Research in International Business and Finance 74 (2025) 102715

Contents lists available at ScienceDirect

Research in International Business and Finance

journal homepage: www.elsevier.com/locate/ribaf

Does ESG performance affect trade credit financing? Evidence from China

Yonghui Lian [a], Zixin Yang [a,b,*], Hong Cao [a]

[a] School of Finance, Capital University of Economics and Business, Beijing 100070, China
[b] School of Economics, Tianjin University of Finance and Economics Pearl River College, Tianjin 301811, China

ARTICLE INFO

JEL classifications:
G30
G32
M14

Keywords:
ESG performance
Trade credit
Supply chain
Chinese market

ABSTRACT

This paper explores the impact of corporate environmental, social, and governance (ESG) performance on companies' trade credit financing via a sample of publicly traded Chinese companies from 2009 to 2021. The results indicate that ESG performance has a positive effect on companies' trade credit financing. Mechanism analysis reveals that reducing corporate risk, enhancing product market competitiveness, and improving information disclosure quality are the primary channels through which ESG performance improves trade credit financing. Heterogeneity analysis reveals that the positive impact of ESG performance on trade credit financing is more significant for companies with lower levels of supplier concentration and customer concentration, as well as for companies facing higher levels of financing constraints. Further analysis shows that ESG performance helps companies obtain trade credit from both their suppliers and their customers. In addition, this paper provides evidence that ESG performance helps reduce the cost of trade credit financing.

1. Introduction

Environmental, social, and governance (ESG) evaluates companies based on their environmental, social, and governance performance rather than solely their financial performance. In emerging market countries such as China, ESG has garnered recognition from diverse sectors of society. With the incorporation of A-shares into the MSCI Emerging Markets Index and MSCI Global Index in 2018, foreign investors have increasingly engaged in the A-share market, leading domestic investors to shift their attention from solely economic gains to a more comprehensive evaluation of performance, encompassing environmental impact, social responsibility, and corporate governance (Sun et al., 2024). Simultaneously, the Chinese government and regulatory agencies have implemented policies to incentivize companies to enhance their ESG performance and guide investors in adopting ESG investment principles. While such policy encouragement and regulatory guidance are important in a market economy, it is equally crucial to stimulate companies' intrinsic motivation to achieve greater economic benefits and develop stronger sustainable capabilities through improved ESG performance.

However, there is a divergence of opinions in the existing literature regarding the potential effects of a firm's ESG performance. Some scholars argue that it can increase firm value (Fatemi et al., 2015; Wong et al., 2021; Chen et al., 2024; An et al.,2025), positively influence firm-level investor responses (Pandey et al., 2024), mitigate firm risk (Lins et al., 2017; Albuquerque et al., 2019; Kinateder et al., 2021), and lower firms' capital costs (Hong and Kacperczyk, 2009; El Ghoul et al., 2011) as well as debt costs (Goss and Roberts,

* Corresponding author at: School of Finance, Capital University of Economics and Business, Beijing 100070, China.
E-mail address: yangzixin0502@163.com (Z. Yang).

https://doi.org/10.1016/j.ribaf.2024.102715
Received 14 April 2024; Received in revised form 9 November 2024; Accepted 19 December 2024
Available online 25 December 2024

2011; Martin and Moser, 2016; Guo et al., 2024). Conversely, some scholars argue against ESG activities, claiming that they harm shareholder wealth (Masulis and Reza, 2015; Bonnie et al., 2018) and increase firms' risk (Becchetti et al., 2013). In addition, it has been argued that the impact of ESG performance on firm risk, valuation or sustainable growth is nonlinear (Azmi et al., 2021; Bofinger et al., 2022; Bagh et al., 2024), and the effects of three pillars—Environmental, Social, and Governance—on firm risk, portfolio excess returns and stock market dependence is divergent (Zhang et al.,2022; Deng et al.,2024; Staněk Gyönyör and Horváth, 2024). Prior research has focused primarily on the impact of ESG performance on firm value, risk, equity financing, and debt financing using data from developed nations. Research on the impact of ESG performance on trade credit financing in emerging market countries is limited.

In emerging market countries with underdeveloped financial markets, such as China, trade credit has emerged as a significant means of financing for enterprises, serving as an alternative financing method to the formal financial system. Compared with traditional formal financing channels such as bank loans and stock financing, trade credit financing offers advantages such as lower costs and reduced information asymmetry (Saeed and Zureigat, 2020). This form of financing is particularly crucial for Chinese enterprises. According to data from the National Bureau of Statistics (NBS), the total amount of trade credit of Chinese enterprises accounts for 43.1 % of the balance of all enterprise loans. As the concept of ESG has gained widespread acceptance, stakeholders in the supply chain are increasingly concerned with companies' ESG performance. Therefore, it is important to determine whether good ESG performance enables companies to acquire more trade credit from upstream suppliers and downstream customers in the supply chain.

Consequently, we empirically investigate the impact of corporate ESG performance on trade credit financing via a research sample of 3361 Chinese listed A-share companies between 2009 and 2021. Empirical results show that ESG performance significantly increases the amount of trade credit acquired by firms. The conclusions of this paper remain valid after a series of robustness tests. Additionally, our study aims to examine the mechanisms by which ESG performance impacts trade credit financing. The influence mechanism test demonstrates that effective ESG performance mitigates firms' risk, bolsters their product competitiveness, and enhances their disclosure quality. These factors collectively contribute to an augmented ability to obtain trade credit. Heterogeneity tests reveal that the influence is notably more pronounced among companies characterized by lower supplier concentration, lower customer concentration and greater financing constraints. Further analysis shows that ESG performance helps companies obtain trade credit from not only their suppliers but also their customers. Additionally, it is found that ESG performance is linked to a reduction in the cost of trade credit financing.

This study adds valuable insights to the current body of literature. First, it contributes to research on the economic consequences of firms' ESG performance (El Ghoul et al., 2011; Harjoto and Laksmana, 2018; Lian et al., 2023). By investigating the economic implications of ESG performance in relation to trade credit financing in Chinese listed companies, this study offers empirical evidence that supports the positive economic outcomes associated with corporate ESG performance. These findings have significant implications for companies operating in other emerging markets.

Second, this study contributes to trade credit financing research. It offers a comprehensive analysis of how ESG performance influences trade credit financing, thereby providing new insights into the factors that affect this type of financing. Additionally, unlike previous studies that considered only trade credit provided by suppliers to enterprises (El Ghoul and Zheng, 2016; Saeed and Zureigat, 2020), this study takes into account trade credit provided by both suppliers and customers. Furthermore, the existing literature predominantly concentrates on the quantity of trade credit financing (Xu et al., 2020; Luo et al., 2023), whereas this paper aims to expand the existing knowledge by investigating the influence of ESG performance on the cost of trade credit financing. The analysis helps establish whether strong ESG performers have greater trade credit demand and whether counterparties are more ready to provide trade credit to strong ESG performers along the supply chain.

Finally, this study proposes the use of instrumental variables to address the endogeneity problem associated with ESG performance. Many previous studies have used industry, regional, or early company ESG performance as instrumental variables (Breuer et al., 2018; He et al., 2023; Lian et al., 2023), which may not fully satisfy the assumption of exogeneity (Gormley and Matsa, 2014). In contrast, this paper selects the market value held by ESG funds in listed companies and the blood donation rate of the province where the firm is registered as instrumental variables for the company's ESG performance. These instrumental variables are better able to satisfy both the relevance and exogeneity requirements, which may provide valuable insights for future research on ESG-related topics that need to address endogeneity concerns.

The subsequent sections of the paper are structured as follows: Section 2 formulates the hypotheses; Section 3 provides an overview of the data and methodology; Section 4 presents the baseline regression, robustness tests, and endogeneity tests; Section 5 and Section 6 conduct an analysis of impact channels and heterogeneity; additional analysis is reported in Section 7; and the paper concludes in Section 8.

2. Literature and hypothesis development

Trade credit is a prevalent form of credit arrangement between suppliers and customers. Trade credit has a triple identity as a short-term financing tool, a short-term investment tool, and a competitive tool at the same time. First, trade credit is a short-term and informal method of financing used by enterprises. In economies with underdeveloped financial markets or limited access to bank credit, firms often turn to trade credit as an alternative form of financing. This is because it can be challenging for them to secure funding from formal sources (Petersen and Rajan, 1997). Second, trade credit is a short-term investment that carries inherent risks for the entity extending it. Suppliers bear the risk of customers defaulting on payments because of poor business performance or even bankruptcy (Cunat, 2007), whereas customers assume the risk of suppliers' delayed shipments or provision of substandard goods when they extend trade credit to suppliers. Therefore, companies prefer to provide trade credit to more secure counterparties. Third, trade credit serves as a competitive tool for companies to increase sales and product procurement. Suppliers often offer trade credit to

customers to increase product sales, particularly when dealing with influential customers (Fabbri and Klapper, 2016). Customers frequently extend trade credit to suppliers to ensure the timely acquisition of raw materials and products, especially when dealing with dominant suppliers.

Owing to the ongoing development of ESG management practices in supply chains, supply chain stakeholders are now more concerned about their counterparts' ESG performance when making trade credit decisions. According to stakeholder theory and resource dependence theory, firms can better meet the needs of their stakeholders through ESG practices, thus gaining access to key strategic resources (Gaur et al., 2011). Stakeholders in the supply chain, such as a firm's suppliers and customers, view trade credit as a crucial strategic resource for firm growth. In addition, excellent ESG performance can alleviate the concerns of supply chain stakeholders about the firm's financial soundness by reducing the firm's risk (Wen et al., 2024), increasing the firm's bargaining power with supply chain stakeholders by improving the firm's competitiveness in the market, and reducing the information asymmetry between supply chain stakeholders and the firm by enhancing the disclosure of firm information. Together, these factors increase the amount of trade credit provided by supply chain stakeholders to high-performing ESG firms.

Based on the preceding analysis, we formulate the following hypothesis:

H1. Firms with better ESG performance can obtain more trade credit financing.

