▪ Journal of Competitiveness

BIODIVERSITY RISK, TRADE CREDIT AND SUSTAINABLE SUPPLY CHAINS

*Hao Liu, Qiang Guo, Chao Liang**

Abstract

The global initiative to address biodiversity loss and advance sustainable development has highlighted the importance of corporate biodiversity risk disclosure. Given this context, we construct a corporate biodiversity risk disclosure index to examine the influence of biodiversity risk disclosure on net trade credit. Our findings indicate that corporate biodiversity risk disclosure positively influences net trade credit. Additionally, this positive effect is influenced by the combination of suppliers' increasing provision of trade credit and customers' increasing requests for a reduced reliance on trade credit. Our channel analysis indicates that biodiversity risk disclosure significantly enhances net trade credit by improving information transparency and corporate reputation. A cross-sectional test demonstrates that greater social trust and lower credit availability strengthen the incentive effect of biodiversity risk disclosure on net trade credit. We further confirm that leveraging biodiversity risk disclosure for enhanced trade credit is an effective pathway through which to achieve supply chain sustainability. These findings contribute to corporate biodiversity risk governance and sustainable supply chain management.

Keywords: *Biodiversity risk; Trade credit; Disclosure; Supply chain sustainability; Sustainable development*

JEL Classification: G11, G3, G32, Q5, Q56, Q57

Article history: Received: March 2025; Accepted: October 2025; Published: March 2026

1 INTRODUCTION

The World Economic Forum has recognized biodiversity loss as a growing and substantial risk that firms must address (Silva et al., 2019). Consequently, the worldwide need to address biodiversity issues and promote sustainable development has garnered widespread attention from various stakeholders, including policymakers, financial institutions, and investors (Treepongkaruna, 2024; Garel et al., 2024; Giglio et al., 2023; Azizi et al., 2024). In this situation, businesses face a range of significant challenges and transformative opportunities. Thus, an active and accurate understanding of the economic consequences and explorations of effective governance strategies for corporate biodiversity risks are urgently needed.

In fact, organizations have begun to address biodiversity risk with strategic responses (Carvalho et al., 2022). Maroun & Ecim (2024) investigate biodiversity reporting to assess biodiversity-related disclosures as either policy concerns or conservation efforts. In addition, biodiversity disclosure is becoming an increasingly prominent issue for investors (Ali et al., 2023; Kalhoro & Kyaw, 2024; Garel et al., 2024; Carvajal et al., 2021). Biodiversity risk disclosure is not only an issue in corporate social responsibility (CSR) but also a fundamental aspect of strategic risk management in relation to biodiversity loss.

However, data released by the Carbon Disclosure Project (CDP) indicate that almost 70% of companies providing disclosures through the CDP did not evaluate the effects of their value

https://doi.org/10.7441/joc.2026.01.12

chain on biodiversity in 2022 (Carvalho et al., 2022). In China, biodiversity disclosure is also inadequate. According to the Evaluation Report on Corporate Biodiversity Disclosure (2021), only 15 (8%) of the 188 A-share listed companies evaluated explicitly mentioned the keyword "biodiversity" in their annual or social responsibility reports. Wagner (2022) identified conflicts between risk perceptions and actions taken for biodiversity conservation, primarily due to companies' reluctance to engage in meaningful initiatives. In this context, one of the main reasons for the lack of biodiversity disclosure is the insufficient awareness and disclosure of biodiversity issues by most enterprises. Enterprises tend to fix issues after the fact, instead of avoiding them before the fact. In practice, biodiversity risk tends to occur in firms that are more dependent on natural resources. Thus, the behaviour of stakeholders concerned with corporate biodiversity risk may have already been adapted before the firms encountered biodiversity risk. In conclusion, an adequate understanding of the economic consequences of corporate biodiversity disclosure remains a major issue.

A considerable body of literature has explored the economic consequences of biodiversity disclosure, revealing that this type of disclosure has a positive effect on stock returns (Ma et al., 2024), cash holdings (Ahmad et al., 2024), bond yields (Chen et al., 2024) and environmental performance and sustainable activities (Roberts et al., 2022). However, numerous research gaps exist. First, the current literature is deficient in terms of examining the economic consequences of biodiversity disclosure associated with external financing. Karolyi et al. (2023) called for research into the nature of biodiversity financing, suggesting that this topic is worthy of in-depth exploration. Second, the current literature does not adequately address the influence of biodiversity disclosure on decision-making and behavioural adjustments both upstream and downstream within the supply chain. Suppliers and customers deserve credit for participating in environmental management as noninvestment stakeholders (Song et al., 2024; Liew & Cao, 2024; Lintukangas et al., 2023; Bai & Astvansh, 2024). However, climate-related risks have become increasingly critical for credit financing (Dou et al., 2025; Umar et al., 2025). Given this context, this paper selects commercial credit as the research entry point to explore the impact of corporate biodiversity risk disclosure. Trade credit is not only one of the most important financial contracts in the supply chain but also a significant external financing tool for Chinese enterprises; it often serves as an adjustment mechanism for supply chain stability when the supply chain is exposed to biodiversity risks (Ersahin et al., 2024). Therefore, we seek to address the existing research gap by analysing the connection between biodiversity disclosure and trade credit.

Information asymmetry and moral hazard serve as primary factors that contribute to credit rationing and elevated costs (Stiglitz & Weiss, 1981; Kong et al., 2020). Trade credit refers to an arrangement in which customers postpone payment to their suppliers (Huyghebaert, 2006; Xu et al., 2019). This situation involves considerable risks linked to information asymmetry and is exposed to substantial credit risks that may lead to enormous losses, especially in the absence of collateral or third-party assurances (Wu et al., 2014). On the one hand, biodiversity disclosure can convey more information and alleviate information asymmetry (Drempetic et al., 2020). Additionally, public biodiversity risk disclosure helps reduce information search and processing costs. Organizations can optimize resource allocation and enhance risk management by reinforcing internal governance in response to external pressures (Huang et al., 2023; Di Marco et al., 2023). In conclusion, biodiversity disclosure can enhance corporate information transparency, consequently facilitating firms in obtaining increased trade credit.

On the other hand, biodiversity information disclosure occurs in response to investors and stakeholders' demand for information (Islam & van Staden, 2018; Michelon et al., 2020). Additionally, firms effectively convey positive signals to illustrate their attention to and

forward-thinking reactions to biodiversity risks, as well as their dedication to CSR (Hahn et al., 2015). Therefore, biodiversity disclosure can improve corporate reputation, and companies with strong reputations suggest a lower default risk, which increases suppliers' willingness to cooperate and increases the amount of trade credit provided (Quan et al., 2024; Luo et al., 2023).

In addition, an increase in net trade credit may signal both an enhancement in the supply of trade credit from its suppliers and a diminished demand for trade credit use by its consumers (Liu et al., 2016). As creditors, suppliers extend more trade credit in response to stakeholder demand and maintain supply chain stability, given the reduction in credit risk. However, customers may have motivations and face pressure to maintain the supply chain in an environmentally sustainable manner (Darendeli et al., 2022), thus demanding less trade credit usage to maintain supply chain stability. Therefore, the impact of corporate biodiversity risk disclosure on trade credit comes from the joint influence of suppliers' enhanced trade credit supply and customers' demand for less trade credit use, as demonstrated by increased net trade credit.

We construct a corporate biodiversity risk disclosure index to examine the impact of biodiversity risk disclosure on net trade credit. The text data are from the Management Discussion and Analysis (MD&A) sections of the annual reports of Chinese A-share listed companies from 2003 to 2023. Our findings indicate that corporate biodiversity risk disclosure positively influences net trade credit. Additionally, this positive effect is influenced by the combination of suppliers' increased provision of trade credit and customers' requests for reduced reliance on trade credit. Based on our theoretical analysis, our channel analysis indicates that biodiversity risk disclosure significantly enhances net trade credit by improving information transparency and corporate reputation. In addition, a cross-sectional test demonstrates that greater social trust and lower credit availability strengthen the incentive effect of biodiversity risk disclosure on net trade credit. Finally, we further confirm that leveraging biodiversity risk disclosure for enhanced trade credit is an effective way to achieve supply chain sustainability.

Our study contributes to the related literature in several ways. First, our study fills one of the gaps in research on biodiversity risk disclosure. Recent studies have explored the economic consequences of biodiversity disclosure, revealing that it has a positive effect on stock returns (Ma et al., 2024), cash holdings (Ahmad et al., 2024), and bond yields (Chen et al., 2024). However, these studies have lacked an external, informal finance and supply chain perspective, especially with respect to trade credit. In contrast, we expand the research horizon to the level of firms' supply chain decision-making and behavioural adjustments to overcome the previous limitation of the sole focus on the impacts of biodiversity on internal firms or specific stakeholders. On the one hand, suppliers and customers deserve credit for participating in environmental management as noninvestment stakeholders (Song et al., 2024; Liew & Cao, 2024; Lintukangas et al., 2023; Bai & Astvansh, 2024). On this basis, we further specifically analyse the impact of biodiversity risk disclosure on supply chain funding arrangements. On the other hand, the use of funds by upstream suppliers and the supply of funds to downstream customers jointly constitute corporate trade credit activities (Fisman & Love, 2003). Many studies have explored trade credit from the perspective of a one-way analytical logic, especially when suppliers supply more trade credit to customers (Huang et al., 2023). We integrate the perspectives of both the suppliers to whom trade credit is provided and the customers by whom trade credit is used, which is considered corporate net trade credit.

Second, this study extends the literature on the determinants of trade credit. Previous studies have shown that trade credit is related to firm-level characteristics, such as geographic

https://doi.org/10.7441/joc.2026.01.12

proximity (Ouyang et al., 2024), entrepreneurs' status (Luo et al., 2024), environmental labels (Li et al., 2024), and environmental, social, and governance (ESG) performance (Luo et al., 2023). However, existing research has paid little attention to an important environmental information mechanism, i.e., biodiversity risk disclosure. Although several studies have investigated the positive role of environmental information disclosure in supply chain networks and transparency (Wang et al., 2023; Bellamy et al., 2020; Gualandris et al., 2021), they have focused only on the supply chain structure. In contrast, we provide evidence that corporate biodiversity risk disclosure positively influences net trade credit. Such disclosure appears to be useful not only for expanding the literature on the determinants of trade credit but also for enriching the literature on the effect of environmental disclosure on external and informal finance.

Finally, we expand the literature on sustainable supply chain management. Research has established that trade credit is a liquidity reserve that maintains supply chain stability (Amberg et al., 2021; Devalkar & Krishnan, 2019; Ersahin et al., 2024). We find that supply chain sustainability is promoted when biodiversity risk disclosures are made to enhance trade credit. In other words, trade credit still has a risk management function and a role in maintaining supply chain stability when firms are exposed to biodiversity risk. We expand the boundaries of research and contribute to the literature in which trade credit still has a positive effect on supply chain stability under specific risk disclosure conditions.

The subsequent sections are structured as follows. Section 2 examines the relevant literature and formulates hypotheses. Section 3 outlines the data, variables, methods, and descriptive statistics. Section 4 outlines the empirical analysis, including primary channels, cross-sectional analyses and robustness testing. Section 5 presents the supplementary analysis. Section 6 concludes the investigation and presents suggestions for future research.

