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A Study on Corporate ESG Performance amid Financing Constraints in Green Low-Carbon Transformation

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Abstract

Today, global climate change is becoming increasingly severe. In response to this challenge, the European Union's Carbon Border Adjustment Mechanism (CBAM) has initiated a revolution in the energy sector, prompting countries to intensify their efforts toward achieving carbon neutrality. Within this context, the concept of ESG (Environmental, Social and Governance), introduced by the United Nations in 2004, has gained significant attention from the public, governments, investors, and enterprises alike. It has gradually emerged as a critical factor influencing corporate reputation, investment appeal, market positioning, and even export performance.

Moreover, numerous countries and regions are implementing stricter regulations related to ESG compliance that require companies to adhere to specific standards concerning environmental protection, social responsibility, and governance transparency. For import-export enterprises, these policy shifts may present enhanced export opportunities alongside reduced compliance costs. However, successfully navigating the wave of green development and innovation is essential for their future growth.

Research indicates that strong ESG performance can significantly enhance firms' export outcomes. This effect can be realized through an increase in financing constraints; further studies reveal that the impact of ESG on export performance is particularly pronounced among non-state-owned enterprises and high-tech firms.

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Keywords: export performance, financing constraints, corporate green innovation

1. Introduction

Today, global climate change is becoming increasingly serious. The EU's Carbon Border Adjustment Mechanism (CBAM) has brought about a revolution in the energy industry in response to climate change, and countries have stepped up their carbon neutral layout. Under the dual-carbon background, the People's Bank of China, the Ministry of Ecology and Environment, the General Administration of Financial Supervision, and the China Securities Regulatory Commission have jointly issued the Opinions on Playing the Role of Green Finance to Serve the Construction of a Beautiful China (hereinafter referred to as 'Opinions'). The Opinions put forward 19 key initiatives in four aspects, namely, increasing support in key areas, enhancing the professional service capacity of green finance, enriching green financial products and services, and strengthening implementation guarantees, which provide a programme of action and a scientific guideline for the vigorous development of green finance and the support and guarantee of the construction of a beautiful China. The Opinions make it clear that focusing on the actual needs of the construction of a beautiful China, a number of landmark major engineering projects will be coordinated and planned, and docking financing support will be increased. In accordance with the requirements of synergistically promoting carbon reduction, pollution reduction, green expansion and growth, building a beautiful China construction project library around the construction of the first area of beautiful China, the green and low-carbon development of key industries, in-depth promotion of pollution prevention and control, ecological protection and restoration, and other key areas, to effectively enhance the accuracy of financial support. Since the 18th National Congress of the Party, green technological innovation as an important way to achieve win-win economic growth and environmental protection, its role in the sustainable development of the company has been widely recognised by all sectors of society. Therefore, green finance, as a new type of financial model, pays more attention to environmental protection than traditional finance. The development of green finance can be effectively dovetailed with green development and economic optimisation, injecting powerful kinetic energy into sustainable development. In the context of high-quality sustainable development, green finance, as an important strategic fulcrum of economic and financial development, faces many snagging challenges for Chinese companies. However, ESG is increasingly receiving widespread attention as a key indicator of sustainable development capability. Qiu Niobium (2024) argues that the mandatory construction of an ESG disclosure system is crucial to China's development, in order to guide export enterprises to improve the system design to some extent, and to coordinate the relationship between mandatory disclosure and voluntary disclosure. Based on the above analyses, A-share listed companies are selected as a research sample to explore how ESG performance ‘forces’ listed companies to carry out green innovations from the perspective of external financing constraints. The sample of A-share listed companies is selected to investigate how ESG performance ‘pushes’ listed companies to carry out green innovation and constantly transform and upgrade to overcome green trade barriers.

2. Literature Review

In the new stage of high-quality economic development, issues such as environmental degradation, climate change, and resource scarcity are becoming increasingly prominent. Various industries recognize the necessity of enhancing efficiency and pursuing high-quality development to address the challenges associated with energy overconsumption. The pathway forward lies in green and low-carbon transformation. Within the context of the digital economy, green development and sustainable practices have emerged as critical research topics for both academics and practitioners. Simultaneously, enterprises serve as vital agents of economic growth; thus, effectively implementing sustainable development concepts and transforming business strategies to achieve corporate sustainability is essential for promoting high-quality economic advancement. Environmental, social, and governance (ESG) criteria represent a core component of sustainable development by emphasizing the integration of environmental stewardship, social responsibility, and governance performance rather than solely focusing on financial outcomes. Since its introduction by the United Nations in 2004, there has been a growing emphasis among investors and organizations on ESG disclosure and investment practices. The Twentieth Five-Year Plan articulates a commitment to "promote green development while living in harmony with humanity." Similarly, both the Fourteenth Five-Year Plan and Vision 2035 underscore the importance of green developmental principles. Furthermore, the State-owned Assets Supervision and Administration Commission (SASAC) has prioritized ESG considerations within its framework for advancing corporate social responsibility (CSR). In response to calls for "green development" alongside high-quality economic strategies, an increasing number of companies are prioritizing ESG initiatives. They are expanding their contributions towards ESG goals while addressing stakeholders' demands—including those from investors—for non-financial information through comprehensive ESG disclosures.