2.1. ESG performance, firm risk, and trade credit financing

ESG performance has the potential to mitigate firm risk, making counterparties more inclined to give trade credit to firms. Several factors contribute to the reduction of firm risk through ESG performance. First, firms that prioritize ESG practices tend to be highly profitable and efficient, resulting in sufficient and stable cash flows (Goss and Roberts, 2011). This financial stability contributes to a decrease in the firm's overall financial risk. Second, companies that exhibit good ESG performance typically demonstrate enhanced risk management capabilities, resulting in less likelihood of facing litigation challenges and regulatory penalties related to ESG matters (Wong et al., 2021). Finally, stakeholders recognize good ESG performance, which contributes to a positive brand image (Brammer and Millington, 2005). This, in turn, enables firms to build ethical and reputational capital, which can serve as a form of insurance against potential risks and challenges. When faced with a decline in the external economic environment or negative news, companies that exhibit outstanding ESG performance are more likely to garner support from stakeholders and successfully navigate challenging circumstances (Schnietz and Epstein, 2005).

Drawing on the previous discussion, we propose Hypothesis 2:

H2. Firms with better ESG performance can increase their trade credit financing by reducing firm risk.

2.2. ESG performance, product market competitiveness, and trade credit financing

ESG performance can enhance a company's market competitiveness. High product competitiveness positions firms favourably within the supply chain, giving them more bargaining power in their interactions with both upstream and downstream firms. This advantageous position ultimately strengthens a firm's capacity to obtain trade credit (Fisman and Raturi, 2004; Van Horen, 2004). The primary factor contributing to the enhancement of a firm's product competitiveness in the marketplace through ESG performance is the promotion of green innovation within the firm (Chouaibi et al., 2022). Enterprises aim to implement ESG concepts through green process innovation. This approach entails reducing energy and resource consumption during the production process, improving the technical efficiency of product manufacturing, and ultimately increasing market competitiveness (Porter and Linde, 1995; Wang et al., 2024). In addition, enterprises integrate the ESG concept into raw material selection, product design, and packaging in their green product innovation to differentiate their products and take the lead in putting such products into the market, thereby consolidating their market position (Eccles et al., 2014; Wang et al., 2023).

Based on this discussion, Hypothesis 3 is proposed:

H3. Firms with better ESG performance can increase their trade credit financing by enhancing their product market competitiveness.

2.3. ESG performance, information disclosure quality, and trade credit financing

ESG performance contributes to enhancing the quality of corporate information disclosure. This helps mitigate information asymmetries between enterprises and their counterparties (An et al., 2025). If suppliers and consumers lack a comprehensive understanding of a business's actual operational circumstances, they typically exercise caution and decline to extend trade credit to the enterprise. This statement suggests that the presence of information asymmetry can hinder firms from obtaining trade credit financing. However, enhancing the quality of corporate disclosure can enhance firms' capacity to secure trade credit financing by reducing information asymmetry (Hui et al., 2012). Firms that demonstrate strong ESG performance prioritize safeguarding their stakeholder relationships. Consequently, they actively disclose information regarding their environmental, social, and corporate governance initiatives (Michelon and Parbonetti, 2012). This supplementary information, which is primarily nonfinancial in nature, serves to complement the data presented in the financial statements (Kuai et al., 2025). It can assist stakeholders within the supply chain in comprehensively understanding the enterprise's business status and genuine intention to finance the industry's credit (Zhang et al., 2020). This enhanced understanding enables suppliers and customers to extend greater trade credit to the enterprise.

Based on the analysis above, Hypothesis 4 is formally proposed:

H4. Firms with better ESG performance can increase trade credit financing by improving information disclosure quality.

3. Research design

3.1. Data

This analysis covers a sample of A-share listed firms from 2009 through 2021. The sample selection procedure comprises multiple steps: (1) excluding publicly listed enterprises in the financial sector; (2) excluding publicly traded corporations in the special treatment state; and (3) removing samples with missing total asset size, trade credit data, or financial leverage above 1. Additionally, all the continuous variables are winsorized at the 1 % and 99 % levels. The final dataset consists of 32,141 observations, with a cross-sectional number of N = 3361 and a time horizon of T = 13. We obtained ESG data from the Sino-Securities Index Information Service (Shanghai) Co. Ltd. and firms' accounting data from the CSMAR database.

3.2. Model and variables

We adopt the Model (1) to examine Hypothesis 1:

$$TC_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \gamma_1 X_{i,t} + \sum Ind + \sum Year + \varepsilon_{i,t} \quad (1)$$

The variable $TC_{i,t}$ reflects the trade credit financing obtained by firm i in year t, whereas $ESG_{i,t}$ gauges the ESG performance of firm i in year t. $X_{i,t}$ represents a collection of control variables, whereas Ind and Year indicate industry fixed effects[1] and year fixed effects, respectively. $\varepsilon_{i,t}$ indicates the random perturbation term.

3.2.1. Trade credit (TC)

Previous research has focused mainly on trade credit received by companies from upstream suppliers, measuring trade credit financing in terms of accounts payable and notes payable (El Ghoul and Zheng, 2016; Saeed and Zureigat, 2020). Importantly, however, companies can also obtain trade credit from their customers. To provide a comprehensive assessment of trade credit financing, we adopt the approach proposed by Luo et al. (2023). This approach evaluates the total trade credit obtained by firms by adding accounts payable, notes payable, and advances from customers. Furthermore, we standardize total trade credit by dividing it by the firm's total assets to obtain the TC.

3.2.2. ESG performance (ESG)

This study uses the Sino-Securities Index Information Service (Shanghai) Co. Ltd. ESG rating system (referred to as the SSI ESG rating system) to evaluate firms' ESG performance, which is consistent with the research of Chen and Xie (2022), Lian et al. (2023), Lin et al. (2023), and Luo et al. (2023). The SSI ESG rating system was designed with reference to internationally recognized ESG evaluation frameworks and tailored to suit the specific characteristics of the Chinese market. The final ratings, ranging from C to AAA, are determined on the basis of the scores obtained from these indicators. For the purpose of regression analysis, this study converts the SSI ESG ratings into numerical values, assigning a value of 1 to the rating of C and incrementally increasing the value by 1 for each higher rating level, with a value of 9 assigned to the highest rating of AAA. As the SSI ESG rating system is updated on a quarterly basis, this study estimates a company's ESG performance for a given year by averaging the ESG ratings from the four quarters.

3.2.3. Control variables (X)

According to Chod et al. (2019), Guo et al. (2021), and Luo et al. (2023), Model (1) incorporates various control variables that can impact trade credit financing. These variables are listed in Table 1.

4. Empirical results

4.1. Descriptive statistics

As shown in Table 2, the average TC is 16.309 %, with a median of 13.401 %. Notably, a small subset of the sample firms exhibits a high proportion of trade credit financing relative to their total assets, with the maximum TC value reaching 54.241 %. The average ESG score is 4.104, with a median of 4.000. This result indicates that the average ESG rating of Chinese listed companies is a B, which is relatively low and consistent with the findings of Zheng et al. (2023). The distributions of the remaining variables fall within reasonable ranges. The correlation coefficients between TC and ESG, as shown in Table 3, are significantly positive.

[1] A two-digit code classification is used for the manufacturing industry and a one-digit code classification for other industries to generate industry fixed effects.

4.2. Baseline results

The results of Model (1) are presented in Table 4. Column (1) shows the results after accounting for the firms' financial characteristics. Columns (2) and (3) include fixed effects for time and industry, respectively, whereas Column (4) includes fixed effects for both time and industry. The standard errors in all the columns are clustered at the industry level. The analysis focuses on the ESG coefficients, which are consistently positive at a significant level of 1 % in all the columns. This finding indicates that firms with better ESG performance can secure more trade credit financing, thereby confirming research Hypothesis H1. Taking Column (4) as an example, one level increase in the ESG rating results in a 0.38 increase in TC. This increase represents 2.38 % (3.30 %) of the average (standard deviation) of TC for the sample companies.

The coefficients of SIZE, AGE, TQ, and PPE are significantly negative. This suggests that larger firms and those with a longer history, better growth prospects and greater collateral availability are less dependent on trade credit. The significant positive coefficients of LEV suggest that companies with higher debt ratios face greater difficulty in obtaining financing from formal financial channels and are therefore more dependent on trade credit financing. The significant positive coefficients of ROA and CF can be attributed to the perception that firms with higher profitability and cash flow are less risky. This perception makes suppliers and customers more willing to extend trade credit to these firms.

4.3. Robustness test

4.3.1. Alternative indicators of TC

In the baseline regression analysis, TC refers to gross trade credit. We consider the net trade credit and exclude any trade credit extended by firms to external entities = (accounts payable - accounts receivable) + (notes payable - notes receivable) + (advances from customers - prepayments). We derive two measures, NTC1 and NTC2, by standardizing net trade credit financing in relation to total assets and operating income, respectively. In addition, owing to the special nature of notes payable, we also construct indicators of trade credit financing that do not include notes payable. Specifically, we define TC0 = (accounts payable + advances from customers)/total assets, NTC3 = (accounts payable - accounts receivable + advances from customers - prepayments)/total assets, and NTC4 = (accounts payable - accounts receivable + advances from customers - prepayments)/operating income. The coefficients of ESG in Columns (1) and (5) of Table 5 remain significantly positive, indicating that regardless of the measure used, the results indicate that good ESG performance contributes to the amount of a firm's trade credit financing.

4.3.2. Alternative indicators of ESG performance

First, we employ an alternative assignment method to convert the ESG ratings of listed companies into numerical values. Specifically, we assign a value of 1 to ESG2 if the ESG rating is C, CC, or CCC. ESG2 is granted a value of 2 (3) if the ESG rating is B, BB, or BBB (A, AA, or AAA). Similarly, we assign a value of 0 (1) to ESGdum if it is between C-BBB(A-AAA). Second, we examine the influence of firms' environmental responsibility (E), social responsibility (S), and corporate governance performance (G) on trade credit. The SSI ESG rating system not only provides overall ESG ratings for listed companies but also offers sub-ratings that assess their environmental responsibility, social responsibility, and corporate governance. Each of these sub-ratings is evaluated on a nine-point scale ranging from C-AAA, and corresponding indicators are derived by assigning values of 1–9 to the C-AAA scale. Third, on the basis of the works of Shou et al. (2020) and He et al. (2023), we utilize Hexun.com's social responsibility composite score (HXCSR) to gauge ESG performance.

The coefficients of ESG2, ESGdum, E, and S in Columns (1)–(4) of Table 6 are significantly positive at the 1 % level, whereas the coefficients of G and HXCSR exhibit significant positive relationships at the 5 % level, indicating that employing different ESG measures does not change our results.

