



## Research article

# Environmental, social and governance performance: Can and how it improve internationalization of Chinese A-share listed enterprises

Shanshan Wang<sup>a</sup>, Fenglan Chen<sup>b,\*</sup>, Xiaoyan Yang<sup>a</sup>

<sup>a</sup> School of Economics and Management, Xiamen University of Technology, No.600. Ligong Road, Xiamen, 361024, Fujian, China

<sup>b</sup> School of Economics, Shenzhen University, No.3688. Nanhai, Shenzhen, 518061, Guangdong, China

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## ABSTRACT

As an important enterprises' practice in implementing the UN 2030 sustainable development, environmental, social, and governance (ESG) performance has drawn escalating attention from government, business and academia. This focus substantially impacts internationalization of enterprises. This paper tries to provide quantitative evidence of the impact of ESG performance of Chinese A-share listed companies on their international operation from 2009 to 2021. The results show that: (i) the ESG performance of listed enterprises exercise a significant positive impact on the internationalization operation. (ii) The effect of ESG performance on enterprises internationality is driven by increasing total factor productivity, enterprise reputation, and green innovation, as well as by mitigating financing constraint. (iii) Good ESG performance significantly boosts enterprise internationalization for non-heavy polluting, large-scale enterprises. This effect is also pronounced for enterprises with local government reports featuring a high frequency of environmental terms or those in high-tech industries.

## 1. Introduction

Since the reform and opening up, the internationalization of Chinese enterprises, driven primarily by exports and outward investments, has significantly accelerated [1]. This trend has not only spurred improvements in China's consumption and industrial structure but also emerged as a crucial engine of global economic growth [2]. However, China's foreign trade and investment are facing manifold difficulties from external international market. There are several reasons can account for this. First, requirements for new environmental standards in international trade are becoming more strict [3]. As global climate and environmental issues intensify, sustainability has become a global concern and critical theme, and green low-carbon development or carbon neutrality have also become an irreversible trend of global economic development [4]. Sustainable development urgently calls for the implementation of environmental, social and governance principles [5,6].

Meanwhile the ecological environment department of China has sanctioned A-share listed entities, including Yunnan ZD and Jiangsu HF, for either failing to disclose or misrepresenting environmental information. These industry practices show that simply focusing on profit maximization and refusing to address ESG challenges may hinder an organization's internationalization. Chinese enterprises that do not fully disclose ESG information have encountered setbacks in international operations. For instance, due to a low

\* Corresponding author.

E-mail address: [chenfl@szu.edu.cn](mailto:chenfl@szu.edu.cn) (F. Chen).

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ESG composite score, Contemporary Ampere Technology Co. was removed from the Hang Seng A-Share Sustainable Development Enterprise Index.

Besides, the challenges of internationalization primarily stem from internal factors. Reshoring of manufacturing by European countries and the United States, coupled with investment shifts to other developing nations due to rising labor and resource costs, hampers the export and outward investment endeavors of China's enterprises. Additionally, China has been transitioning from its role as the world's factory to becoming a hub for innovation [7]. These two transformations foster the high-quality internationalization of Chinese enterprises, enabling them to enhance their competitive position in the global market. The implementation and disclosure of ESG information serve as powerful tools for enterprises to gain international competitiveness, resulting in enhanced reputation, operational resilience, and access to capital financing [8,9].

Exploring the ESG performance's influence on internationalization is pivotal for enterprises, investors, and policymakers [10–12]. The process of internationalization will encounter numerous ESG-related risks, including diverse environmental regulations, labor practices across countries, and the increased costs. Effectively navigating these risks are crucial for companies aiming to enter and thrive in international markets [13,14].

Additionally, this study offers insights from the investor's perspective, highlighting the growing significance of ESG performance in attracting international investors, since investors are increasingly using ESG standards to assess the risks and potentials of companies with international operations [15]. Therefore, examining the impact of ESG on international business practices further provides investors with insights into a company's global competitive capabilities.

Furthermore, numerous urgent ESG issues, such as climate change and environmental conservation, transcend national borders, requiring policymakers to adopt a transnational viewpoint. The complex interplay between corporate globalization and these global challenges highlights the significance of grasping how ESG considerations impact a company's global endeavors. This understanding can provide policymakers with actionable insights for navigating the intricacies of international expansion in the ESG era.

This naturally raises an important research topic: can and how does ESG affect the internationalization of enterprises. However, the focus of ESG-internationalization nexus is underexplored, with only a small amount of literature addressing their interrelation. Furthermore, few studies have integrated the impact of environmental, social, or governance factors on internationalization. Regarding studies that focus on the impact of ESG performance on export trade, they have primarily concentrated on the association of individual ESG components with trade or outward investment. Some studies focus on environmental regulation or disclosure [16–18], social responsibility [19–21], corporate governance [22]. To address these gaps, this study seeks to overcome previous limitations by examining the impact of ESG performance on internationalization, as well as the mediated effects of ESG on internationalization. This research is beneficial for Chinese enterprises seeking to adapt to the evolving standards of international trade and fulfill their social responsibilities. As a result, enhancing the competitiveness of the industrial chain and ultimately improving internationalization outcomes can be achieved. This study extended previous literature in the following ways.

- (a) incorporate comprehensive ESG indicators, encompassing environmental, social, and corporate governance dimensions, as well as each dimension itself disclosed by authoritative institutions to explore the impact of listed companies' ESG performance on corporate internationalization. Although some literature focus on the relationship between environment or social responsibility or governance and trade or investment [10,11], they fail to detect the association between ESG and internationalization of listed companies based on the latest data [23].
- (b) explore mechanism through which ESG factors shape internationalization process, focusing on financing cost, total factor productivity, corporate reputation, green innovation, etc. There's a notable gap in the literature regarding these mechanisms [10].
- (c) confirm the long-term effect of ESG on internationalization. literature has also found that it is not conducive to the development of enterprises in the short term [10,19], but there is still a lack of robust test on its long-term impact, in addition, the issue of endogeneity has not been adequately addressed.

The remaining sections of this study are organized as follows. Section 2 presents a literature review and theoretical hypothesis. Section 3 reports the empirical research including baseline regression, heterogeneity and mechanism analysis. Section 4 is conclusion recommendations and limitations.

## 2. Literature review and theoretical hypothesis

### 2.1. Existing research on the effect of ESG

The concept of ESG was first formally proposed by the United Nations Environment Program (UNEP) in 2004, which is an abbreviation of Environmental, Social and Governance. The content of ESG includes the company's environmental impact, social responsibility and internal governance, which is used by the company to regulate and supervise its own behavior, and is also the basis for investors to measure the sustainability of the invested company or assets. With the development of society, investors now evaluate listed companies not only by traditional financial metrics like market value, operating income, and profitability but also by non-financial indicators including environmental and social impact. Driven by the new investment concept, ESG investment came into being and has been developing rapidly.

In recent years, the ESG framework has garnered significant interest and scrutiny from the global economic sector. This increased attention has led to a plethora of studies exploring the impact of ESG principles on financial outcomes and the valuation of enterprises,

among other critical dimensions. Regarding the relationship between ESG and financial performance, there is a belief that strong ESG performance can enhance financial performance. This finding holds practical significance for investors, corporate management, decision-makers, and industry regulators [24]. Meanwhile, enterprises will endeavor to improve ESG performance in response to the urgent demand of investors. Empirical research investigating the impact of ESG disclosure on financial performance, using data from Turkish companies listed in the XKURY (Borsa Istanbul Corporate Governance Index) from 2007 to 2017, has shown interesting results. The study found that environmental disclosure within the ESG framework had a significant and negative influence on financial performance. However, when considering the governance dimension, shareholder rights and relevant provisions of the board of directors had a significantly positive impact on financial performance [25].

Regarding the impact of ESG on enterprise value, the majority of current research indicates that ESG performance notably enhances enterprise value. However, the magnitude of this positive effect differs among various enterprise categories [26–28]. A meta-analysis of more than 2000 literatures in the fields of management, accounting, finance and economics, found that about 90 % of the studies have shown a positive ESG-corporate value relationship [29]. Investigations have confirmed that ESG performance enhanced the legitimacy of enterprises and help enterprises to continuously increase enterprises value [30,31]. CEO power has been introduced in the link between environment and corporate value, and there is a positive correlation between the level of ESG disclosure and corporate value [32], and the more closely related the relationship between the two and CEO power, the more significant the impact of ESG disclosure on corporate value [30]. Similar result was also derived when proposing a new scoring method to evaluate the ESG performance of Chinese A-share listed companies from 2010 to 2019, by using Tobin's Q, return on assets (ROA) and price-to-book ratio (MB) as proxy variables of corporate value [33].

The impact effect of ESG performance will differ between enterprises regarding its ownership, enterprise size and pollution level. In contrast to non-state-owned enterprise, state-owned enterprises play a more important role in enhancing enterprise value [33]. It is also demonstrated that ESG effect of non-state-owned enterprises was more significant when selecting the data of 417 A-share listed companies in China from 2015 to 2017 [34]. Besides, they argued that small-scale enterprises and non-polluting enterprises contributed more significantly to enterprises' export in contrast to large-scale enterprises and heavy-polluting ones.

## 2.2. Impact of ESG on internationalization

In recent years, there has been a growing recognition among governments and corporations of the dual objectives of pursuing green trade initiatives and achieving high-quality development. While many studies have investigated the impact of ESG performance on financial metrics and company valuation, there is still a significant gap in the literature regarding the relationship between ESG performance and international expansion, particularly among Chinese listed companies.

A small branch of literature has comprehensively addressed the effect of environment, society or governance effect on internationalization. Good ESG performance can improve the export intensity of enterprises through innovation enhancement and financing constraints mitigation. This assertion is supported by an analysis of data from Chinese listed companies spanning from 2008 to 2015 [23]. Based on the ESG performance data of China's A-share listed companies from 2015 to 2020, a regression model with two mediators involving with enterprise innovation and financing cost, showing that the enterprises with good ESG performance will be encouraged to engage in more exporting activities [12]. There is a U-shaped relationship between ESG performance and export performance. The improvement of ESG performance will inhibit export performance in the short term, but promote export performance in the long term. Technology research and development is the key factor to strengthen ESG performance and facilitate export or investment. This result is derived from data of A-share listed companies from 2011 to 2020 [10].

### 2.2.1. The impact of the environmental disclosure or regulation on internationalization

Several studies have highlighted the impact of environmental performance, including environmental disclosure and regulations, on exports. These studies indicate that environmental regulations can actively promote exports by enhancing the product structure of enterprises [35] and the quality of products internationalization [36,37]. Environmental regulations can serve as an indirect catalyst for boosting enterprise exports through the stimulation of enterprise innovation [24].

Besides the linear relationship, some studies try to explore its nonlinearity relationship and heterogeneity [10]. This exploration reveals that environmental information disclosure can promote enterprises to make explicit decision to export. In addition, the nonlinear relationship is uncovered, specifically, nexus between information disclosure of hard environment (such as R&D environment expenditure and related environmental penalty expenditure) and export scale was U-shaped, while the relationship between information disclosure of soft environment (like environmental protection policy, environmental protection goals) and export scale forms an inverted U-shaped. When considering heterogeneity, it's observed that in sectors with higher pollution footprints, stringent environmental regulations significantly curtail both the propensity to export and the scale of exports among firms [18].