ESG encompasses three dimensions: Environment, Society, and Governance. These dimensions correspond, from top to bottom, to environmental externalities, social externalities, and the public aspects of corporate governance. The UN's Principles for Responsible Investment (PRI) framework defines ESG as follows: E (Environment): This dimension includes factors related to the quality and functioning cycles of the natural environment. Key considerations encompass climate change and carbon emissions, air and water pollution, biodiversity preservation, energy consumption, waste recycling practices, among others. S (Social): This aspect pertains to factors that influence the rights, welfare, and interests of individuals and society at large. Specific areas of focus include customer satisfaction levels, data protection and privacy concerns, gender equality initiatives, community relations efforts, human rights advocacy, and labor standards compliance. G (Corporate Governance): This dimension addresses factors associated with the governance structures of companies and their subsidiaries. Notable elements include board composition dynamics; supervisory board structure; issues related to bribery and corruption; compensation mechanisms for irregularities; as well as political contributions. (Qu Shuyang & Wang Yongqing，2020) ESG Corporate Disclosure: ESG disclosure refers to the provision of information by a company regarding its specific practices related to environmental, social, and governance (ESG) factors. This disclosure constitutes a crucial component of a company's non-financial reporting.

The term "ESG Performance" describes an organization's accomplishments and current state of development in the three domains of environmental, social, and corporate governance. These three sections address a company's operations' effects on the environment, its social obligations, and the efficiency and openness of its internal governance framework. A company's performance in terms of environmental sustainability, social responsibility, and corporate governance is referred to as its ESG performance. According to research, companies with strong ESG performance not only have more market competitiveness and a stronger brand image, but they also have the potential to save money on financing and, to some extent, boost their market value (Su Li and Wei Hao, 2024) [11].

Furthermore, according to Qiu Muyuan and Yin Hong (2019) [36], ESG performance is a significant representation of corporate social responsibility and the advancement of green development, both of which are very consistent with the country's construction strategy for an ecological civilization.

First, according to Long Ziwu and Zhang Xiaofei (2023), a company's ESG performance can encourage its green technology initiatives to innovate and carry out significant innovation activities; Second, according to Ali Fatemi and Martin Glaum (2017), enhancing information asymmetry both inside and outside the company increases its long-term value; and third, easing financing restrictions, avoiding risk, and eventually gaining value.

The environmental, social, and governance (ESG) performance of businesses has drawn a lot of attention from the academic and business sectors as a crucial indicator of their capacity for sustainable development in today's globalized economy. An overview of pertinent studies on ESG performance, particularly as it relates to corporate export performance, is given in this study.

2.1 Impact of ESG performance on firms' import and export performance

Chinese businesses have comparatively fewer resources than huge global corporations, and therefore have several difficulties when it comes to exporting. The export performance of businesses has long received scholarly attention as a crucial means of stabilizing the balance of payments and improving societal welfare in general. The literature has shown that a number of characteristics, including a firm's capacity for innovation, have a major impact on its export performance (Wang Qizhen *et al*., 2016). Trade barriers (He Youliang, 2018; Zhu Xinkai *et al*., 2020) [35], and so on. Trade barriers not only intensify friction between nations but also elevate the costs and risks associated with import and export compliance for firms, diminish export incentives and trade efficiency, and therefore hinder the expansion of enterprise export scale and market reach. Furthermore, information friction, indicative of the information asymmetry encountered by economic agents in their decision-making processes, constitutes an essential factor in the analysis of enterprise exports. Within the framework of information asymmetry, a firm's reputation serves as a crucial criterion for overseas consumers to evaluate the quality of exported goods. In the near term, goodwill can substantially improve enterprises' export performance; however, the longevity and dynamics of this effect warrant further investigation.