4.3.3. Subsample regression

We divide the sample into two subsamples according to the firms' industry classification, with the manufacturing subsample accounting for 65.20 % of the observations and the non-manufacturing subsample accounting for 34.80 %. Additionally, the adoption of ESG practices in China has been on the rise since the inclusion of A-shares in the MSCI Emerging Markets Index in 2018. As a result, we further partition the sample into two subsamples: one before 2018 and one after 2018. The coefficients of ESG in Table 7 remain significantly positive, indicating that our finding holds across all the subsamples.

4.3.4. PSM regression

We use the propensity score matching method. The results of the univariate difference test show that firms with higher and lower ESG ratings also differ significantly in terms of other firm characteristic variables. Thus, the enhancement effect of ESG on the level of trade credit financing may not arise purely from differences in ESG performance but may be confounded by differences in other firm characteristics or because other variables jointly influence the level of trade credit financing and ESG performance. The usual treatment fully incorporates firm micro characteristic variables in the regression model, whereas the other treatment uses the propensity score matching (PSM) method. To meet the requirements of the traditional PSM format, we divide companies' ESG ratings into two classes. Companies with ESG$\geq$ 5 are used as the better ESG performance group, i.e., the treatment group. We find other matching samples with similar characteristics for the companies in the treatment group in the remaining sample (control group). Table 8 shows the estimation results of firm ESG performance on trade credit financing after multiple matching approaches are taken. The matching methods corresponding to Columns (1)– (7) are "one-to-one matching", "nearest neighbour matching", "calliper matching", "kernel

matching", "spline matching", "local linear regression matching", and "martingale matching". The regression results show that regardless of which matching method we use, there is still a significant positive relationship between ESG and trade credit financing. This supports this paper's conclusion that higher ESG performance can significantly enhance corporate trade credit financing.[2]

4.4. Tests for endogeneity

First, additional control variables are incorporated to mitigate concerns about omitted variables. Model (1) includes a comprehensive set of corporate financial characteristic variables that may impact firms' trade credit financing. Here, we integrate corporate governance factors that may impact trade credit, such as the ownership percentage of the top shareholder (TOP1), board size (BOARD), board independence (INDEP), CEO duality (DUAL), and a dummy variable for state-owned companies (SOE). Additionally, to account for unobservable omitted variables that may not vary over time, we estimate the two-way fixed effects model. The coefficients of ESG in Columns (1) and (2) of Table 9 remain significantly positive.

Second, the issue of reverse causality can be addressed by including lagged explanatory variables. One concern with benchmark regressions is that firms with more trade credit access may be more likely to improve their ESG performance. Since future trade credit financing is unlikely to impact current ESG performance, we re-estimate the regression model using one-, two-, and three-period lead trade credit as explanatory variables. The coefficients of ESG in Columns (3)– (5) of Table 9 are all significantly positive, suggesting that the results of this study are not undermined by the issue of reverse causality.

Third, we address the endogeneity concern through instrumental variable regression. Previous studies have used industry or regional ESG as an instrumental variable for firms' ESG performance (Breuer et al., 2018). However, these variables tend to violate the exclusion restriction assumption (Gormley and Matsa, 2014), despite their high correlation with firms' ESG performance. In this study, we introduce two innovative instrumental variables. First, we utilize ESG fund shareholding data, specifically the market value held by ESG funds in listed companies (IV1).[3] Second, we obtain IV2 by multiplying the 2011 blood donation rate of the province where the firm is registered with the human development index of China published by the United Nations. ESG funds, as large institutional investors, may improve a listed company's ESG performance via multiple ESG investing techniques. Similarly, higher blood donation rates in the regions where companies are located suggest a greater degree of corporate ethics, more social responsibility awareness, and better ESG performance. Therefore, both variables are closely associated with corporate ESG performance. Furthermore, these variables have a low probability of directly influencing firms' trade credit financing, thus satisfying the exogeneity requirement of instrumental variables.[4] To assess the validity of the instrumental variables, we conduct tests for underidentification, weak instruments, and overidentification. We use the Kleibergen–Paap rk LM statistic, the Kleibergen–Paap rk Wald F statistic, and the Hansen J statistic for these tests because we do not think that the disturbance terms are independent and spread out in the same way. Columns (6) and (7) of Table 9 present the results from the two-stage least squares method (IV-2SLS). The chosen instrumental variables are supported by the three statistics, and the ESG coefficient is still significantly positive at the 1 % level in Column (7). These findings support the conclusion that ESG performance improves corporate trade credit financing.

4.5. Mechanism analysis

In this section, we examine the mechanisms through which ESG performance affects the accessibility of trade credit. Specifically, we explore whether it can motivate companies to secure increased trade credit by reducing corporate risk, enhancing market competitiveness, and improving the quality of corporate disclosure. To this end, we develop Models (2) and (3), where the variable M represents the mechanism under examination.

$$M_{i,t} = \alpha_0 + \alpha_1 ESG_{i,t} + \gamma_1 X_{i,t} + \sum Ind + \sum Year + \varepsilon_{i,t} \tag{2}$$

$$TC_{i,t} = \delta_0 + \delta_1 ESG_{i,t} + \delta_2 M_{i,t} + \gamma_1 X_{i,t} + \sum Ind + \sum Year + \varepsilon_{i,t} \tag{3}$$

In the baseline regression Model (1), β_1 reflects the total effect of ESG on TC, whereas δ_1 in the regression Model (3) with the

[2] Before propensity score matching regression, a balance test is needed. It shows that the standardized deviations of all the covariates after matching are less than 10 %. Compared with the results before matching, the standardized deviations of all the covariates are significantly reduced, and all the covariates pass the balance test, which suggests that there are no significant systematic differences between the treatment and control groups.

[3] We exclude structured sub funds and ETF-linked funds from all China public funds and determine whether a fund is an ESG fund based on the presence of specific ESG-related keywords in the fund name. These keywords include: ESG, new energy (新能源), sustainable development (可持续发展), beautiful China (美丽中国), green (绿色), low carbon (低碳), energy saving (节能), environmental protection (环保), clean (清洁), carbon neutral (碳中和), circular economy (循环经济), eco-environment (生态环境), environmental governance (环境治理), pollution control (污染治理), exhaust gas control (尾气治理), responsibility (责任), poverty alleviation (扶贫), and corporate governance (公司治理). After screening, a total of 198 ESG funds established between 2005 and 2022 are identified.

[4] We also use the number of Confucius temples within 200 km of a listed company's registered location as instrumental variables for the company's ESG performance. A larger number of Confucius temples in proximity to a company's registered site suggests a stronger degree of corporate ethics, social responsibility awareness, and better ESG performance (Goodell et al., 2024). The regression outcomes utilizing this instrumental variable continue to support the conclusions of this work.

inclusion of the mediator variable reflects the direct effect of ESG on TC, and the indirect effect of ESG affecting TC through the mediator variable M is $\alpha_1\delta_2$.

4.6. Mechanism I: corporate risk

To assess corporate risk (RISK), we utilize the three-year rolling standard deviation of industry-mean-adjusted earnings before interest, taxes, depreciation, and amortization (EBITDA) normalized by total assets, as recommended by John et al. (2008)[5]. The significantly negative coefficient of ESG in Column (1) of Table 10 indicates that strong ESG performance decreases corporate risk. Additionally, the coefficient of RISK in Column (2) of Table 10 is significantly negative, suggesting that increased corporate risk negatively affects companies' ability to obtain trade credit. Although the coefficient of ESG remains positive in Column (2), its magnitude decreases from 0.380 in the baseline regression to 0.270. This suggests that the direct impact is smaller than the overall impact of ESG on trade credit. By combining the results in Columns (1) and (2) of Table 10, we can infer that ESG may increase trade credit by reducing corporate risk.

4.7. Mechanism II: product market competitiveness

Drawing on Mitani (2014), we use market share (MR) to assess a company's product competitiveness. The market share is determined by dividing a listed company's main business revenue by the total main business revenue of all listed companies in the same industry. A larger market share indicates stronger product market competitiveness. The coefficient of ESG is significantly positive in Column (3) of Table 10, indicating that ESG contributes to enhancing product competitiveness. The positive coefficient of MR in Column (4) means that stronger product market competitiveness facilitates the acquisition of more trade credit. The coefficient of ESG decreases from 0.380 when MR is not included to 0.374 in Column (4). According to these analyses, we can infer that strong ESG can improve the market competitiveness of a company's products, leading to increasing trade credit financing.

4.8. Mechanism III: information disclosure quality

To assess the quality of listed companies' disclosure, we construct information disclosure quality (IDQ) based on the disclosure assessment results published by the Shanghai Stock Exchange and Shenzhen Stock Exchange, as suggested by Lian et al. (2023). The IDQ is divided into four grades: excellent, good, qualified, and unqualified, with corresponding values of 4, 3, 2, and 1, respectively, as outlined by Lian et al. (2023). The coefficient of ESG is significantly positive in Column (5) of Table 10, indicating that good ESG performance enhances information disclosure quality. The positive coefficient of IDQ in Column (6) reveals that enterprises with higher disclosure quality promote trade credit financing. The coefficient of ESG decreases from 0.380 when IDQ is not included to 0.351 in Column (6). On the basis of these analyses, we can conclude that ESG performance improves the quality of information disclosure, thereby enhancing corporate trade credit financing.

Finally, we modify Model (3) by incorporating the three aforementioned variables related to mechanisms. Column (7) of Table 10 shows that the coefficient of RISK is significantly negative, whereas the coefficients of MR and IDQ are significantly positive. This finding suggests that the three mechanisms operate independently and do not exhibit any noticeable interference. Therefore, we conclude that ESG factors facilitate the attainment of trade credit through three distinct mechanisms: mitigating corporate risk, bolstering competitiveness in the product market, and improving the quality of information disclosure.

5. Heterogeneity test

5.1. Supply chain concentration

In a supply chain consisting of suppliers, firms, and customers, the ESG-TC relationship is influenced by the concentration of suppliers and customers. When supplier concentration is low, suppliers experience severe competition and are compelled to give more trade credit to customers to increase product sales (Petersen and Rajan, 1997). However, suppliers do not offer trade credit to all customers without first screening them. Instead, they prioritize lending to customers with better reputations, lower risk, and greater information transparency, which are typically better ESG performers. Therefore, we anticipate that the performance of ESG factors will have a stronger impact on trade credit financing when companies have fewer suppliers.