Some studies have also conducted heterogeneity tests, which revealed that state-owned enterprises and enterprises located in the central and western regions were less affected [18]. A theoretical model was established to investigate the impact of environmental legislation on the domestic value-added rate of Chinese firms' exports, which was further verified by micro-level data of Chinese enterprises [38]. The "cost effect" and "innovation effect" of environmental legislation control were found to promote the domestic value-added rate of Chinese enterprises through two channels: factor substitution and mark-up. However, both excessively stringent and overly lenient environmental regulations can have negative effects on environmental information disclosure, which in turn, hinders the internationalization process of enterprises.

Existing research concern with enterprise environmental performance are focus on environmental disclosure and environmental regulation, emission reduction and energy conservation has been underexplored. Further research is required to understand the

relationship between environmental performance and export, focusing on indicators that comprehensively capture the environmental performance of businesses.

A similar conclusion was reached in a study investigating the influence of ESG performance on investment efficiency, which incorporated data from Chinese A-share listed companies from 2011 to 2020. Further investigation into how audit quality impacts the relationship between ESG performance and investment efficiency revealed a stronger effect for non-state-owned enterprises or those in less developed areas, extending to inward investments [21]. As for inward investment, empirical test revealed that good ESG factors in all sample countries are a crucial driving force for foreign capital inflow [39].

### 2.2.2. *The impact of corporate social responsibility on internationalization*

The outcomes of extensive research focused on analyzing the impact of Corporate Social Responsibility (CSR) on exports have consistently shown a significant positive association. Investigations have included large and medium-sized Brazilian exporters, using questionnaire surveys in data collection [19]. Some studies have taken listed companies in China as samples [40,41]. These studies also further explain how corporate social responsibility affects its exports, including enhancing the degree of product differentiation [19], and improving the market image and intangible assets of enterprises [41]. Effectively balance strategic differentiation with legal consistency. Costa [42] and Wang et al. [43] further introduced exploratory and exploitative innovation as the mechanism by which CSR affects exports. Exploratory innovation mainly uses the acquired new knowledge and skills to create new products and services, while exploitative innovation focuses on using existing knowledge and skills to improve existing products. The research results showed that CSR could help enhance the impact of exploratory innovation on export performance, whereas the impact of exploitative innovation on export performance was negative [42].

### 2.2.3. *The impact of corporate governance on internationalization*

It has been confirmed that good corporate governance will positively affect export or investment by considering different mediation effect [22,44,45]. The finding suggested that corporate governance enhanced export strategy effectiveness by taking 779 listed manufacturing companies in China from 2002 to 2005 as samples [22]. These studies unanimously conclude that directors with international backgrounds play a pivotal role in strengthening the positive correlation between corporate governance and export intensity. Among these studies, the empirical research was based on listed manufacturing companies from 2012 to 2016 and data was sourced from China Stock Market & Accounting Research Database (CSMAR) and China's Customs database [44,45].

In view of the above studies, we propose research hypothesis 1.

**H1.** The good ESG performance of listed companies may facilitate enterprise to operate internationally.

## 2.3. *The mechanisms of ESG's impact on internationalization*

With a growing global emphasis on ESG practices from investors and governments, firms are increasingly adopting these practices for sustainable development. Research indicates that these practices can enhance internationalization capabilities by reducing financing costs, improving total factor productivity, and enhancing corporate reputation and green innovation.

### 2.3.1. *Financing costs mitigation*

According to the Information Asymmetry Theory [46] and Signaling Theory [47], good ESG performance can enhance corporate transparency, convey a signal of sustainable development, and make investors and financial institutions more willing to provide funds at lower interest rates. Besides, the disclosure of ESG performance would enable stakeholders to obtain sufficient and accurate investing information about enterprises in making investment decisions [48]. This will ultimately reduce the financing cost of the enterprises. Comparable outcomes emerged from analyzing samples of Chinese family companies, European Union enterprises, and Korean security market data, respectively [49–51]. These studies indicated that good ESG performance could reduce debt financing costs due to financial support from creditors.

The positive impact of lower financing costs on internationalization has been confirmed in numerous studies. An analysis of the World Bank's "Investment Environment Survey (2005)" showed that reducing financing costs significantly increased the export propensity of Chinese private enterprises. Additionally, an analysis using panel data from 30 developing countries from 2000 to 2012 concluded that the reduction of financing costs can significantly improve export stability [52,53]. Thus, there's a significant link between enterprises' ESG performance and financing costs in financial markets, meaning that lower financing costs, facilitated by ESG, allow inexperienced exporters to begin exporting and enhance their internationalization capabilities.

### 2.3.2. *Total factor productivity improvement*

According to Information Asymmetry Theory [46], strong ESG performance boosts transparency and reduces information disparities among decision-makers or investors, lowering decision risks and uncertainties and promoting efficient resource allocation. Based on Signaling Theory [47], companies can signal their commitment to sustainable development by improving their environmental, social, and governance practices. This positively impacts investors, employees, and suppliers, facilitating the attraction of higher-quality investments and enhancing the efficiency of production and supply chain allocation. Moreover, improved ESG performance reflects a company's attention to the interests of stakeholders, which in turn can enhance operational efficiencies, innovation, and employee productivity according to Stakeholder Theory [54]. These theories are further supported by empirical evidence from studies [55,56], which found that good ESG performance can promote the enhancement of a company's total factor productivity.

Numerous studies have confirmed the positive impact of increased total factor productivity on exports. Using data from Chinese industrial enterprises and customs from 2000 to 2014, it has been shown that higher total factor productivity substantially enhances both the breadth of enterprise exports and the quality of export products [57]. This finding remains consistent across various methods of measuring factor productivity indicating that more productive enterprises tend to export more [58].

### 2.3.3. Corporate reputation enhancement

According to Signaling Theory, a company's robust ESG performance transmits a strong positive signal to the market and stakeholders, underscoring its commitment to sustainable development. This dedication enhances the company's reputation, encouraging stakeholders to collaborate more willingly. Consequently, it increases the company's opportunities and access to resources, thereby facilitating its internationalization.

At the same time, the core principles of Information Asymmetry Theory and Stakeholder Theory highlight that strong ESG performance is vital for reducing information asymmetry and showing genuine concern for stakeholders. This dual benefit not only enhances the company's international image and reputation but also fosters more favorable conditions for its global expansion.

It has been argued that by implementing social responsibility strategy, enterprises can enhance corporate reputation [59]. Literature indicates that robust ESG performance and its distinct components significantly elevate a company's reputation, satisfying the wide-ranging expectations of its stakeholders [54]. In this end, from an environmental perspective, corporate environmental responsibility can enhance corporate reputation by increasing concerns about stakeholder and impressing them [60]. From social perspective, companies can fulfill their social responsibilities and establish their corporate image through charitable donations to enhance their reputation [61]. Better corporate governance and limiting executive self-interests boost listed companies' reputations from a governance view [62].

Enterprises with a good reputation often have a high level of export volumes. A empirical research using massive amount of Chinese transaction data showed that exporters with superior reputations achieved greater export volumes in contrast to other enterprises with nearly identical true ratings [63]. It will enable the investors and stakeholders to have full perceptions of the reputation of the enterprises and thereby increase exports [64].

### 2.3.4. Green innovation stimulation

In accordance with Information Asymmetry Theory, the transparent disclosure of a company's environmental and social responsibility information mitigates information asymmetry between external investors and the company. This transparency allows investors to gain a more profound understanding of the company's actual operations and future development potential, thereby securing more green investments and financing.

Green technologies are crucial elements of a company's ESG performance. According to Signaling Theory, by demonstrating high levels of ESG performance, a company signals its environmental stewardship and technological prowess to the international market, thereby attracting more international investments and fostering cooperation, which in turn enhances its level of internationalization.

Furthermore, by improving ESG performance, a company more effectively meets the expectations of international stakeholders, thereby increasing its competitiveness and acceptance in the global market. As Stakeholder Theory underscores, balancing the needs of different stakeholders, particularly by adhering to environmental and social responsibility standards across various countries and regions, significantly advances the process of internationalization.

The positive impact of ESG performance on green innovation have been further confirmed by some empirical studies such as [65, 66]. Empirical evidences also show that green innovation enhances export quality and attracts international investments [67,68]. Research identifies green innovation as a pivotal intermediary, asserting that it can enhance the sophistication of green export technology through its transmission effect, thereby facilitating the advancement of green exports within the industry [69]. Consequently, the implementation of ESG practices can foster green innovation and subsequently enhance their internationalization efforts.

Based on the above analysis, this paper proposes hypothesis 2.

**H2.** Effective ESG performance can facilitate internationalization by lowering financing costs, enhancing total factor productivity, boosting corporate reputation, and fostering green innovation.

## 3. Empirical research on the impact of ESG performance on corporate internationalization

### 3.1. Model setting and variables

This study aims to investigate the impact of ESG performance on firms' internationalization and sets the following baseline empirical regression model by following Lu et al. [70]:

$$\begin{aligned} \ln exp_{it} = & a_0 + a_1 \ln esg_{it} + a_2 size + a_3 cashflow_{it} + a_4 lev_{it} + a_5 age_{it} + a_6 roe_{it} + a_7 tobinq_{it} \\ & a_8 far_{it} + a_9 \ln exp_{it} + \sum b_i ind + \sum b_j year + \varepsilon_{it} \end{aligned} \quad (1)$$

Among them, the dependent variable *lnexp* denotes corporate internationalization. *lnesg* represents the natural logarithm of the listed company's ESG rating, measured by the ESG rating data of Sino-Securities. The higher the value, the greater the ESG advantage of the listed company. *lnexp* represents a one-stage lag in the dependent variable,  $a_1$  is coefficient of the impact of ESG performance on internationalization. If  $a_1$  is larger than 0. *ind* indicates that the individual fixed effect excludes the individual characteristics that do not vary with time at the individual level, and *year* represents the year fixed effect, eliminating the factors that do not change with the

industry at the year level. In addition, the VIF (Variance Inflation Factor) value of each variable was far less than 5, therefore statistically it can be considered that there is no multicollinearity problem.

### 3.2. Variables

The dependent variable is the level of enterprise internationalization of listed companies (*lnexp*). Extant literature categorizes the measurement methods of this indicator into the following types: (i) internationalization is represented by enterprise performance, primarily measured by overseas revenue [71]. (ii) the level of internationalization is indicated by the number of countries in which the enterprise has invested [72]. (iii) the internationalization level is demonstrated by the number of the enterprise's subsidiaries abroad [73]. (iv) a composite indicator synthesizes various methods, such as using the average of three types of estimation methods for the level of internationalization [74].

These methods are closely aligned with those utilized by the United Nations Conference on Trade and Development, facilitating a thorough evaluation of a corporation's degree of internationalization. It is particularly significant that existing literature commonly gauges corporate internationalization through overseas revenue or its ratio to total revenue, owing to the strong positive correlation between various other metrics and international operations [75]. Thus, in the empirical analysis beyond the baseline regression model, this study predominantly measures corporate internationalization by overseas revenue.

