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The Impact of ESG Performance on Corporate Financing under Sustainable Development

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Abstract

Under the concept of sustainable development, green development has become the current trend of enterprise development. Financing is an indispensable step in the green development and transformation of enterprises. This article takes non-financial listed companies on the A-share market as the research object, using panel data from 2009 to 2021, and the KZ index as a proxy variable for financing constraints to study the impact of corporate ESG performance on financing constraints. The results indicate that good corporate ESG performance can effectively alleviate corporate financing constraints, and the results remain significant after a series of robustness tests; the heterogeneity results indicate that the inhibitory effect of ESG performance on financing constraints is more significant for non-state-owned enterprises, enterprises operating in heavily polluting industries, and enterprises located in the eastern region. Based on this conclusion, this study proposes targeted recommendations for different types of enterprises to alleviate financing constraints, which is of great significance for promoting green and sustainable development of enterprises.

Keywords

ESG Performance; Financing Constraints; Green Development; Sustainable Development.

1. Introduction

In the report of the 20th National Congress of the Communist Party of China, it was pointed out that we should promote green development, grasp the new stage of development, construct a new development pattern, and achieve sustainable development strategy. The "Blue Book on Sustainable Development: China Sustainable Development Evaluation Report (2022)" released by institutions such as the China International Economic Exchange Center points out that the overall level of sustainable development in China has been continuously optimized from 2015 to 2020, with an increase of nearly 42 percentage points in 2020 compared to 2015. Guided by the concept of sustainable development, China's economic strength has made significant leaps, with the "economic development" indicator value increasing from 60.4 in 2015 to 83.0 in 2020. The social ecological environment and residents' quality of life have also greatly improved. Among them, the improvement of national economic strength cannot be separated from the credit of enterprises. As the cells of the national economy, enterprises play a crucial role in economic development. Vigorously developing advanced technology industries and promoting green industries have also become new growth points for China's economic development. Building green finance, green enterprises, and green development can not only create new economic growth points, but also help accelerate the green transformation of the economic structure, enhance the sustainable development of enterprises, and significantly promote environmental protection. Therefore, how to enhance the sustainable development capability of enterprises and optimize their financing is also an important issue for sustainable development in the current social market economy.

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The term "sustainable development" was first proposed in writing in the International Union for Conservation of Nature's "World Conservation Plan" to express the necessity of building the sustainability of natural environments and resources (PP Rogers, 2012), but its specific meaning is still vague and lacks an actionable definition (April, 2008). With the changes of the times and the development of the social economy, the concept of sustainable development has been more systematically expounded. Currently, the widely recognized definition is "development that can meet the needs of contemporary people without harming the ability of future generations to meet their needs" (Chen, 2018). In the 1980s, in order to get rid of its own terrible predicament and keep up with the ideological trend of Western countries, another translation movement began to rise after the late Qing Dynasty and early Republic of China. The concept of sustainable development gradually infiltrated China with the emergence of translations, and the country also began to realize environmental issues. In 1983, the State Council established environmental protection as a fundamental national policy in China. With the vigorous progress of China's reform and opening up and economic development, environmental problems have become increasingly prominent under the rapid and extensive growth of the economy, and sustainable development issues have received more and more attention. In 1994, the White Paper on Population, Resources, Environment and Development in the 21st Century of China first incorporated the sustainable development strategy into the long-term planning of China's economic and social development (Jin, 2002). In 1996, the National People's Congress raised sustainable development as an important guideline and strategic goal to the national will. In the new century, China has a deeper understanding of the concept of sustainable development and has established five development concepts of "innovation, coordination, green, openness, and sharing". Now, the concept of sustainable development, as a new perspective and method, has penetrated into the construction process of various undertakings in China and is the goal we strive for.

Sustainable development of enterprises, as an important component of the sustainable development process, is an important idea for enterprises to pursue sustainable development. Investors' evaluation criteria for corporate development are not only based on profit, but also on the level of environmental pollution, social responsibility, and internal governance of the enterprise, which have become important criteria for investors to study the development of the enterprise. ESG indicators are considered to be a comprehensive measure of a company's true sustainability and endogenous capabilities, abbreviated as Environmental, Social, and Governance. ESG is an investment philosophy that starts from the perspective of corporate environmental, social, and governance performance rather than financial performance. It is also an important standard for measuring the level of green and sustainable development of enterprises in the international community. The international concept of ESG and the construction of rating systems were proposed earlier, and the development of ESG can be traced back to the last century. Due to the serious environmental problems caused by the development concept of "emphasizing economy over environment", foreign countries began initiatives such as environmental protection and proposed the concept of "sustainable development" in 1992. Since 2000, relevant reports have been issued abroad, and subsequent versions have also included indicators such as environmental performance and social performance in the scope of information disclosure. Since 2010, responsible investment and ESG have become mainstream in the financial and regulatory industries (Lykkesfeldt, 2022). The ESG concept was first proposed by the United Nations Environment Programme in 2004. In 2006, the United Nations Principles for Responsible Investment (UN PRI) officially incorporated ESG into investment decisions. Through scholars' research, it has been found that there is a strong correlation between ESG and enterprises. Wong et al. (2021) investigated how ESG performance effectively reduces the cost of capital for Malaysian companies, and extended this conclusion to companies in emerging and developing countries. Kim et al. (2021) found