Trade credit along the supply chain is closely tied to the negotiating strength of both suppliers and customers (Fabbri and Klapper, 2016). If a firm has a high concentration of customers, its bargaining power is weak, whereas that of its customers is strong. In this

[5] We thank the reviewer for suggesting improvements to corporate risk measurement. Our measure of corporate risk is computed as $RISK_{i,n} = \sqrt{\frac{1}{N-1}\sum_{n=1}^{N}\left(ADJ\_ROA_{i,n} - \frac{1}{N}\sum_{n=1}^{N} ADJ\_ROA_{i,n}\right)^2} \mid N = 3$, where $ADJ\_ROA_{i,n} = \frac{EBITDA_{i,n}}{ASSETS_{i,n}} - \frac{1}{X_n}\sum_{k=1}^{X}\frac{EBITDA_{k,n}}{ASSETS_{k,n}}$. That is, for each firm with available earnings and total assets for at least three years in 2009–2021, we compute the deviation of the firm's EBITDA/assets from the industry average (for the corresponding year) and then calculate the standard deviation of this measure for each firm. We compute EBITDA as the earnings before interest, taxes, depreciation, and amortization and then scale it with the contemporaneous total assets.

situation, even if a firm has good ESG performance, it may struggle to obtain trade credit from its customers because of its disadvantaged position in negotiations. Consequently, we anticipate that when firms face a greater concentration of customers, ESG factors will have less effect on trade credit.

To assess supplier concentration, we utilize the methodology outlined by Zhang et al. (2020) and examine data on a company's procurement from its five largest suppliers. We calculate the Herfindahl index for the firm's top five suppliers (SHHI),[6] comparing it to the median Herfindahl index of all listed firms. If $SHHI_{i,t}$ is greater than the median SHHI of all listed firms in year t, then the supplier concentration faced by firm i is considered high, and $DSHHI_{i,t}$ takes the value of 1; otherwise, it is 0. Similarly, we calculate the Herfindahl index for the firm's top five customers (CHHI),[7] comparing it to the median Herfindahl index of all listed firms. If the firm's Herfindahl index is greater than the median, it is considered to have a greater concentration of customers ($DCHHI_{i,t} = 1$).

The coefficients of ESG are significantly positive in Columns (1) and (2) of Table 11. However, the coefficient is greater (0.590) in the group with lower supplier concentration (DSHHI = 0) than in the group with higher supplier concentration (0.321). The test comparing the coefficients of ESG between the two groups confirms that the coefficients of ESG are significantly different (P = 0.031). Additionally, in Column (3), the coefficient of DSHHI × ESG is significantly negative at the 10 % level. This further supports the idea that lower supplier concentration enhances the impact of ESG on trade credit.

Columns (5) and (6) of Table 11 display the results for lower customer concentration (DCHHI = 0) and higher customer concentration (DCHHI = 1), respectively. The ESG coefficients are 0.463 and 0.237, respectively. The test of the difference in coefficients between the two groups rejects the hypothesis that the coefficients are not different (P = 0.045). Additionally, in Column (3), the coefficient of DCHHI × ESG is significantly negative at the 1 % level. This suggests that higher customer concentration diminishes the promotional impact of ESG on trade credit.

5.2. Financing constraints

In China's bank-dominated financial system, bank credit has emerged as the primary and crucial source of financing for enterprises. However, the presence of credit rationing hinders enterprises from acquiring adequate loan amounts from financial institutions (An et al., 2025). To address shortfalls in financing, businesses often rely on trade credit from upstream and downstream companies in the supply chain as an alternative to traditional financing options, such as bank loans (Petersen and Rajan, 1997). From a capital demand standpoint, the demand for trade credit financing increases as enterprises face more financing constraints. From the standpoint of capital supply, enterprises facing financing constraints are more likely to face elevated risks and reduced information transparency. These factors play crucial roles in preventing upstream and downstream counterparties from extending trade credit to such enterprises. The significance of corporate ESG performance is highlighted in this scenario, as it has the potential to mitigate firm risk through the "insurance effect". Additionally, engaging in more proactive information disclosure may help reduce information asymmetry between enterprises and their counterparties. This can effectively address the concerns of supply chain counterparties when extending trade credit to firms. On the basis of the aforementioned analyses, it is anticipated that ESG performance will exert a more pronounced influence on the utilization of trade credit financing with companies that face greater financing constraints.

We employ the SA index, as suggested by Hadlock and Pierce (2010), to assess the extent of corporate financing constraints.[8] The variable $FINCON_{i,t}$ is assigned a value of 1 when $SA_{i,t}$ exceeds the median SA of all the sample firms in year t; otherwise, it is assigned a value of 0. As indicated in Table 12, in the subgroup with lower financing constraints (FINCON = 0), the coefficient for ESG performance is 0.262. In contrast, in the subgroup with greater financing constraints (FINCON = 1), the coefficient for ESG performance is 0.531. The test comparing coefficients between the two groups reveals a significant difference between them (P = 0.012). The coefficient of FINCON × ESG in Column (3) is significantly positive at the 5 % level. This suggests that as financing constraints intensify, ESG's influence on trade credit increases.

6. Further analysis

6.1. Trade credit from suppliers versus trade credit from customers

Firms can obtain trade credit from different parties in the supply chain. A firm can acquire trade credit from its upstream suppliers as a customer, and as a supplier, it can obtain trade credit from its downstream customers. However, past research has focused mostly on trade credit supplied by suppliers to enterprises, overlooking the trade credit offered by consumers to firms (El Ghoul and Zheng, 2016; Saeed and Zureigat, 2020). In this section, we explicitly differentiate between the sources of trade credit. Specifically, trade credit from suppliers (TC_S) is defined as the ratio of accounts payable and notes payable to total assets, and trade credit from

[6] $SHHI_{i,t} = \sum_{j=1}^{5}\left(\frac{S_{i,j,t}}{S_{i,t}}\right)^2$, where $S_{i,j,t}$ represents the number of purchases made by firm i from its jth largest supplier in year t, and $S_{i,t}$ represents the total number of purchases made by firm i in year t.

[7] $CHHI_{i,t} = \sum_{j=1}^{5}\left(\frac{C_{i,j,t}}{C_{i,t}}\right)^2$, where $C_{i,j,t}$ represents the number of sales made by firm i to its jth largest customer in year t, and $C_{i,t}$ represents the total number of sales made by firm i in year t.

[8] SA= -0.737 ×SIZE+ 0.043 ×$SIZE^2$-0.040 ×AGE where size is expressed as the natural logarithm of total assets at the end of the period divided by millions and age is expressed as the number of years the firm has been listed.

customers (TC_C) is defined as the ratio of advances from customers to total assets. The descriptive statistics indicate that the mean values of TC_S and TC_C are 12.87 % and 3.53 %, respectively.

We substitute the explanatory variables in our model with TC_S and TC_C and display the regression results in Columns (1) and (2) of Table 13. The coefficients of ESG in both columns are significantly positive, suggesting that companies with strong ESG performance are more likely to receive trade credit from both upstream suppliers and downstream customers. One unit increase in ESG performance leads to a 0.16 increase in TC_S and a 0.20 increase in TC_C. These increases account for 1.27 % (1.58 %) of the mean (standard deviation) of TC_S and 5.77 % (3.17 %) of the mean (standard deviation) of TC_C.

6.2. Quantity of trade credit financing versus its cost

Trade credit financing is influenced by both the availability of credit from suppliers and customers and the demand for credit from firms. Additionally, the finding that ESG helps increase trade credit for firms can be attributed to both the increased supply of trade credit from suppliers and customers and the increased demand for trade credit from firms. To determine whether ESG primarily affects the supply of or demand for trade credit, it is important to analyse the impact of ESG on the cost of trade credit. If ESG performance largely drives the supply of trade credit from counterparties, we would expect to observe an increase in the amount and a drop in the cost of trade credit.

Owing to data limitations, it is challenging for us to obtain a direct indicator of the cost of financing trade credit. We attempt to approximate the cost of trade credit financing for firms by considering the variations in the relative costs of different types of credit. Specifically, we use TCP1 = accounts payable/(accounts payable + notes payable + advances from customers) × 100 % and TCP2 = (accounts payable + advances from customers)/(accounts payable + notes payable + advances from customers) × 100 % to indirectly reflect the cost of the trade credit financing of an enterprise. The larger the values of TCP1 and TCP2 are, the lower the cost is. The above indicator is rational because among accounts payable, notes payable and advances from customers, notes payable have the highest cost. On the one hand, the cost of notes payable is greater than that of accounts payable. This is because in China, enterprises' notes payable mainly exist in the form of bank acceptance bills, which are issued by the bank, promised to be honoured with a certain invoicing fee and require the enterprise to deposit an agreed-upon percentage of security deposits and other financial support. Moreover, unlike accounts payable, notes payable have a clear payment time, and the enterprise must pay unconditionally during the payment period. On the other hand, notes payable are more costly than advances from customers. Enterprises that receive advances from customers not only do not incur costs but can also use customer funds for a period and obtain the benefits of the funds during this period.

Columns (3) and (4) of Table 13 report the results with TCP1 and TCP2 as the explanatory variables. The coefficients of ESG in both columns are significantly positive at the 1 % level. This suggests that companies with stronger ESG performance rely less on notes payable for trade credit financing, resulting in lower trade credit financing costs. Combined with previous analyses, our findings present evidence that strong ESG performance can both increase the availability of trade credit financing and lower its cost. This finding indicates that ESG primarily impacts the supply of trade credit from suppliers and customers, rather than the demand for trade credit by firms.

7. Conclusions

This study examines how firms' ESG practices affect their ability to obtain trade credit financing. The findings suggest that firms with stronger ESG performance can obtain more trade credit. The analysis reveals that this relationship is mediated by several factors, including reduced firm risk, enhanced competitiveness in the product market, and improved quality of firm disclosure. These factors alleviate concerns among suppliers and customers regarding extending trade credit to firms. Further analysis reveals that the influence of ESG on trade credit is stronger when firms have lower supplier and customer concentrations and when they face more severe financing constraints. Moreover, the study shows that ESG facilitates trade credit from not only suppliers but also customers. Additionally, ESG performance both increases the amount of trade credit and decreases its cost. The implications of this research extend beyond Chinese firms, as they provide guidance for global firms in managing ESG practices within their supply chains.

Based on these findings, we can draw several conclusions.