Main independent variable is the logarithm of listed companies' ESG performance (*lnesg*). Taking into account the timeliness of this research, alongside the prevailing conditions of the Chinese stock market and the comprehensive coverage offered by ESG ratings, this study adopts the ESG rating provided by Sino-Securities as a stand-in metric for assessing the ESG performance of enterprises [76–79].

The ESG index released by Shanghai Sino-Securities comprises three first-level indicators, 16 s-level indicators, and 44 third-level indicators. Sino-Securities Index has been evaluating the ESG performance of securities issuers, including A-shares and bond issuers, since 2009, and now covers all A-share listed companies. The index systematically calculates the ESG scores of all A-share listed

**Table 1**  
Definitions of main variables.

Variable type	Variable name	Symbol	Measurement	Data source
Dependent variable	Enterprise internationalization	<i>lnexp</i>	Ln(overseas revenue)	CSMAR Database
		<i>FCNT</i>	the number of countries in which the enterprise has invested	CSMAR Database
		<i>FSUB</i>	the number of the enterprise's subsidiaries abroad	CSMAR Database
Core Independent variables	Enterprise ESG Performance	<i>lnesg</i>	Enterprise ESG performance	WIND Database
Mediators	Total Factor Productivity of Enterprises	<i>tfp</i>	Total factor productivity of enterprises	Annual Report of Listed Companies, Announcement
	Financing Cost	<i>cost</i>	Financial expense/Total debt	Annual Reports of Listed Companies, Announcement
	Enterprise reputation	<i>rep</i>	Ln(enterprise's intangible assets)	Annual Report of Listed Companies, Announcement, CNRDS
	Green innovation	<i>green</i>	The number of green innovation patent applications/total green patent.	The number of patent applications
Heterogeneous Variable	Whether heavy polluting enterprises	<i>pollution</i>	Yes if <i>pollution</i> = 1, No if <i>pollution</i> = 0	China Securities Regulatory Commission
	Whether large scale enterprises	<i>scale</i>	Yes if <i>scale</i> = 1, No if <i>scale</i> = 0	CSMAR Database
	Whether state-owned enterprises	<i>SOE</i>	Yes if <i>SOE</i> = 1, No if <i>SOE</i> = 0	CSMAR Database
	High-tech industry condition	<i>tech</i>	The value of the high -tech industry is 1, otherwise it will be 0	CSMAR Database
Control Variable	Frequency of environmental words in government reports	<i>frequency</i>	Environmental words/Total number of words in the work report	Local government reports
	Cash flow ratio	<i>cashflow</i>	Net cash flow from operating activities/Total assets	CSMAR Database
	Asset-Liability Ratio	<i>lev</i>	Annual revenue/Previous year's annual revenue -1	CSMAR Database
	Enterprise age	<i>age</i>	Ln(Observed year - opening year +1)	CSMAR Database
	Enterprise scale	<i>size</i>	Ln(total assets per year)	CSMAR Database
	Net profit margin	<i>far</i>	Total profit/Average balance of fixed assets)	CSMAR Database
	On fixed assets			
	Return on equity	<i>roe</i>	Net Profit/Average balance of shareholders' equity	CSMAR Database
	Tobin's Q value	<i>tobinq</i>	Market value/Total assets at the end of the period	Annual Reports of Listed Companies, CSMAR Database
	Whether to be high-tech industry	<i>tech</i>	Belong to high-tech if <i>tech</i> = 1, otherwise <i>tech</i> = 0	CSMAR Database
One-phase lag of enterprise internationalization	<i>lnexp</i>	One-phase lag of <i>lnexp</i>	CSMAR Database	

Note: ln() means take logarithm.



companies through a combination of quarterly regular evaluations and dynamic tracking. To facilitate empirical analysis, this article draws on related research [80,81], and sums up the quarterly data of ESG scores.

Mechanism variables including total factor productivity (*tfp*), financing cost (*cost*), reputation (*rep*) and green innovation (*green*). This study uses the FE method for calculation when measuring total factor productivity [82], and the ration of financial expense to total debt is served as proxy of financing cost [48]. At the same time, the total amount of intangible assets is used as the proxy of the index to measure the reputation of enterprises [81]. We use the panel data with a fixed effect to estimate the parameters of firm productivity. Because the panel data with fixed effects can narrow the difference of original data, it generates a more robust productivity coefficient in the analysis.

$$y_{ijt} = \beta_0 + \beta_1 \cdot k_{ij}(t-1) + \beta_2 l_{ij}(t-1) + \lambda_{jt} + \varepsilon_{ijt} \quad (2)$$

Where  $y$  = the industrial output value of the firm,  $\varepsilon$  = the net fixed assets of the firm,  $l$  = the number of labour input of the firm, and  $k$  = the difference between the original value of fixed assets and the accumulated depreciation.  $\lambda$  = the industry and time fixed effects, which will be considered a virtual variable in the model. The lowercase forms of  $y$ ,  $k$ , and  $l$  are being taken as natural logarithms for calculation. The study first estimated the coefficients of capital ( $k$ ) and labour ( $l$ ). Then, the labour factor growth rate and capital growth rate are calculated. Finally, the study uses the total economic growth rate minus labour factor growth rate and capital growth rate to indirectly calculate the Solo residual value (technology growth rate) and finally get the value of firms' total factor productivity (hereafter TFP).

This study measures corporate green innovation using the number of green patent applications rather than granted patents, as application data is more stable, reliable, and timely [83]. Green patents are classified based on standards from the World Intellectual Property Organization, focusing on green inventions and utility models, but excluding design patents. This exclusion is due to the absence of a specific classification for green design patents and their significantly lower technological innovation content compared to green inventions and utility models.

The description of the primary variables and control variables is presented in Table 1, which also incorporates references to the research conducted by pertinent scholars [27,84].

### 3.3. Descriptive analysis

Table 2 lists the results of descriptive statistical analysis of each variable. The logarithm of enterprise internationalization (*lnexp*) is dependent variable, whose average value is 19.357, the difference between the minimum value and the maximum value is about 20, and the standard deviation is large. All these data show that there are obvious differences in overseas operating revenue and overseas business volume among listed companies.

The core independent variable is natural logarithm of the ESG performance of listed companies (*lnesg*). The enterprise with the highest rating is converted to grade A, and the enterprise with the lowest rating is converted to grade C. The average of *lnesg* is 4.289, which is converted to grade B, and the overall performance is not good. The difference between the maximum value and the minimum value is 0.408, and the standard deviation is 0.076, indicating that there is no significant difference in *lnesg* within the observed enterprises.

The mean values of the mediators *tfp*, *cost* and *rep* are 11.583, 0.007 and 18.796, respectively. There is a large difference between the maximum and minimum values, indicating that there are significant differences between the total factor productivity, financing costs and corporate reputation among different enterprises.

#### 3.3.1. Person's correlation statistical analysis

The results of correlation statistical analysis of each variable are shown in Table 3 below. This paper mainly analyzes the Person's correlation statistics of the dependent variable *lnexp* and the core independent variable *lnesg*, and makes a simple assessment on the

**Table 2**  
Descriptive statistical analysis.

Variable	Observation	Mean	Standard Deviation	Min	Max
<i>lnexp</i>	15068	19.357	2.235	6.058	26.949
<i>lnesg</i>	15072	4.289	0.076	4.025	4.433
<i>size</i>	15072	22.264	1.290	18.291	28.502
<i>cashflow</i>	15072	0.049	0.072	-0.762	2.225
<i>lev</i>	15072	0.430	0.210	0.008	4.543
<i>age</i>	15072	2.848	0.356	1.099	4.007
<i>far</i>	15072	-4.323	588.692	-72233.4	1599.9
<i>roe</i>	15037	0.036	3.223	-186.557	281.989
<i>tobinq</i>	14794	2.098	1.420	0.699	27.338
<i>tfp</i>	15072	11.583	1.326	7.221	15.795
<i>cost</i>	15072	0.007	0.061	-2.451	2.732
<i>rep</i>	14975	18.796	1.599	9.749	26.191
<i>green</i>	1015	0.76261	1.1988	0	1
<i>lnexp</i>	12723	19.382	2.092	13.330	24.205

relationship between them based on the obtained results. From the data shown in Tables 3 and it can be deduced that the coefficient between listed enterprises' ESG performance and enterprise internationalization is 0.106, which is positively significant at the 1 % level, that is, the better the enterprise's ESG performance, the more internationalization it will have. Since there may be errors in correlation test, further empirical test will be conducted in the following.

### 3.4. Baseline regression results and robustness tests

In order to confirm the basic hypothesis proposed above that the ESG performance of listed companies has a significant positive impact on corporate internationalization, this study applies OLS estimation method to conduct empirical tests on the observed samples. Table 4 shows the regression results based on the fixed effect model, illustrating the impact of listed companies' ESG performance on their internationalization. Column (1) conveys the regression result after adding all control variables, column (2) lists the regression result without adding any control variable. Column (3) depicts that the regression results with adding control variable *roe*, and column (4) represents the regression result with replacing *tobinq*. Column (5) and (6) show the results when measuring internationalization by the number of outward investing countries and overseas subsidiaries. Column (7) lists the result when measuring internationalization by taking average of *lnexp*, *FCNT* and *FSUB*.

The influence coefficients of *lnesg* involving with column (1)–(7) were significant at 1 % level. The influence coefficient when applying other methodologies regarding Tobit model [85], multiple linear regression [12] and principal component [23] in studies relevant to the effect of ESG on trade, is in line with our regression result. Among them, most of the results obtained by empirical test of the effect of environment in ESG on internationalization are significantly positive at the significance level of 1 % [10]. It can be seen that there is a significant positive correlation between the ESG performance of listed enterprises and their internationalization. That is, Enhanced ESG performance in listed companies significantly drives their internationalization and amplifies overseas revenue. This is further supporting assumption H1.

The report from Table 4 explicitly indicates that there is a positive and significant effect of ESG performance on internationalization, which is consistent with the results of [11,12].

To further confirm the substantial impact of ESG performance components on internationalization, we conduct an empirical investigation into how the environment, social responsibility, and corporate governance affect international expansion. Table 5 reports that the influence coefficient of these three dimensions of ESG on internationalization are all significantly positive, indicating that the improvement of corporate environmental, social responsibility, governance performance is conducive to the improvement of internationalization level. This aligns with research from An and Chen, Yang and Han [10,86].

Due to increased environmental awareness, while also enhancing green supply chain management. This meets the market's demand for environmentally friendly products, effectively improves product competitiveness, and leads to a higher level of internationalization.

Regarding the impact of social responsibility and governance on internationalization, companies committed to sustainable development produce more trustworthy products for consumers. Additionally, trading partners are more likely to engage in long-term collaborations with these enterprises. Therefore, the social responsibility and corporate governance of enterprises are also beneficial in promoting their internationalization.