Contemporary research primarily analyses the determinants influencing business exports through the lenses of reputation (Cagé and Rouzet, 2015), trade barriers (Zhu Xinkai *et al*., 2020) [35], and information friction (Jin Xiangyi and Dai Jinping, 2019). While the connection between environment, social responsibility, and corporate governance (ESG) and outward foreign direct investment has been extensively examined by researchers like Xie Hongjun and Lv Xue (2022) [30], the impact of ESG performance on corporate export performance remains inadequately investigated. While the beneficial effect of corporate governance on corporate exports is widely acknowledged by scholars (Zhao, Yonggao *et al*., 2011; Xu, Jiayun, 2018), studies have yet to arrive at a definitive consensus about the influence of environmental and social responsibility on corporate exports. Yang Coronation *et al*. (2022) [28] contend that environmental regulation enhances the quality of exported products, thereby fostering corporate exports, whereas Li Feng and Cui Kangle (2022) propose that corporate social responsibility will elevate international market demand through the lens of brand trust. Nevertheless, certain studies indicate that heightened environmental control (Ren Li and Huang Chongjie, 2015) or the fulfilment of social duty (Zhang Jingzhong and Cai Dongqing, 2006) may elevate production costs for enterprises, thereby hindering their exports.ESG performance substantially enhances enterprises' export performance. Enhancing environmental protection, social responsibility, and corporate governance enables enterprises to elevate the international competitiveness of their products and services, thus fostering export growth. Companies exhibiting superior ESG performance are more prone to receive acknowledgement from the global market and benefit from an elevated export premium (Enron and Chen Yimao, 2023). Concurrently, ESG performance is a critical determinant for companies to secure international contracts and sustain export market share.

2.2 The moderating role of financing constraints

ESG performance significantly influences finance limitations. Effective ESG performance helps mitigate information asymmetry in firms, enhancing their transparency and credibility, hence lowering financing costs and eliminating financial limitations (Qiu Muyuan and Yin Hong, 2019) [36]. Moreover, ESG performance serves as a critical criterion for investors to evaluate company risk and make investment decisions; organisations with superior ESG ratings are more likely to secure the backing and confidence of financial institutions.

Unlike the current research, these studies typically concentrate on examining the influence of overall ESG score performance on business strategy. The incremental contributions of this study are as follows. The article examines the influence of firms' ESG performance on export performance utilising panel data from listed corporations for the years 2018 to 2022. Subsequently, after elucidating the effect on company export performance, the research concentrates on the moderating variable of finance limitations. The correlation between ESG performance and export performance is examined using a moderating effect model, elucidating the transmission mechanism of the value-enhancing effect and the interplay among the moderating variables. The entire transmission pathway of "ESG performance-financing constraints-export performance" is validated; specifically, robust ESG performance in enterprises can mitigate financing constraints, enhance export performance, and ultimately improve international competitiveness, thereby securing a market share in the global arena. This elucidates the impact of financial support and offers empirical evidence for advancing sustainable development strategies. strategy through the provision of empirical evidence. Thirdly, we execute critical study on the varying effects of ESG performance, particularly enterprise value, considering diverse industry features and differing enterprise sizes, while elucidating the internal and external circumstances that underpin the ESG value enhancement process.

The prevailing research consistently indicates that ESG ratings positively influence business value, particularly within the global economy's heightened emphasis on sustainable development. Future research may investigate the intricate relationship between ESG ratings and export performance, as well as the influence of specific factors across various industries and market conditions on this relationship. This will augment ESG research and offer viable development strategies for firms to improve their value and competitiveness in sustainable development. It will enhance the intrinsic motivation of firms, prompting them to adopt energy conservation, reduce emissions, and restructure industries while boosting economic efficiency and achieving green transformation. To effectively support low-carbon transformation, they recommend transitioning from a holistic viewpoint to a long-term perspective.

3. Theoretical analysis and research hypothesis

3.1 Financing Constraints

Stakeholder theory posits that firms may mitigate environmental pollution, resource depletion, and waste emissions by implementing green technology to enhance and safeguard the environment. The environmental effects can enhance corporate environmental responsibility, elevate corporate ESG ratings and recognition, thereby fostering investor preference for companies with strong ESG performance. Additionally, financing constraints significantly influence enterprise value, further augmenting export performance. The notion of synergistic effect posits that interactions and intrinsic connections among numerous entities can yield outcomes where the combined effect

exceeds the sum of individual effects, resulting in 1+1>2. The synergistic impact on financing constraints is evident in that green technologies enable enterprises to mitigate the risks and costs associated with green innovation, enhance economic benefits, alleviate financing constraints, and significantly improve export performance. Empirical examination: Empirical studies evaluate the precise relationship between ESG ratings and export performance by evaluating data from enterprises across various industries and countries. These studies indicate that elevated ESG ratings are typically correlated with superior export performance, particularly in markets that mandate stringent environmental and social responsibility norms.The performance of ESG significantly influences the long-term growth of organisations. Enterprises must proactively align with national sustainable development strategies to bolster their international competitiveness and market value through the enhancement of their ESG performance. The government and other agencies should concurrently enhance the institutional framework for ESG disclosure and advance the ESG rating system to create a conducive development environment for firms.
This Study presents the following hypotheses:

H1. ESG performance enhances firms' export performance and mediates green technology innovation (ESG performance and export/ import performance)

H1a. Environmental dimension (E) Enhanced fulfilment of obligations results in improved export performance.

H1b. Enhanced performance in the social dimension (S) of accountability correlates with improved export performance.

H1c. Governance Dimension (G) Enhanced efficacy in executing responsibilities results in improved export performance.

H2. Industries with high pollution levels will exert a greater influence of firms' ESG performance on export performance than other sectors.

Enhancing firms' ESG performance ultimately bolsters the export performance of exporting firms by mitigating financial limitations.

4. Research Design
4.1 Sample selection and data sources
This study utilises A-share listed firms as samples from 2018 to 2022. The subsequent treatments are implemented: (1) exclusion of samples from the financial and real estate sectors; (2) exclusion of samples categorised as T, such as ST or *ST; (3) exclusion of samples with incomplete data on primary variables. The data utilised in this work are sourced from the CNRDS database, Wind database, and CSMAR database. ESG performance and financial data are sourced from CSMAR, Wind, and other databases.

4.2 Variable Definition
4.2.1 explanatory variable
From the standpoint of objective metrics, research in international commerce often categorises export performance into four primary dimensions: financial performance, strategic performance, market performance, and customer performance. Since financial performance may more objectively and directly indicate the export status of firms, most scholars prefer to utilise financial data as the primary metrics for evaluating export performance. This paper discusses Enron and Chen Yimao, who utilised annual abroad sales revenue of firms as a metric for assessing export performance.

4.2.2 Core explanatory variables
Corporate Environmental, Social, and Governance performance. This study employs wind rating system data as the explanatory variables in all empirical tests. Wind ESG rating data exhibits varying performance across the three dimensions of ESG, with the overall grade categorised into three tiers: C-AAA, and is updated frequently.

4.2.3 Control Variable
This paper identifies control variables influencing firms' export performance at the firm level, including firm age, profitability, firm size, cash flow, pollution intensity, and shareholding concentration, as detailed in Table 1.

4.2.4 Moderator Variable
Existing studies measure financing constraints primarily in two ways: first, through singular metrics such as interest coverage ratios or dividend payout ratios; second, by synthesising factors like asset size and operational duration, yielding results that exhibit greater stability and reliability. This work references the methodology employed by Yanli Li and Jenny Sun *et al*. to compute the SA index using the subsequent formula:

SA=-0.737×SIZE+0.043×SIZE2-0.04×AGE

The natural logarithm of the total asset size of the firm is utilised to quantify SIZE; AGE represents the operational duration of the enterprise, calculated by subtracting the year of establishment from the observation year. The degree of business finance limitations is utilised to assess the moderating influence test. A higher SA index indicates a greater extent of finance limitations encountered by the firm.

Table 2: List of variable definitions

explanatory variable	**ESG rating performance**	**AAA to C grades are assigned a score of 9 to 1, in that order.**
explanatory variable	Export performance	Enterprise's foreign earnings for the year
intermediary variable	Number of green patent applications	The sum of the number of patent, utility model and design applications filed by the enterprise in the year plus 1 taking the natural logarithm
control variable	Enterprise size (Size)	The total assets of the enterprise are taken as the natural logarithm
	Age of enterprise (Age)	
	profitability	EBIT/total assets
	cash flow	Net cash flows from operating activities/total assets
	1 for heavily polluting enterprises, 0 for non-heavily polluting industries	
	shareholding concentration	Shareholding ratio of the largest shareholder