Firms should strengthen their ESG practices and continuously improve their ESG performance. First, they should improve their ESG management systems, formulate ESG development strategies, and lead sustainable development with ESG concepts; second, they should improve the quality of ESG disclosure and strengthen communication with investors and the capital market. Third, firms should strengthen supply chain ESG management, integrate ESG concepts into entire supplier management and procurement business processes, and establish an incentive mechanism to encourage upstream and downstream firms to actively participate in ESG practices.

The government and regulators should improve the construction of the ESG ecosystem and provide a favourable external environment for ESG development. First, they should formulate relevant laws and policies to promote the development and popularization of ESG concepts and increase public awareness and acceptance of ESG. Second, they should encourage firms to disclose ESG information and strengthen penalties for "greenwashing" to increase the transparency and credibility of ESG information. Third, the government and regulators should guide long-term funds, represented by sovereign wealth funds and pension funds, to incorporate ESG principles into their investment decisions to promote the steady development of ESG investment.

Funding information

This work was supported the National Natural Science Foundation of China [grant numbers 71903136].

CRediT authorship contribution statement

Yonghui Lian: Writing – original draft, Methodology, Funding acquisition, Conceptualization. **Zixin Yang:** Writing – original draft, Visualization, Software, Formal analysis, Data curation. **Hong Cao:** Validation, Supervision, Investigation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Table 1
Variables definition

Variables name	Symbol	Definition
Trade Credit	TC(%)	(accounts payable + notes payable + advances from customers)/ total asset× 100 %
ESG performance	ESG	Constructed based on the SSI ESG rating system
Firm size	SIZE	log(total asset)
Firm age	AGE	log(years since the firm established)
Leverage	LEV(%)	total debt /total asset× 100 %
Return on Asset	ROA(%)	net profit / total asset× 100 %
Tobin's Q	TBQ	market value of assets / total assets
Cash flow ratio	CF(%)	net cash flow from operations /total asset× 100 %
Fixed assets ratio	PPE(%)	net fixed assets / total asset× 100 %

Table 2
Descriptive statistics

Variable	Obs	Mean	Std	Min	Median	Max
TC(%)	32141	16.309	11.736	0.664	13.401	54.241
ESG	32141	4.104	1.019	1.000	4.000	8.000
SIZE	32141	22.202	1.340	14.759	22.020	28.636
AGE	32141	2.799	0.399	0.000	2.833	4.143
LEV(%)	32141	43.182	20.598	5.117	42.641	89.188
ROA(%)	32141	3.635	6.157	−24.964	3.662	20.663
TQ	32141	2.070	1.331	0.869	1.640	8.534
CF(%)	32141	4.585	7.051	−17.138	4.522	25.439
PPE(%)	32141	21.422	16.156	0.225	18.125	70.991

Table 3
Correlation matrix

	TC	ESG	SIZE	AGE	LEV	ROA	TQ	CF	PPE
TC	1	0.03***	0.18***	0.02***	0.49***	−0.11***	−0.14***	−0.07***	−0.14***
ESG	0.01**	1	0.19***	−0.03***	−0.05***	0.22***	−0.14***	0.09***	−0.06***
SIZE	0.19***	0.23***	1	0.23***	0.50***	−0.06***	−0.53***	0.08***	0.03***
AGE	0.02***	−0.05***	0.19***	1	0.16***	−0.13***	−0.10***	0.01	−0.04***
LEV	0.51***	−0.06***	0.48***	0.18***	1	−0.42***	−0.36***	−0.14***	0.03***
ROA	−0.10***	0.23***	0.02***	−0.11***	−0.36***	1	0.25***	0.41***	−0.07***
TQ	−0.14***	−0.13***	−0.40***	0.00	−0.26***	0.13***	1	0.09***	−0.06***
CF	−0.05***	0.08***	0.08***	0.02***	−0.15***	0.37***	0.10***	1	0.25***
PPE	−0.19***	−0.05***	0.09***	−0.00	0.08***	−0.07***	−0.09***	0.24***	1

Note: The Pearson (Spearman) correlation coefficient is in the lower (upper) half of the correlation matrix. ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively.

Table 4
The impact of ESG performance on TC

Variable	(1)	(2)	(3)	(4)
	TC	TC	TC	TC
ESG	0.372***	0.400***	0.361***	0.380***
	(6.59)	(7.09)	(6.76)	(7.11)
SIZE	−1.054***	−1.150***	−0.770***	−0.775***
	(−18.81)	(−20.08)	(−14.17)	(−13.86)
AGE	−1.623***	−2.094***	−0.917***	−0.836***
	(−11.99)	(−13.66)	(−7.30)	(−5.78)
LEV	0.355***	0.360***	0.341***	0.342***
	(98.97)	(99.47)	(94.11)	(93.27)
ROA	0.132***	0.143***	0.137***	0.136***
	(12.10)	(13.00)	(12.80)	(12.55)
TQ	−0.566***	−0.597***	−0.539***	−0.553***
	(−13.82)	(−13.60)	(−13.44)	(−12.88)
CF	0.146***	0.143***	0.165***	0.166***
	(15.15)	(14.54)	(17.76)	(17.57)
PPE	−0.181***	−0.179***	−0.132***	−0.133***
	(−49.72)	(−48.61)	(−33.39)	(−33.29)
Constant	31.324***	33.335***	17.291***	16.984***
	(27.18)	(27.33)	(14.73)	(13.63)
Year FE	NO	YES	NO	YES
Ind FE	NO	NO	YES	YES
N	32,141	32,141	32,141	32,141
Adj.R^2	0.341	0.343	0.428	0.429

Note: The table shows the baseline regression results. Column (1) shows the regression results without controlling for industry and year fixed effects, and Columns (2), (3) and (4) show the results after controlling for year fixed effects, industry fixed effects, and both of industry and year fixed effects, respectively. The t values adjusted for industry level clustering are in parentheses. ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively.

Table 5
Robustness tests for alternative indicators of TC

Variable	(1)	(2)	(3)	(4)	(5)
	NTC1	NTC2	TC0	NTC3	NTC4
ESG	0.311***	0.979***	0.329***	0.289***	1.913**
	(4.21)	(5.31)	(6.86)	(4.17)	(2.14)
SIZE	1.490***	2.159***	−0.560***	1.885***	2.832**
	(20.66)	(12.45)	(−7.12)	(27.03)	(2.57)
AGE	0.815***	2.972***	−0.408***	1.374***	4.839***
	(3.98)	(6.40)	(−2.87)	(7.18)	(3.35)
LEV	0.175***	0.479***	0.247***	0.074***	0.396***
	(34.97)	(37.63)	(59.01)	(15.19)	(6.75)
ROA	0.039**	0.446***	0.089***	0.068***	1.105***
	(2.31)	(10.24)	(8.75)	(4.10)	(3.82)
TQ	−0.465***	−1.304***	−0.201***	−0.145**	−2.269***
	(−6.84)	(−7.55)	(−5.00)	(−2.17)	(−3.61)
CF	0.393***	0.665***	0.157***	0.397***	0.537***
	(28.30)	(20.28)	(16.78)	(29.49)	(4.12)
PPE	0.093***	0.193***	−0.105***	0.112***	0.221***
	(17.68)	(13.92)	(−23.79)	(23.06)	(3.34)
Constant	−44.410***	−82.577***	13.139***	−49.697***	−96.304***
	(−26.91)	(−21.31)	(8.76)	(−31.76)	(−3.98)
Year FE	YES	YES	YES	YES	YES
Ind FE	YES	YES	YES	YES	YES
N	29,172	29,172	32,141	32,091	32,091
Adj.R^2	0.283	0.303	0.365	0.277	0.025

Note: Columns (1)-(5) show regression results for alternative trade credit measures; Cluster adjusted t values are in parentheses. ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively.

Table 6
Robustness tests for alternative indicators of ESG

Variable	(1) TC	(2) TC	(3) TC	(4) TC	(5) TC	(6) TC
ESG2	0.581***					
	(4.62)					
ESGdum		0.691***				
		(4.61)				
E			0.404***			
			(8.39)			
S				0.199***		
				(5.99)		
G					0.096**	
					(2.17)	
HXCSR						0.011**
						(2.51)
SIZE	−0.759***	−0.712***	−0.759***	−0.733***	−0.706***	−0.716***
	(−12.54)	(−12.12)	(−13.68)	(−13.35)	(−12.73)	(−11.60)
AGE	−1.043***	−1.022***	−0.896***	−0.832***	−0.888***	−0.900***
	(−7.04)	(−6.91)	(−6.20)	(−5.74)	(−6.14)	(−5.84)
LEV	0.343***	0.343***	0.338***	0.338***	0.340***	0.340***
	(88.87)	(88.66)	(92.44)	(92.74)	(90.48)	(85.93)
ROA	0.147***	0.144***	0.144***	0.140***	0.144***	0.141***
	(12.80)	(12.53)	(13.48)	(12.98)	(13.27)	(11.07)
TQ	−0.635***	−0.620***	−0.551***	−0.564***	−0.571***	−0.622***
	(−13.69)	(−13.39)	(−12.82)	(−13.16)	(−13.30)	(−13.17)
CF	0.184***	0.184***	0.165***	0.165***	0.165***	0.169***
	(18.60)	(18.65)	(17.47)	(17.55)	(17.51)	(16.48)
PPE	−0.136***	−0.136***	−0.133***	−0.132***	−0.133***	−0.131***
	(−32.34)	(−32.24)	(−33.23)	(−33.04)	(−33.26)	(−30.35)
Constant	18.294***	17.827***	17.444***	17.280***	16.454***	17.931***
	(13.72)	(13.41)	(13.93)	(13.86)	(13.07)	(12.90)
Year FE	YES	YES	YES	YES	YES	YES
Ind FE	YES	YES	YES	YES	YES	YES
N	28,717	28717	32,141	32,141	32,141	27,493
Adj.R^2	0.440	0.440	0.430	0.429	0.429	0.435

Note: Columns (1)-(2) show regression results for alternative ESG measures; columns (3)-(5) show regression results for three dimensions(E, S and G); columns (6) show regression results for HXCSR. Cluster adjusted t values are in parentheses. ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively.

