	0.0001	0.0001	0.0009	0.0016	0.0004	0.0031
T-stat	-9.09	-1.99	23.8	-15.32	-0.79	6.43
P-value	0	0.047	0	0	0.428	0
Lower CI	-0.0012	-0.0006	0.0186	-0.0271	-0.001	0.0138
Upper CI	-0.0007	0	0.0219	-0.0209	0.0004	0.0259

Source: Authors' elaboration.

Table 6 represents the REM by using the COD as the dependent variable. The table indicates that the *ESG* has a coefficient impact of -0.0009 on the *ESG*. The *SIZ*, *ROA*, and *ATO* also have an adverse effect on *COD*. The coefficients of the same are -0.0003, -0.0240, and -0.0003. These are significant as the p-value < 0.05. *ATO* is not statistically significant as the p-value of 0.4280 > 0.05. *LEV* has a positive impact of 0.0203 on the *COD* and is statistically significant.

4.2.3. Model 3: Cost of equity

Table 7 indicates the empirical results using *COE* as the dependent variable. It shows the results using the FEM.

Table 7. FEM for Model 3

Variable (COE)	*ESG*	*SIZ*	*LEV*	*ROA*	*ATO*	*Constant*
Coefficient	-0.0004	0.0042	-0.017	-0.0733	0.0029	-0.0196
SE	0.0011	0.0017	0.011	0.021	0.0056	0.0365
T-stat	-0.38	2.53	-1.55	-3.48	0.52	-0.54
P-value	0.705	0.012	0.121	0.001	0.603	0.591
Lower CI	-0.0026	0.0009	-0.0385	-0.1146	-0.008	-0.0911
Upper CI	0.0018	0.0075	0.0045	-0.0321	0.0138	0.0519

Source: Authors' elaboration.

Table 7 indicates that *ESG* has a detrimental effect on *COE*, but it is not statistically significant as p-value 0.7050 > 0.05. The *SIZ* has a positive coefficient on *COE* and is significant as p-value < 0.05. *LEV* and *ATO* also have statistical figures that are not significant. The coefficients are -0.0170 and 0.0029. *ROA* has a negative coefficient of -0.0733 and is significant as p-value < 0.05.

Table 8 represents the empirical results using *COE* as the dependent variable and considering a REM approach.

Table 8. REM for Model 3

Variable (COE)	*ESG*	*SIZ*	*LEV*	*ROA*	*ATO*	*Constant*
Coefficient	-0.0001	0.0035	-0.0285	-0.0737	0.0018	0.0099
SE	0.0011	0.0015	0.0102	0.02	0.0047	0.0315
T-stat	-0.1	2.4	-2.79	-3.69	0.39	0.31
P-value	0.924	0.017	0.005	0	0.698	0.753
Lower CI	-0.0022	0.0006	-0.0485	-0.1129	-0.0074	-0.0519
Upper CI	0.002	0.0064	-0.0084	-0.0346	0.0111	0.0717

Source: Authors' elaboration.

Table 8 indicates that *ESG* has a negative coefficient impact of -0.0001 on *ESG* and is not statistically significant. The p-value 0.9240 > 0.05. The *SIZ* has a coefficient of 0.0035 and is significant as p-value < 0.05. *LEV* has a coefficient impact of -0.0285 on the *COE* using the REM. The same is significant as p-value < 0.05. The coefficient impact of *ROA* on *COE* is -0.0737 and is statistically significant as p-value < 0.05. *ATO* has a positive impact of 0.0018 on the *COE*, but it is not significant. The p-value of the same is 0.6980.

5. DISCUSSION

The results of the empirical analysis are discussed in this particular segment of the research paper. Firstly, the study considers a baseline FEM and REM without using the robust clustering effect using firm ID. Based on the baseline FEM and REM, a Hausman test is considered to analyse the appropriate approach. For Model 1, the Baseline FEM and REM are presented in Appendix A. The Hausman test results for the selection criteria between the FEM and the REM are also presented in Appendix A. Based on Appendix A, it has been understood that the Prob > chi^2 is < 0.05. This indicates that the FEM

is viable for showing appropriate results. For Model 2, the baseline FEM and REM, along with the Hausman test results, are provided in Appendix B. The Hausman test results indicate a Prob > chi^2 is < 0.05. This also shows that the FEM is more appropriate for Model 2. Finally, the baseline FEM and REM results are presented in Appendix C for Model 3. The Hausman test in Appendix C indicates a Prob > chi^2 that is less than 0.05. Thus, the FEM is also more appropriate here.