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that ESG factors have a positive impact on corporate financing, while social factors and corporate governance have a positive effect on companies, while environmental factors have a negative effect. Raimo et al. (2021) observed data from 2019 companies and found that companies that disclose non-financial information with higher transparency can reduce their debt financing costs by reducing information asymmetry. Gigante et al. (2022) used the RD model to study and found that companies with higher ESG performance have lower debt costs. Aich et al. (2021) found that the impact of ESG performance on company value is becoming increasingly important, and companies also consider ESG related content during the investment process.

The development of ESG concept in China started relatively late, and early information on ESG mainly focused on environmental protection. In 2006, the Shenzhen Stock Exchange issued the "Guidelines for Social Responsibility of Listed Companies" for the first time, and in 2008, the Shanghai Stock Exchange issued the "Guidelines for Environmental Information Disclosure of Listed Companies", requiring companies in the previous period to disclose social responsibility information in a timely manner. The Environmental Protection Law, introduced in 2014, provides clear regulations in legal form for enterprises to disclose pollution information and for environmental monitoring agencies to publicly disclose information. In 2016, the People's Bank of China and other departments issued the Guiding Opinions on Building a Green Financial System, requiring the establishment of a mandatory environmental information disclosure system for listed enterprises (Chen et al., 2021). In 2018, the China Securities Regulatory Commission (CSRC) issued the "Code of Corporate Governance for Listed Companies", which for the first time established the basic framework for environmental, social responsibility, and corporate governance information disclosure in China. Therefore, in the future, listed companies should not only consider ESG as a cost, but also integrate it into their important strategies and development directions. By laying out emerging industries, improving corporate governance, upgrading industries, actively assuming social responsibility, and creating greater social value. Most of the research on the impact of ESG on corporate financing in China focuses on the cost of corporate financing. Mei et al. (2023) found that good ESG performance can effectively reduce the cost of corporate debt financing, and can be achieved by increasing the attention of investment institutions to lower financing costs. Chen et al. (2023) studied companies listed in Shanghai and Shenzhen, and found that strengthening investor attention can enhance the promotion effect of ESG on enterprises by improving information transparency and reducing financing constraints. ESG performance not only affects the domestic financing situation of enterprises, but also affects their overseas bond financing, and good ESG performance of enterprises has a significant promoting effect on overseas bond financing (Shi et al., 2023). Wang et al. (2022) used listed companies covered by Shanghai, Shenzhen, and China Securities as research objects, and used econometric models to verify the complex correlation between ESG performance and corporate financing costs, that is, the better the ESG performance, the lower the financing cost of the company, and the greater the impact of ESG performance on corporate financing costs during the epidemic period. With the implementation of green credit policies in China, Luo et al. (2023) found through data research on Chinese listed companies that performance can increase a company's chances of obtaining credit.

So, in the process of promoting green development, has ESG had an impact on corporate financing, what kind of impact has it caused, will ESG performance differ for different types of corporate financing, and what role will it play in the sustainable development of enterprises? These are the questions that this article wants to study. Specifically, this article takes non-financial listed companies in China's A-share market as the research object, and uses panel data from 2009 to 2021 to study the impact of ESG on corporate financing constraints under the concept of sustainable development. Research has found that good ESG performance can

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effectively reduce the financing constraints of enterprises, and the impact is more significant for non-state-owned enterprises, heavily polluting enterprises, and enterprises in the eastern region.

The possible marginal contributions of this article lie in three aspects: firstly, this article draws on existing literature, which has extensively studied corporate financing from three aspects: ESG concept environment, social responsibility, and corporate governance. From the perspective of ESG as a whole, this article studies the impact of ESG ratings on corporate financing constraints; Secondly, promoting green development and green transformation is a key focus for the development of Chinese enterprises. The ESG concept plays an important role in achieving the goal of "carbon neutrality and peak carbon emissions" and green development. This article uses research on the impact of ESG on corporate financing to further promote the development of ESG concepts in China and provide more data support for the sustainable development of enterprises; Thirdly, the conclusion of this article provides certain theoretical references and literature references for promoting sustainable development through corporate financing, in the context of promoting green development, grasping the new development stage, and constructing a new development pattern.

The remaining content of the article is mainly arranged as follows: the second part is theoretical analysis and research hypotheses, the third part is research design, the fourth part is empirical results and analysis, the fifth part is heterogeneity testing, and the sixth part is conclusions and recommendations.