4.3 Modelling

To examine the impact of firms' ESG performance on export performance, the following model is constructed:

$$\left(Export_{i,t}\right) = \alpha + \mathrm{ESG}_{i,t} + \mathrm{control}_{i,t} + \delta t + \mu i$$

where Exportipti,t is the model explanatory variable representing firm i's export performance level in year t; ESGi,t is the model explanatory variable representing firm i's ESG performance in year t; Controlsi,t represents the control variables; δt and μi denote year fixed effects and industry fixed effects, respectively, to control for external macro-environmental shocks as well as industry characteristics' effects; Regression models for intermediary variables In order to verify whether corporate ESG promotes import and export performance by enhancing the moderating effect of financing constraints, the moderating effect model is constructed as follows (2)

$$Export_{i,t} = \gamma_0 + \gamma_1 \mathrm{ESG}_{i,t} + \gamma_2 \mathrm{SA} + \gamma_3 \sum \quad \mathrm{control}_{i,t} + \delta t + \mu i$$

5. Empirical results and analyses

5.1 Descriptive statistical analyses

Table 2: Table of descriptive statistics results for variables

Var Name	Obs	Mean	SD	Min	Median	Max
E	14724	1.671	2.037	0.000	1.010	10.000
S	14724	3.965	1.872	0.000	3.880	10.000
G	14724	6.461	0.984	0.000	6.500	10.000
Pant	14724	0.646	1.271	0.000	0.000	8.351
Export	14724	16.093	76.985	0.000	0.485	3354.987
Age	14724	11.751	8.087	1.000	10.000	32.000
Size	14724	22.514	1.355	17.954	22.320	28.636
Top1	14724	32.697	14.750	2.870	30.180	89.090
Pop	14724	0.208	0.406	0.000	0.000	1.000
ROE	14724	0.014	0.020	-0.088	0.011	0.816
Cash	14724	0.054	0.066	-0.155	0.051	0.268
ESG	14724	4.203	1.121	1.000	4.250	8.000
SA	14724	-3.914	0.263	-5.690	-3.917	-2.094

Table 2 presents the outcomes of the descriptive statistics for the primary variables. The average company ESG performance is 4.203, with a standard deviation of 1.121. The mean performance on the environmental (E) dimension is 1.671, with a median of 1.010; the mean performance on the social responsibility (S) dimension is 3.965, with a median of 3.880; and the mean and median performance on the corporate governance (G) dimension is 6.461 and 6.500, respectively. This indicates that the performance of most corporations in the environmental and social responsibility (ESR) dimensions is inferior to that in the corporate governance (CG) dimension and below the mean. The outcomes of other variables are fundamentally aligned with those of pertinent studies.

5.2 Basic regression analysis

Table 3: Benchmark regression results on the relationship between firms' ESG performance and export performance

Variables	-1 Pant	Variables	-1 Export
	(.)		(.)
ESG	0.1040***	ESG	19,214.8477***
	-11.009		-4.02
Age	-0.0262***	Age	-6,646.3613***
	(-19.633)		(-6.663)
Size	0.1940***	Size	224,560.2656***
	-17.444		-16.698
Top1	-0.0022***	Top1	-2,386.1663***
	(-2.922)		(-4.953)
Pop	-0.0327	Pop	-44,904.5859***
	(-1.380)		(-3.267)
ROE	-5.0658***	ROE	-442487.5938
	(-7.753)		(-1.052)
Cash	0.4857***	Cash	134469.4531
	-2.888		-1.44
Constant	-3.7292***	Constant	-4.8113e+06***
	(-16.040)		(-16.781)
Observations	14,724	Observations	14,724
Adjusted R-squared	0.0614	Adjusted R-squared	0.1386

Robust t-statistics in parentheses*** p<0.01, ** p<0.05, * p<0.1

Table 4: Regression results of the relationship between the three dimensions of firms' ESG performance and firms' export performance

	(1) Export	(2) Export	(3) Export
E	1.6456***		
	(5.38)		
S		2.4601***	
		(6.82)	
G			0.4846
			(1.01)
Age	-0.5373*	-0.2155	-0.3155
	(-1.76)	(-0.72)	(-1.02)
Size	24.4979***	24.5313***	25.0495***
	(16.86)	(16.92)	(17.25)
Top1	-0.1683*	-0.1745*	-0.1677*
	(-1.80)	(-1.86)	(-1.79)
Pop	-13.6479**	-13.4502**	-13.3579**
	(-2.46)	(-2.43)	(-2.41)
ROE	43.3708*	42.9497*	42.5599*
	(1.75)	(1.73)	(1.72)
Cash	26.7838***	27.2192***	26.7832***
	(3.76)	(3.82)	(3.75)
_cons	-524.2089***	-535.2855***	-539.7473***
	(-16.71)	(-17.14)	(-17.25)
N	14724	14724	14724
r2	0.0407	0.0422	0.0384

Note: t-values in parentheses, * denotes P≤0.1,** denotes P≤0.05,*** denotes P≤0.01. Same below.