The summary statistics of the variable shown in Table 2 indicate that Chinese a-listed companies exhibit a moderate average ESG performance. However, this comes with a substantial variation across the entire scale between 1 and 8. The COD indicates relatively low borrowing costs. However, the data comes with high standard deviations across the firms of 0.0039. The COE is more reasonably centred around 1.81%. The average ESG scores indicate 0.0644, showing that the firms are operating on a moderate level. However, certain firms have a high ESG valuation mark of 2.1849. The SIZ of firms varies moderately, with a range between 19.41 and 26.44. LEV indicates a broad range in capital structure, where there are some firms that have high leverage at 0.91. Highly leveraged firms may experience higher financing costs. ROA also indicates that a majority of the firms are modestly profitable. However, the summary statistics show a negative minimum (–0.375), which shows that a subset of firms are loss-making. Finally, using ATO, it has been understood that operational efficiency varies significantly across firms. Outliers (ATO > 2.5) may reflect capital-light industries or misreported values.

The results of the panel data regression using Model 1 report that using the FEM, an increase in the ESG factor of a firm leads to a fall in the TFC by 0.21%. This valuation is statistically significant. The same could be further understood from Model 2 and Model 3, where the growth in the ESG factor indicated a fall in COD and COE, respectively. The impact on COD is worth -0.06% and is significant, whereas the impact on COE is worth -0.04%. However, the relation between *ESG* and COE is not significant (p-value =0.7050 > 0.05).

SIZ of a firm have a varied impact on the cost of financing across the various models. Using Model 1 and Model 3, it is understood that as SIZ increases, the TFC and COE also increase. The magnitude of change is by 0.16% and 0.42%, respectively. Both Models show a statistically significant result. However, the impact of SIZ on COD is negative. As SIZ increases by 1 percent, the COD falls by 0.1%. This relation is also statistically significant. LEV also shows a varied impact across the three models used in the research. An increase in LEV has a positive impact of 8.29% and 1.86% on TFC and COD, respectively. Both indicators are significant. The increase in LEV has an adverse effect on COE by 1.70%. This is not statistically significant. ROA negatively impacts the cost of financing using all three models. The impact on TFC is worth -3.19%, whereas the impact on COD is -2.33%. The increase in ROA also impacts the COE negatively by -7.33%. All the estimates are statistically significant. Finally, ATO has a varied impact on the financing costs. ATO impacts the TFC and COE positively. An increase in ATO leads to a 0.93% positive impact on TFC and a 0.29% impact on COE. The impact on COE is, however, not significant. The ATO also posits a detrimental effect on COD. As the ATO rises, the COD falls by 0.06%, and the effect is also statistically significant.

The results of the empirical analysis show that there is a negative effect of ESG on TFC by -0.21%. This confirms that the higher ESG performance leads to a reduction in the financing cost of firms in China. The result of the analysis is in line with the literature by Huang (2022) and Egorova et al. (2024), who argue that a growth in ESG ratings acts as a positive signal in capital markets. Therefore, this leads to the firms gaining more traction with respect to being less risky in the financial markets. Moreover, the results also support the empirical evidence found by Piechocka-Kałużna et al. (2021) in the United States, as it indicates that ESG factors reduce average capital cost. Furthermore, Dwomor and Mensah (2024) also argue that positive ESG ratings improve firm performance and lower capital costs in emerging economies. It has also been understood from the empirical analysis that the ESG significantly reduces COD by -0.06%. This indicates that ESG performance reduces the default risk of firms and ensures long-term sustainability. The same is also argued by Lavin and Montecinos-Pearce (2022) and Arora and Sharma (2022), who argue that ESG reduces COD for firms in Chile and India, respectively. Furthermore, Piechocka-Kałużna et al. (2021) also support the same stance, as the environmental component significantly reduces debt cost. Finally, with respect to the equity cost, it has been found that the ESG coefficient negatively impacts the COE by 0.04%. However, it is not statistically significant. This is because ESG impact is overshadowed by other firm-level factors. As a result, investors may not fully account for sustainable performance scores in equity valuations. However, the negative coefficient is supported by a number of studies. Tang (2022) found that ESG reduces COE in Chinese firms, whereas La Rosa and Bernini (2022) reveal that negative ESG performance raises COE. Thus, the market, despite not perceiving sustainability as a strong signal in equity markets, still shows a negative impact on COE.