Table 7
Subsample regression results

Variable	(1)	(2)	(3)	(4)
	TC	TC	TC	TC
	Manufacturing subsample	Non-manufacturing subsample	Year < 2018	Year≥ 2018
ESG	0.367***	0.446***	0.193**	0.553***
	(5.83)	(4.49)	(2.53)	(7.39)
SIZE	−0.676***	−0.950***	−0.564***	−0.931***
	(−9.98)	(−9.73)	(−7.43)	(−11.37)
AGE	−0.387**	−1.774***	−1.025***	−0.612**
	(−2.39)	(−6.25)	(−6.16)	(−2.16)
LEV	0.342***	0.339***	0.342***	0.335***
	(78.89)	(50.83)	(72.63)	(56.46)
ROA	0.133***	0.122***	0.122***	0.148***
	(10.10)	(6.39)	(7.53)	(10.06)
TQ	−0.595***	−0.587***	−0.587***	−0.456***
	(−12.19)	(−6.75)	(−10.55)	(−6.69)
CF	0.148***	0.189***	0.215***	0.070***
	(12.99)	(11.81)	(18.24)	(4.45)
PPE	−0.147***	−0.113***	−0.145***	−0.115***
	(−29.84)	(−16.67)	(−27.71)	(−18.53)
Constant	17.066***	22.460***	14.031***	20.353***
	(11.94)	(10.19)	(8.42)	(10.41)
Year FE	YES	YES	YES	YES
Ind FE	YES	YES	YES	YES
N	20,957	11,184	19,702	12,439
Adj.R^2	0.399	0.470	0.451	0.408

Note: Columns (1)-(4) show regression results for manufacturing, non-manufacturing, and before and after 2018; Cluster adjusted t values are in parentheses. ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively.

Table 8
PSM regression results

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	1:1 matching	1:4 nearest neighbor matching	Caliper matching	Kernel matching	Spline matching	Local linear regression matching	Martingale matching
ESG	0.543***	0.419***	0.383***	0.383***	0.543***	0.543***	0.380***
	(6.59)	(7.03)	(7.17)	(7.17)	(6.59)	(6.59)	(6.50)
SIZE	−0.993***	−0.904***	−0.800***	−0.800***	−0.993***	−0.993***	−0.926***
	(−11.61)	(−14.22)	(−14.38)	(−14.38)	(−11.61)	(−11.61)	(−14.46)
AGE	−0.959***	−1.056***	−0.812***	−0.812***	−0.959***	−0.959***	−0.776***
	(−4.21)	(−6.43)	(−5.61)	(−5.61)	(−4.21)	(−4.21)	(−4.57)
LEV	0.372***	0.368***	0.344***	0.344***	0.372***	0.372***	0.361***
	(60.57)	(83.23)	(93.89)	(93.89)	(60.57)	(60.57)	(81.70)
ROA	0.154***	0.151***	0.136***	0.136***	0.154***	0.154***	0.139***
	(8.51)	(11.03)	(12.52)	(12.52)	(8.51)	(8.51)	(10.04)
TQ	−0.505***	−0.497***	−0.506***	−0.506***	−0.505***	−0.505***	−0.541***
	(−6.96)	(−9.36)	(−12.10)	(−12.10)	(−6.96)	(−6.96)	(−9.94)
CF	0.175***	0.177***	0.166***	0.166***	0.175***	0.175***	0.189***
	(11.62)	(16.05)	(17.71)	(17.71)	(11.62)	(11.62)	(16.62)
PPE	−0.143***	−0.135***	−0.133***	−0.133***	−0.143***	−0.143***	−0.136***
	(−22.13)	(−28.98)	(−33.46)	(−33.46)	(−22.13)	(−22.13)	(−29.12)
Constant	21.832***	19.695***	17.201***	17.201***	21.832***	21.832***	19.238***
	(10.94)	(13.61)	(13.84)	(13.84)	(10.94)	(10.94)	(13.31)
Year FE	YES	YES	YES	YES	YES	YES	YES
Ind FE	YES	YES	YES	YES	YES	YES	YES
N	12,285	23,335	31,926	31,926	12,285	12,285	24,029
Adj.R^2	0.443	0.449	0.432	0.432	0.443	0.443	0.440

Note: This table presents the results of PSM regression. The t values adjusted for industry level clustering are in parentheses. ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively.

Table 9
Endogeneity tests

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	TC	TC	$TC_{i,t+1}$	$TC_{i,t+2}$	$TC_{i,t+3}$	2SLS First Stage	2SLS Second Stage
ESG	0.330***	0.096**	0.357***	0.357***	0.307***		7.831***
	(6.16)	(2.01)	(5.99)	(5.33)	(4.02)		(5.81)
IV1						0.001***	
						(4.74)	
IV2						1.451**	
						(2.30)	
SIZE	−1.065***	−1.044***	−0.706***	−0.621***	−0.500***	0.206***	- 2.500***
	(−17.97)	(−12.56)	(−11.68)	(−9.45)	(−6.93)	(32.57)	(−7.99)
AGE	−1.080***	0.480	−0.953***	−0.932***	−0.958***	−0.139***	0.256
	(−7.27)	(1.38)	(−6.10)	(−5.60)	(−5.38)	(−9.03)	(0.95)
LEV	0.340***	0.253***	0.312***	0.281***	0.258***	−0.008***	0.406***
	(92.49)	(73.48)	(78.64)	(65.85)	(55.68)	(−21.88)	(34.20)
ROA	0.127***	0.057***	0.088***	0.080***	0.067***	0.029***	−0.070*
	(11.49)	(7.90)	(7.30)	(5.96)	(4.34)	(23.93)	(−1.66)
TQ	−0.546***	0.036	−0.670***	−0.772***	−0.746***	−0.066***	−0.169*
	(−12.51)	(0.93)	(−13.58)	(−13.89)	(−12.15)	(−12.43)	(−1.89)
CF	0.165***	0.129***	0.148***	0.093***	0.057***	−0.001	0.177***
	(17.40)	(22.95)	(14.60)	(8.57)	(4.89)	(−1.38)	(15.14)
PPE	−0.143***	−0.064***	−0.135***	−0.125***	−0.121***	0.001***	−0.139***
	(−35.50)	(−14.54)	(−31.24)	(−26.71)	(−23.86)	(2.67)	(−25.67)
TOP1	0.052***						
	(13.92)						
BOARD	0.257						
	(0.78)						
INDEP	−2.892***						
	(−2.69)						

(*continued on next page*)

Table 9 (*continued*)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	TC	TC	$TC_{i,t+1}$	$TC_{i,t+2}$	$TC_{i,t+3}$	2SLS First Stage	2SLS Second Stage
DUAL	−0.265**						
	(−2.30)						
SOE	1.684***						
	(12.84)						
Constant	21.825***	26.290***	18.075***	18.113***	16.778***	0.022	20.535***
	(14.77)	(12.64)	(13.40)	(12.32)	(10.44)	(0.15)	(12.31)
Firm FE	NO	YES	NO	NO	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES
Ind FE	YES	NO	YES	YES	YES	YES	YES
N	31,682	32,141	28,440	25,170	22,034	30,166	30,166
Adj.R^2	0.440	0.097	0.395	0.361	0.336		0.095
Kleibergen-Paap rk LM							70.550
							[0.000]
Kleibergen-Paap rk Wald F							13.566
							{19.93}
Hensan J							2.682
							[0.102]

Note: Column (1) shows the regression results with the inclusion of corporate governance-related control variables. Column (2) shows the regression results controlling for two-way fixed effects; columns (3)-(5) show the regression results with TC ($TC_{i,t+1}$, $TC_{i,t+2}$, $TC_{i,t+3}$) as explanatory variables in one, two, and three periods ahead; column (6)-(7) shows the regression results for IV-2SLS. The t-values adjusted for clustering are in (), the p-values of each statistic are in [], and the values in {} are the critical values at the 10 % level of the Stock-Yogo test; ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively.

Table 10
Mechanism analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	RISK	TC	MR	TC	IDQ	TC	TC
ESG	−0.005***	0.270***	0.000**	0.374***	0.132***	0.351***	0.279***
	(−16.92)	(4.99)	(2.09)	(7.00)	(33.21)	(5.86)	(4.63)
RISK		−14.875***					−10.373***
		(−9.46)					(−6.09)
MR				17.246***			14.022***
				(9.62)			(4.65)
IDQ						1.130***	1.021***
						(10.69)	(9.53)
SIZE	−0.002***	−0.806***	0.009***	−0.937***	0.109***	−1.159***	−1.247***
	(−9.60)	(−14.33)	(22.87)	(−16.09)	(28.33)	(−17.53)	(−18.47)
AGE	−0.004***	−0.950***	−0.005***	−0.746***	−0.044***	−0.243	−0.359**
	(−6.34)	(−6.54)	(−7.00)	(−5.16)	(−4.15)	(−1.48)	(−2.18)
LEV	−0.000***	0.343***	−0.000***	0.342***	−0.003***	0.353***	0.354***
	(−10.02)	(91.75)	(−2.80)	(93.65)	(−10.85)	(83.89)	(82.92)
ROA	−0.002***	0.103***	−0.000**	0.137***	0.024***	0.111***	0.087***
	(−27.05)	(8.97)	(−2.29)	(12.66)	(30.67)	(9.26)	(6.89)
TQ	0.003***	−0.478***	0.001***	−0.579***	0.010***	−0.496***	−0.443***
	(13.46)	(−10.68)	(10.96)	(−13.44)	(3.16)	(−10.59)	(−9.21)
CF	0.000***	0.173***	0.000***	0.164***	0.002***	0.139***	0.141***
	(11.02)	(18.13)	(4.30)	(17.36)	(3.56)	(12.99)	(13.01)
PPE	−0.000***	−0.138***	−0.000	−0.133***	0.000	−0.125***	−0.129***
	(−13.14)	(−34.08)	(−0.29)	(−33.42)	(1.11)	(−28.03)	(−28.40)
Constant	0.131***	19.661***	−0.158***	19.715***	0.049	20.643***	23.653***
	(26.72)	(15.51)	(−19.10)	(15.53)	(0.56)	(14.22)	(16.03)
Year FE	YES	YES	YES	YES	YES	YES	YES
Ind FE	YES	YES	YES	YES	YES	YES	YES
N	31,306	31,306	32,141	32,141	24,260	24,260	23,718
Adj.R^2	0.195	0.437	0.324	0.431	0.228	0.433	0.440

Note: Columns (1)(3)(5) show the regression results for model (2), and columns (2)(4)(6) show the regression results for model (3); the last column reports the results with the inclusion of the three mediating variables RISK, MR and IDQ simultaneously. The t values adjusted for industry level clustering are in parentheses. ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively.