### 3.5. Robustness test

#### 3.5.1. Propensity Score Matching (PSM)

Considering that the level of internationalization may affect the environmental protection awareness and social responsibility [87]. Addressing the endogeneity bias induced by reverse causality is crucial yet remains a gap in existing research on ESG performance and corporate internationalization. This study innovatively incorporates Propensity Score Matching to address this issue. Specifically, it uses the introduction of the new environmental protection law in 2016 as an external shock. Companies affected by this law are categorized into experimental groups, while unaffected companies are assigned to control groups. The study further screens out qualified control groups from enterprises unaffected by environmental laws. Meanwhile, the matching variables are involved with *size*, *cashflow*, *lev*, *age*, *far*, *roe*, *lnexp* (One-phase lag of internationalization), the samples were matched by kernel matching

**Table 3**  
Person's Correlation statistical analysis.

	<i>lnexp</i>	<i>esg</i>	<i>size</i>	<i>cashflow</i>	<i>lev</i>	<i>age</i>	<i>far</i>	<i>lnexp</i>
<i>lnexp</i>	1							
<i>esg</i>	0.106***	1						
<i>size</i>	0.546***	0.184***	1					
<i>cashflow</i>	0.088***	0.088***	0.026**	1				
<i>lev</i>	0.353***	-0.067***	0.525***	-0.172***	1			
<i>age</i>	0.087***	-0.00300	0.141***	0.0130	0.162***	1		
<i>far</i>	-0.086***	0.069***	0.0110	0.069***	-0.146***	-0.0160	1	
<i>roe</i>	0.064***	0.185***	0.079***	0.257***	-0.181***	-0.026***	0.420***	
<i>tobinq</i>	-0.248***	-0.101***	-0.375***	0.117***	-0.296***	-0.038***	0.129***	0.234**

Note: \*\*\* means  $p < 1\%$ , \*\* means  $p < 5\%$ , \* means  $p < 10\%$  level difference is statistically significant, the same below.



**Table 4**  
Regression results based on fixed effects model.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	<i>lnexp</i>	<i>lnexp</i>	<i>lnexp</i>	<i>lnexp</i>	<i>FCNT</i>	<i>FSUB</i>	<i>comp</i>
<i>lnesg</i>	0.581*** (0.133)	0.560*** (0.131)	0.572*** (0.131)	0.581*** (0.133)	0.684** (0.316)	236.2** (111.1)	0.791** (0.371)
<i>size</i>	0.499*** (0.0204)	0.490*** (0.0187)	0.485*** (0.0194)	0.499*** (0.0204)	−0.0782 (0.0500)	−1.952 (17.16)	−0.00487 (0.0573)
<i>cashflow</i>	0.741*** (0.117)	0.715*** (0.114)	0.751*** (0.115)	0.741*** (0.117)	−0.0360 (0.233)	−91.44 (82.13)	−0.304 (0.274)
<i>lev</i>	0.263*** (0.0771)	0.258*** (0.0628)	0.300*** (0.0752)	0.263*** (0.0771)	0.324** (0.147)	75.65 (51.12)	0.255 (0.171)
<i>age</i>	0.120 (0.123)	0.168 (0.122)	0.158 (0.122)	0.120 (0.123)	−0.0330 (0.472)	36.79 (164.9)	0.125 (0.551)
<i>far</i>	0.00137** (0.000552)	0.00144*** (0.000552)	0.00138** (0.000553)	0.00137** (0.000552)	0.0167 (0.0198)	4.485 (6.915)	0.0152 (0.0232)
<i>roe</i>	0.00309 (0.00373)		0.0000397 (0.00228)	0.00309 (0.00373)	0.0544 (0.0443)	0.534 (0.436)	0.0132 (0.0557)
<i>tobinq</i>	0.00334 (0.00750)			0.00334 (0.00750)	−0.00514 (0.0252)	20.32** (8.821)	0.0677** (0.0295)
<i>llnexp</i>	0.499*** (0.00813)	0.499*** (0.00800)	0.499*** (0.00802)	0.499*** (0.00813)			
<i>LEFCNT</i>					0.0000708*** (0.00000148)		
<i>LEFSUB</i>						0.0000463*** (0.000000561)	
<i>lcon</i>							0.463*** (0.00562)
_cons	−4.306*** (0.739)	−4.160*** (0.723)	−4.088*** (0.728)	−4.364*** (0.735)	−1.172 (1.996)	−1106.5 (691.6)	−3.709 (2.310)
<i>N</i>	12131	12402	12372	12159	2996	2996	2993
<i>R</i> <sup>2</sup>	0.909	0.908	0.908	0.909	0.520	0.743	0.743

Note:  $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . t-values are in parentheses. The standard error is in parentheses.

**Table 5**  
PSM tests.

	Unmatched	Mean	% reduct	t-test
Variable	Matched	Treated	Control	$p > t$
<i>size</i>	U	22.422	22	0.000
	M	22.42	22.4	0.210
<i>cashflow</i>	U	0.0526	0.434	0.000
	M	0.05265	0.049	0.008
<i>lev</i>	U	0.42347	0.4339	0.002
	M	0.4236	0.4186	0.109
<i>age</i>	U	2.9608	2.658	0.000
	M	2.9599	2.96	0.985
<i>far</i>	U	−7.2552	0.555	0.432
	M	0.42731	0.575	0.557
<i>roe</i>	U	0.02337	0.0567	0.038
	M	0.02359	0.063	0.344
<i>llnexp</i>	U	19.482	19.2	0.000
	M	19.483	19.48	0.881

Note: (i) M is short for matched, U is short for unmatched. (ii) p-value: the probability of occurrence of the null hypothesis. P-value corresponds to the null hypothesis before matching that there is a significant difference between the experimental group and the control group, and the null hypothesis after matching that there is a significant difference between the experimental group and the control group.

method. Finally, we regress the baseline model using screen samples.

The results show that the null hypothesis that most of the control variables do not match is rejected, *lnesg* is still significant by applying new regression. This further confirms that the conclusion is robust (see Tables 5 and 6).

### 3.5.2. Instrumental variable method

A key drawback of Propensity Score Matching (PSM) is its limitation to only control for endogeneity from observed variables, leaving the issue of unobservable factors unaddressed. Thus, in order to further deal with the endogenous problem of ESG behavior on enterprise internationalization, we apply a two-stage least square (2SLS) instrumental method in robustness test. We use the forest coverage rate as our instrumental variable. It's closely linked to companies' ESG performance but bears no relation to their global expansion efforts. Our analysis employs a two-step 2SLS approach. Initially, we analyze the relationship between internationalization and our chosen instrument alongside control variables. The next stage involves regressing internationalization against predicted ESG

**Table 6**  
Regression results after rematching considering time shock.

group	Coef.	Std. Err.	P > z	[95 % Conf.	Interval]
<i>lnesg</i>	1.7977	0.266957	6.73	0	−3.59541
<i>size</i>	0.370787	0.02263	0	0.326432	0.415142
<i>cashflow</i>	0.710346	0.310326	0.022	0.102119	1.318573
<i>lev</i>	−2.06604	0.127848	0	−2.31662	−1.81547
<i>age</i>	3.015729	0.074952	0	2.868827	3.162631
<i>far</i>	−0.0037	0.002661	0.165	−0.00891	0.001519
<i>roe</i>	−0.00892	0.00721	0.216	−0.02305	0.005215
<i>lnexp</i>	−0.03082	0.012129	0.011	−0.05459	−0.00705
<i>_cons</i>	−14.7254	0.474914	0	−15.6562	−13.7946

values and a set of controls. As reported in Table 7, the influence coefficient of *lnesg* is significant and positive in 2SLS instrumental method (see Table 7).

### 3.5.3. Different ESG measurement

There are several methods of measuring ESG performance internationally. In addition to Sino-securities used in this paper, Bloomberge, CNRDS (China Research Data Service Platform) are also widely used. Reflecting on the accessible time series data, we chose to employ ESG indices formulated by Bloomberg and CNRDS, supplanting those derived from Sino-Securities. The research results are shown in Table 8, indicating that the results of ESG calculated under different measurement methods are still robust.

### 3.5.4. Replace different fixed effects

We consider different fixed effect among year, individual and industry, on the purpose of testing baseline regression result. Unlike the fixed effect in baseline regression model, column (1) to column (4) shows different fixed effects. The first column accounts for the year and individual fixed effects, the second for the year and industry fixed effects, the third combines individual and industry effects, and the fourth integrates individual, industry, and year fixed effects into the model. Table 9 reports the regression results of *lnesg*, which is still significant and positive at 1 % level. That is to say, the influence coefficient of *lnesg* is robust. All in all, the empirical results of this paper are still significant, that is, the main hypothesis of this paper is still valid, and the robustness of the empirical conclusions has been further verified.

### 3.6. Mediation effect

Drawing on the principles of Information Asymmetry Theory, Signaling Theory, and Stakeholder Theory, robust ESG performance can significantly benefit a company in multiple dimensions. Firstly, it aids in lowering financing costs. Companies excelling in ESG practices can diminish information asymmetry, bolster corporate transparency, and deliver favorable signals of sustainable development to investors, thereby reducing the financing risk premium. Secondly, there is a strong correlation between ESG performance and the enhancement of a company’s TFP, reputation, and green innovation. By optimizing resource utilization, mitigating operational risks, and attracting top-tier talent, companies can significantly elevate their TFP. Furthermore, superior ESG performance enables companies to better fulfill the expectations of international stakeholders, draw more consumers and investors, enhance their reputation, and foster green innovation. This, in turn, establishes a robust foundation for successful international market entry.

Combined with the previous theoretical analysis and the relevant theories studied in the previous research, this study uses four mechanism variables such as total factor productivity, financing costs, corporate reputation and green innovation to explore the mechanism, through which ESG performance impact the internationalization of enterprises. The relationship between the impact mechanisms is shown in Fig. 1.

To empirically investigate the mediating effect, the regression model is structured as equations (2) and (3).

$$lnexp_{it} = b_0 + b_1 mediate_{it} + b_2 size_{it} + b_3 cashflow_{it} + b_4 lev_{it} + b_5 age_{it} + b_6 far_{it} + b_7 lnexp_{it} + \sum b_i ind + \sum b_j year + \epsilon_{it} \tag{3}$$

**Table 7**  
Instrumental variable method.

	(1)	(2)
	<i>forestcoverrate</i>	<i>lnexp</i>
<i>lnesg</i>	0.738* (0.534)	
<i>ngreen</i>		0.0454*** (0.0120)
<i>_cons</i>	26.58*** (4.097)	17.36*** (0.481)
<i>N adj. R2</i>	3999	12527
	0.535	0.436

Note: p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01. t-values are in parentheses. The standard error is in parentheses.