The empirical analysis shows that SIZ has a positive impact on TFC and COE, whereas there is a negative impact on COD. This is because larger firms secure better debt terms. However, despite the same, equity investors demand higher returns due to growth expectations. On the other hand, an increase in LEV leads to an increase in TFC and COD. However, it reduces COE significantly. This is because high leverage raises credit risk, leading to higher debt costs. Tang (2022) concludes that high LEV causes a rise in COE, whereas Gholami et al. (2023) reveal that high LEV increases idiosyncratic risk. As a result, an increase in LEV leads to a rise in TFC and COD.

It is also concluded from the empirical analysis that an increase in ROA leads to a negative effect on TFC, COD, and COE. This happens as the profitability of firms enhances firm credibility and lowers the associated risk. This helps in building trust among the investors. The same is argued by Alduais (2023), who reveals that higher ROA reduces COE. Finally, it has also been found from the empirical analysis that ATO has a positive effect on TFC and COE. However, the impact on COD

is negative. This happens as high ATO may reflect low-margin business models. Thus, there is a varied impact across financing costs, as some perceive the same as efficient. Although debt financiers perceive the same as risky, the margin of business remains low. Similar conclusions are revealed by Huo et al. (2021), who found that high ATO leads to an increase in financing costs in capital-intensive industries.

6. CONCLUSION

This particular research aimed at analysing the impact that the ESG ratings have on the financing costs for Chinese A-share listed firms. The analysis employed a quantitative research design and used panel data regression using the FEM to analyse the causal impact. The result found that ESG scores significantly impact the TFC negatively by -0.21%. Moreover, the COD is also negatively impacted by -0.06%, and the COE is impacted by -0.04%. Based on the results, it can be concluded that *H1a, H2a, H4a* and *H4b* are accepted. The *H3a* of higher ESG ratings leading to lower COE is rejected as the relation is not statistically significant. Furthermore, there is a mixed impact of Higher ATO on financing cost through *H4c*, as there is a positive effect on TFC, but the impact on COE is not significant.

Based on the result, substantial policy implications could be understood for the regulatory authorities in China, as it encourages ESG reporting. Mandatory sustainability disclosure frameworks would enhance transparency and reduce information asymmetry in capital markets. Moreover, for firms, adherence to ESG practices would lead to tangible financial benefits through reduced borrowing costs. Finally, for investors, ESG scores can be used as a valid proxy for firm stability. This would help the investors make risk-adjusted investment decisions.

The research also posits some substantial limitations, as the analysis does not explicitly differentiate industry-specific ESG impact. This could mask the sectoral dynamics and reduce the robustness of the analysis. Moreover, the model does not capture time-varying macroeconomic shifts. This might dilute the impact of ESG on equity costs. Finally, the paper uses a composite ESG score. Thus, the separate effects of ESG factors are not examined. Finally, firm identifiers and detailed classifications are not displayed due to data limitations. Based on these limitations, it can be inferred that future research could use disaggregated ESG data to study channel-specific effects on financing cost. Moreover, sectoral analysis within China could also be considered for more nuanced insights.