Table 11
Heterogeneity test for supply chain concentration

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	DSHHI= 0	DSHHI= 1	All Sample	DCHHI= 0	DCHHI= 1	All Sample
ESG	0.590***	0.321***	0.585***	0.463***	0.237***	0.498***
	(6.86)	(3.51)	(7.02)	(5.90)	(2.94)	(6.47)
SUPHHI			−0.998**			
			(−1.96)			
ESG×SUPHHI			−0.214*			
			(−1.78)			
CUSHHI						0.887*
						(1.93)
ESG×CUSHHI						−0.306***
						(−2.85)
SIZE	−1.298***	−0.922***	−1.111***	−0.709***	−0.772***	−0.758***
	(−13.31)	(−8.78)	(−15.51)	(−8.69)	(−8.38)	(−12.51)
AGE	−0.875***	−0.186	−0.562***	−0.513**	−0.955***	−0.909***
	(−3.42)	(−0.68)	(−2.97)	(−2.25)	(−4.46)	(−5.81)
LEV	0.373***	0.312***	0.341***	0.343***	0.338***	0.341***
	(57.58)	(47.61)	(72.96)	(63.28)	(60.62)	(87.30)
ROA	0.159***	0.121***	0.140***	0.110***	0.142***	0.131***
	(9.16)	(6.90)	(11.28)	(6.75)	(9.03)	(11.56)
TQ	−0.409***	−0.590***	−0.519***	−0.426***	−0.632***	−0.543***
	(−5.25)	(−8.55)	(−9.93)	(−6.70)	(−9.62)	(−11.81)
CF	0.138***	0.117***	0.126***	0.172***	0.126***	0.150***
	(8.51)	(7.08)	(10.64)	(12.37)	(8.78)	(14.92)
PPE	−0.150***	−0.089***	−0.115***	−0.142***	−0.132***	−0.136***
	(−21.78)	(−12.89)	(−23.38)	(−24.13)	(−21.18)	(−31.84)
Constant	26.771***	19.900***	23.055***	14.855***	17.345***	15.698***
	(11.73)	(7.71)	(13.63)	(8.10)	(8.55)	(11.06)
Year FE	YES	YES	YES	YES	YES	YES
Ind FE	YES	YES	YES	YES	YES	YES
N	10,483	9844	20,327	14,471	13,686	28,157
Adj.R^2	0.462	0.377	0.433	0.446	0.427	0.429
Chi2	4.63			4.04		
P-value	[0.031]			[0.045]		

Note: Columns (1)-(3) show the regression results for supplier concentration heterogeneity; columns (4)-(6) show the regression results for customer concentration heterogeneity; The t values adjusted for industry level clustering are in parentheses. ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively. The Chi2 statistic is used to test the significance of the difference in coefficients between groups, and the corresponding p-values in square brackets.

Table 12
Heterogeneity test of financing constraint

Variable	(4)	(5)	(6)
	low financing constraint	high financing constraint	All Sample
ESG	0.262***	0.531***	0.265***
	(3.56)	(6.83)	(3.67)
FINCON			−1.145**
			(−2.53)
ESG×FINCON			0.255**
			(2.50)
SIZE	−0.974***	−0.824***	−0.782***
	(−10.43)	(−11.19)	(−14.00)
AGE	−0.690	−1.207***	−0.937***
	(−1.58)	(−5.44)	(−4.75)
LEV	0.333***	0.354***	0.342***
	(66.40)	(64.77)	(93.30)
ROA	0.157***	0.122***	0.135***
	(10.27)	(8.01)	(12.48)
TQ	−0.638***	−0.542***	−0.547***
	(−9.86)	(−9.31)	(−12.70)
CF	0.185***	0.145***	0.166***
	(14.08)	(10.83)	(17.57)

(*continued on next page*)

Table 12 (*continued*)

Variable	(4)	(5)	(6)
	low financing constraint	high financing constraint	All Sample
PPE	−0.133***	−0.130***	−0.133***
	(−24.37)	(−21.99)	(−33.19)
Constant	22.195***	18.653***	17.293***
	(9.44)	(11.45)	(12.33)
Year FE	YES	YES	YES
Ind FE	YES	YES	YES
N	16,886	15,255	32,141
Adj.R^2	0.403	0.468	0.430
Chi2	6.24		
P-value	[0.012]		

Note: The t values adjusted for industry level clustering are in parentheses. ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively. The Chi2 statistic is used to test the significance of the difference in coefficients between groups, and the corresponding p-values in square brackets.

Table 13
Impact of ESG performance on the source and cost of trade credit

Variable	(1)	(2)	(3)	(4)
	TC_S	TC_C	TCP1	TCP2
ESG	0.160***	0.200***	0.377***	0.874***
	(3.14)	(6.20)	(2.92)	(2.67)
SIZE	−0.734***	−0.127*	0.151	0.807**
	(−15.18)	(−1.76)	(1.22)	(2.16)
AGE	−0.969***	0.140	1.503***	6.807***
	(−7.45)	(1.38)	(4.14)	(7.68)
LEV	0.267***	0.086***	−12.664***	−0.148
	(61.64)	(24.27)	(−14.72)	(−0.06)
ROA	0.097***	0.034***	−5.253**	8.557
	(8.83)	(5.21)	(−2.10)	(1.30)
TQ	−0.492***	0.034	0.691***	3.458***
	(−6.28)	(1.11)	(5.80)	(9.45)
CF	0.062***	0.102***	28.727***	132.890***
	(6.77)	(13.69)	(12.96)	(19.47)
PPE	−0.072***	−0.061***	17.291***	−31.088***
	(−20.85)	(−16.90)	(18.31)	(−12.05)
Constant	14.275***	4.070***	43.090***	69.056***
	(13.69)	(3.07)	(14.79)	(7.68)
Year FE	YES	YES	YES	YES
Ind FE	YES	YES	YES	YES
N	32,141	32,141	32,141	32,141
Adj.R^2	0.373	0.230	0.088	0.223

Note: Columns (1)-(2) show the regression results on trade credit sourced from upstream and downstream firms, respectively; columns (3)-(4) shows the regression results on the cost of trade credit; The t values adjusted for industry level clustering are in parentheses. ***, ** and * represent the 1 %, 5 % and 10 % significance levels, respectively.

Data availability

Data will be made available on request.

References

Albuquerque, R., Koskinen, Y., Zhang, C., 2019. Corporate social responsibility and firm risk: theory and empirical evidence. Inst. Oper. Res. Manag. Sci. 65 4415–4469. https://doi.org/10.1287/MNSC.2018.3043.

An, H., Ran, C., Gao, Y., 2025. Does ESG information disclosure increase firm value? The mediation role of financing constraints in China. Res. Int. Bus. Financ. 73, 102584. https://doi.org/10.1016/j.ribaf.2024.102584.

Azmi, W., Hassan, M.K., Houston, R., Karim, M.S., 2021. ESG activities and banking performance: international evidence from emerging economies. J. Int. Financ. Mark. Inst. Money 70, 101277. https://doi.org/10.1016/j.intfin.2020.101277.

Bagh, T., Zhou, B., Alawi, S.M., Azam, R.I., 2024. ESG resilience: exploring the non-linear effects of ESG performance on firms sustainable growth. Res. Int. Bus. Financ. 70, 102305. https://doi.org/10.1016/j.ribaf.2024.102305.

Becchetti, L., Ciciretti, R., Hasan, I., 2013. Corporate social responsibility, stakeholder risk, and idiosyncratic volatility. J. Corp. Financ. 35, 297–309. https://doi.org/10.2139/ssrn.2289720.