To evaluate hypothesis H1, which posits that ESG performance enhances enterprises' export success, model (1) is regressed, and Table 2 presents the benchmark regression findings. The regression coefficient of ESG rating on export performance is 0.1386, with all values significantly negative at the 1% level, suggesting that a high ESG rating enhances export performance. In column 1, the regression coefficient for firms' environmental dimension (E) evaluations on export performance is 0.0407, significant at the 1 percent level, indicating that enhancements in firms' environmental performance positively influence export performance. The regression coefficient for the social governance dimension (S) scores on firms' export performance in column 2 is 0.0422, significant at the 1 percent level, suggesting that enhancements in the social governance dimension (S) will positively influence firms' export performance. In column 3, the regression coefficient for the corporate governance dimension (G) score on businesses' export performance is 0.0384, significant at the 1 percent level, suggesting that enhancements in the social governance dimension (G) will elevate firms' export success. Consequently, hypothesis H1 of this study is validated.

5.3 Robustness Tests

Table 5 Table of Robustness Test Results for Replacing ESG Scores of Different Institutions

	(1) Export	(2) Export	(3) Export
E Score	0.2438***		
	(3.45)		
S Score		0.0261	
		(0.47)	
G Score			0.1225*
			(1.79)
Age	-0.3773	-0.2450	-0.1948
	(-1.25)	(-0.82)	(-0.65)
Size	24.9351***	25.0832***	24.9807***
	(17.19)	(17.27)	(17.20)
Top1	-0.1558*	-0.1664*	-0.1684*
	(-1.66)	(-1.77)	(-1.80)
Pop	-13.2582**	-13.4220**	-13.2977**
	(-2.39)	(-2.42)	(-2.39)
ROE	41.5879*	42.2536*	42.2807*
	(1.68)	(1.70)	(1.70)
Cash	26.8829***	26.8894***	27.0376***
	(3.77)	(3.77)	(3.79)
_cons	-548.7185***	-540.1875***	-546.0399***
	(-17.48)	(-17.22)	(-17.33)
N	14724	14724	14724
r2	0.0393	0.0383	0.0385

This study undertakes robustness tests to validate the trustworthiness of the regression results from the following aspects: This research evaluates the robustness of the regression results by substituting the explanatory variables and utilising the ESG rating data from CSI, acknowledging potential measurement bias issues from other rating agencies. The regression results in Table 2-4 indicate that the ESG regression coefficients are significant at the 1% level, demonstrating that ESG performance can boost business export performance, hence confirming the reliability of the benchmark regression results.

6. Further Analysis

6.1 Testing the transmission mechanism: financing constraints, the moderating effect of cash holdings

Table 9 presents the results of the moderating effect test on the influence of firms' ESG performance on export performance and total factor productivity. According to Leilei Gu and Hongyu Wang, the kz index serves as a proxy variable for financial limitations. The statistical results of incorporating the interaction term in model (2), while including control variables and accounting for individual and temporal fixed effects, are presented in the table. The statistical results are presented in the table, revealing a substantial positive correlation for the interaction term at 0.1224, which indicates a strong model fit. The connection between finance restrictions and export performance exhibits a strong positive moderating effect. In the global low-carbon context, the study revealed that examining the influence of corporate ESG performance on export performance assists Chinese enterprises in navigating green trade barriers, adapting to the evolving international landscape, fostering green compliance, leveraging social responsibility advantages, enhancing the overall competitiveness of the industrial chain, dismantling trade barriers, and improving export performance. This enables domestic enterprises to secure a market share in the international arena and attain synergistic efficiency. Increase market share and achieve enhanced synergistic efficiency.

Table 6: Moderating Effect Tests of Firms' ESG Performance, Financing Constraints and Export Performance