2. Theoretical Analysis and Research Hypotheses

2.1. Theoretical Analysis

Investment decision-making is one of the three major decisions of enterprises, which is related to the overall strategy and long-term development of the enterprise. It is also an important issue that investors and researchers have long been concerned about (Yu et al., 2014). The development of an enterprise is a process of financing, growth, refinancing, and further development. Corporate financing is usually a long-term development problem that non-financial enterprises need to solve, and there are generally two solutions: internal financing and external financing. In China's banking dominated financial system, bank loans are the most important external financing method. The Equator Principle is an important basis for bank investment, requiring financial institutions to comprehensively evaluate the potential impact of a project on the environment and society before investing in it, and to use financial leverage to enable the project to play a positive role in environmental protection and social harmony. The proposal of the Equator Principles strengthens environmental protection and social responsibility, while reducing the long-term risks of financing projects and enhancing environmental and social harmony, promoting sustainable development. The ESG philosophy has similarities with this principle, which has also promoted the development of companies in terms of ESG philosophy.

2.2. Research Hypothesis

2.2.1. ESG Performance and Corporate Financing

ESG performance comprehensively reflects relevant information such as a company's environment, corporate governance, and social responsibility. It is the core framework for sustainable development of a company and an important lever for implementing sustainable development. ESG has gradually become a key criterion for investors to evaluate companies. Enterprises with better ESG performance will have a better reputation and a lower degree of public information asymmetry, which can effectively reduce their financing constraints and obtain more commercial credit financing (Shang, 2022). Wang et al. (2022) also believe that

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ESG performance provides investors with a lot of corporate information, and good ESG performance can give investors a positive investment signal. The quality of ESG information disclosure plays an indispensable role in corporate financing and financing capabilities, and the impact of environmental factors on financing capabilities is increasingly strengthened. With the proposal of the "carbon peak and carbon neutrality" target in recent years and the government's advocacy for green finance, companies with good environmental performance are more likely to obtain bank loans (Qiu and Yin, 2019). Samet al. (2017) argue that companies with higher social responsibility performance have higher investment efficiency, and found that companies can improve their investment levels by alleviating the problem of information asymmetry in their external disclosure. Jiang et al. (2016) reached a similar conclusion, stating that information asymmetry among information publishers is one of the important reasons for corporate financing constraints. When corporate executives have financial experience, it can alleviate the problem of information asymmetry inside and outside the company, and lower the financing constraints on the company. Corporate social responsibility plays an increasingly important role in the process of economic development. Actively assuming social responsibility can not only effectively improve the relationship between enterprises and employees, but also enhance their own value and influence. The disclosure of corporate social responsibility information has a significant impact on corporate financing constraints, and the financing constraints of companies that disclose social responsibility are significantly lower than those that do not disclose social responsibility reports (He et al., 2012). Based on the above analysis, this article proposes the following two hypotheses:

H1: Good ESG performance can alleviate a company's financing constraints.

H2: Good ESG performance cannot alleviate a company's financing constraints.

2.2.2. The Impact of ESG Performance of Enterprises with Different Ownership Types on Financing Constraints

Chinese enterprises can be divided into state-owned enterprises and non-state-owned enterprises according to their ownership nature, and their operating methods are different. The supervisory departments of state-owned enterprises manage at different levels, while non-state-owned enterprises operate independently. Compared to non-state-owned enterprises, state-owned enterprises have government support policies that give them an advantage in the financing process. And for the development of non-state-owned enterprises, the development of state-owned enterprises will be more stable and easier to obtain investment. For non-state-owned enterprises, investors' inherent thinking is that such enterprises only focus on their own profits and have high flexibility, which cannot determine their long-term development in the future. So non-state-owned enterprises can publicly disclose their non-financial information, allowing investors to have a deeper understanding of the company and reflect its corporate governance through ESG performance, giving investors more accurate data to evaluate the company. Based on the above analysis, this article proposes the following two hypotheses:

H3: Compared to non-state-owned enterprises, the ESG performance of state-owned enterprises can better alleviate their financing constraints.

H4: Compared to state-owned enterprises, the ESG performance of non-state-owned enterprises can better alleviate their financing constraints.

2.2.3. The Impact of ESG Performance of Enterprises in Different Industries on Financing Constraints

In ESG performance, environmental performance has always been a focus of attention in recent years. Guided by the goal of "peak carbon emissions and carbon neutrality", the country vigorously advocates the development of low-carbon and green industries, so investors will focus more on green industries and develop green finance. For heavily polluting enterprises, investors based on stereotypical perceptions may believe that such enterprises do not conform

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to the current economic development model and pose adverse environmental hazards, and may not pay too much attention to the investment of heavily polluting enterprises. Therefore, in order for heavily polluting enterprises to achieve industrial transformation and sustainable development, good ESG performance can play a significant role. Environmental regulatory measures have promoted corporate social responsibility and played a significant role in alleviating financing constraints for heavily polluting enterprises (Shi et al., 2022). By demonstrating ESG performance, companies can showcase their environmental protection measures, demonstrate their social responsibility and unlimited potential during the transformation process, and attract investors' attention. Based on the above analysis, this article proposes the following two hypotheses:

H5: Compared to non heavy polluting industries, good ESG performance can better alleviate financing constraints for companies in heavy polluting industries.