Tables and figures should be numbered and pertaining references must be included in the text. The acceptable labeling for a table is Tab.1 and Fig. 1 for a figure. The title of the table or figure and the source should follow. The text should be composed in such a manner that there are not too many figures or tables on a single page. Tables and figures in a landscape format are not acceptable.

2 THEORETICAL BACKGROUND AND HYPOTHESIS ANALYSIS

Information asymmetry and moral hazard serve as primary factors contributing to credit rationing and elevated costs (Stiglitz & Weiss, 1981; Kong et al., 2020). Trade credit refers to an arrangement in which customers postpone making payments to their suppliers (Huyghebaert, 2006; Xu et al., 2019). This situation involves considerable risks linked to information asymmetry and exposure to substantial credit risks that may lead to enormous losses, especially in the absence of collateral or third-party assurances (Ding et al., 2023; Wu et al., 2014). Nonetheless, there is potential to enhance transparency and strengthen reputation, which may result in a decrease in credit-related risk and an increase in ESG performance. Specifically, we anticipate that biodiversity disclosure will assist firms in obtaining increased trade credit through two channels.

First, from the perspective of information asymmetry, biodiversity disclosure can enhance corporate information transparency, thus helping firms obtain increased trade credit. Reducing information asymmetry is crucial for enterprises to obtain financing (Ellul et al., 2016) and improve their trade credit financing ability (Kong et al., 2020). In concrete terms, biodiversity risk disclosure provides useful information for supply chain operations. As supplementary ESG

https://doi.org/10.7441/joc.2026.01.12

disclosure, in addition to being a form of financial performance reporting (Bai & Astvansh, 2024), biodiversity disclosure provides incremental and salient information to stakeholders. Such disclosure can convey more internal information about enterprises to the outside world (Drempetic et al., 2020) and enhance communication between corporations and pertinent external stakeholders. Beneficially, suppliers and customers gain an in-depth understanding, which subsequently fosters mutual trust and enhances the capacity of suppliers and customers to secure trade credit (Zhang et al., 2020). Furthermore, audited annual reports serve as a more reliable and readily accessible resource for suppliers and customers to obtain information regarding business risk (Chiu et al., 2019). The spread of information by means of the MD&A sections in annual reports not only aids in verifying accurate information and allows suppliers and customers to monitor impacted firms but also helps reduce information search and processing costs (Huang et al., 2023; Darendeli et al., 2022); this potentially leads to increased trade credit flows (Kong et al., 2020). In addition, as a result of the increased efficiency of information transfer, biodiversity disclosure regulations may compel corporations to adhere to elevated levels of management transparency (Dang et al., 2024). Organizations can optimize their resource allocation and improve their risk management by reinforcing internal governance in response to external pressures (Di Marco et al., 2023). This transparency and public accountability cultivate trust between suppliers and customers, allowing enterprises to obtain financing at reduced costs (Feng et al., 2024).

Second, from the perspective of moral hazard, biodiversity disclosure can improve corporate reputation, thus helping firms obtain increased trade credit. Companies with strong reputations suggest lower-level default risk, which increases not only suppliers' willingness to cooperate but also the amount of trade credit provided (Quan et al., 2024; Luo et al., 2023). First, as biodiversity disclosure is increasingly becoming a prominent issue for investors (Ali et al., 2023; Garel et al., 2024), companies have promoted ESG disclosure in response to their investors and stakeholders' demands for information (Islam & van Staden, 2018; Michelon et al., 2020), which contributes to improving corporate reputation and building closer partnerships. Additionally, companies effectively convey positive signals to illustrate their attention and forward-thinking reactions to biodiversity risks (Hahn et al., 2015), as well as their dedication to CSR. This transparency reflects a company's commitment to sustainability while also improving corporate reputation (Zhang et al., 2022; Tamimi & Sebastianelli, 2017). Ultimately, companies that are acknowledged for CSR are viewed as trustworthy and are less inclined to moral hazard or default (Zhang et al., 2020). Given this analysis, corporate biodiversity risk disclosure can further increase information transparency and enhance corporate reputation, which contributes to an increase in the amount of corporate trade credit provided. Nevertheless, the utilization of funds by upstream suppliers and the provision of funds to downstream customers collectively represent corporate trade credit activities (Fisman & Love, 2003). An increase in net trade credit may signal both an increase in the supply of trade credit from its suppliers and a diminished demand for trade credit use by its consumers (Liu et al., 2016). Indeed, firms that are vulnerable to biodiversity loss should hold much greater precautionary capital reserves to address these risks and ensure supply chain stability (Ahmad et al., 2024). Naturally, firms increase the amount of credit that they obtain from suppliers while reducing the credit extended to customers to reserve liquidity and manage risk (Amberg et al., 2021). Suppliers and customers certainly deserve credit for participating in environmental management as noninvestment stakeholders (Song et al., 2024; Liew & Cao, 2024; Lintukangas et al., 2023). On this basis, as creditors, suppliers extend more trade credit in response to stakeholder demand and to maintain supply chain stability, given the reduction in the amount of credit risk. However, customers are concerned not only with their own CSR but also with

https://doi.org/10.7441/joc.2026.01.12

that of their suppliers (Dai et al., 2021; She, 2021). Thus, customers can be motivated and face pressure to maintain the supply chain in an environmentally sustainable manner (Darendeli et al., 2022), thus demanding less trade credit usage to maintain supply chain stability. In conclusion, the impact of corporate biodiversity risk disclosure on trade credit comes from the joint influence of suppliers' increased provision of trade credit and customers' requests for a reduced degree of reliance on trade credit, as demonstrated by increased net trade credit.

Overall, corporate biodiversity risk disclosure further improves information transparency and corporate reputation, with suppliers' increased trade credit supply and customers' demand for less trade credit use, as demonstrated by increased net trade credit. Therefore, we propose the following hypothesis:

H1: Corporate biodiversity risk disclosure positively influences net trade credit.

3 RESEARCH OBJECTIVE, METHODOLOGY AND DATA

3.1 Data

Our sample includes all A-share listed companies in the sample period from 2003 to 2023. Our data come from four sources. First, the MD&A sections in the annual reports of the listed companies used in this paper for machine learning and text analysis are from the Chinese Research Data Services Platform (CNRDS). Second, we obtain financial data and corporate governance information from the China stock market and accounting research database and the CNRDS. Third, we use data on social trust levels from Chinese micro investigation databases, including the China Entrepreneurship Survey System (CECC) and the Chinese General Social Survey (CGSS). We manually collect information on urban nature reserves and nature parks via the Biodiversity Impact Assessment Tool (https://bia.hinature.cn/#/).

We exclude the following companies: companies listed in the financial industry due to differing accounting standards, companies receiving special treatment due to financial difficulties, companies for which there is just a single year of financial data, and companies with missing data. To mitigate the impact of outliers, we apply winsorization at the 1% level to each continuous variable (two-tailed). The final sample contains 35,649 firm-year data ranging from 2003 to 2023.

3.2 Key variables

3.2.1 Corporate biodiversity risk disclosure

Identifying and managing biodiversity risk plays a pivotal role in the business process. We systematically integrate methods and variables of biodiversity risk from previous research (see Tab. 1), which is based on the aftermath of a biodiversity risk event and lacks external validity. However, focusing on ex ante biodiversity risk may be more practically and instructively relevant for companies. For enterprises, biodiversity risk is defined as the adverse effects that biodiversity loss or degradation may have on a corporation. This risk exposure may arise from the adverse effects of corporate activities on biodiversity or from corporate overreliance on biodiversity resources. Guided by the Sustainable Disclosure Guidelines, corporate biodiversity risk disclosure entails the transparent reporting of the effects of biodiversity loss on company activities, as well as the plans, measures, and efficacy of a corporation's responses to these impacts via designated means. Therefore, for the purposes of this paper, corporate biodiversity

https://doi.org/10.7441/joc.2026.01.12

risk disclosure means the extent to which a company discusses and discloses corporate biodiversity risks in the MD&A section of its annual report.

However, it is difficult to accurately assess biodiversity risk at the corporate level. The Taskforce on Nature-related Financial Disclosures offers a risk management and disclosure framework for determining, evaluating, controlling and, when applicable, disclosing nature-related concerns. This initiative provides an opportunity to analyse the biodiversity risk of listed companies, for which a small number of studies have constructed biodiversity risk indicators for companies on the basis of machine learning and text analysis methods (Giglio et al., 2023; Garel et al., 2024; Ahmad et al., 2024; He et al., 2024). The former China Securities Regulatory Commission mandates that publicly listed companies in China articulate the opportunities, difficulties, and diverse risks that impact their prospects for growth in the MD&A sections of their annual reports. For companies with high-level biodiversity risk disclosure, management has an incentive to communicate its concerns and pressures related to biodiversity risk to shareholders in the MD&A sections of their annual reports to reduce potential future litigation risk. [1]

Tab. 1 – Summary of corporate biodiversity risk measurements. Source: own research

Method	Variables and Data	Sources
Survey	Survey of manufacturing firms in Germany	(Wagner, 2022)
Score	B/E disclosure index from annual reports and sustainability reports	(Hassan et al., 2020)
	Biodiversity restoration protection and biodiversity impact reduction from ASSET4	(Carvajal et al., 2021)
	Biodiversity-related risks in Bloomberg	(Carvalho et al., 2022)
	Biodiversity disclosure score from the Iceberg Data Lab	(Ali et al., 2023)
	Biodiversity disclosures (per the register) from sustainability reports	(Maroun & Ecim, 2024)
	Biodiversity disclosures index from Asset4 ESG	(Orazalin et al., 2024)
Event study	Biodiversity-related policy events	(Kalhoro & Kyaw, 2024)
	Green Shield Action (GSA) in China	(Chen et al., 2024)
Text analysis	10K-Biodiversity-Count Score/10K-Biodiversity-Negative Score	(Giglio et al., 2023; Garel et al., 2024; Ahmad et al., 2024; Steindl et al.,2024)
	Biodiversity risk (BR) index from ten mainstream Chinese news media outlets	(Ma et al., 2024)
	Chinese corporate biodiversity exposure (CCBE) and Chinese corporate biodiversity concern (CCBC)	(He et al., 2024)

[1] For instance, the Chinese listed company Zhenghe Ecology (605069) disclosed its relevant biodiversity risk in the MD&A section of its annual report (2021): "Customers have set higher standards for ecological projects, paying more attention to the enhancement of ecosystem functions, biodiversity protection and the transformation of ecological value into economic value and requiring construction units to provide full life-cycle services for ecological projects." See Appendix A1 for more disclosed biodiversity risk information.

https://doi.org/10.7441/joc.2026.01.12

With reference to such literature, this work constructs a corporate biodiversity risk disclosure index based on the MD&A sections of annual reports. In comparison, the indicator construction in this paper has the following advantages. First, we refer not only to the biodiversity dictionary constructed by Giglio et al. (2023) but also to the analysis framework of biodiversity risk in pressure–state–response assessment models and multiple research reports to expand the seed words. In the end, we construct a Chinese biodiversity risk dictionary independently. Second, our research perspective emphasizes the disclosure of biodiversity risk as a corporate strategy. Therefore, this study focuses on the biodiversity risks disclosed in the MD&A section of corporate annual reports, which is more in line with the research theme.