	(1) Export	(2) Export	(3) Export	(4) Export	(5) Export	(6) Export
E	0.6918**	30.3077***				
	(2.35)	(7.97)				
X1		7.5711***				
		(7.81)				
S			1.3264***	14.4546***		
			(3.83)	(3.25)		
X2				3.3637***		
				(2.96)		
G					0.5621	24.9994***
					(1.23)	(4.13)
X3						6.2874***
						(4.05)
SA	369.9724***	348.7503***	368.2313***	351.1603***	372.7449***	330.8540***
	(32.35)	(29.74)	(32.20)	(27.42)	(32.75)	(21.52)
Age	13.7045***	13.3502***	13.7770***	13.5665***	13.8506***	13.8629***
	(25.96)	(25.26)	(26.47)	(25.84)	(26.47)	(26.51)
Size	21.6799***	20.9992***	21.6384***	21.8137***	21.8322***	21.5986***
	(15.57)	(15.09)	(15.57)	(15.68)	(15.70)	(15.53)
Top1	-0.4306***	-0.4186***	-0.4329***	-0.4316***	-0.4331***	-0.4231***
	(-4.79)	(-4.67)	(-4.81)	(-4.80)	(-4.81)	(-4.70)
Pop	-10.0379*	-9.6409*	-9.9742*	-9.9518*	-9.8407*	-9.8384*
	(-1.89)	(-1.82)	(-1.88)	(-1.88)	(-1.85)	(-1.85)
ROE	47.3531**	50.0635**	47.1975**	47.8897**	47.0208**	46.0993*
	(2.00)	(2.12)	(1.99)	(2.02)	(1.98)	(1.95)
Cash	24.1470***	23.9977***	24.3877***	24.5135***	24.0856***	23.9124***
	(3.54)	(3.53)	(3.58)	(3.60)	(3.53)	(3.51)
_cons	829.2918***	765.1006***	818.6811***	750.1946***	832.5114***	674.5040***
	(16.11)	(14.71)	(15.87)	(13.27)	(16.17)	(10.45)
N	14724	14724	14724	14724	14724	14724
r2	0.1224	0.1271	0.1231	0.1238	0.1221	0.1234

6.2. Heterogeneity Test

Heterogeneity analysis (high and low polluting firms, different industries)

Within the framework of carbon neutrality, the developmental effects of ESG disclosure on enterprises' transformation and enhancement may exhibit variety. This paper investigates the heterogeneous impact of ESG performance on firms' export performance, specifically analysing the differential effects based on whether firms are classified as high polluters, to thoroughly explore the relationship between ESG performance and export outcomes. In contrast to non-polluting enterprises, heavily polluting firms must allocate greater financial resources to enhance their ESG performance, which may exacerbate their "greenwashing" practices and significantly affect their reputation. Nonetheless, it is contended that the enhanced ESG performance of big polluters signifies their greater willingness to contribute to sustainable development, hence making stakeholders more predisposed to invest in them. Is there a distinction in the influence of ESG performance on enterprises with varying levels of pollution during the export process? This paper categorises all samples into heavy polluters and non-heavy polluters, conducting group regressions in accordance with the Guidelines for Industry Classification of Listed Companies (2012 Revision), the Management Directory of Industry Classification for

Environmental Verification of Listed Companies, and the Guidelines for Environmental Information Disclosure of Listed Companies. The regression findings successfully passed the Chow test, demonstrating that the coefficients of the two groups are comparable. The regression results in Table 1 indicate that the coefficients of ESG performance for non-heavily polluted enterprises are significantly positive and exceed those of heavily polluted enterprises, suggesting that the ESG performance of non-heavily polluted enterprises more effectively enhances their export performance compared to heavily polluted enterprises.

Table 7: Heterogeneity test of whether firms are highly polluting or not

	(1) Pop=1 Export	(2) Pop=0 Export	(3) Pop=1 Export	(4) Pop=0 Export	(5) Pop=1 Export	(6) Pop=0 Export
E	2.5097***	1.4596***				
	(4.02)	(4.18)				
S			1.0489	2.8587***		
			(1.64)	(6.70)		
G					0.8760	0.2601
					(0.94)	(0.47)
Age	1.7263***	-1.1728***	2.2242***	-0.8768**	2.0982***	-0.9558***
	(2.99)	(-3.30)	(3.94)	(-2.51)	(3.59)	(-2.66)
Size	12.7655***	29.0169***	13.2294***	28.8500***	13.3520***	29.5245***
	(4.88)	(16.48)	(5.05)	(16.42)	(5.09)	(16.77)
Top1	-0.3070*	-0.1017	-0.2833*	-0.1236	-0.2905*	-0.1030
	(-1.89)	(-0.90)	(-1.74)	(-1.10)	(-1.78)	(-0.91)
ROE	62.5103	30.5604	60.5000	30.1255	57.0809	30.2560
	(1.27)	(1.06)	(1.23)	(1.05)	(1.16)	(1.05)
Cash	21.6392*	26.9852***	21.8261*	27.3343***	21.6484	26.9660***
	(1.65)	(3.23)	(1.66)	(3.28)	(1.64)	(3.23)
_cons	-291.5753***	-621.7453***	-308.7509***	-629.0481***	-310.8917***	-634.9988***
	(-5.27)	(-16.26)	(-5.58)	(-16.53)	(-5.61)	(-16.64)
N	3067	11657	3067	11657	3067	11657
r2	0.0594	0.0407	0.0539	0.0436	0.0531	0.0388