H6: Compared to heavily polluting industries, good ESG performance can better alleviate financing constraints for non heavily polluting industry enterprises.

2.2.4. The Impact of ESG Performance of Enterprises in Different Regions on Financing Constraints

The ESG rating criteria mainly include environmental rating, social responsibility rating, and corporate governance rating. Currently, investors are more concerned about environmental rating. The distribution of energy resources in China varies to varying degrees across regions, with coal and other resources that cause severe environmental pollution mainly distributed in the northern Qinling Huaihe region, with the majority in the central and western regions, and only a small portion in coastal cities. According to the policy classification standards in our country, it can be divided into the eastern region, central region, and western region. The eastern region has limited coal resources and a relatively fast economic development rate. Most of the developing enterprises are high-tech industries, with the tertiary industry being the main sector among the three major industries; However, the coal resources in the central and western regions are abundant, and their economic development lags behind that of the eastern regions. Enterprises mainly consume natural resources, which poses a certain threat to environmental pollution. Based on the above analysis, this article proposes the following two hypotheses:

H7: Compared to the central and western regions, good ESG performance can better alleviate the financing constraints of enterprises in the eastern region.

H8: Compared to the eastern region, good ESG performance can better alleviate the financing constraints of enterprises in the central and western regions.

3. Research Design

3.1. The Data Comes from Sample Selection

This article selects non-financial listed companies from 2009 to 2021 as samples, with ESG rating data sourced from the WIND database and other financial and governance data sourced from the CSMAR database. To avoid the impact of special events on the economy, this article also processed the collected data as follows, including: (1) Removing samples of abnormal transactions; (2) Exclude T-class samples such as ST or * ST; (3) Exclude samples that have been listed for less than one year; (4) To eliminate the influence of extreme values, all continuous variables were subjected to bilateral truncation at 1% and 99%. Finally, a total of 18213 observations were obtained from 1401 companies.

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3.2. Model Setting and Variable Definition

Based on Hypotheses 1 and 2, in order to study the impact of ESG performance on corporate financing, this paper uses the construction of a linear regression model for empirical analysis. The constructed model is shown below:

$$KZ_{i,t} = \beta_0 + \beta_1 ESG1_{i,t} + \beta_2 Controls + \varepsilon \quad (1)$$

In model (1), KZ represents the financing constraints of the enterprise, Controls is the control variable, and ε is the random error term. Model (2) is generated after considering bidirectional fixation (i.e. time fixation effect and firm fixation effect).

$$KZ_{i,t} = \beta_0 + \beta_1 ESG1_{i,t} + \beta_2 Controls + \lambda_t + \zeta_i + \varepsilon_{it} \quad (2)$$

3.2.1. Explained Variable

Referring to the research ideas of Wei Zhihua et al. (2014) and Shi Yongdong et al. (2022), the KZ index is constructed, which can reflect the degree of financing constraints faced by enterprises. The larger the KZ index, the higher the financing constraints faced by enterprises and the lower the financing efficiency. Refer to the five factor KZ index method proposed by Wei Zhihua et al. (2014) to calculate KZ. Enterprises are classified according to their annual cash dividends/total assets (D/A), cash and cash equivalents/total assets (Cash/A), operating cash flows/total assets (CF/A), asset liability ratio (Lev), and Tobin's Q (Q). The first three indicators with values below the median are taken as 1, while the asset liability ratio and Q with values above the median are taken as 1. Add these 5 values together to obtain KZ_0, then use KZ_0 as the dependent variable, and estimate the regression coefficients of each variable with D/A, Cash/A, CF/A, Lev, and Q as independent variables. Finally, use the estimated coefficients to calculate the fitted value KZ. The specific measurement method is as follows:

$$KZ = -11.35 \times CF/A - 45.72 \times D/A - 4.04 \times Cash/A + 5.38 \times Lev + 0.16 \times Q \quad (3)$$

3.2.2. Explanatory Variables

The ESG performance of this article is mainly measured by Huazheng rating data, which is a good data for evaluating how a company's commitments and performance are consistent with its sustainable development goals. Huazheng ESG ratings are divided into 9 categories, from high to low, namely AAA, AA, A, BBB, BB, B, CCC, CC, C. This article sets ESG 1=9, when ESG=AAA; set ESG1 = 8, when ESG=AA, and so on. The value of ESG1 is 1 to 9, and the higher the value of ESG1, the better the ESG performance of the enterprise.

3.2.3. Control Variables

Referring to existing literature, this article selects the following indicators as control variables for this study, including: enterprise size (Size), enterprise age (Age), asset liability ratio (Lev), cash holdings (Cash), return on equity (Roa), fixed asset ratio (Fixed), equity concentration (Top), TobinQ value (TobinQ), independent director ratio (Indep), tangible asset ratio (Tang), revenue growth rate (Growth), and capital intensity (Capital). In addition, this article also controlled for year and enterprise (id1) as fixed variables. The specific variable definitions are shown in Table 1.