The steps include collecting data, extracting textual data, generating the dictionary and constructing indicators (see Fig. 1). The comprehensive procedure is outlined in Appendix A2.

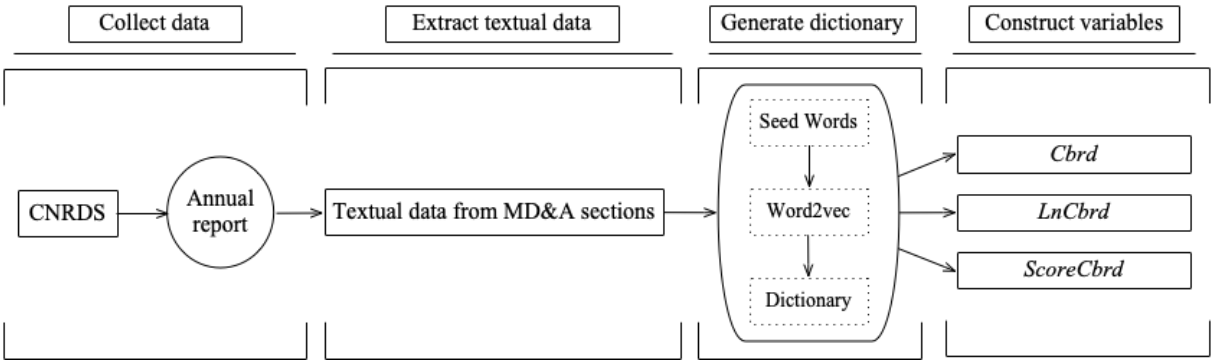


Fig. 1 – Construction process of corporate biodiversity risk. Source: own research

We construct the following three indicators to characterize corporate biodiversity risk disclosure.

$$Cbrd_{i,j} = \frac{tf_{i,j}}{\alpha_j} \times 100 \quad (1)$$

$$LnCbrd_{i,j} = ln\left(tf_{i,j} + 1\right) \quad (2)$$

$$ScoreCbrd_{i,j} = tf_{i,j} \times W_{i,j}, W_{i,j} = \begin{cases} \frac{1+lntf_{i,j}}{1+ln\alpha_j} \times ln\frac{N}{df_i}, & \text{if } tf_{i,j} \geq 1 \\ 0, & \text{if } tf_{i,j} = 0 \end{cases} \quad (3)$$

where *i* represents the keywords appearing in each annual report and *j* represents the company's annual reports. $tf_{i,j}$ is the sum of the word frequency of keyword *i* in the j_{th} annual report file. α_j is the length of the j_{th} MD&A section in the annual report file. *N* represents the number of MD&A files in the annual reports in the data. df_i denotes the data of the annual report file in which keyword *i* appears. $W_{i,j}$ is the weight of keyword *i* in the j_{th} annual report file. Ultimately, we construct three measurements of corporate biodiversity risk disclosure: $Cbrd_{i,j}$ is the sum of the frequency of biodiversity risk keywords divided by the total number of words in the MD&A section and multiplied by 100[2]; $LnCbrd_{i,j}$ is the natural logarithm of the sum of the frequency of all biodiversity risk keywords; and $ScoreCbrd_{i,j}$ is the sum of word frequencies of biodiversity risk keywords multiplied by a weighting factor by TF-IDF (term frequency-inverse document frequency) (Loughran & Mcdonald, 2011).

2 Multiplying by 100 here only serves to better characterize the biodiversity risk disclosure carried out by listed companies.

https://doi.org/10.7441/joc.2026.01.12

Among the three indices, $Cbrd_{i,j}$ effectively excludes the effect of differences in text length in the MD&A section, which is an intuitive representation of the level of disclosure of biodiversity risk information. Moreover, we construct $LnCbrd_{i,j}$ and $ScoreCbrd_{i,j}$ to mitigate the effects of high-frequency words in text analysis and to correct for word-specific commonalities. In the latter part of this paper, we use $Cbrd_{i,j}$ to conduct the empirical analyses and $LnCbrd_{i,j}$ and $ScoreCbrd_{i,j}$ to perform validity and robustness tests. In addition, we validate the validity of the corporate biodiversity risk disclosure index constructed in this paper using three methods, as described in Appendix A3.

3.2.2 Net trade credit

Current research typically employs accounts payable and accounts receivable to quantify corporate received and provided trade credit, which is an essential informal financing tool in the operations of Chinese enterprises (Ersahin et al., 2024; Amberg et al., 2021; Ouyang et al., 2024; Huang et al., 2023). Following existing studies, we define our key dependent variable, net trade credit (*Ntc*), as accounts payable minus accounts receivable, scaled by sales. A higher value corresponds to increased net trade credit received by the firm. In addition, annual reports for listed companies are typically published in the first half of the year after the conclusion of the previous fiscal year. To precisely assess the promptness of the effects of corporate biodiversity risk disclosure on net trade credit, we include one-year-ahead dependent variables in the regressions.

3.3 Regression models

We employ benchmark regression to evaluate the impact of corporate biodiversity risk disclosure on net trade credit as follows:

$$Ntc_{i,t+1} = \beta_0 + \beta_1 \times Cbrd_{i,t} + \beta_2 \times X_{i,t} + FIRM_i + YEAR_t + \varepsilon_{i,t} \quad (4)$$

where *i* and *t* index the firm and the year, respectively. The dependent variable (*Ntc*) is net trade credit, as measured by accounts payable minus accounts receivable, scaled by sales. The independent variable (*Cbrd*) is the sum of the frequency of biodiversity risk keywords divided by the total number of words in the MD&A section and multiplied by 100. $X_{i,t}$ is a vector of control variables that may capture other determinants related to net trade credit (Xu et al., 2019; Kong et al., 2020). Specifically, we control for firm size (*Size*), book leverage (*Lev*), firm age (*Age*), return on assets (*Roa*), the cash-to-assets ratio (*Cashflow*), return on investment in capital (*Capex*), market value (*TobinQ*), tangibility (*Tangibility*), the centralized system of shareholding (*Balance*), board directors (*Board*), the percentage of independent directors (*Indboard*), the standard unqualified opinion (*Opinion*) and being audited by a Big Four accounting firm (*Audit*). The variable definitions are provided in detail in Appendix B. $FIRM_i$ and $YEAR_t$ are included in all regression models to control for firm and year fixed effects. $\varepsilon_{i,t}$ is the residual term. All regression equations used in this study use standard errors clustered at the individual firm level by default.

Tab. 2 – Descriptive statistics. Source: own research

Variable	N	Mean	Min.	P25	P50	P75	Max.	SD
Ntc	35,649	-0.048	-0.953	-0.132	-0.020	0.059	0.648	0.218
Pay	35,649	0.194	0.006	0.090	0.155	0.249	0.926	0.156
Rec	35,649	0.234	0	0.069	0.168	0.313	1.393	0.237
Cbrd	35,649	0.067	0	0	0.019	0.072	0.878	0.136
LnCbrd	35,649	0.823	0	0	0.693	1.386	5.598	0.984

https://doi.org/10.7441/joc.2026.01.12

ScoreCbrd	35,649	0.715	0	0	0.064	0.417	14.684	2.064
Size	35,649	22.212	19.930	21.289	22.016	22.938	26.246	1.288
Lev	35,649	0.443	0.051	0.286	0.440	0.592	0.933	0.201
Age	35,649	2.754	1.386	2.485	2.833	3.045	3.497	0.422
Roa	35,649	0.037	-0.257	0.014	0.037	0.066	0.192	0.061
Cashflow	35,649	0.050	-0.182	0.011	0.049	0.090	0.250	0.070
Capex	35,649	0.390	-1.560	0.004	0.055	0.172	14.738	1.765
TobinQ	35,649	1.912	0.854	1.182	1.520	2.166	8.055	1.186
Tangibility	35,649	0.047	0	0.015	0.032	0.056	0.852	0.062
Balance	35,649	0.701	0.020	0.222	0.534	1.021	2.799	0.605
Board	35,649	2.148	1.609	1.946	2.197	2.197	2.708	0.205
Indboard	35,649	0.371	0.273	0.333	0.333	0.429	0.571	0.054
Opinion	35,649	0.973	0	1	1	1	1	0.162
Audit	35,649	0.071	0	0	0	0	1	0.257

3.4 Descriptive statistical analysis

Tab. 2 provides the descriptive statistics. The dependent variable (*Ntc*) has a mean of -0.048, indicating that the trade credit provided to customers is greater than that received by suppliers (the mean value of accounts receivable is 0.234, and the mean value of accounts payable is 0.194), which indicates that there is a more general problem with financial delinquency in the supply chain. Moreover, the standard deviation of firms' net trade credit is 0.218, suggesting that the aforementioned phenomena exhibit significant variation across companies. In addition, the mean values of the three biodiversity risk indicators *Cbrd*, *LnCbrd*, and *ScoreCbrd* are 0.067, 0.823, and 0.715, respectively, and their standard deviations are 0.136, 0.984, and 2.064, respectively. This finding suggests that the biodiversity risk faced by different firms varies considerably, which may be related to the different degrees of biodiversity risk across industries. Overall, the values of our dependent variables, variables of interest, and control variables are in line with those of prior studies (Xu et al., 2019; Kong et al., 2020).

4 EMPIRICAL RESULTS AND ANALYSIS

In brief, the findings validate the idea that biodiversity risk disclosure enhances the net trade credit of listed companies. Additionally, the incentive effect is influenced by the combination of suppliers' enhanced trade credit supply and customers' demand for less trade credit use. This situation offers essential guidance for companies pursuing grants within the era of information transparency, suggesting that proactive biodiversity risk declarations with supply chain partners are vital for risk management and fostering resistance in sustainable growth initiatives.

Tab. 3 – Corporate biodiversity risk disclosure and trade credit. Source: own research

	(1)	(2)	(3)	(4)	(5)
	Ntc	*Ntc*	*Ntc*	*Pay*	*Rec*
Cbrd	0.088***	0.043***	0.064***	0.033***	-0.040**
	(0.008)	(0.008)	(0.017)	(0.013)	(0.016)
Constant	-0.053***	-0.967***	0.194**	0.067	-0.117
	(0.001)	(0.027)	(0.099)	(0.074)	(0.101)
Controls	No	Yes	Yes	Yes	Yes
Firm FE	No	No	Yes	Yes	Yes

https://doi.org/10.7441/joc.2026.01.12

Year FE	No	No	Yes	Yes	Yes
Observations	35649	35649	35649	35649	35649
R-squared	0.003	0.156	0.687	0.691	0.734

Note: ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% levels, respectively.

4.2 Testing the channels

To date, evidence indicates that biodiversity risk disclosure significantly contributes to firms' ability to obtain net trade credit. Furthermore, corporate biodiversity risk disclosure via improved information transparency and corporate reputation helps corporations receive increased trade credit with the supply chain. This section presents more explicit evidence to substantiate this perspective.

4.2.1 Information transparency

In accordance with our discussion in Section 2, the impact of biodiversity risk disclosure on net trade credit for companies with differing degrees of transparency is discussed. In accordance with Bushman et al. (2004), we utilize the information disclosure assessment scores for listed companies each year to calculate the degree of information transparency. These scores are divided into four grades, namely, excellent, good, passing and failing. The quality of information disclosure ranges from high to low. Accordingly, we assign a score from 1 to 4, with a larger score indicating better information disclosure quality. Information transparency takes the natural logarithm of the score and is set one year ahead (*Tra*).