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APPENDIX A

Table A.1. FEM results for Eq. (1)

Variable (TFC)	*Coefficient*	*SE*	*T-stat*	*P-value*
ESG	-0.0021	0.0002	-8.9400	0.0000
SIZ	0.0016	0.0003	5.9200	0.0000
LEV	0.0829	0.0016	52.1100	0.0000
ROA	-0.0319	0.0032	-9.8600	0.0000
ATO	0.0093	0.0007	12.6300	0.0000
Constant	-0.0637	0.0060	-10.6400	0.0000

Table A.2. REM results for Eq. (1)

Variable (TFC)	*Coefficient*	*SE*	*T-stat*	*P-value*
ESG	-0.0024	0.0002	-11.1000	0.0000
SIZ	0.0009	0.0002	3.8800	0.0000
LEV	0.0893	0.0014	64.8300	0.0000
ROA	-0.0314	0.0030	-10.3100	0.0000
ATO	0.0080	0.0006	13.1600	0.0000
Constant	-0.0492	0.0047	-10.4000	0.0000

Table A.3. Hausman results for Eq. (1)

Variable (TFC)	*FE1*	*RE1*	*b-B*	*SE*
ESG	-0.0021	-0.0024	0.0003	0.0001
SIZ	0.0016	0.0009	0.0008	0.0002
LEV	0.0829	0.0893	-0.0064	0.0008
ROA	-0.0319	-0.0314	-0.0005	0.0011
ATO	0.0093	0.0080	0.0014	0.0004
Prob>Chi2	0.0000			

APPENDIX B

Table B.1. FEM results for Eq. (2)

Variable (COD)	*Coefficient*	*SE*	*T-stat*	*P-value*
ESG	-0.0006	0.0001	-7.5500	0.0000
SIZ	-0.0010	0.0001	-10.0900	0.0000
LEV	0.0186	0.0006	33.4600	0.0000
ROA	-0.0223	0.0011	-19.6900	0.0000
ATO	-0.0006	0.0003	-2.2800	0.0230
Constant	0.0355	0.0021	16.9600	0.0000

Table B.2. REM results for Eq. (2)

Variable (COD)	*Coefficient*	*SE*	*T-stat*	*P-value*
ESG	-0.0009	0.0001	-12.4600	0.0000
SIZ	-0.0003	0.0001	-3.7100	0.0000
LEV	0.0203	0.0005	41.6100	0.0000
ROA	-0.0240	0.0011	-22.2600	0.0000
ATO	-0.0003	0.0002	-1.3600	0.1750
Constant	0.0198	0.0017	11.8900	0.0000

Table B.3. Hausman results for Eq. (2)

Variable (COD)	*FE1*	*RE1*	*b-B*	*SE*
ESG	-0.0006	-0.0009	0.0003	0.0000
SIZ	-0.0010	-0.0003	-0.0007	0.0001
LEV	0.0186	0.0203	-0.0017	0.0003
ROA	-0.0223	-0.0240	0.0017	0.0003
ATO	-0.0006	-0.0003	-0.0003	0.0001
Prob>Chi2	0.0000			

APPENDIX C

Table C.1. FEM results for Eq. (3)

Variable (COE)	*Coefficient*	*SE*	*T-stat*	*P-value*
ESG	-0.0004	0.0009	-0.5000	0.6200
SIZ	0.0042	0.0010	4.1600	0.0000
LEV	-0.0170	0.0060	-2.8600	0.0040
ROA	-0.0733	0.0121	-6.0600	0.0000
ATO	0.0029	0.0027	1.0600	0.2910
Constant	-0.0196	0.0223	-0.8800	0.3780

Table C.2. REM results for Eq. (3)

Variable (COE)	*Coefficient*	*SE*	*T-stat*	*P-value*
ESG	-0.0001	0.0008	-0.1200	0.9030
SIZ	0.0035	0.0009	3.8400	0.0000
LEV	-0.0285	0.0056	-5.1000	0.0000
ROA	-0.0737	0.0117	-6.2800	0.0000
ATO	0.0018	0.0025	0.7300	0.4630
Constant	0.0099	0.0200	0.5000	0.6200

Table C.3. Hausman results for Eq. (3)

Variable (COD)	*FE1*	*RE1*	*b-B*	*SE*
ESG	-0.0004	-0.0001	-0.0003	0.0002
SIZ	0.0042	0.0035	0.0007	0.0004
LEV	-0.0170	-0.0285	0.0115	0.0021
ROA	-0.0733	-0.0737	0.0004	0.0030
ATO	0.0029	0.0018	0.0011	0.0011