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Table 1. Definition and Explanation of Research Variables

Variable	Variable Name	Variable symbol	Variable definition
Dependent variable	Financing constraints	KZ	Calculated by formula (3)
Explanatory variables	ESG rating	ESG1	Huazhong ESG Rating Data
control variable	Enterprise scale	Size	Logarithmic calculation of natural assets
	Enterprise age	Lnage	Year of establishment of the enterprise
	Asset liability ratio	Lev	Total liabilities/total assets
	Cash holdings	Cash	Operating cash flow/total assets
	Return on equity	Roe	Net profit/shareholder equity
	Fixed asset ratio	Fixed	Net fixed assets/total assets
	Concentration of equity	Top	Number of shares held by the largest shareholder/total number of shares
	Tobin's Q value	Tobin	Enterprise market value/total assets
	Proportion of independent directors	Indep	Number of independent directors/number of board members
	Revenue growth rate	Growth	Revenue growth/previous period revenue
	Capital intensity	Captical	Total assets/operating income
	Proportion of tangible assets	Tang	Tangible assets/total assets
	Property Rights Nature	Soe	State owned enterprises have a value of 1, otherwise it is 0
	Enterprise nature	Ind	1 for heavily polluting enterprises, otherwise 0
	Fixed time effect	λ_t	Control year
	Individual fixed effects	ξ_i	Control the enterprise

4. Empirical Results and Analysis

4.1. Descriptive Statistical Analysis

Table 2. Descriptive Statistics

	N	Mean	SD	Min	Max
KZ index	17084	1.624	2.299	-11.345	13.662
ESG1	18213	4.047	1.131	1	8
Fixed	18211	0.241	0.182	0.002	0.719
Tang	18211	0.934	0.084	0.526	1
Growth	18137	0.455	1.29	-0.684	8.452
Top	18211	34.775	15.192	8.413	74.295
Lev	18211	0.499	0.208	0.05	0.953
Cash	18206	0.174	0.124	0.014	0.694
Tobin	17792	2.061	1.489	0.848	9.413
Roe	18040	0.056	0.147	-0.828	0.341
Size	18206	22.485	1.417	19.541	26.331
Lnage	18212	2.665	0.513	0	3.332
Capital	18183	2.616	2.537	0.377	15.571
Indep	18211	0.374	0.07	0.25	0.6
id	18213	701	404.445	1	1401
year	18213	2015	3.742	2009	2021

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According to the descriptive statistical analysis results in Table 2, the maximum value of the KZ index is 13.662, the minimum value is only -11.345, and the variance is 2.299. It can be seen that there are significant differences in financing constraints among different enterprises. From the ESG1 data, it can be seen that there is a significant gap between the ESG ratings of different types of enterprises, with some companies having an ESG rating of only 1 (i.e. CCC), while others have already reached an ESG rating of 8 (i.e. AA). The average ESG rating of the enterprise is 4.047, with a variance of 1.131, indicating that the majority of the enterprise's ESG ratings are between BB and B. This suggests that the average level of the enterprise's ESG rating is at a moderate level, with significant room for improvement.

4.2. Benchmark Regression Model

Table 3 shows the benchmark regression results of Model (1) and Model (2), where Column (1) presents the results of the most primitive model without considering control variables and fixed effects, Column (2) only considers control variables, Column (3) only adds bidirectional fixed effects (time fixed effects and firm fixed effects), and Column (4) comprehensively considers both control variables and bidirectional fixed effects. According to the regression results, the better the ESG performance of a company, the lower its financing constraints. When the time and company are not fixed, the ESG coefficient is -0.026 and significantly negative at the 5% significance level. When considering bidirectional fixation, the ESG coefficient becomes -0.049 and significantly negative at the 1% significance level. This indicates that the higher the ESG rating of a company, the significantly lower its financing constraints. Good ESG performance can alleviate the problem of financing constraints and promote corporate financing. Therefore, the H1 hypothesis has been confirmed, and the H2 hypothesis is not valid.

Table 3. Benchmark Regression Results

	(1)	(2)	(3)	(4)
ESG1	-0.172***	-0.026**	-0.328***	-0.049***
	(-10.48)	(2.31)	(-13.64)	(-4.96)
Constant	2.377***	9.423***	2.973***	3.444***
	(29.79)	(28.69)	(30.06)	(7.84)
control variable		yes		yes
Observations	17,084	17,014	17,084	17,014
R-squared			0.026	0.705
Fixed Enterprise			yes	yes
Fixed time			yes	yes

Note: * * *, * *, and * represent significance levels of 1%, 5%, and 10%, respectively. The values in parentheses are heteroscedastic robust standard errors.