In column (1) of Tab. 4, the coefficient of corporate biodiversity risk disclosure is positive and significant at the 10% level, which suggests that corporate biodiversity risk disclosure can enhance listed companies' information disclosures. This finding suggests that corporate biodiversity risk disclosure can convey more information and alleviate information asymmetry (Drempetic et al., 2020), implying that corporate biodiversity risk disclosure increases the information transparency of listed companies, which in turn helps firms obtain net trade credit.

Tab. 4 – Channel tests. Source: own research

	(1)	(2)
	Tra	*Rep*
Cbrd	0.049*	0.061*
	(0.025)	(0.032)
Constant	0.987***	-6.613***
	(0.167)	(0.245)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	19331	30403
R-squared	0.499	0.800

Note: ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% levels, respectively.

4.2.2 Corporate reputation

We subsequently examine how reputation affects the connection between corporate biodiversity risk disclosure and net trade credit. Corporate reputation is measured via the factor analysis method, which uses 12 corporate reputation evaluation indices. We divide them into

https://doi.org/10.7441/joc.2026.01.12

10 levels, ranging from high to low. Corporate reputation takes the natural logarithm of the index and is set one year ahead (*Rep*).

In column (2) of Tab. 4, the coefficient of corporate biodiversity risk disclosure is positive and significant at the 10% level, which indicates that corporate biodiversity risk disclosure can significantly improve corporate reputation. In other words, corporate biodiversity risk disclosure effectively conveys positive signals to illustrate corporations' attention to and forward-thinking reactions to biodiversity risks, and companies with strong reputations can imply lower-level default risk (Quan et al., 2024; Luo et al., 2023). The results suggest that corporate biodiversity risk disclosure affects net trade credit by improving corporate reputation.

Overall, we reveal direct evidence that enhancing transparency and corporate reputation are two channels through which corporate biodiversity risk disclosure enables enterprises to obtain net trade credit. This finding supports the theoretical derivation in Section 2.

4.3 Cross-sectional tests

We analyse social trust and credit availability to offer additional evidence to support our primary claim regarding the impact of corporate biodiversity risk disclosure on the ability of enterprises to obtain net trade credit.

4.3.1 Social trust

Social trust underpins trade credit. Companies situated in areas with elevated social trust utilize greater amounts of trade credit from suppliers than do other companies (Wu et al., 2014). Consequently, corporate biodiversity risk disclosures can be more inclined to facilitate the acquisition of net trade credit when enterprises are situated in locations with greater social trust than when they are situated in locations with less social trust. We construct the following three proxies for social trust: (1) the natural logarithm of the weighted sum of the regional trust survey data from the CECC (*TruCecc*); (2) data from the CGSS (2013) to gauge social trust, calculated as the proportion of individuals who "strongly agree" and "somewhat agree" in response to a33 in the CGSS, relative to the total number of those from that province who participated (*TruCgss*) (this metric has been extensively employed in research within the Chinese context, as exemplified by Wu et al. (2014)); and (3) the Urban Business Credit Environment Index, which is used as a measure of regional trustworthiness (*Tru*). The full sample is divided on the basis of the medians of the respective measures.

The grouping tests show that columns (1) and (2) of Tab. 5 indicate that two groups, namely, high- and low-level social trust, respectively, are significantly positive. The results of the between-groups coefficient difference test indicate that this difference is greater in regions with high-level social trust than in those with low-level social trust. In addition, columns (3)-(4) and columns (5)-(6) of Table 5 present the same findings. These results indicate that corporate biodiversity risk disclosure can be more inclined to facilitate the acquisition of net trade credit when enterprises are situated in locations with greater social trust than in locations with less social trust. This finding validates our hypothesis and aligns with Wu et al. (2014).

Tab. 5 – Cross-sectional tests of social trust. Source: own research

	(1)	(2)	(3)	(4)	(5)	(6)
	Ntc	*Ntc*	*Ntc*	*Ntc*	*Ntc*	*Ntc*
	High_TruCecc	*Low_TruCecc*	*High_TruCgss*	*Low_TruCgss*	*High_Tru*	*Low_Tru*
Cbrd	0.079***	0.041*	0.066***	0.033**	0.078***	0.033*
	(0.027)	(0.021)	(0.023)	(0.016)	(0.024)	(0.018)

https://doi.org/10.7441/joc.2026.01.12

Constant	0.233	0.103	0.201*	-0.095	0.231*	-0.166
	(0.146)	(0.133)	(0.117)	(0.149)	(0.119)	(0.154)
Empirical p value	-0.039**		-0.032*		-0.045**	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17082	18092	21099	14160	23162	11429
R-squared	0.731	0.669	0.704	0.808	0.695	0.780

Note: ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% levels, respectively.

4.3.2 Credit availability

Credit availability refers to the likelihood of firms being able to borrow from formal financial institutions such as banks. Trade credit is an important alternative source of financing for firms in China because of the relatively severe external financial constraints (Huang et al., 2011). In other words, when firms are faced with a single source and higher financing costs, they need the informal financing assets provided by trade credit. Therefore, it is reasonable to presume that corporate biodiversity risk disclosures are more likely to facilitate the acquisition of net trade credit when enterprises have lower-level credit availability than when they have higher-level credit availability from banks.

We use the financial environment and the size and cost of loans as three proxies for credit availability. (1) The financial environment refers to the financial marketization index (Lucey et al., 2020). The smaller the index, the worse the external financial environment. This means that it is more difficult for enterprises to obtain funds from banks than from other sources, which increases their dependence on trade credit (*Fin*). (2) The natural logarithm of the sum of short-term borrowings, long-term borrowings and noncurrent liabilities due within one year is used to measure the total amount of bank loans available to enterprises (*Loa*). (3) The natural logarithm of the sum of a firm's interest expense, fee expense, and other finance charges is used to measure the cost of lending. The higher the credit cost is, the less bank credit is available and the more trade credit is used (*Cos*). The full sample is divided based on the medians of the respective measures.

Tab. 6 – Cross-sectional tests of credit availability. Source: own research

	(1)	(2)	(3)	(4)	(5)	(6)
	Ntc	*Ntc*	*Ntc*	*Ntc*	*Ntc*	*Ntc*
	High_Fin	*Low_ Fin*	*High_Loa*	*Low_ Loa*	*High_Cos*	*Low_ Cos*
Cbrd	0.023	0.066***	0.016	0.060**	0.057**	0.008
	(0.018)	(0.020)	(0.018)	(0.028)	(0.024)	(0.023)
Constant	-0.039	0.402***	-0.123	0.697***	-0.038	-0.104
	(0.152)	(0.141)	(0.175)	(0.170)	(0.254)	(0.241)
Empirical p value	0.042**		0.044**		-0.049*	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

https://doi.org/10.7441/joc.2026.01.12

Observations	17223	17035	11818	11559	4086	3826
R-squared	0.820	0.656	0.719	0.701	0.802	0.808

Note: ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% levels, respectively.

The results of the grouping test show that in columns (1)-(2) and columns (3)-(4) of Tab. 6, firms with worse financial environments and fewer loans are positive and significant at the 1% level. In addition, in columns (5)-(6) of Tab. 6, firms with high loan costs are significantly positive. These findings all pass the between-groups coefficient difference test. They indicate that corporate biodiversity risk disclosures are more likely to facilitate the acquisition of net trade credit when enterprises have lower credit availability; this suggests that under credit constraints, firms prefer to obtain alternative financing through supply chain relationships due to the lack of support from traditional financing sources, such as the high cost of bank loans (Javadi & Masum, 2021). At this point, biodiversity risk disclosure can serve as a "signal of credible commitment." On the one hand, it conveys the risk management capability and environmental responsibility awareness of an enterprise to suppliers (Clarkson et al., 2008). On the other hand, environmental disclosure enhances the trust of supply chain partners by reducing the risk perception of stakeholders (Cheng et al., 2014). As a result, when bank credit is limited (lower credit availability), suppliers rely more on the additional information disclosed by firms to assess their solvency and thus extend payment terms or increase prepayments (Burkart & Ellingsen, 2004). This finding deepens our understanding of the "financing substitution effect" of firms (Huang et al., 2011).

4.4 Robustness tests

Our findings may be influenced by potential endogeneity, reverse causality, omitted variable bias, and sample self-selection bias. In this subsection, we use various approaches, including a two-stage least squares (2SLS) model with instrumental variables, alternative measures, propensity score matching (PSM) methods and change models, to validate the robustness of the results.

4.4.1 Two-stage least squares instrumental variable estimation

Based on the baseline regression, this study uses the lagged term of corporate biodiversity risk disclosures to mitigate potential endogeneity issues. However, as an increase in net trade credit to businesses leads to stronger business partnerships and larger-scale corporate production operations, this situation can lead to greater exposure to biodiversity risks.

Tab. 7 – IV regression results. Source: own research

	(1)	(2)	(3)	(4)
	IV1: *NatRes*		IV2: *NatPar*	
	First stage	Second stage	First stage	Second stage
	Cbrd	*Ntc*	*Cbrd*	*Ntc*
NatRes	19.626***			
	(6.072)			
NatPar			12.150***	
			(2.431)	
Cbrd		0.428**		0.348*
		(0.212)		(0.181)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

https://doi.org/10.7441/joc.2026.01.12

Observations	29677	29677	29677	29677
R-squared		-0.018		-0.002
F-statistic	10.45		25.00	

Note: ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% levels, respectively.

To mitigate the endogeneity problem, we use 2SLS instrumental variable estimation. Instrumental variables include the number of nature reserves and nature parks in cities. We have a fundamental rationale behind the use of these two instrumental variables. The abundance of natural resources in a city increases the likelihood that local listed firms will directly contribute to greater resource destruction; this exacerbates biodiversity risks and incentivizes companies to address these concerns in the MD&A sections of their annual reports. Therefore, with reference to the literature (Chen et al., 2024), we manually collect information on urban nature reserves and nature parks from the Biodiversity Impact Assessment Tool. To reflect the time trend, we consider the corporate biodiversity risk disclosures of the average urban value and obtain corresponding panel data. Moreover, regarding the excluded limitation criterion for instrumental variables, nature reserves and nature parks belong to the objective geography and city level, which neither directly affects a firm's net trade credit nor fulfils the condition of exogeneity. We use two instrumental variables, *NatRes*, as a cross-multiplier of the number of urban nature reserves and corporate biodiversity risk disclosures of the city mean, and *NatPar*, as a cross-multiplier of the number of urban nature parks and corporate biodiversity risk disclosures of the city mean.

Initially, we incorporate the two instrumental variables above into the regression individually. The first-stage results are shown in columns (1) and (3) of Tab. 7. The coefficients of *NatRes* in column (1) and *NatPar* in column (3) are positive. The F statistic exceeds 10 in the first stage, suggesting that the model is devoid of a weak instrumental variable issue. This finding suggests that greater numbers of nature reserves and nature parks supply natural resources in the listed firm city and consider corporate biodiversity risk disclosures. The second-stage results suggest that increased biodiversity risk disclosures continue to lead to significant increases in net trade credit to businesses, as shown in columns (2) and (4) of Tab. 7. We additionally affirm that the findings are valid when we mitigate any endogeneity through the 2SLS instrumental variable method.