Bofinger, Y., Heyden, K.J., Rock, B., 2022. Corporate social responsibility and market efficiency: evidence from ESG and misvaluation measures. J. Bank. Financ. 134, 106322. https://doi.org/10.1016/j.jbankfin.2021.106322.
Bonnie, B., Xuying, C.C., Chongyang, C., 2018. Corporate social responsibility, firm value, and influential institutional ownership. J. Corp. Financ. 52, 73–95. https://doi.org/10.1016/j.jcorpfin.2018.07.004.
Brammer, S., Millington, A., 2005. Corporate reputation and philanthropy: an empirical analysis. J. Bus. Ethics 61, 29–44. https://doi.org/10.1007/s10551-005-7443-4.
Breuer, W., Müller, T., Rosenbach, D., Salzmann, A., 2018. Corporate social responsibility, investor protection, and cost of equity: a cross-country comparison. J. Bank. Financ. 96, 34–55. https://doi.org/10.1016/j.jbankfin.2018.07.018.
Chen, Z., Sugiyama, K., Tasaka, K., Kito, T., Yasuda, Y., 2024. Impact of environmental, social and governance initiatives on firm value: analysis using AI-based ESG scores for Japanese listed firms. Res. Int. Bus. Financ. 70, 102303. https://doi.org/10.1016/j.ribaf.2024.102303.
Chen, Z., Xie, G., 2022. ESG disclosure and financial performance: moderating role of ESG investors. Int. Rev. Financ. Anal. 83, 102291. https://doi.org/10.1016/j.irfa.2022.102291.
Chod, J., Lyandres, E., Yang, S.A., 2019. Trade credit and supplier competition. J. Financ. Econ. 131, 484–505. https://doi.org/10.1016/j.jfineco.2018.08.008.
Chouaibi, S., Chouaibi, J., Rossi, M., 2022. ESG and corporate financial performance: the mediating role of green innovation: UK common law versus Germany civil law. Eur. J. Bus. 17, 46–71. https://doi.org/10.1108/EMJB-09-2020-0101.
Cunat, V., 2007. Trade Credit: Suppliers as debt collectors and insurance providers. Rev. Financ. Stud. 20, 491–527. https://doi.org/10.1093/rfs/hhl015.
Deng, G., Ma, S., Yan, J., Shuai, C., Liu, H., 2024. Dissecting the impact of the three E, S, G pillars on credit risk. Econ. Anal. Policy 83, 301–313. https://doi.org/10.1016/j.eap.2024.06.006.
Eccles, R.G., Ioannou, I., Serafeim, G., 2014. The impact of corporate sustainability on organizational processes and performance. Manag. Sci. J. Inst. Manag. Sci. 60 2835–2857. https://doi.org/10.1287/MNSC.2014.1984.
El Ghoul, S., Guedhami, O., Kwok, C.C., Mishra, D.R., 2011. Does corporate social responsibility affect the cost of capital? J. Bank. Financ. 35, 2388–2406. https://doi.org/10.1016/j.jbankfin.2011.02.007.
El Ghoul, S., Zheng, X., 2016. Trade credit provision and national culture. J. Corp. Financ. 41, 475–501. https://doi.org/10.1016/j.jcorpfin.2016.07.002.
Fabbri, D., Klapper, L.F., 2016. Bargaining power and trade credit. J. Corp. Financ. 41, 66–80. https://doi.org/10.1016/j.jcorpfin.2016.07.001.
Fatemi, A., Fooladi, I., Tehranian, H., 2015. Valuation effects of corporate social responsibility. J. Bank. Financ. 59, 182–192. https://doi.org/10.1016/j.jbankfin.2015.04.028.
Fisman, R., Raturi, M., 2004. Does competition encourage credit provision? Evidence from African trade credit relationships. Rev. Econ. Stat. 86, 345–352. https://doi.org/10.1162/003465304323023859.
Gaur, S.S., Vasudevan, H., Gaur, A.S., 2011. Market orientation and manufacturing performance of Indian SMEs: moderating role of firm resources and environmental factors. Eur. J. Mark. 45, 1172–1193. https://doi.org/10.1108/03090561111137660.
Goodell, J.W., Li, M., Liu, D., Wang, Y., 2024. Aligning empirical evidence on ESG with ancient conservative traditions, 2024. Int. Rev. Financ. Anal. 94, 103284. https://doi.org/10.1016/j.irfa.2024.103284.
Gormley, T.A., Matsa, D.A., 2014. Common errors: how to (and not to) control for unobserved heterogeneity. Rev. Financ. Stud. 27, 617–661. https://doi.org/10.1093/rfs/hht047.
Goss, A., Roberts, G.S., 2011. The impact of corporate social responsibility on the cost of bank loans. J. Bank. Financ. 35, 1794–1810. https://doi.org/10.1016/j.jbankfin.2010.12.002.
Guo, K., Bian, Y., Zhang, D., Ji, Q., 2024. ESG performance and corporate external financing in China: The role of rating disagreement. Res. Int. Bus. Financ. 69, 102236. https://doi.org/10.1016/j.ribaf.2024.102236.
Guo, C., Su, W., Song, X., 2021. The substitution financing effect of suppliers' trade credit on customers' trade credit: evidence from China. J. Bus. Econ. Manag. 22, 1456–1475. https://doi.org/10.3846/jbem.2021.15608.
Hadlock, C.J., Pierce, J.R., 2010. New evidence on measuring financial constraints: moving beyond the KZ Index. Rev. Financ. Stud. 23, 1909–1940. https://doi.org/10.1093/rfs/hhq009.
Harjoto, M., Laksmana, I., 2018. The impact of corporate social responsibility on risk taking and firm value. J. Bus. Ethics 151, 353–373. https://doi.org/10.1007/s10551-016-3202-y.
He, F., Ding, C., Yue, W., Liu, G., 2023. ESG performance and corporate risk-taking: evidence from China. Int. Rev. Financ. Anal. 87, 102550. https://doi.org/10.1016/j.irfa.2023.102550.
Hong, H., Kacperczyk, M., 2009. The price of sin: the effects of social norms on markets. J. Financ. Econ. 93, 15–36. https://doi.org/10.1016/j.jfineco.2008.09.001.
Hui, K.W., Klasa, S., Yeung, P.E., 2012. Corporate suppliers and customers and accounting conservatism. J. Account. Econ. 53, 115–135. https://doi.org/10.1016/j.jacceco.2011.11.007.
John, K., Litov, L., Yeung, B., 2008. Corporate governance and risk-taking. J. Financ. 63, 1679–1728. https://doi.org/10.1111/j.1540-6261.2008.01372.x.
Kinateder, H., Choudhury, T., Zaman, R., Scagnelli, S.D., Sohel, N., 2021. Does boardroom gender diversity decrease credit risk in the financial sector? Worldwide evidence. J. Int. Financ. Mark. Inst. Money 73, 101347. https://doi.org/10.1016/j.intfin.2021.101347.
Kuai, Y., Wang, P., Huang, G., 2025. Corporate ESG performance and credit misallocation: evidence from China. Res. Int. Bus. Financ. 73, 102621. https://doi.org/10.1016/j.ribaf.2024.102621.
Lian, Y., Ye, T., Zhang, Y., Zhang, L., 2023. How does corporate ESG performance affect bond credit spreads: empirical evidence from China. Int. Rev. Econ. Financ. 85, 352–371. https://doi.org/10.1016/j.iref.2023.01.024.
Lin, Y., Lu, Z., Wang, Y., 2023. The impact of environmental, social, and governance (ESG) practices on investment efficiency in China: does digital transformation matter? Res. Int. Bus. Financ. 66, 102050. https://doi.org/10.1016/j.ribaf.2023.102050.
Lins, K.V., Servaes, H., Tamayo, A., 2017. Social capital, trust, and firm performance: the value of corporate social responsibility during the financial crisis. J. Financ. 72, 1785–1824. https://doi.org/10.1111/jofi.12505.
Luo, C., Wei, D., He, F., 2023. Corporate ESG performance and trade credit financing –evidence from China. Int. Rev. Econ. Financ. 85, 337–351. https://doi.org/10.1016/j.iref.2023.01.021.
Martin, P.R., Moser, D.V., 2016. Managers' green investment disclosures and investors' reaction. J. Account. Econ. 61, 239–254. https://doi.org/10.1016/j.jacceco.2015.08.004.
Masulis, R.W., Reza, S.W., 2015. Agency problems of corporate philanthropy. Rev. Financ. Stud. 28, 592–636. https://doi.org/10.1093/rfs/hhu082.
Michelon, G., Parbonetti, A., 2012. The effect of corporate governance on sustainability disclosure. J. Manag. Gov. 16, 477–509. https://doi.org/10.1007/s10997-010-9160-3.
Mitani, H., 2014. Capital structure and competitive position in product market. Int. Rev. Econ. Financ. 29, 358–371. https://doi.org/10.1016/j.iref.2013.06.009.
Pandey, D.K., Kumari, V., Palma, A., Goodell, J.W., 2024. Impact of ESG regulation on stock market returns: Investor responses to a reasonable assurance mandate. Financ. Res. Lett. 64, 105412. https://doi.org/10.1016/j.frl.2024.105412.
Petersen, M.A., Rajan, R.G., 1997. Trade credit: theories and evidence. Rev. Financ. Stud. 10, 661–691. https://doi.org/10.1093/rfs/10.3.661.
Porter, M.E., Linde, C., 1995. Toward a new conception of the environment-competitiveness relationship. J. Econ. Perspect. 9, 97–118. https://doi.org/10.1257/jep.9.4.97.
Saeed, A., Zureigat, Q., 2020. Corporate social responsibility, trade credit and financial crisis. J. Risk Financ. Manag. 13, 144. https://doi.org/10.3390/jrfm13070144.
Schnietz, K.E., Epstein, M.J., 2005. Exploring the financial value of a reputation for corporate social responsibility during a crisis. Corp. Reput. Rev. 7, 327–345. https://doi.org/10.1057/palgrave.crr.1540230.
Shou, Y., Shao, J., Wang, W., Lai, K., 2020. The impact of corporate social responsibility on trade credit: evidence from Chinese small and medium-sized manufacturing enterprises. Int. J. Prod. Econ. 230, 107809. https://doi.org/10.1016/j.ijpe.2020.107809.

Stanëk Gyönyör, L., Horváth, M., 2024. Does ESG affect stock market dependence? An empirical exploration of S&P 1200 companies shows the divergent nature of E–S–G pillars. Res. Int. Bus. Financ. 69, 102230. https://doi.org/10.1016/j.ribaf.2024.102230.
Sun, Z., Du, Q., Du, A.M., Li, Z., Yang, T., 2024. The information environment and ecological environment perspectives: Capital market openness and firm ESG rating divergence. Res. Int. Bus. Financ. 71, 102475. https://doi.org/10.1016/j.ribaf.2024.102475.
Van Horen, N., 2004. Trade credit as a competitiveness tool: evidence from developing countries. ⟨https://mpra.ub.uni-muenchen.de/2792/⟩.
Wang, J., Ma, M., Dong, T., Zhang, Z., 2023. Do ESG ratings promote corporate green innovation? A quasi-natural experiment based on SynTao Green Finance's ESG ratings. Int. Rev. Financ. Anal. 87, 102623. https://doi.org/10.1016/j.irfa.2023.102623.
Wang, M., Wang, Y., Wen, S., 2024. ESG performance and green innovation in new energy enterprises: Does institutional environment matter? Res. Int. Bus. Financ. 71, 102495. https://doi.org/10.1016/j.ribaf.2024.102495.
Wen, H., Liu, Y., Lee, C.-C., 2024. How ESG performance affects maturity mismatches between investment and financing: evidence from Chinese a-share listed companies. Res. Int. Bus. Financ. 71, 102412. https://doi.org/10.1016/j.ribaf.2024.102412.
Wong, W.C., Batten, J.A., Ahmad, A.H., Mohamed-Arshad, S.B., Nordin, S., Adzis, A.A., 2021. Does ESG certification add firm value? Financ. Res. Lett. 39, 101593. https://doi.org/10.1016/j.frl.2020.101593.
Xu, H., Wu, J., Dao, M., 2020. Corporate social responsibility and trade credit. Rev. Quant. Financ. Account. 54, 1389–1416. https://doi.org/10.1007/s11156-019-00829-0.
Zhang, Y., Lara, J.M.G., Tribó, J.A., 2020. Unpacking the black box of trade credit to socially responsible customers. J. Bank. Financ. 119, 105908. https://doi.org/10.1016/j.jbankfin.2020.105908.
Zhang, X., Zhao, X., He, Y., 2022. Does it pay to be responsible? The performance of ESG investing in China. Emerg. Mark. Financ. Trade 58, 3048–3075. https://doi.org/10.1080/1540496X.2022.2026768.
Zhang, X., Zou, M., Liu, W., Zhang, Y., 2020. Does a firm's supplier concentration affect its cash holding? Econ. Model. 90, 527–535. https://doi.org/10.1016/j.econmod.2020.01.025.
Zheng, J., Jiang, Y., Cui, Y., Shen, Y., 2023. Green bond issuance and corporate ESG performance: Steps toward green and low-carbon development. Res. Int. Bus. Financ. 66, 102007. https://doi.org/10.1016/j.ribaf.2023.102007.