4.3. Robustness Test

4.3.1. Replace the Explained Variable

Financing constraints are jointly influenced by multiple factors such as external financial environment and internal governance of enterprises, but financing constraints themselves are difficult to accurately measure. Therefore, researchers use internal and external factors as indicators to measure the financing constraints of enterprises, and construct variables such as KZ index, SA index, FC index, WW index, etc. The financing constraint FC index refers to the strength of financing ratio constraints on a company's balance sheet, and is an important indicator for measuring the level of financing constraints. It is usually used to evaluate the openness of the equity financing market. The higher the index, the stricter the financing constraints; The lower the index, the more relaxed the financing constraints are. This article

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selects the FC index as a replacement variable for the KZ index, and establishes an FC index model based on Kuang et al. (2010) and Gu et al. (2020):

$$P(QUFC = 1 \text{ or } 0|Z_{i,t}) = \frac{e^{Z_{i,t}}}{1+e^{Z_{i,t}}} \tag{4}$$

$$\begin{aligned} Z_{i,t} = {} & \alpha_0 + \alpha_1 size_{i,t} + \alpha_2 lev_{i,t} + \alpha_3 (\frac{CashDiv}{ta})_{i,t} + \alpha_4 MB_{i,t} \\ & + \alpha_5 (\frac{NWC}{ta})_{i,t} + \alpha_6 (\frac{EBIT}{ta})_{i,t} \end{aligned} \tag{5}$$

Among them, ta represents total assets, CashDiv represents cash dividends issued by the company in the current year, MB represents the company's market to book ratio, NWC represents net operating capital, and EBIT represents pre tax profit.

Construct a model based on the FC index to regress FC financing constraint indicators and ESG ratings:

$$FC_{i,t} = \beta_0 + \beta_1 ESG1_{i,t} + \beta_2 Controls + \lambda_t + \zeta_i + \varepsilon_{it} \tag{6}$$

From the results of replacing the dependent variable in Table 4, it can be seen that the regression results using the FC index are consistent with the KZ index results, indicating a negative correlation between a company's ESG performance and its financing constraints. The higher the ESG rating, the better the performance, and the looser the company's financing constraints. And the results are all quite significant. This indicates that the proxy variables of different financing constraints do not have an impact on the research conclusions, and further confirms the robustness of the negative correlation between ESG performance and corporate financing constraints.

Table 4. Results of Replacing the Explained Variable

	(1)	(2)	(3)	(4)
ESG1	-0.046***	-0.002*	-0.046***	-0.001**
	(-26.52)	(-1.96)	(-8.50)	(0.35)
Constant	0.575***	3.695***	0.574***	3.998***
	(39.91)	(159.40)	(25.66)	(36.94)
control variable		yes		yes
R-squared			0.040	0.787
Fixed Enterprise			yes	yes
Fixed time			yes	yes

Note: * * *, * *, and * represent significance levels of 1%, 5%, and 10%, respectively. The values in parentheses are heteroscedastic robust standard errors.

4.3.2. Replace Explanatory Variables

In benchmark regression, this article assigns one-to-one values based on the ESG rating results from AAA to C and sets 9 indicator values for ESG1. In the robustness test, this article reassigns the ESG rating results of Huazhong Securities and constructs the ESG2 index. When the ESG rating is AAA to A, ESG2=3; When the ESG rating from BBB to B, ESG2=2; When the ESG rating is at CCC to C, ESG2=1. Regression analysis was conducted on the model after replacing the explanatory variables, and the results are shown in columns (1) - (2) of Table 5. The first data

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result shows that without considering control variables such as time and fixed enterprise, the ESG2 coefficient is -0.295, which is significantly negative at the 1% significance level, indicating that the replacement of explanatory variables will not affect the research conclusions of this article. Taking into account both control variables and bidirectional fixation, the results are shown in column (2) of Table 5, where the coefficient of influence of ESG2 on financing constraints is -0.104, which is significantly negative at the 1% level. This result further indicates the stability of the research conclusions in this article.

4.3.3. Shorten the Time Window

Environmental protection has always been an important component of China's economic development process. At the Fifth Plenary Session of the 18th CPC Central Committee in 2015, General Secretary Xi pointed out that to adhere to the concept of green development, we must adhere to the basic national policy of conserving resources and protecting the environment, and proposed to build the concept of innovation, coordination, development, sharing and green development. The proposal of the concept of green development has a significant impact on the economic development of enterprises. Enterprises are the main force in promoting social construction and ecological environment protection. While pursuing maximum economic benefits, they also have to bear the social responsibility of green development. In the pursuit of green development, enterprises will actively abandon or change the production mode that has caused damage to the ecological environment in the past, and reduce environmental pollution through technological innovation and energy consumption reduction. This approach not only effectively reduces the environmental pollution emissions of enterprises and enhances their environmental ratings, but also promotes their social responsibility, which is beneficial for enhancing their good social image. The effect is more pronounced for heavy industry, high energy consuming, and heavily polluting enterprises. Ecological civilization was written into the Constitution in 2018. Under stricter policy constraints, enterprises will pay more attention to environmental protection in their production activities. To avoid the influence of other policy concepts on the research conclusions, this article considers 2015 as an important key point in the development of ESG in China, and conducts research by changing the sample interval. Select sample data from 2009 to 2014 for regression, and the regression results are shown in columns (3) - (4) of Table 5. Under the control of variables, fixed time, and fixed enterprise, the coefficient between ESG1 and corporate financing constraints is -0.078, which is significantly negative at the 1% significance level. This indicates that the conclusion still holds after excluding other data that may affect ESG rating results. Explain the robustness of the benchmark regression results.