4.4.2 Alternative measures of the dependent and independent variables

In the benchmark regression, this work uses *Cbrd* as the core independent variable. This study also constructs *LnCbrd* and *ScoreCbrd* as two proxy indicators of corporate biodiversity risk disclosure. In columns (1)-(4) of Tab. 8, when the key independent variable is replaced, the coefficient remains positive and significant at the 1% level. This finding affirms that the prior findings are robust to the utilization of various key independent variables, thus suggesting that corporate biodiversity risk disclosure enhances net trade credit.

Tab. 8 – Alternative measures of the independent variables. Source: own research

	(1)	(2)	(3)	(4)	(5)	(6)
	Ntc	*Pay*	*Rec*	*Ntc*	*Pay*	*Rec*
LnCbrd	0.006***	0.003*	-0.004**			
	(0.002)	(0.001)	(0.002)			
ScoreCbrd				0.004***	0.002**	-0.002**

https://doi.org/10.7441/joc.2026.01.12

				(0.001)	(0.001)	(0.001)
Constant	0.203**	0.071	-0.124	0.201**	0.072	-0.120
	(0.099)	(0.074)	(0.102)	(0.099)	(0.074)	(0.101)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	35649	35649	35649	35649	35649	35649
R-squared	0.687	0.690	0.734	0.687	0.691	0.734

Note: ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% levels, respectively.

We also test the robustness of the results with alternative dependent variables; additional metrics are commonly employed in current studies (Cai et al., 2023). We use five new variables: (1) accounts payable plus payable notes minus accounts receivable minus receivable notes, scaled by sales (*NtcNot*); (2) accounts payable plus payable notes, scaled by the cost of goods sold (*PayNot*); (3) accounts receivable plus receivable notes, scaled by total sales (*RecNot*); (4) accounts payable minus accounts receivable, scaled by total assets (*NtcAss*); and (5) accounts payable minus accounts receivable, scaled by total liabilities (*NtcLia*). The outcomes are presented in columns (1)-(5) of Tab. 9. All the coefficients exhibit significant correlations when other metrics are employed, thus confirming the robustness of the findings.

4.4.3 Different PSM methods

Firms' disclosure of biodiversity risk in the MD&A sections of their annual reports is not random; rather, it is determined by characteristics such as human capital, management practices, the technology level, and the external environment. Thus, there may be self-selection bias in the sample in the empirical study. For this reason, this work uses PSM to mitigate the endogeneity problem.

Tab. 9 – Alternative measures of the independent variables. Source: own research

	(1)	(2)	(3)	(4)	(5)
	NtcNot	*PayNot*	*RecNot*	*NtcAss*	*NtcLia*
Cbrd	0.060***	0.030*	-0.031*	0.021***	0.056***
	(0.022)	(0.015)	(0.018)	(0.005)	(0.017)
Constant	0.161	0.018	-0.217*	-0.033	-0.290**
	(0.123)	(0.094)	(0.119)	(0.041)	(0.120)
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	26426	29375	29864	35649	35649
R-squared	0.669	0.699	0.738	0.748	0.757

Note: ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% levels, respectively.

Using the dummy biodiversity risk disclosure (equal to 1 when a company discloses biodiversity risk no less than once and 0 otherwise) as the criterion, the full samples are divided into two groups: high-level biodiversity risk disclosure (treatment group) and low-level biodiversity risk disclosure (control group). We use nearest-neighbour matching at ratios of 1:1, 1:2, 1:3, and 1:4, referencing the control variables as the covariate and net trade credit as the outcome variable. After matching, the means of the two sets of covariates are not significantly

https://doi.org/10.7441/joc.2026.01.12

different, and the assumption of balance is satisfied (see Appendix C). We subsequently re-execute the regression utilizing the matched data. Columns (1)-(4) of Tab. 10 reveal that the coefficient of the key independent variable (Cbrd) remains significantly positive, hence reinforcing the main findings.

Tab. 10 – PSM results. Source: own research

	(1)	(2)	(3)	(4)
	Ntc	*Ntc*	*Ntc*	*Ntc*
Cbrd	0.062***	0.066***	0.071***	0.073***
	(0.022)	(0.018)	(0.017)	(0.017)
Constant	0.090	0.144	0.194*	0.180*
	(0.120)	(0.107)	(0.103)	(0.101)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	17786	26206	30204	32482
R-squared	0.708	0.701	0.697	0.693

Note: ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% levels, respectively.

5 ADDITIONAL ANALYSES: A PATHWAY TO SUPPLY CHAIN SUSTAINABILITY

Amid the current sharp escalation of global instability, maintaining supply chain sustainability has emerged as particularly crucial. The preceding section confirms the beneficial effect of biodiversity risk disclosure on net trade credit. The next question is whether leveraging biodiversity risk disclosure for enhanced trade credit is an effective pathway to supply chain sustainability.

We expect that supply chain sustainability is promoted when biodiversity risk disclosures are made to enhance trade credit. Specifically, on the one hand, increased net trade credit indicates an increase in the liquidity available to these firms (Amberg et al., 2021) to address biodiversity risks. This increase not only bolsters supply chain resilience and stability (Devalkar & Krishnan, 2019; Ersahin et al., 2024) but also positively contributes to supply chain ESG performance. On the other hand, an increase in corporate net trade credit facilitates the establishment of enduring and robust partnerships among supply chain stakeholders (Lee & Rhee, 2011; Bai & Astvansh, 2024), which can improve overall competitiveness and more effectively advance sustainable development goals (Wang et al., 2024; Bai & Astvansh, 2024).

$$\mathrm{SC_{Sus}} = (-0.5 \times \mathrm{SC_{Res}}) + \left(0.5 \times \mathrm{SC_{Esg}}\right) \quad (5)$$

$$\mathrm{SC_{Res}} = (0.5 \times \mathrm{SC_{SCE}}) + (0.5 \times \mathrm{SC_{SCS}}) \quad (6)$$

$$\mathrm{SCE_a} = \mathrm{Ln}\left(360 / \frac{main\ business\ cost}{average\ balance\ of\ inventory}\right) \quad (7)$$

$$\text{or } \mathrm{SCE_b} = \mathrm{Ln}(|inventory_t - inventory_{t-1}|) \quad (8)$$

$$\mathrm{SCS} = \frac{(|top5\ sale_t - top5\ sale_{t-1}| + |top5\ purchase_t - top5\ purchase_{t-1}|)}{top5\ sale_t + top5\ purchase_t} \quad (9)$$

Tab. 11 – Economic consequence analysis results. Source: own research

https://doi.org/10.7441/joc.2026.01.12

	(1) *SC_Susa*	(2) *SC_Susb*
Cbrd × *Ntc*	0.319**	0.328*
	(0.154)	(0.168)
Ntc	-0.045	-0.043
	(0.040)	(0.042)
Cbrd	0.102**	0.118***
	(0.044)	(0.046)
Constant	-1.286***	-1.465***
	(0.319)	(0.336)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	17652	15965
R-squared	0.642	0.642

Note: ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% levels, respectively.

To evaluate the impact of biodiversity risk disclosure on supply chain sustainability after enhancing net trade credit, following Ersahin et al. (2024), we use an interaction term. We define supply chain sustainability in two dimensions: supply chain resilience and supply chain ESG performance. In this work, supply chain sustainability (SC_{Sus}) is constructed from supply chain resilience (SC_{Res}) and supply chain ESG performance (SC_{Esg}) and is assigned a weight of 0.5. The larger the indicator is, the better the supply chain sustainability. Supply chain ESG performance (SC_{Esg}) is a positive indicator that uses the natural logarithm of ESG scores from the CNRDS database. In addition, supply chain resilience (SC_{Res}) is a negative indicator that uses the same weighting method as that used for supply chain sustainability. A smaller indicator indicates greater supply chain resilience. Specifically, the supply chain efficiency (SCE_a or $\mathrm{SCE_b}$) indicator is measured via the number of enterprise inventory turnover days or the enterprise inventory adjustment amplitude. Supply chain stability (*SCS*) is measured via supply chain volatility. Specific definitions and calculations are given in the four formulas below, where *t* represents the year.

Ultimately, we construct two supply chain sustainability metrics and two periods ahead (*SC_Susa* and *SC_Susb*), distinguished by different measures of supply chain efficiency (*SCE*). Tab. 11 shows the results. The coefficient *Cbrd* × *Ntc* in columns (1) and (2) is positive and significant at the 5% and 10% levels, respectively, suggesting that biodiversity risk disclosure improves supply chain sustainability after enhancing net trade credit. Therefore, trade credit acts as a financial source for businesses to respond to biodiversity loss when firms disclose biodiversity risk, which improves supply chain resilience and ESG performance. This finding confirms that corporate biodiversity risk disclosure improves supply chain sustainability by enhancing net trade credit, hence facilitating stable and sustainable development, which is consistent with supply chain stakeholders' shared goal of working on sustainable supply chain research theories (Song et al., 2024; Liew & Cao, 2024; Lintukangas et al., 2023).

https://doi.org/10.7441/joc.2026.01.12

6 CONCLUSIONS AND IMPLICATIONS

The global initiative to address biodiversity loss and advance sustainable development has highlighted the importance of corporate biodiversity risk disclosure. Firms' comprehensive and timely biodiversity risk disclosure constitutes an encouraging response to environmental accountability. Moreover, accurately understanding the economic consequences of and exploring effective governance strategies to address enterprise biodiversity risk are important.

Given this context, we construct a corporate biodiversity risk disclosure index to examine the impact of biodiversity risk disclosure on net trade credit. The text data are from the MD&A sections of the annual reports of Chinese A-share listed companies from 2003 to 2023. The findings indicate that corporate biodiversity risk disclosure positively influences net trade credit. Additionally, this positive effect is influenced by the combination of suppliers' increased provision of trade credit and customers' requests for reduced reliance on trade credit. Our channel analysis indicates that biodiversity risk disclosure significantly enhances net trade credit by improving information transparency and corporate reputation. A cross-sectional test demonstrates that greater social trust and less credit availability strengthen the incentive effect of biodiversity risk disclosure on net trade credit. We further confirm that leveraging biodiversity risk disclosure for enhanced trade credit is an effective pathway through which to achieve supply chain sustainability. The findings contribute to corporate biodiversity risk governance and sustainable supply chain management. Most importantly, the conclusions of this paper have practical implications in terms of government management in sustainable disclosure guidelines, competitive strategies for corporate environmental disclosure, and cooperation in sustainable supply chain management. Considering the findings and practical significance noted above, we propose three managerial implications below.

The government must establish mandatory biodiversity risk disclosure frameworks to encourage businesses to reduce biodiversity loss while diligently meeting environmental obligations. At present, the quality of biodiversity disclosure varies in extent and breadth among sampled companies (Azizi et al., 2024). In November 2024, Chinese government departments jointly issued the Corporate Sustainability Disclosure Guidelines - Basic Guidelines (for Trial Implementation). On this basis, governments should integrate disclosure mandates with market-driven incentives such as tax rebates for firms that comply with sustainability disclosure guidelines or preferential green bond eligibility. This dual approach can transform regulatory compliance into a competitive advantage, enabling firms to incorporate biodiversity into ESG strategies while accessing low-cost sustainability-linked loans. In addition, in response to the fact that, as informal financing, trade credit is a substitute for bank credit, governments should strengthen the regulation and management of informal financing.