**Table 8**  
Regression results of different ESG measurement.

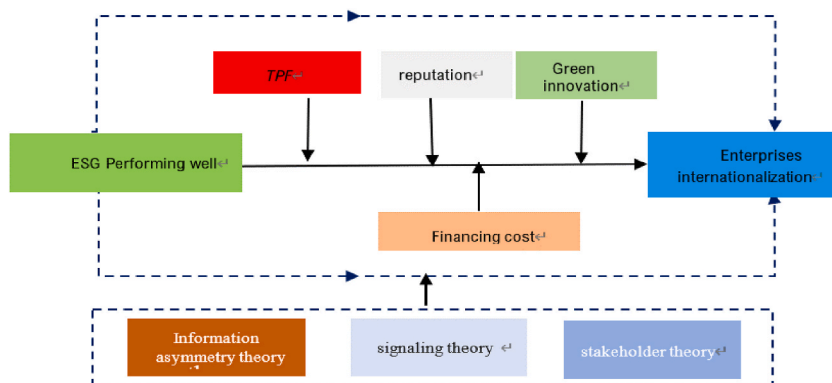
	(1)	(2)	(3)
	Sino-security	Bloomberge	CNRDS
<i>lnesg</i>	0.581*** (0.133)	0.00450* (0.00248)	0.130* (0.089)
<i>size</i>	0.499*** (0.0204)	0.484*** (0.0314)	0.458*** (0.0301)
<i>cashflow</i>	0.741*** (0.117)	0.718*** (0.192)	0.816*** (0.191)
<i>lev</i>	0.263*** (0.0771)	0.508*** (0.128)	0.401*** (0.124)
<i>age</i>	0.120 (0.123)	0.445** (0.180)	0.388** (0.172)
<i>far</i>	0.00137** (0.000552)	0.0234* (0.0135)	0.0236* (0.0133)
<i>roe</i>	0.00309 (0.00373)	0.235** (0.103)	0.223** (0.102)
<i>tobinq</i>	0.00334 (0.00750)	-0.0226* (0.0125)	-0.0166 (0.0123)
<i>lnexp</i>	0.499*** (0.00813)	0.496*** (0.0122)	0.511*** (0.0118)
<i>_cons</i>	-4.306*** (0.739)	-2.593*** (0.823)	-2.523** (1.062)
<i>Ind-fixed</i>	Yes	Yes	Yes
<i>Year-fixed</i>	Yes	Yes	Yes
<i>N</i>	12131	4596	4760
<i>R<sup>2</sup></i>	0.909	0.926	0.923
<i>adj. R<sup>2</sup></i>	0.894	0.913	0.911

Note: p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01. t-values are in parentheses. The standard error is in parentheses.

**Table 9**  
Regression results of robustness test.

	(1)	(2)	(3)	(4)
	<i>lnexp</i>	<i>lnexp</i>	<i>lnexp</i>	<i>lnexp</i>
<i>lnesg</i>	0.581*** (0.133)	0.415*** (0.102)	0.524*** (0.132)	0.494*** (0.132)
<i>size</i>	0.499*** (0.0204)	0.137*** (0.00876)	0.514*** (0.0205)	0.530*** (0.0212)
<i>cashflow</i>	0.741*** (0.117)	0.698*** (0.110)	0.678*** (0.116)	0.751*** (0.116)
<i>lev</i>	0.263*** (0.0771)	0.158*** (0.0481)	0.358*** (0.0768)	0.291*** (0.0778)
<i>age</i>	0.120 (0.123)	-0.116*** (0.0256)	-0.302*** (0.0520)	0.144 (0.123)
<i>far</i>	0.00137** (0.000552)	0.00276*** (0.000567)	0.00130** (0.000549)	0.00133** (0.000547)
<i>roe</i>	0.00309 (0.00373)	0.00560 (0.00411)	0.00175 (0.00375)	0.00151 (0.00373)
<i>tobinq</i>	0.00334 (0.00750)	0.00421 (0.00588)	-0.00611 (0.00676)	0.00283 (0.00747)
<i>lnexp</i>	0.499*** (0.00813)	0.884*** (0.00440)	0.478*** (0.00821)	0.480*** (0.00822)
<i>_cons</i>	-4.306*** (0.739)	-2.244*** (0.429)	-2.801*** (0.625)	-4.341*** (0.743)
<i>Year-fixed</i>	Yes	Yes	No.	Yes
<i>Industry-fixed</i>	No	Yes	Yes	Yes
<i>Ind-fixed</i>	Yes	No	Yes	Yes
<i>N</i>	12131	12286	12128	12128
<i>R<sup>2</sup></i>	0.909	0.863	0.911	0.912
<i>adj. R<sup>2</sup></i>	0.894	0.862	0.895	0.896

Note: p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01. t-values are in parentheses. The standard error is in parentheses.



**Fig. 1.** Framework of the influence mechanism of ESG performance on enterprise internationalization.

Among them, *mediate* is the mediating variable, including financing cost (*cost*), total factor productivity (*tfp*), corporate reputation (*rep*), green innovation (*green*). In addition, the selection of control variables remains consistent with the baseline model.

Table 10 panel A shows the regression results of the mechanism test. Column (1) is the regression of corporate ESG performance on

the mechanism variable of *tfp*. The correlation coefficient is positive and significant at 1 % level, indicating that better corporate ESG performance will lead to the improvement of *tfp*. Enterprises with good ESG performance will enhance corporate transparency and reduce information asymmetry, leading efficient resource allocation.

Column (2) reports the regression result of corporate ESG performance on corporate financing cost (*cost*), that is, the ESG performance will significantly reduce the financial cost at a level of 1 %. This is mainly because enterprises with a strong ESG record are generally perceived as less risky, boasting better governance structures. This perception translates into higher credit scores, making investors and financial institutions more inclined to provide funds at lower interest rates.

Column (3) conveys the regression result of corporate ESG performance on the corporate reputation (*rep*), namely, the impact coefficient of ESG performance on corporate reputation is significantly positive at the level of 10 %, indicating that enterprises with stronger ESG performance are capable of attaining a higher level of reputation. Column (4) demonstrates the positive impact of ESG performance on green innovation (*green*) due to signal of sustainable development may attract more international green investment.

Table 10 Panel B reports the impact of mediators on the internationalization. Regression in column (1)- column (4) indicates that the four mediators will significantly affect internationalization at 1 % level. The impact of mediators on internationalization is mainly attributed to the following reasons: enterprises with higher productivity are better positioned to enter the international market, which often has higher standards and demands, as well as a greater level of diversification. Additionally, due to the low cost of financing, companies are able to address more external market risks, thereby enhancing their level of internationalization. Moreover, because the reputation of high-level ESG performance is helpful in attracting more international investment and cooperation, while the green innovation will boost the internationalization directly.

Regression results of mechanism test support H2.

### 3.7. Heterogeneity test

Some studies have found that the impact of ESG performance on corporate exports or investment varies with different levels of pollution, enterprise scale and ownerships [10,88]. The influence of technological advancement on exports and investments has been frequently discussed in numerous studies [10,89]. In addition, Dagestani et al. (2024) showed that long-term government environmental attention and environmental law enforcement can effectively promote corporate disclosure of information on the environment, social responsibility, and corporate governance [90].

Based on this, the paper incorporates a range of variables into the heterogeneity analysis. These include whether the enterprise is heavily polluting (*pollution*), classified as high-tech (*tech*), the size of the enterprise (*scale*), its nature as a state-owned enterprise (*SOE*), and the frequency of environmental protection terminology in Chinese local government reports (*frequency*).

The measurement of these variables is as follows. **Pollution** is determined based on the 16 major categories of heavily polluting industries listed in the 2010 "Guidelines for Environmental Information Disclosure by Listed Companies" and the major categories of heavily polluting industries and corresponding sub-industries listed in the "List of Industry Classification Management for Environmental Audits of Listed Companies". If the industry to which the enterprise belongs is heavily polluting, the enterprise is identified as a heavily polluting enterprise, otherwise it is a non-heavy polluting enterprise. **Tech** is based on the "Industrial Strategic Emerging Industries Classification Catalogue" issued by the State Council of China and matched with the "Guidelines for Industry Classification of Listed Companies" to determine the industries of high-tech listed companies. To quantify variable of **frequency**, we collected more than 300 government work reports from the official websites of local governments across 30 provinces and municipalities, spanning from 2010 to 2021. Utilizing text analysis methods, we extracted data on environmental protection-related words from these local government work reports over the specified period. The frequency of these terms served as a proxy indicator for gauging the level of governmental focus on environmental issues. As for **scale** determination, when the scale is greater than the mean of the variable **scale**, it is a large enterprise, otherwise it is a small enterprise. As for **SOE** determination, state-owned enterprises are defined as enterprises with absolute state control or enterprises in which state capital exceeds 50 %, otherwise it is non-SOE.

The results are shown in Table 11. The ESG performance of non-heavy polluting enterprises has a significant positive effect on

**Table 10a**  
Panel A: Regression results of impact of ESG on mediators.

	(1)	(2)	(3)	(4)
	<i>tfp</i>	<i>cost</i>	<i>rep</i>	<i>green</i>
<i>lnesg</i>	0.204*** (4.75)	-0.0379*** (-5.12)	0.183** (1.97)	0.298* (0.160)
<i>size</i>	0.822*** (152.64)	-0.00213*** (-3.17)	1.008*** (88.31)	-0.00456 (0.0142)
<i>cashflow</i>	0.656*** (16.96)	-0.00795 (-1.10)	0.0915 (1.09)	-0.226 (0.152)
<i>lev</i>	0.507*** (20.99)	0.103*** (27.73)	0.0463 (0.89)	0.0454 (0.0730)
<i>age</i>	0.135*** (6.29)	0.00900*** (4.17)	0.00762 (0.17)	0.00207 (0.0736)
<i>far</i>	0.00906*** (3.26)	-0.00303*** (-6.56)	-0.0750*** (-12.47)	0.00182 (0.00527)
<i>roe</i>	0.400*** (18.17)	0.000608 (0.15)	-0.0509 (-1.07)	0.0544 (0.0443)
<i>tobinq</i>	0.0256*** (8.94)	0.00258*** (5.26)	-0.00559 (-0.91)	-0.00382 (0.00538)
<i>_cons</i>	-8.381*** (-39.08)	0.137*** (4.11)	-4.787*** (-10.45)	-0.000985 (0.00718)
<i>Time-fixed</i>	Yes	Yes	Yes	Yes
<i>Industry-fixed</i>	Yes	Yes	Yes	Yes
<i>N</i>	14762	14762	14670	971
<i>R<sup>2</sup></i>	0.7788	0.0812	0.5006	0.146