Table 5. Results of Replacing Explanatory Variables and Shortening Time Windows

	(1)	(2)	(3)	(4)
ESG1	-0.172***	-0.049***	-0.098***	-0.078***
	(-10.48)	(-4.96)	(-3.49)	(-5.47)
ESG2	-0.295***	-0.104***		
	(-8.08)	(-5.03)		
Constant	2.186***	3.561***	2.504***	2.144***
	(28.49)	(8.32)	(19.89)	(5.95)
control variable		yes		yes
R-squared		0.705		0.721
time	13	13	6	6
Fixed Enterprise		yes		yes
Fixed time		yes		yes

Note: * * *, * *, and * represent significance levels of 1%, 5%, and 10%, respectively. The values in parentheses are heteroscedastic robust standard errors.

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4.3.4. Endogeneity Test

ESG information disclosure and information use may have a lag effect. To alleviate its impact on research conclusions and reduce the problem of bidirectional causality, this article uses a lag of one period to regress the explanatory variables to the original model. According to the regression results in column (2) of Table 6, the explanatory variable coefficient for the lagged period is -0.029, which is significantly negative at the 5% significance level. The results of benchmark regression demonstrate robustness. Observing the results in column (4), it can be seen that after fixing time and enterprise in both directions, the L.ESG1 result is still negative, significantly negative at the 10% significance level.

Table 6. Regression Results with One Phase Lag

	(1)	(2)	(3)	(4)
L.ESG1	-0.154***	-0.029**	-0.117***	-0.008*
	(-9.18)	(-2.45)	(-6.64)	(-0.62)
Constant	2.259***	9.234***	2.061***	13.016***
	(27.93)	(27.16)	(28.03)	(23.32)
control variable		yes		yes
R-squared			0.003	0.467
id	1,401	1,401	1,401	1,401
Fixed Enterprise			yes	yes
Fixed time			yes	yes

Note: * * *, * *, and * represent significance levels of 1%, 5%, and 10%, respectively. The values in parentheses are heteroscedastic robust standard errors.

5. Heterogeneity Test

5.1. Heterogeneity Test of Property Rights

Under the unique economic background of our country, there are differences in financing constraints and ESG performance between state-owned and non-state-owned enterprises. Based on the nature of corporate ownership, this article divides the sample into state-owned listed companies and non-state-owned listed companies to study the impact of ESG performance on corporate financing under different ownership types. The specific regression results are shown in columns (1) - (2) of Table 7. It can be seen that for both state-owned and non-state-owned enterprises, the impact of ESG performance on financing constraints shows a significant negative correlation at the 1% level, but the absolute coefficient of state-owned enterprises is smaller than that of non-state-owned enterprises. This result confirms the accuracy of hypothesis H4 and negates H3.

Compared to non-state-owned holding enterprises, state-owned holding enterprises have their uniqueness. The controlling entity is the national government, which invisibly establishes a good corporate image in the minds of investors or investment institutions. Their financing constraints are relatively relaxed compared to non-state-owned holding enterprises, making it relatively easy to obtain financial or technological support in the credit market. At the same time, it is precisely because the main body of state-owned holding enterprises is the national government that such enterprises will have stricter environmental constraints in their production activities, actively responding to the government's green development concept and applying green development technologies to production. In terms of corporate governance, internal management personnel are selected by the government and have a strong management team. At the level of social responsibility, state-owned holding enterprises are influenced by government policy concepts and actively engage in social responsibility.

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Therefore, the ESG performance of state-owned holding enterprises will not be too low. Non state-owned holding enterprises have higher financing costs and lower returns than similar state-owned enterprises. In the investment process, the other party considers the risk and proposes more financing conditions to non-state-owned enterprises, making them face more financing constraints. Therefore, non-state-owned holding enterprises can consider carrying out corporate green transformation and green development to alleviate their financing constraints. In addition, non-state-owned enterprises should further improve their corporate governance structure, actively assume social responsibilities, and establish a good corporate image.

5.2. Industry Heterogeneity Test

Considering that the evaluation criteria for ESG performance include environmental governance factors, this article conducts heterogeneity tests on industries with different levels of pollution. The classification of heavily polluting industries is mainly based on the "Guidelines for Industry Classification of Listed Companies" revised by the China Securities Regulatory Commission in 2012 and the "Guidelines for Environmental Information Disclosure of Listed Companies" , which are divided into 16 heavily polluting industries such as coal, mining, textile, petrochemical, chemical, metallurgical, thermal power, and pharmaceuticals. Study the regression relationship between ESG performance and corporate financing constraints in industries with different levels of pollution. According to the research results in columns (3) - (4) of Table 7, it can be seen that ESG performance has a negative impact on financing constraints in industries with different levels of pollution, and all have a significant impact. But the results in heavily polluting industries are more significant than those in non heavily polluting industries. This further confirms H5.