Organizations must take the initiative to improve the level of their biodiversity risk disclosure. Our findings reveal that corporate biodiversity risk disclosure can enhance net trade credit by improving information transparency and social reputation, which reflects the financing advantages of biodiversity risk disclosure. Therefore, enterprises should strictly follow sustainable disclosure guidelines and improve the level and quality of their biodiversity risk disclosure. In addition, enterprises should use biodiversity risk disclosure as a competitive strategy and seize the opportunity to utilize trade credit to manage biodiversity risks for the sustainable development of supply chains. If necessary, companies can negotiate payment terms linked to sustainability disclosure with supply chain partners.

Sustainable supply chain development must be guarded by supply chain partners and stakeholders. Leveraging biodiversity risk disclosure for enhanced trade credit is an effective way to achieve supply chain sustainability. Therefore, to combat biodiversity loss, companies

https://doi.org/10.7441/joc.2026.01.12

must implement efficient and practical risk-control strategies that foster partnerships within supply chains. Involving both suppliers and consumers in managing risk mitigates exposure to biodiversity-related hazards and enhances flexibility and adaptation within supply chains. Furthermore, such involvement can motivate supply chain partners to act to reduce greenhouse gases by jointly demonstrating their sustainability responsibility with improved disclosure.

This study has limitations. First, our sample covers all industries. Considering the heterogeneity in the distribution of biodiversity risk across industries, future research could analyse some specific industries in depth. Second, since the central concern of this paper is the extent to which the level of biodiversity risk-related disclosure affects the net trade credit of firms, the rationale and motivation for suppliers to provide trade credit or for customers to reduce trade credit have not been analysed in depth; they could be further explored in the future.

https://doi.org/10.7441/joc.2026.01.12

Appendix

Appendix A. Supplementary information on corporate biodiversity risk disclosure

Appendix A1. Biodiversity risk disclosure

Tab A1 Biodiversity risk disclosed in the MD&A sections. Source: own research

PSR	Code	Name	Year	Context
Pressure	000592	Pingtan Development	2009	Due to enhanced control of domestic deforestation, the timber harvesting quota target issued by the Fujian Provincial Forestry Department has declined, which may pose a risk to the company.
Status	605069	Zhenghe Ecology	2021	Customers have set higher standards for ecological projects, paying more attention to the enhancement of ecosystem functions, biodiversity protection and the transformation of ecological value into economic value and requiring construction units to provide full life-cycle services for ecological projects.
Response	600126	Hangzhou Steel	2019	The company will unswervingly adhere to the principle that "lucid waters and lush mountains are priceless assets," closely follow the working idea of "environmental management and green development," and strengthen its daily environmental protection management in terms of adhering to the stipulations of the latest sustainability action plan.

Appendix A2. Construction process for biodiversity risk disclosure

(1) Collecting data and extracting textual data

The CNRDS is a Chinese authoritative financial website that contains accessible and analysable textual annual reports. Moreover, since listed companies present MD&A sections in different forms, the CNRDS can accurately intercept MD&A information from annual reports. Therefore, we choose the CNRDS as the data source and finally obtain 58,496 annual reports from 2003 to 2023.

(2) Generating a dictionary of biodiversity risk disclosure

A. Screening seed words: Based on the impact analysis framework of biodiversity risk in pressure–state–response assessment models, we refer mainly to the biodiversity-related word lists provided by industry research reports such as the 2021 Corporate Biodiversity Pressure Assessment Report, the Chinese translation of biodiversity-related words provided by Giglio et al. (2023), and the policy documents on biodiversity issued by the Ministry of Ecology and Environment, and the criteria for biodiversity disclosure issued by the Taskforce on Nature-related Financial Disclosures (TNFD). Among them, we manually select keywords such as "biodiversity", "deforestation" and "ecological protection" as seed words.

B. Expanding vocabulary: The skip-gram model, with word2vec technology, is employed to learn the vocabulary from the annual report content as the sample. The ten terms exhibiting the highest degree of semantic similarity to each seed word are selected via the cosine similarity method.

https://doi.org/10.7441/joc.2026.01.12

C. Generating the dictionary: Repeated words, words not related to biodiversity risk and words with too low frequency are excluded, and 131 words are obtained to generate the biodiversity risk dictionary of this paper, which is shown in Table A2.

(3) Constructing variables of biodiversity risk disclosure based on MD&A sections

On the basis of the Python tool, MD&A sections are processed via "jieba" segmentation, keyword searching, matching and word frequency statistics, and the biodiversity risk words are calculated. The frequency of biodiversity risk words and the length of MD&A sections are calculated.

Tab. A2 Corporate biodiversity risk dictionary. Source: own research

PSR	Risk	Type	Keywords (131)
Pressure	Biodiversity damage in business processes	Land and sea use change	land degradation, environmental damage, deforestation, logging, overexploitation, hunting, intensive agriculture, economic forestry, mineral extraction, illegal sand mining, road expansion, oil and gas pipeline laying, arable land expansion, habitat fragmentation, incidental capture, enclosure of lakes and fields, hydropower dam construction, encroachment on waters, illegal farming, shrinkage of lake areas , reduction of water space, water scarcity, groundwater depletion, freshwater supply, deterioration of water quality (25)
		Direct utilization of living organisms	species, population, animal, plant, wild, coral, aquatic, endangered species, microorganisms, germplasm resources, species loss, species extinction, resource security, overuse of natural resources (14)
		Pollution emissions	environmental pollution, chemical pollution, pesticide pollution, air pollution, greenhouse gas emissions, PM2.5, water pollution, sewage, wastewater, pollutants, solid waste pollution, plastic pollution, soil pollution, waste, noise pollution (15)
		Introduction of alien species	alien species, biological invasion, species invasion, biosecurity, biological genetic resources (5)
		Environmental pressure	eco-controversies, environmental penalties, environmental crisis, ecological protection red line (4)
Status	Biodiversity status and biodiversity loss conditions	Climate change	climate change, climate risk, extreme heat, tropical cyclones, storm surges, rising temperatures, global warming, extreme weather (8)
		Natural disasters	natural disasters, soil erosion, land sanding, desertification, soil erosion, landslides, wildfires, flood control, flood control, drought control, forest fires, pests (12)
		Biodiversity loss	biodiversity, ecosystem diversity, species diversity, genetic diversity, ecosystems, microecology, ecosphere, biosphere, habitat, nature reserves, natural environment, rainforests, forests, oceans, coasts, tropics, freshwaters, wetlands, ecosystem degradation, ecosystem fragmentation, ecosystem collapse, forest cover loss, shrinking of natural shorelines, hydrologic changes, nutrient loading, habitat loss, natural carrying capacity (27)

https://doi.org/10.7441/joc.2026.01.12

Response	Response to biodiversity loss	Environmental policy	convention on biodiversity, COP15, SDG14, SDG15, ecological civilization building, Kunming Declaration, Montreal Declaration, Kunming Framework, environmental protection, ecological protection, environmental quality, green ecology, ecological security, ecological barrier, carbon reduction, carbon sinks, carbon footprints, ecological threats, lucid waters and lush mountains are priceless assets, three lines and one list, green shield (21)

Appendix A3. Validity tests of biodiversity risk disclosure

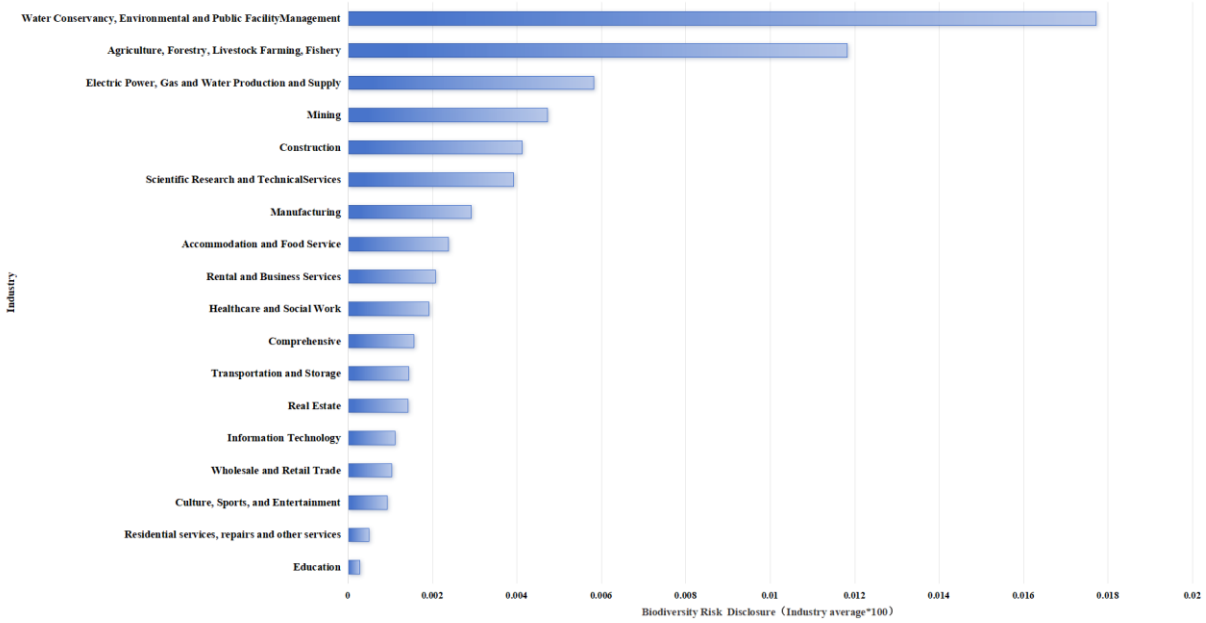


Fig. A1 Industry distribution characteristics of biodiversity risk. Source: own research

(1) Industry distribution characteristics

We calculate the sectoral averages of corporate biodiversity risk disclosure, which are shown in Figure A1. The biodiversity risk disclosure of enterprises shows obvious differences across industries. Among them, biodiversity risk disclosure is more obvious in water conservancy, environmental and public facility management; agriculture, forestry, livestock farming, and fishery; electric power, gas and water production and supply; mining; and construction and other industries with high degrees of dependence on natural resources. However, there is lower-level biodiversity risk disclosure in industries with low-level natural resource dependence, such as residential services, repairs and other services as well as education. This finding suggests that biodiversity risk disclosure is highly correlated with natural resource dependence and aligns with the current body of data from the literature (Ma et al., 2024; He et al., 2024), which further corroborates the reasonableness of the identification of biodiversity risk disclosure in this work from the industry distribution perspective.

(2) Correlation test of different indicators

The indicators of corporate biodiversity risk disclosure constructed in this article include *Cbrd*, *LnCbrd*, and *ScoreCbrd*. These indicators are constructed in the way that is commonly used in the literature so that they can corroborate each other to confirm the level of corporate biodiversity risk disclosure. We further conduct Pearson correlation tests on these variables in Table A3. The correlation coefficients of *Cbrd* with *LnCbrd* and *ScoreCbrd* are 0.835 and

https://doi.org/10.7441/joc.2026.01.12

0.911, respectively, which are positive and significant at the 1% level, suggesting that these three indices reflect the level of biodiversity risk disclosure to a certain extent.