**Table 10b**  
Panel B: Regression results of the impact of mediators on internationalization.

	(1)	(2)	(3)	(4)
	<i>lnexp</i>	<i>lnexp</i>	<i>lnexp</i>	<i>lnexp</i>
<i>tfp</i>	0.908*** (34.35)			
<i>cost</i>		1.007*** (7.15)		
<i>rep</i>			0.0709*** (5.54)	
<i>green</i>				0.0339** (0.0166)
<i>size</i>	0.180*** (6.44)	0.919*** (49.45)	0.844*** (37.28)	0.946*** (0.0608)
<i>cashflow</i>	0.538*** (4.44)	1.124*** (9.02)	1.126*** (8.99)	1.064 (0.869)
<i>lev</i>	0.0487 (0.63)	0.366*** (4.57)	0.474*** (5.97)	2.781*** (0.363)
<i>age</i>	0.0367 (0.47)	0.149* (1.85)	0.178** (2.21)	0.176 (0.353)
<i>far</i>	-0.0283*** (-3.22)	-0.0168* (-1.83)	-0.0190** (-2.05)	-0.0000596** (0.0000251)
<i>roe</i>	-0.0794 (-1.15)	0.273*** (3.85)	0.293*** (4.11)	0.455*** (0.171)
<i>toibinq</i>	-0.0267*** (-2.95)	-0.00526 (-0.56)	-0.00138 (-0.15)	-0.0661* (0.0375)
<i>_cons</i>	4.727*** (9.15)	-1.808*** (-3.87)	-1.572*** (-3.33)	-3.689* (1.898)
<i>Time-fixed</i>	Yes	Yes	Yes	Yes
<i>Industry-fixed</i>	Yes	Yes	Yes	Yes
<i>N</i>	14758	14758	14666	971
<i>R<sup>2</sup></i>	0.3515	0.3008	0.2994	0.538

Note:  $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . t-values are in parentheses. The standard error is in parentheses.

internationalization promotion, while effect of heavy polluting enterprises is not significant. Compared with heavy polluters, non-heavy polluters require less investment in improving ESG performance, while heavy polluters not only need to change the original production methods technically, but also need additional capital in investment. The improvement of ESG performance is difficult to have short-term effect, due to its transformation of ESG concept will last for a long time. In the perspective of stakeholders, improving the environment is the responsibility of heavy polluters, which reduces the sensitivity of improvements in their ESG performance to product sales. Therefore, good corporate ESG performance promotes the internationalization of non-heavy polluting companies more effectively than heavily polluting ones. Non-heavy polluting enterprises exhibit stronger environmental awareness, innovate more in green technology for low pollution emissions, and have more competitive international products in the global drive for sustainable development.

The internationalization promotion effect of ESG performance of high-tech enterprises is significantly positive at 1 % level, while that of non-high-tech enterprises is not significant. This finding is similar to the conclusion of Enron and Chen (2022), who believed that enterprises could enjoy the positive effects of ESG earlier by increasing R&D investment to improve the level of scientific and technological innovation. This is because high-tech industry enterprises' technology update iteration is rapid, comparing with that of non-high-tech industry, which is easier to meet the market demand and take the lead in grabbing market share, and further play the driving role of ESG performance on internationalization. Hence, the ESG performance of firms has a more pronounced impact on the internationalization of the high-tech industry compared to the non-high-tech industry.

The internationalization promoting effect of ESG performance of large-scale enterprises is significantly positive at the 1 % level, while it is not significant for enterprises in small scale industries, which is consistent with the conclusion of Wu et al. [23].

There are several reasons can account for the results of heterogeneity test. Enterprises with larger scale often have more tighter relationship with other enterprises, society and government. Moreover, in comparison to smaller enterprises, large-scale enterprises possess greater capital and resources, enabling them to uphold their reputation and societal standing. This advantage facilitates their ability to assume greater environmental and social responsibilities. For example, large-scale enterprises are striving to cultivate green production, nurture a distinct corporate culture, enhance employee well-being, and elevate corporate governance standards. Conversely, small-scale enterprises tend to prioritize corporate profits and short-term development strategies. Consequently, the positive impact of corporate ESG performance on the internationalization of large-scale enterprises surpasses that of small-scale enterprises.

The impact of ESG practices on state-owned enterprises is notably positive, whereas it is not as significant for non-state-owned enterprises. This finding is consistent with heterogeneity analysis based on enterprise scale, given that most state-owned enterprises are large in size. This empirical result is similar to Wu et al. [23]. If enterprises locate in the local governments that include high-frequency ESG keywords in their reports, the impact of ESG performance on internationalization is more significant. This heterogeneity has not yet been further explored in relevant studies.

#### 4. Conclusions, implications and limitations

This study uses a sample of 2172 companies listed on the Shanghai and Shenzhen A-share stock markets to explore the relationship between corporate ESG performance and their internationalization. The aim is to foster the development of ESG principles within enterprises, establish a competitive edge in ESG practices, and ultimately enhance their competitiveness in international business.

The findings are as follows. Firstly, the ESG performance of listed enterprises exerts a markedly positive influence on corporate internationalization, indicating that superior ESG performance correlates with higher levels of internationalization. Secondly, good corporate ESG performance primarily influences internationalization through several channels, including enhancing total factor

**Table 11**  
Heterogeneity analysis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Pollution = 1	Pollution = 0	Tech = 1	Tech = 0	Scale = 0	Scale = 1	SOE = 1	SOE = 0	frequency = 1	Frequency = 0
<i>lnesg</i>	0.0669 (0.35)	0.407*** (2.96)	0.509*** (3.16)	0.214 (1.38)	0.239 (1.38)	0.382** (2.57)	2.418*** (0.392)	0.107 (0.258)	0.529** (0.229)	0.176 (0.109)
<i>size</i>	0.236*** (10.86)	0.190*** (13.85)	0.219*** (12.46)	0.231*** (14.15)	0.279*** (12.85)	0.185*** (7.81)	0.830*** (0.0254)	0.901*** (0.0225)	0.131*** (0.0234)	0.121*** (0.00953)
<i>cashflow</i>	0.563*** (3.25)	0.507*** (3.58)	0.889*** (4.97)	0.388*** (2.73)	0.545*** (2.86)	0.487*** (3.58)	2.493*** (0.403)	2.382*** (0.264)	0.160 (0.192)	0.508*** (0.125)
<i>lev</i>	0.217** (2.06)	0.417*** (5.90)	0.346*** (4.02)	0.380*** (4.60)	0.247** (2.38)	0.382*** (5.27)	0.898*** (0.169)	1.040*** (0.123)	0.149 (0.113)	0.283*** (0.0520)
<i>age</i>	-0.0802 (-1.06)	-0.111*** (-2.68)	-0.120** (-2.30)	-0.0998* (-1.85)	-0.128** (-2.02)	-0.101** (-2.34)	0.166* (0.0959)	0.128** (0.0597)	0.00590 (0.0625)	-0.111*** (0.0268)
<i>far</i>	0.0572** (2.11)	0.0113 (1.40)	0.00264 (0.18)	0.0106 (1.14)	-0.000884 (-0.07)	0.0171* (1.68)	-0.00453** (0.0000222)	0.00215** (0.00106)	-0.0495 (0.0354)	0.0123* (0.00723)
<i>roe</i>	0.618*** (5.48)	0.531*** (7.25)	0.706*** (7.49)	0.478*** (5.93)	0.544*** (5.63)	0.580*** (7.25)	0.0504 (0.0528)	0.0126* (0.00657)	0.738*** (0.153)	0.611*** (0.0659)
<i>tobinq</i>	-0.0289** (-2.10)	-0.00865 (-0.95)	-0.0281*** (-2.83)	-0.00105 (-0.09)	-0.00604 (-0.44)	-0.0170* (-1.76)	-0.142*** (0.0241)	-0.00477 (0.0145)	-0.00856 (0.0199)	-0.0107 (0.00726)
<i>lnexp</i>	0.738*** (73.53)	0.793*** (125.74)	0.758*** (92.00)	0.757*** (104.01)	0.717*** (84.98)	0.801*** (114.71)	-10.20*** (1.650)	-2.056* (1.131)	0.865*** (0.0119)	0.863*** (0.00456)
<i>Time-fixed</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Industry fixed</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>_cons</i>	8.177*** (7.12)	-1.753*** (-2.88)	0 (.)	-1.154* (-1.65)	-1.541* (-1.86)	-1.638** (-2.09)	-4.519*** (1.293)	-5.040*** (1.164)	-2.504** (1.012)	-0.530 (0.462)
<i>N</i>	3738	8550	4911	7377	5786	6502	4056	9336	1475	10810
<i>R2</i>	0.4680	0.4045	0.4643	0.3840	0.3506	0.3024	0.519	0.329	0.880	0.868

Note: p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01. t-values are in parentheses. The standard error is in parentheses.



productivity, fostering green innovation, and bolstering corporate reputation, while simultaneously reducing financing costs. Thirdly, taking into account the diversity among enterprises, the favorable impact of strong ESG performance on international expansion is more evident in large-scale enterprises and those not engaged in heavy pollution. This beneficial effect is particularly pronounced for businesses located in regions where local government reports consistently highlight environmental issues or for enterprises within high-tech industries. The findings of this study inspire several significant implications.

First, enterprises should actively adopt and integrate all relevant ESG standards, incentives, and policies related to foreign trade and investment in their host countries. Products that fail to comply with ESG standards may encounter restrictive measures in the host country's market, such as trade barriers, penalties, or outright bans. Therefore, corporations should diligently observe the evolving landscape of ESG concepts, regulations, and their modifications in host markets.

Second, guiding enterprises in crafting long-term development strategies is essential. While fulfilling social responsibilities and disclosing ESG performance may incur additional costs, businesses must bear these compliance and operational expenses when prioritizing ESG performance. Such costs arise from efforts to protect the environment, uphold social responsibilities, and enhance governance, as well as from driving digital transformation and reinforcing ESG principles through training and education.

However, these endeavors help businesses avert unnecessary resource wastage and optimize their supply chains. Moreover, exemplary ESG performance serves as a valuable asset in securing stakeholders' trust and loyalty toward the company and its products. As attention to corporate ESG performance intensifies, it compels businesses to embrace sustainable development principles, delve into innovative technologies, achieve high-quality growth, and advance their international presence.

Third, policies should fully account for the beneficial impact impacts of good corporate ESG performance. Based on the mechanism testing in this study, measures could include attracting more talent to companies, protecting corporate green intellectual property, and guiding financial institutions to provide more funding support for key ESG projects. Additionally, corporate foreign investment and exports could prioritize regions with better environmental systems. If the institutional environment of the international operation region is poor, our companies could counteract these disadvantages with superior ESG performance.

Fourth, policy guidance on corporate ESG behavior should consider diverse characteristics of the enterprise. Specifically, for industries that are not heavily polluted or are of large scale, as well as for enterprises located in regions with environmentally focused local governance or those within the high-tech sector, the guidance for international operations must prioritize enhancing their ESG standards.

#### 4.1. Limitations of the study

Like all empirical research, this study is not without its limitations. In terms of the influence mechanism, our research indicates that the ESG achievements of listed corporations significantly elevate their global operational standards by advancing total factor productivity, bolstering corporate reputation, fostering green innovation, and diminishing financing expenses. Nevertheless, it is evident that other mechanism like institutional environment might also have an impact. Therefore, it is necessary to further explore other possible influencing mechanisms, and also to conduct research that is specific to each influencing mechanism. Future research can also be specific to each influencing mechanism research. Additionally, more reliable measures of firm internationalization can be integrated into future research. This study uses the overseas investment income of listed enterprises as the measurement index of enterprise internationalization. With the deepening of the research, it is necessary to find some measurement indicators that can replace internationalization.

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#### Data availability

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request. Data associated with the study are available in China Stock Market & Accounting Research Database (CSMAR).

#### CRedit authorship contribution statement

**Shanshan Wang:** Writing – original draft, Methodology, Funding acquisition, Conceptualization. **Fenglan Chen:** Writing – review & editing. **Xiaoyan Yang:** Software.