7. Research findings and policy implications

7.1 Conclusions of the study

This study utilises panel data from 14,724 publicly traded companies spanning 2018 to 2022 to examine the influence of three distinct dimensions of firms' ESG (environmental, social, and governance) on export success, while also investigating the moderating effect of finance restrictions. The findings indicate that (1) strong ESG performance can enhance the export success of Chinese companies; nevertheless, there exists a significant disparity in ESG performance across these enterprises, particularly in the environmental (E) component, which is comparatively weaker. Financing constraints exert a substantial negative moderating influence on the correlation between corporate ESG performance and export performance, suggesting that Chinese enterprises can mitigate financing constraints by actively embracing social responsibility, thereby attracting additional capital to enhance quality and efficiency. Enterprises can leverage ESG performance to augment their competitiveness in the global market, hence enhancing export performance and overall business efficacy. The coefficient of ESG performance for non-heavily polluted enterprises is significantly positive and exceeds that of heavily polluted enterprises, suggesting that the ESG performance of non-heavily polluted enterprises enhances their export performance more effectively than that of heavily polluted enterprises.

7.2 Policy Implications

Currently, domestic research on ESG primarily concentrates on its idea and connotation, while empirical studies remain in the nascent phase. As the ESG concept evolves, numerous rating agencies and databases assess the ESG performance of publicly traded companies. This paper aims to enhance the understanding of corporate ESG performance through empirical research and elucidate the relationship between ESG performance and export performance. This paper will align the trajectory of ESG development with China's unique transformation and sustainable development objectives, including "dual-carbon," to assist companies in devising more effective investment strategies and targeted planning for the harmonious advancement of the economy and the environment, while simultaneously addressing the dynamic business landscape and stakeholder expectations. Conversely, China shares numerous similarities with other developing nations regarding economic fundamentals and various developmental challenges; thus, it is crucial to consider Chinese enterprises as representative cases to analyse, generalise, and elucidate the interplay between environmental policy and economic development based on China's experiences. Enhancing the internal rationale of environmental policy and economic development based on China's empirical evidence aligns more closely with the realities of emerging nations, offering greater significance in their efforts to balance economic growth and environmental conservation.ESG performance can offer insights for the multidimensional and balanced advancement of firms, enhancing their economic, environmental, and social advantages, hence improving their export performance and securing a specific market share in the global arena.The performance of ESG (Environmental, Social, and Governance) significantly enhances enterprises' export performance.

In light of the aforementioned conclusions, this paper presents the subsequent insights: Initially, ESG is an imported concept; however, developed countries have discussed it more extensively and earlier. For central enterprises, a greater emphasis on ESG can bolster international competitiveness, which is particularly crucial for high-pollution enterprises operating abroad. The government ought to establish guidelines for ESG disclosure for Chinese enterprises based on internationally recognised standards, while concurrently developing an ESG disclosure framework tailored to China's unique national conditions and economic development stage, thereby circumventing the "choke point" issues encountered by domestic enterprises within the Western ESG disclosure system, including trade barriers. Secondly, in light of the beneficial influence of ESG performance on export outcomes, companies ought to enhance their environmental protection initiatives: they should proactively adopt strategies to mitigate environmental pollution and resource depletion, including optimising production processes, utilising clean energy, and instituting waste recycling programs. This would not only raise a company's ESG environmental dimension score but also bolster its green reputation in the global market. Augment social responsibility adherence: Corporations must concentrate on the effects of their products or services on society, encompassing consumer pleasure, data protection, gender equality, community relations, and human rights. By diligently executing social responsibility, firms can elevate their social dimension ratings and bolster the trust of consumers and partners. Improve disclosure transparency: Companies should augment the transparency of their ESG operations by issuing frequent ESG reports and publicly disclosing their environmental protection initiatives, social responsibility efforts, and governance policies. Transparent information disclosure mitigates information asymmetry and bolsters the market credibility of firms. The government should prioritise the proactive management of ESG ratings: companies must consistently monitor fluctuations in ESG ratings, promptly adjust and refine ESG-related strategies and initiatives, and ensure that ESG performance aligns with the organization's long-term development objectives. In response to the national sustainable development strategy, enterprises must align with the national ecological civilisation construction strategy, actively embrace the national mandate for green and sustainable development, and bolster their international competitiveness by enhancing their ESG performance.

8. References

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