Tab. A3 Pearson correlation test. Source: own research

Variables	*Cbrd*	*LnCbrd*	*ScoreCbrd*
Cbrd	1.000		
LnCbrd	0.835***	1.000	
ScoreCbrd	0.911***	0.764***	1.000

(3) Conceptualization of biodiversity risk disclosure

Feng et al. (2024) reported that a firm's bankruptcy risk increases with its increasing climate change exposure. Similarly, corporate biodiversity risk can lead to financial losses and operational disruptions for companies. These enterprise-specific biodiversity risk disclosures can exacerbate uncertainty about an enterprise's future prospects, leading to greater default and operational risks. Therefore, an effective biodiversity risk indicator must be able to capture the "risk" content of a firm's exposure (Lopez-lira, 2021). Hence, the influence of biodiversity risk on corporate default risk can be evaluated for validity.

In accordance with Bharath and Shumway (2008), this study calculates the corporate default distance to measure default risk. An increased default distance indicates that the business is situated further from the default point, resulting in a reduced default risk. Table A4 shows the results of biodiversity risk on default risk. The influence of biodiversity risk on the default distance is significantly negative. This finding suggests that biodiversity risk can indeed reflect the current and future risks that firms may face and that this indicator mainly captures the basic connotation of firms' "risk". In conclusion, Table A4 supports the rationality of the biodiversity risk indicators of Chinese listed companies constructed via the text analysis method and machine learning from the perspective of "risk".

Tab. A4 Influence of biodiversity risk on default risk. Source: own research

	Default
	(1)
Cbrd	-0.099**
	(0.046)
Constant	7.821***
	(0.308)
Controls	Yes
Firm FE	Yes
Year FE	Yes
Observations	29137
R-squared	0.638

Notes: ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% levels, respectively.

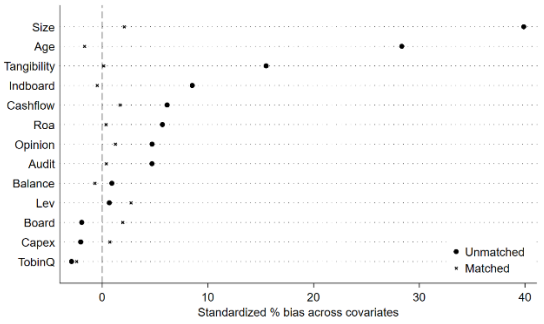
https://doi.org/10.7441/joc.2026.01.12

Appendix B. Variable definitions. Source: own research

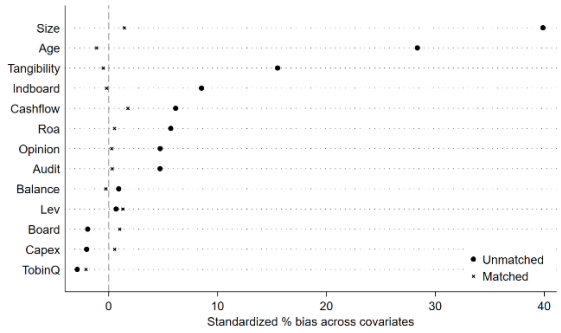
Variable	Definition
Ntc	Accounts payable minus accounts receivable, scaled by sales
Pay	Accounts payable scaled by the cost of goods sold
Rec	Accounts receivable scaled by total sales
Cbrd	$Cbrd_{i,j} = \frac{tf_{i,j}}{\alpha_j} \times 100$
Size	Natural logarithm of total assets
Lev	Total liabilities over total assets
Age	Natural logarithm of the number of years elapsed since the company was created
Roa	Return on assets
Cashflow	Net cash flow from operating activities over total assets
Capex	Return on investment in capital
TobinQ	Market value over total assets
Tangibility	Proportion of tangible assets, including property, plant and equipment, divided by total assets
Balance	Centralized system of shareholding
Board	Natural logarithm of the number of board members
Indboard	Percentage of independent directors
Opinion	Equal to 1 if the firm receives a standard unqualified opinion and 0 otherwise
Audit	Equal to 1 if the firm is audited by a Big Four accounting firm and 0 otherwise

Appendix C. PSM balance test results. Source: own research

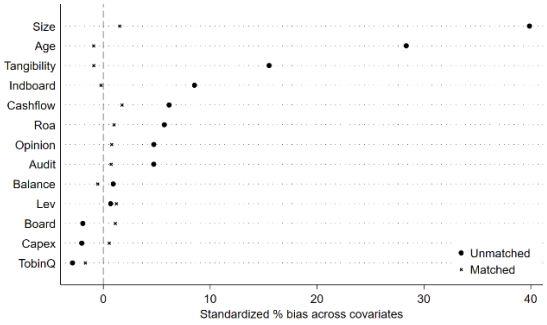
Figures (1) to (4) present the balance test results of nearest-neighbour matching at ratios of 1:1, 1:2, 1:3, and 1:4. After matching, the means of two sets of covariates are not significantly different, and the assumption of balance is satisfied.

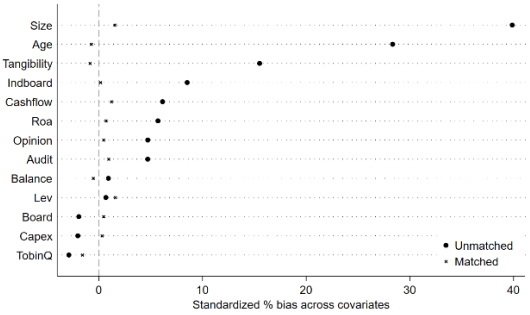


(1)



(2)





https://doi.org/10.7441/joc.2026.01.12

(3) (4)

References

1. Ahmad, M. F., & Karpuz, A. (2024). Beyond climate change risk: Biodiversity and corporate cash holdings. *Economics Letters*, 236, 111608. https://doi.org/10.1016/j.econlet.2024.111608
2. Ali, R., García-Sánchez, I. M., Aibar-Guzmán, B., & Rehman, R. U. (2024). Is biodiversity disclosure emerging as a key topic on the agenda of institutional investors?. *Business Strategy and the Environment*, 33(3), 2116-2142. https://doi.org/10.1002/bse.3587
3. Amberg, N., Jacobson, T., Von Schedvin, E., & Townsend, R. (2021). Curbing shocks to corporate liquidity: The role of trade credit. *Journal of Political Economy*, 129(1), 182-242. https://doi.org/10.1086/711403.
4. Azizi, L., Scope, C., Ladusch, A., & Sassen, R. (2025). Biodiversity disclosure in the European finance sector. *Ecological Economics*, 228, 108430. https://doi.org/10.1016/j.ecolecon.2024.108430
5. Bai, M., & Astvansh, V. (2025). How and Why does a Business-to-Business Firm's Corporate Social Responsibility Disclosure Impact its Dependence on its Major Customers and Major Suppliers?. *Production and Operations Management*, 34(1), 60-78. https://doi.org/10.1177/10591478241276133
6. Bellamy, M. A., Dhanorkar, S., & Subramanian, R. (2020). Administrative environmental innovations, supply network structure, and environmental disclosure. *Journal of Operations Management*, 66(7-8), 895-932. https://doi.org/10.1002/joom.1114
7. Bharath, S. T., & Shumway, T. (2008). Forecasting default with the Merton distance to default model. *The Review of Financial Studies*, 21(3), 1339-1369. https://doi.org/10.1093/rfs/hhn044
8. Breuer, W., Müller, T., Rosenbach, D., & Salzmann, A. (2018). Corporate social responsibility, investor protection, and cost of equity: A cross-country comparison. *Journal of Banking & Finance*, 96, 34-55. https://doi.org/10.1016/j.jbankfin.2018.07.018
9. Burkart, M., & Ellingsen, T. (2004). In-kind finance: A theory of trade credit. *American Economic Review*, 94(3), 569-590. DOI: 10.1257/0002828041464579
10. Cai, W., Quan, X., & Tian, G. G. (2023). Local corruption and trade credit: Evidence from an emerging market. *Journal of Business Ethics*, 185(3), 563-594. https://doi.org/10.1007/s10551-022-05215-w
11. Carvajal, M., Nadeem, M., & Zaman, R. (2021). Biodiversity disclosure, sustainable development and environmental initiatives: Does board gender diversity matter? *Business Strategy and the Environment*, 31(3), 969-987. https://doi.org/10.1002/bse.2929
12. Carvalho, S.H.C.D., Cojoianu, T., & Ascui, F. (2022). From impacts to dependencies: A first global assessment of corporate biodiversity risk exposure and responses. *Business Strategy and the Environment*, 32(5), 2600-2614. https://doi.org/10.1002/bse.3142

https://doi.org/10.7441/joc.2026.01.12

13. Chen, F., et al. (2024). Pricing the priceless: The financial cost of biodiversity conservation (working paper 32743). *National Bureau of Economic Research*. DOI: 10.3386/w32743

14. Cheng, B., Ioannou, I., & Serafeim, G. (2014). Corporate social responsibility and access to finance. *Strategic Management Journal*, 35(1), 1-23. https://doi.org/10.1002/smj.2131

15. Chiu, T., Kim, J., & Wang, Z. (2019). Customers' risk factor disclosures and suppliers' investment efficiency. *Contemporary Accounting Research*, 36(2), 773-804. https://doi.org/10.1111/1911-3846.12447

16. Clarkson, P. M., Li, Y., Richardson, G. D., & Vasvari, F. P. (2008). Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis. *Accounting, Organizations and Society*, 33(4-5), 303-327. https://doi.org/10.1016/j.aos.2007.05.003

17. Dai, R., Liang, H., & Ng, L. (2021). Socially responsible corporate customers. *Journal of Financial Economics*, 142(2), 598-626. https://doi.org/10.1016/j.jfineco.2020.01.003

18. Dang, V. A., Gao, N., & Yu, T. (2024). Environmental regulation and access to credit. *British Journal of Management*, 36(1), 303-322. https://doi.org/10.1111/1467-8551.12848

19. Darendeli, A., Fiechter, P., Hitz, J. M., & Lehmann, N. (2022). The role of corporate social responsibility (CSR) information in supply-chain contracting: Evidence from the expansion of CSR rating coverage. *Journal of Accounting and Economics*, 74(2-3), 101525. https://doi.org/10.1016/j.jacceco.2022.101525

20. Devalkar, S. K., & Krishnan, H. (2019). The impact of working capital financing costs on the efficiency of trade credit. *Production and Operations Management*, 28(4), 878-889. https://doi.org/10.1111/poms.12954

21. Di Marco, R., et al. (2023). Symbol or substance? Scrutinizing the 'risk transparency premise' in marketized sustainable finance: The case of TCFD reporting. *Business Strategy and the Environment*, 32(6), 3027-3052. https://doi.org/10.1002/bse.3285

22. Ding, F., et al. (2023). Firms' access to informal financing: The role of shared managers in trade credit access. *Journal of Corporate Finance*, 79, 102388. https://doi.org/10.1016/j.jcorpfin.2023.102388