#### Declaration of competing interest

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

## References

- [1] W. Zhou, H. Zhong, Z. Wan, X. Ma, X. Gong, International operation of enterprises and Inefficient investment: a mitigating or intensifying effect? *Journal of the Knowledge Economy* (2022) <https://doi.org/10.1007/s13132-022-01060-4>.
- [2] J. Ren, A. Sarkar, H. Li, X. Li, Does the host country's foreign direct investment (FDI) restrictiveness inhibit the export sophistication of the home country? Evidence from China's manufacturing data, *Sustainability* 14 (22) (2022), <https://doi.org/10.3390/su142215218>.
- [3] Y. Tan, Z. Zhu, The effect of ESG rating events on corporate green innovation in China: the mediating role of financial constraints and managers' environmental awareness, *Technol. Soc.* 68 (2022), <https://doi.org/10.1016/j.techsoc.2022.101906>.
- [4] S. Glozer, R. Caruana, S.A. Hibbert, The never-ending story: discursive legitimation in social media dialogue, *Organ. Stud.* 40 (5) (2019) 625–650, <https://doi.org/10.1177/0170840617751006>.
- [5] T.-T. Li, K. Wang, T. Sueyoshi, D.D. Wang, ESG: research progress and future prospects, *Sustainability* 13 (21) (2021), <https://doi.org/10.3390/su132111663>.
- [6] A. Tsang, T. Frost, H.J. Cao, Environmental, social, and governance (ESG) disclosure: a literature review, *Brit. Account. Rev.* 55 (1) (2023) 101149, <https://doi.org/10.1016/j.bar.2022.101149>.
- [7] J. Li, The diffusion of automation technology in global supply chains and its heterogeneous effects on the labor market, *La. Econ.* 2 (9) (2023) 15–30.
- [8] V. Cherkasova, I. Nenuzhenko, Investment in ESG projects and corporate performance of multinational companies, *J. Econ. Integrat.* 37 (1) (2022) 54–92.
- [9] A.J. Rabaya, N.M. Saleh, The moderating effect of IR framework adoption on the relationship between environmental, social, and governance (ESG) disclosure and a firm's competitive advantage, *Environ. Dev. Sustain.* 24 (2) (2021) 2037–2055, <https://doi.org/10.1007/s10668-021-01519-5>.
- [10] R. An, Y.M. Chen, Corporate ESG performance, R&D investment and export performance improvement, *Economic Review Journal* (8) (2023) 98–106, <https://doi.org/10.16528/j.cnki.22-1054/f.202308098>.
- [11] Q.L. Wu, G.F. Chen, J. Han, L.Y. Wu, Does corporate ESG performance improve export intensity? Evidence from Chinese listed firms, *Sustainability* 14 (20) (2022), <https://doi.org/10.3390/su142012981>.
- [12] F. Yu, Feng, the Impact of ESG Performance on Export, Shanghai International Studies University, 2022.
- [13] I. Ioannou, G. Serafeim, Corporate sustainability: a strategy?, in: Harvard Business School Accounting & Management Unit Working Paper (19-065), 2019.
- [14] V. Marano, T. Kostova, Unpacking the institutional complexity in adoption of CSR practices in multinational enterprises, *J. Manag. Stud.* 53 (1) (2016) 28–54.
- [15] S.R. Park, J.Y. Jang, The impact of ESG management on investment decision: institutional investors' perceptions of country-specific ESG criteria, *Int. J. Financ. Stud.* 9 (3) (2021) 48.
- [16] P.Y. Lu, S. Hamori, S.R. Tian, Policy effect of the "blue sky plan" on air pollution, ESG investment, and financial performance of China's steel industry, *Front. Environ. Sci.* 10 (8) (2022) 955906, <https://doi.org/10.3389/fenvs.2022.955906>.
- [17] G.F. Chen, B.Y. Wei, L.Y. Dai, Can ESG-responsible investing attract sovereign wealth funds' investments? Evidence from Chinese listed firms, *Front. Environ. Sci.* 10 (9) (2022) 935466, <https://doi.org/10.3389/fenvs.2022.935466>.
- [18] X. Shi, Z. Xu, Environmental regulation and firm exports: evidence from the eleventh Five-Year Plan in China, *J. Environ. Econ. Manag.* 89 (2018) 187–200, <https://doi.org/10.1016/j.jeem.2018.03.003>.
- [19] D.M. Boehe, L.B. Cruz, Corporate social responsibility, product differentiation strategy and export performance, *J. Bus. Ethics* 91 (2010) 325–346, <https://doi.org/10.1007/s10551-010-0613-z>.
- [20] C.A. Cruz, F. Matos, E.S.G. Maturity, A software framework for the challenges of ESG data in investment, *Sustainability* 15 (3) (2023) 2610, <https://doi.org/10.3390/su15032610>.
- [21] W.B. Wang, Y.Y. Yu, X. Li, ESG performance, auditing quality, and investment efficiency: empirical evidence from China, *Front. Psychol.* 13 (14) (2022) 948674, <https://doi.org/10.3389/fpsyg.2022.948674>.
- [22] J.Y. Lu, B. Xu, X.H. Liu, The effects of corporate governance and institutional environments on export behaviour in emerging economies evidence from China, *manag. Int. Rev.* 49 (4) (2009) 455–478, <https://doi.org/10.1007/s11575-009-0004-9>.
- [23] Q.L. Wu, G.F. Chen, J. Han, L. Wu, Does corporate ESG performance improve export intensity? Evidence from Chinese listed firms, *Sustainability* 14 (20) (2022) 12981, <https://doi.org/10.3390/su142012981>.
- [24] C. Zhao, Y. Guo, J. Yuan, M. Wu, D. Li, Y. Zhou, J. Kang, ESG and corporate financial performance: empirical evidence from China's listed power generation companies, *Sustainability* 10 (8) (2018), <https://doi.org/10.3390/su10082607>.
- [25] E. Saygili, S. Arslan, A.O. Birkan, ESG practices and corporate financial performance: evidence from Borsa Istanbul, *Borsa Istanbul, Rev* 22 (3) (2022) 525–533, <https://doi.org/10.1016/j.bir.2021.07.001>.
- [26] A. Fatemi, I. Fooladi, H. Tehrani, Valuation effects of corporate social responsibility, *J. Bank Financ.* 59 (2015) 182–192, <https://doi.org/10.1016/j.jbankfin.2015.04.028>.
- [27] H. Sun, S.S. Zhong, X.F. Zhang, ESG performance, corporate transparency and corporate reputation, *Soft Sci.* (2023) 1–10.
- [28] C. Zhang, Z.G. Zhang, L.L. Bao, Study on the intertemporal impact of corporate environmental responsibility and financial performance and its mechanism, *Manag. Rev.* 32 (2) (2020) 76–89, <https://doi.org/10.14120/j.cnki.cn11-5057/f.2020.02.007>.
- [29] G. Friede, T. Busch, A. Bassen, ESG and financial performance: aggregated evidence from more than 2000 empirical studies, *Journal of Sustainable Finance & Investment* 5 (4) (2015) 210–233, <https://doi.org/10.1080/20430795.2015.1118917>.
- [30] D.C. Broadstock, K. Chan, L.T.W. Cheng, X. Wang, The role of ESG performance during times of financial crisis: evidence from COVID-19 in China, *Finance Res. Lett.* 38 (2021) 101716, <https://doi.org/10.1016/j.frl.2020.101716>.
- [31] A. Fatemi, I. Fooladi, H. Tehrani, Valuation effects of corporate social responsibility, *J. Bank Financ.* 59 (10) (2015) 182–192.
- [32] Y.W. Li, M.F. Gong, X.Y. Zhang, L. Koh, The impact of environmental, social, and governance disclosure on firm value: the role of CEO power, *Brit. Account. Rev.* 50 (1) (2018) 60–75, <https://doi.org/10.1016/j.bar.2017.09.007>.
- [33] X.L. Yu, K.T. Xiao, Does ESG performance affect firm value? Evidence from a new ESG-scoring approach for Chinese enterprises, *Sustainability* 14 (24) (2022) 16940, <https://doi.org/10.3390/su142416940>.
- [34] L. Zhang, H. Zhao, Tao, does corporate environmental, social and corporate governance (ESG) performance affect corporate value? – empirical research based on A-share listed companies, *Wuhan Finance* 10 (2019) 36–43.
- [35] Y. Zhou, Q. Guo, D.H. Zou, Environmental regulation and corporate product structure optimization strategies — experience evidence from multi-product export enterprises, *China Industrial Economy* (6) (2022) 117–135, <https://doi.org/10.19581/j.cnki.ciejournal.2022.06.005>.
- [36] M. Yang, E.Z. Wang, C.S. Ye, The environmental management system certification and the export of Chinese manufacturing enterprises are "incremental quality", *China Industrial Economy* (6) (2022) 155–173, <https://doi.org/10.19581/j.cnki.ciejournal.2022.06.013>.
- [37] S.J. Zhu, J. Li, Q. Zhang, T.L. Zhong, Environmental information disclosure, cost shock and corporate product quality adjustment, *China Industrial Economy* (3) (2022) 76–94, <https://doi.org/10.19581/j.cnki.ciejournal.2022.03.007>.
- [38] Y. Yang, J. Xie, guo, Impact of environmental legislation controls on the domestic value added rate of firms' exports, *Economic Theory and Management* 12 (2020) 83–99.
- [39] N. Chipalkatti, Q.V. Le, M. Rishi, Sustainability and society: do environmental, social, and governance factors matter for foreign direct investment? *Energies* 14 (19) (2021) <https://doi.org/10.3390/en14196039>.
- [40] Y.C. Wang, Y.M. Wang, Home country social responsibility and firm export performance from the perspective of optimal differentiation and institutional logic, *J. Manag.* 18 (8) (2021) 1195–1203.
- [41] X.D. Xu, S.X. Zeng, H.Q. Chen, Signaling good by doing good: how does environmental corporate social responsibility affect international expansion? *Bus. Strat. Environ.* 27 (7) (2018) 946–959, <https://doi.org/10.1002/bse.2044>.
- [42] C. Costa, L.F. Lages, P. Hortinha, The bright and dark side of CSR in export markets: its impact on innovation and performance, *Int. Bus. Rev.* 24 (5) (2015) 749–757, <https://doi.org/10.1016/j.ibusrev.2015.01.008>.