23. Dou, J., Mirza, N., Umar, M., & Horobet, A. (2025). ESG uncertainties and valuation implications: Evidence from the EU banking sector. *Research in International Business and Finance*, 76, 102872. https://doi.org/10.1016/j.ribaf.2025.102872

24. Drempetic, S., Klein, C., & Zwergel, B. (2020). The influence of firm size on the ESG score: Corporate sustainability ratings under review. *Journal of Business Ethics*, 167(2), 333-360. https://doi.org/10.1007/s10551-019-04164-1

25. Ellul, A., Jappelli, T., Pagano, M., & Panunzi, F. (2016). Transparency, tax pressure, and access to finance. *Review of Finance*, 20(1), 37-76. https://doi.org/10.1093/rof/rfv005

26. Ersahin, N., Giannetti, M., & Huang, R. (2024). Trade credit and the stability of supply chains. *Journal of Financial Economics*, 155, 103830. https://doi.org/10.1016/j.jfineco.2024.103830

27. Feng, F., Han, L., Jin, J., & Li, Y. (2024). Climate change exposure and bankruptcy risk. *British Journal of Management*, 35(4),1843-1866. https://doi.org/10.1111/1467-8551.12792

28. Fisman, R., & Love, I. (2003). Trade credit, financial intermediary development, and industry growth. *Journal of Finance*, 58(1), 353-374. https://doi.org/10.1111/1540-6261.00527

29. Garel, A., Romec, A., Sautner, Z., & Wagner, A.F. (2024). Do investors care about biodiversity? *Review of Finance*, 28(4),1151-1186. https://doi.org/10.1093/rof/rfae010

30. Giglio, S., Kuchler, T., Stroebel, J., & Zeng, X. (2026). Biodiversity risk. *Review of Finance*, 30(1), 131-161. https://doi.org/10.1093/rof/rfaf063

31. Gualandris, J., Longoni, A., Luzzini, D., & Pagell, M. (2021). The association between supply chain structure and transparency: A large-scale empirical study. *Journal of Operations Management*, 67(7), 803-827. https://doi.org/10.1002/joom.1150

32. Hahn, R., Reimsbach, D., & Schiemann, F. (2015). Organizations, climate change, and transparency: Reviewing the literature on carbon disclosure. *Organization & Environment*, 28, 80-102. https://doi.org/10.1177/1086026615575542

33. Hassan, A.M., Roberts, L., & Atkins, J. (2020). Exploring factors relating to extinction disclosures: What motivates companies to report on biodiversity and species protection? *Business Strategy and the Environment*, 29(3), 1419-1436. https://doi.org/10.1002/bse.2442

34. He, F., Chen, L., Brian M. Lucey (2024). Chinese corporate biodiversity exposure. *Finance Research Letters*, 70, 106275. https://doi.org/10.1016/j.frl.2024.106275

35. Huang, H., Shi, X., & Zhang, S. (2011). Counter-cyclical substitution between trade credit and bank credit. *Journal of Banking & Finance*, 35(8), 1859-1878. https://doi.org/10.1016/j.jbankfin.2010.12.009

36. Islam, M. A., & Van Staden, C. J. (2018). Social movement NGOs and the comprehensiveness of conflict mineral disclosures: Evidence from global companies. *Accounting, Organizations and Society*, 65, 1–19. https://doi.org/10.1016/j.aos.2017.11.002

37. Javadi, S., & Masum, A. A. (2021). The impact of climate change on the cost of bank loans. *Journal of Corporate Finance*, 69, 102019. https://doi.org/10.1016/j.jcorpfin.2021.102019

38. Kalhoro, M.R., & Kyaw K. (2024). Manage biodiversity risk exposure? *Finance Research Letters*, 61, 104989. https://doi.org/10.1016/j.frl.2024.104989

39. Karolyi, G. A., & Tobin-de la Puente, J. (2023). Biodiversity finance: A call for research into financing nature. *Financial Management*, 52(2), 231-251. https://doi.org/10.1111/fima.12417

40. Lee, C. H., & Rhee, B. D. (2011). Trade credit for supply chain coordination. *European Journal of Operational Research*, 214(1), 136-146. https://doi.org/10.1016/j.ejor.2011.04.004

41. Li, P., et al. (2024). Government certified environmental labels and trade credit: Evidence from green factories. *Economics Letters*, 244, 112008. https://doi.org/10.1016/j.econlet.2024.112008

42. Liew, M., & Cao, J. (2024). Green supply chain management for carbon accountability. *Energy Economics*, 138, 107840. https://doi.org/10.1016/j.eneco.2024.107840

43. Lintukangas, K., Arminen, H., Kähkönen, A. K., & Karttunen, E. (2023). Determinants of supply chain engagement in carbon management. *Journal of Business Ethics*, 186(1), 87-104. https://doi.org/10.1007/s10551-022-05199-7

44. Liu, Q., Luo, J., & Tian, G. G. (2016). Managerial professional connections versus political connections: Evidence from firms' access to informal financing resources. *Journal of Corporate Finance*, 41, 179-200. https://doi.org/10.1016/j.jcorpfin.2016.09.003

45. Lopez-lira, A. (2021). Why do managers disclose risks accurately? Textual analysis, disclosures, and risk exposures. *Economics Letters*, 204, 109896. https://doi.org/10.1016/j.econlet.2021.109896

46. Loughran, T., & McDonald, B. (2011). When is a liability not a liability? Textual analysis, dictionaries, and 10-Ks. *Journal of Finance*, 66(1), 35-65. https://doi.org/10.1111/j.1540-6261.2010.01625.x

47. Lucey, B., Xiaoxue, W., Yanfang, W., & Ying, X. (2020). Can financial marketization mitigate the negative effect of exchange rate fluctuations on exports? Evidence from Chinese regions.Finance *Research Letters*,34, 101250. https://doi.org/10.1016/j.frl.2019.07.023

48. Luo, C., Sun, H., Yang, G., & Zhang, B. (2024). Law and borders: Entrepreneurs' immigration status and trade credit. *Journal of Corporate Finance*, 87, 102606. https://doi.org/10.1016/j.jcorpfin.2024.102606

49. Luo, C., Wei, D., & He, F. (2023). Corporate ESG performance and trade credit financing – Evidence from China. International *Review of Economics & Finance*, 85, 337-351. https://doi.org/10.1016/j.iref.2023.01.021

50. Ma, F., Wu, H., & Zeng, Q. (2024). Biodiversity and stock returns. *International Review of Financial Analysis*, 95, 103386. https://doi.org/10.1016/j.irfa.2024.103386

51. Maroun, W., & Ecim D. (2024). Biodiversity reporting by United Kingdom (UK)-listed companies: A review of extent, content and readability of disclosures. *Business Strategy and the Environmen*t, 33(8), 7800-7824. https://doi.org/10.1002/bse.3866

52. Michelon, G., Rodrigue, M., & Trevisan, E. (2020). The marketization of a social movement: Activists, shareholders and CSR disclosure. *Accounting, Organizations and Society*, 80, 101074. https://doi.org/10.1016/j.aos.2019.101074

53. Orazalin, N., Ntim, C. G., & Malagila, J. K. (2024). Understanding the relation between climate change risks and biodiversity disclosures: An international analysis.

Journal of Accounting Literature, 48(2), 508-529. https://doi.org/10.1108/JAL-04-2024-0072

54. Ouyang, C., Xiong, J., Liu, L., & Yao, J. (2024). Geographic proximity and trade credit: Evidence from a quasi-natural experiment. *Journal of Corporate Finance*, 84, 102535. https://doi.org/10.1016/j.jcorpfin.2023.102535

55. Quan, X., Xiang, C., & Gao, R. (2024). Reputation is golden: Superstar CEOs and trade credit. *Journal of Business Finance & Accounting*, 51(1-2), 631-656. https://doi.org/10.1111/jbfa.12735

56. Roberts, L., et al. (2021). Corporate accountability towards species extinction protection: insights from ecologically forward-thinking companies. *Journal of Business Ethic*s, 178, 571-595. https://doi.org/10.1007/s10551-021-04800-9

57. She, G. (2022). The real effects of mandatory nonfinancial disclosure: Evidence from supply chain transparency. *Accounting Review*, 97(5), 399-425. http://dx.doi.org/10.2139/ssrn.3929796

58. Silva, G.C.D., Regan, E.C., Pollard, E.H.B., & Addison, P.F.E. (2019). The evolution of corporate no net loss and net positive impact biodiversity commitments: Understanding appetite and addressing challenges. *Business Strategy and the Environment*, 28(7),1481-1495. https://doi.org/10.1002/bse.2379

59. Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *American Economic Review*, 71(3), 393-410. http://www.jstor.org/stable/1802787

60. Tamimi, N., & Sebastianelli, R. (2017). Transparency among S&P 500 companies: An analysis of ESG disclosure scores. *Management Decision*, 55(8), 1660-1680. https://doi.org/10.1108/MD-01-2017-0018

61. Treepongkaruna, S. (2024). Corporate sustainability and biodiversity reporting: A proactive business strategy to mitigate litigation and reputational risks. *Business Strategy and the Environment*, 33(7), 6640-6651. https://doi.org/10.1002/bse.3840

62. Umar, M., Mirza, N., Achim, M. V., & Ribeiro-Navarrete, S. (2025). The impact of climate change on credit portfolios and banking resilience: Preliminary evidence from a developing economy. *International Review of Financial Analysis*,102, 104021. https://doi.org/10.1016/j.irfa.2025.104021

63. Wagner, M. (2022). Business, biodiversity and ecosystem services: Evidence from large-scale survey data. *Business Strategy and the Environment*, 32(5), 2583-2599. https://doi.org/10.1002/bse.3141

64. Wang, L., et al. (2023). Green innovation output in the supply chain network with environmental information disclosure: An empirical analysis of Chinese listed firms. International *Journal of Production Economics*, 256, 108745. https://doi.org/10.1016/j.ijpe.2022.108745

65. Wu, W., Firth, M., & Rui, O. M. (2014). Trust and the provision of trade credit. *Journal of Banking & Finance*, 39, 146-159. https://doi.org/10.1016/j.jbankfin.2013.11.019

66. Xu, H., Wu, J., & Dao, M. (2019). Corporate social responsibility and trade credit. *Review of Quantitative Finance and Accounting*, 54(4), 1389-1416. https://doi.org/10.1007/s11156-019-00829-0

67. Zhang, Y., Lara, J. M. G., & Tribó, J. A. (2020). Unpacking the black box of trade credit to socially responsible customers. *Journal of Banking & Finance*, 119, 105908. https://doi.org/10.1016/j.jbankfin.2020.105908

68. Zhang, Z., Su, Z., Wang, K., & Zhang, Y. (2022). Corporate environmental information disclosure and stock price crash risk: Evidence from Chinese listed heavily polluting companies. *Energy Economics*, 112, 106116. https://doi.org/10.1016/j.eneco.2022.106116

Contact information
Chao Liang
Southwest JiaoTong University
School of Economics & Management
Chengdu, China
E-mail: liangchaoswjt@163.com
ORCID: 0000-0002-8535-5139

Hao Liu
Southwest JiaoTong University
School of Economics & Management
Chengdu, China
E-mail: lhaoswjtu@163.com

Qiang Guo
Chengdu University of Technology
Chengdu, China
E-mail: guoqiang_work@126.com

https://doi.org/10.7441/joc.2026.01.12