- [43] X.Y. Wang, J.H.R. Wang, W.M. Guan, F. Taghizadeh-Hesary, Role of ESG investments in achieving COP-26 targets, *Energy Econ.* 123 (7) (2023) 106757, <https://doi.org/10.1016/j.eneco.2023.106757>.
- [44] J.Y. Xu, Overseas returnees and firms' export behavior: micro evidence from China, *Journal of Finance Research* (2) (2018) 118–134.
- [45] J.H. Qi, W.H. Yang, The impact of overseas directors on export behavior: incremental or qualitative? *Finance Trade Res.* 31 (7) (2020) 34–49, <https://doi.org/10.19337/j.cnki.34-1093/f.2020.07.003>.
- [46] G.A. Akerlof, The market for "lemons": quality uncertainty and the market mechanism, *Q. J. Econ.* 84 (3) (1970), <https://doi.org/10.2307/1879431>.
- [47] M. Spence, Job market signaling, *Q. J. Econ.* 87 (3) (1973), <https://doi.org/10.2307/1882010>.
- [48] J.L. Li, Z. Yang, J.L. Yi, ESG's performance will help reduce the cost of corporate debt financing? — micro evidence from listed companies, *Corporate Economy* 42 (2) (2023) 89–99, <https://doi.org/10.13529/j.cnki.enterprise.economy.2023.02.009>.
- [49] Y. Eliwa, A. Aboud, A. Saleh, ESG practices and the cost of debt: evidence from EU countries, *Crit. Perspect. Account.* 79 (21) (2021) 102097, <https://doi.org/10.1016/j.cpa.2019.102097>.
- [50] G.Y. Jang, H.G. Kang, J.Y. Lee, K. Bae, ESG scores and the credit market, *Sustainability* 12 (8) (2020) 3456, <https://doi.org/10.3390/su12083456>.
- [51] W. Kong, The impact of ESG performance on debt financing costs: evidence from Chinese family business, *Finance Res. Lett.* 55 (8) (2023) 103949, <https://doi.org/10.1016/j.frl.2023.103949>.
- [52] K. Cao, Financial development and financing constraints and Chinese enterprises export participation, *China Economic Issue* (3) (2018) 23–35, <https://doi.org/10.19365/j.issn1000-4181.2018.03.03>.
- [53] S.Y. Lin, F.H. Huang, Research on financing costs, productivity growth and export stability, *World Economic and Political Forum* (1) (2015) 136–150.
- [54] R.E. Freeman, Strategic management: a Stakeholder approach, *J. Manag. Stud.* 29 (2) (1984) 131–154.
- [55] J.M. Ma, D. Gao, J. Sun, Does ESG performance promote total factor productivity? Evidence from China, *Frontiers in Ecology and Evolution* 10 (11) (2022) 1063736, <https://doi.org/10.3389/fevo.2022.1063736>.
- [56] J.L. Fu, X.H. Huang, How does ESG performance affect the full factor productivity of the enterprise? *Econ. Surv.* 40 (3) (2023) 108–117, <https://doi.org/10.15931/j.cnki.1006-1096.2023.03.010>.
- [57] T.J. Zhang, J.Z. Huang, X. Gao, Enterprise management capabilities, full factor productivity and enterprise export-based on China's manufacturing micro-enterprise evidence, *International Trade Issues* (5) (2022) 155–174, <https://doi.org/10.13510/j.cnki.jit.2022.05.008>.
- [58] M.A. Cole, R.J.R. Elliott, S. Virakul, Firm heterogeneity, origin of ownership and export participation, *World Econ.* 33 (2) (2010) 264–291, <https://doi.org/10.1111/j.1467-9701.2009.01231.x>.
- [59] J. Benitez, L. Ruiz, A. Castillo, J. Llorens, How corporate social responsibility activities influence employer reputation: the role of social media capability, *Decis. Support Syst.* 129 (11) (2020) 113223, <https://doi.org/10.1016/j.dss.2019.113223>.
- [60] Y.Y. Zhang, Z. Ouyang, Doing well by doing good: how corporate environmental responsibility influences corporate financial performance, *Corp. Soc. Responsib. Environ. Manag.* 28 (1) (2021) 54–63, <https://doi.org/10.1002/csr.2031>.
- [61] L.L. Gu, W.J. Ouyang, Charitable donation, marketing ability and corporate performance, *Nankai Management Review* 20 (2) (2017) 94–107.
- [62] L. Wang, H. Li, Y.L. Gao, P.Y. Yu, The impact of information disclosure quality on corporate reputation and its mechanism: a case study based on Shanghai electric's financial mine incident, *Manag. Rev.* 34 (8) (2022) 341–352, <https://doi.org/10.14120/j.cnki.cn11-5057/f.2022.08.001>.
- [63] M.X. Chen, M. Wu, The value of reputation in trade: evidence from Alibaba, *Rev. Econ. Stat.* 103 (5) (2021) 857–873, [https://doi.org/10.1162/rest\\_a\\_00932](https://doi.org/10.1162/rest_a_00932).
- [64] B.V. Dimitrova, D. Korschun, Y.V. Yotov, When and how country reputation stimulates export volume, *Int. Market. Rev.* 34 (3) (2017) 377–402, <https://doi.org/10.1108/imr-10-2015-0211>.
- [65] F.Y. Wang, Z.Y. Sun, Does the environmental regulation intensity and ESG performance have a substitution effect on the impact of enterprise green innovation: evidence from China, *24, Int. J. Environ. Res. Publ. Health* 19 (14) (2022) 8558, <https://doi.org/10.3390/ijerph19148558>.
- [66] J. Zhang, Z.Y. Liu, Study on the impact of corporate ESG performance on green innovation performance—evidence from listed companies in China A-shares, *Sustainability* 15 (20) (2023) 14750, <https://doi.org/10.3390/su152014750>.
- [67] M.B. Zheng, G.F. Feng, R.A. Jiang, C.P. Chang, Does environmental, social, and governance performance move together with corporate green innovation in China? *Bus. Strat. Environ.* 32 (4) (2023) 1670–1679, <https://doi.org/10.1002/bse.3211>.
- [68] J.W. Chai, The impact of green innovation on export quality, *Appl. Econ. Lett.* 30 (10) (2023) 1279–1286, <https://doi.org/10.1080/13504851.2022.2045249>.
- [69] F. Zhang, J.Y. Liu, Digital investment, green technology innovation and export green upgrading: experience from China's manufacturing industry, *Inquiry into Economic Issues* (9) (2023) 131–145.
- [70] J. Lu, B. Li, H. Li, Y. Zhang, Sustainability of enterprise export expansion from the perspective of environmental information disclosure, *J. Clean. Prod.* 252 (2020), <https://doi.org/10.1016/j.jclepro.2019.119839>.
- [71] H. Liu, J.-h. Luo, V. Cui, The impact of internationalization on home country charitable donation: evidence from Chinese firms, *Manag. Int. Rev.* 58 (2) (2018) 313–335, <https://doi.org/10.1007/s11575-018-0343-5>.
- [72] M. Bembom, C. Schwens, The role of networks in early internationalizing firms: a systematic review and future research agenda, *Eur. Manag. J.* 36 (6) (2018) 679–694, <https://doi.org/10.1016/j.emj.2018.03.003>.
- [73] N. Pisani, A. Muller, P. Bogăţan, Top management team internationalization and firm-level internationalization: the moderating effects of home-region institutional diversity and firm global focus, *J. Int. Manag.* 24 (3) (2018) 239–256, <https://doi.org/10.1016/j.intman.2018.01.002>.
- [74] H.E. Yildiz, S. Morgulis-Yakushev, U. Holm, M. Eriksson, How do the source and context of experiential knowledge affect firms' degree of internationalization? *J. Bus. Res.* 153 (2022) 378–391.
- [75] W.S.D.S.L. Bingcai, Does social trust affect the internationalization of enterprises, *World Economy Studies* 3 (2022) 54–65, <https://doi.org/10.13516/j.cnki.wes.2022.03.008>.
- [76] X.M. Fang, D. Hu, Corporate ESG performance and innovation: evidence from A-share listed companies, *Econ. Res. J.* 58 (2) (2023) 91–106.
- [77] C. Li, S.S. Ba, K.J. Ma, Y.L. Xu, W.L. Huang, N.Y. Huang, ESG rating events, financial investment behavior and corporate innovation, *Econ. Anal. Pol.* 77 (2023) 372–387, <https://doi.org/10.1016/j.eap.2022.11.013>.
- [78] H. Wen, K.C. Ho, J.J. Gao, L. Yu, The fundamental effects of ESG disclosure quality in boosting the growth of ESG investing, *J. Int. Financ. Mark. Inst. Money* 81 (35) (2022) 101655, <https://doi.org/10.1016/j.intfin.2022.101655>.
- [79] H.J. Xie, X. Lv, Responsible international investment: ESG and China's OFDI, *Econ. Res. J.* 57 (3) (2022) 83–99.
- [80] Q.L. Mao, Y.Q. Wang, Research on the employment effect of ESG: evidence from Chinese listed companies, *Econ. Res. J.* 58 (7) (2023) 86–103.
- [81] L.P. Zhou, Y. Chen, Y.J. Jin, An empirical study on the relationship between corporate social responsibility and financial performance: an analysis from the perspective of corporate reputation, *Jiangsu Soc. Sci.* (3) (2016) 95–102, <https://doi.org/10.13858/j.cnki.cn32-1312/c.2016.03.014>.
- [82] X.D. Lu, Y.J. Lian, Estimation of total factor productivity of industrial enterprises in China: 1999–2007, *economics, Q. Rev.* 11 (2) (2012) 541–558, <https://doi.org/10.13821/j.cnki.ceq.2012.02.013>.
- [83] W. Li Jing, M. Zheng, Ni, Substantive innovation or strategic innovation? – The impact of macro-industrial policies on micro-enterprise innovation, *Econ. Res. J.* 51 (4) (2016) 60–73.
- [84] B.Y. Zhu, Study on the impact of ESG performance on the performance of agricultural listed companies, *Journal of Southwest University (Natural Science Edition)* 45 (1) (2023) 110–122, <https://doi.org/10.13718/j.cnki.xdzk.2023.01.011>.
- [85] F. Chen, C. Wu, Wei, Q. Feng, Wei, Research on the impact of ESG performance on enterprises export, *Asia Pac. Econ. Rev.* (6) (2023) 103–115, <https://doi.org/10.16407/j.cnki.1000-6052.2023.06.015%WCNKI>.
- [86] O.-S. Yang, J.-H. Han, Assessing the effect of corporate ESG management on corporate financial & market performance and export, *Sustainability* 15 (3) (2023), <https://doi.org/10.3390/su15032316>.
- [87] C.Q. Li, L.H. Xu, K.Q. Dai, Enterprises to export learning effects the social responsibility of paradox, *Nankai Econ. Stud.* (3) (2016) 106–117, <https://doi.org/10.14116/j.nkes.2016.03.006>.

- [88] W.C. Chen Fang, Feng Quanwei, Study on the impact of ESG performance on firm exports, *Asia-pacific Economy* (6) (2023) 103–115, <https://doi.org/10.16407/j.cnki.1000-6052.2023.06.015>.
- [89] J.M. Hong Junjie, Chenyan Zhang, Issues, Digital transformation, innovation and Enterprise export quality improvement, *Journal of International Trade* (3) (2022) 1–15, <https://doi.org/10.13510/j.cnki.jit.2022.03.001>.
- [90] A.A. Dagestani, P. Chen, L. Du, J. Hu, Y. Bilan, The impacts of urban development orientation of resource-based cities on environmental information disclosure and greenwashing behavior of listed firms in China, *Environ. Dev. Sustain.* (2024), <https://doi.org/10.1007/s10668-024-04551-3>.