Table 7. Regression Results of Property Heterogeneity and Industry Heterogeneity

	State owned holding	Non-state-owned holding	Non-heavy polluting industries	Heavy polluting industries
	(1)	(2)	(3)	(4)
ESG1	-0.0378***	-0.0803***	-0.0455**	-0.0488***
	(0.0089)	(0.0148)	(0.0193)	(0.0081)
Constant	3.8338***	5.4813***	3.6852***	3.2173***
	(0.3421)	(0.6246)	(0.3810)	(0.5802)
control variable	yes	yes	yes	yes
R-squared	0.719	0.699	0.716	0.699
time	13	13	13	13
Fixed Enterprise	yes	yes	yes	yes
Fixed time	yes	yes	yes	yes

Note: * * *, * *, and * represent significance levels of 1%, 5%, and 10%, respectively. The values in parentheses are heteroscedastic robust standard errors.

Compared to non heavy polluting industries, heavy polluting industries generate more pollutants such as exhaust gas and wastewater during the production process, which poses a threat to the environment and society. Therefore, companies operating in such industries have lower ESG performance. With the continuous improvement of ESG rating standards and the increasing awareness of environmental protection and requirements for ecological environment construction, enterprises operating in heavy polluting industries are facing increasing pressure on environmental protection, and will shift their focus to environmental

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protection. Therefore, heavily polluting industries can further promote energy-saving and emission reduction measures for enterprises, actively introduce high-tech talents to promote green development of enterprises. And for heavily polluting industries, government departments encourage them to undergo green transformation and formulate environmental regulations to appropriately relax their financing constraints. The non heavily polluting industries themselves have relatively less environmental pollution, and there will not be a significant difference in environmental ratings. Enterprises belonging to this industry can effectively improve their ESG performance by enhancing their corporate management mechanisms and strengthening their commitment to social responsibility, thereby reducing financing constraints and facilitating their financing activities.

5.3. Regional Heterogeneity Test

Given the uneven level of economic development in geographical regions of our country, as well as the differences in industrial development among different regions, there are certain disparities in economic development levels among different areas. This article divides China's 31 provinces, municipalities, and autonomous regions into the eastern region and the central western region according to the policy classification standards of China's eastern, central, and western regions (excluding Hong Kong, Macau, and Taiwan due to data search reasons). Further research on the impact of corporate ESG performance and financing constraints in different regions. According to the heterogeneity regression results in Table 7, the ESG performance of enterprises shows a significant impact at the 1% level in both the eastern and central western regions. The improvement of ESG performance can alleviate the financing constraints of enterprises in the eastern and central western regions. From the absolute value of the ESG1 impact coefficient, the ESG performance of enterprises is stronger in the eastern region than in the central and western regions. This result confirms hypothesis H7.

Compared to the central and western regions, the eastern region has more abundant financial resources, and most of the eastern regions are coastal provinces with more convenient and close exchanges with foreign countries. The financing pressure is relatively small, and the financing constraints are relatively relaxed. Therefore, good ESG performance of enterprises can better alleviate their financing constraints. On the contrary, the central and western regions are located within China's geographical location and lack important maritime transportation modes for economic exchanges compared to the eastern regions, which may result in a lack of some foreign financing. At the same time, although the central and western regions have abundant natural resources and rely on mountains for food and rivers for water, there are also a large number of heavily polluting enterprises in the central and western regions. The relevant governments neglect environmental governance in order to vigorously develop the regional economy, resulting in low environmental governance scores for enterprises. Therefore, the central and western regions can further increase efforts to control environmental pollution and strengthen environmental protection to alleviate financing constraints within the region. In addition, the marketization process in the central and western regions lags behind that in the eastern regions, and there is also great room for improvement in the financial system. Therefore, the financing constraints in the central and western regions are stricter than those in the eastern regions. For the central and western regions, local governments should further improve the financial institution system, encourage enterprises to engage in green innovation, implement green development strategies, and achieve sustainable development goals for enterprises.

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Table 8. Regional Heterogeneity Regression Results

	Eastern region	Central and Western Regions
	(1)	(2)
ESG1	-0.0542***	-0.0413***
	(0.0104)	(0.0133)
Constant	1.8701***	6.5423***
	(0.4985)	(0.4238)
control variable	yes	yes
R-squared	0.701	0.718
time	13	13
Fixed Enterprise	yes	yes
Fixed time	yes	yes

Note: * * *, * *, and * represent significance levels of 1%, 5%, and 10%, respectively. The values in parentheses are heteroscedastic robust standard errors.

6. Conclusion and Suggestions

This article uses sample data of A-share listed companies in China from 2009 to 2021, excluding non-financial enterprises, to study the impact of corporate ESG performance on corporate financing. The study found that a good ESG rating of a company has a significant negative correlation with its financing constraints, and the results still hold true after robustness operations such as changing the explanatory and dependent variables and shortening the time interval, indicating the robustness of the research conclusions in this article. Heterogeneity analysis shows that the ESG performance of non-state-owned holding enterprises has a more significant impact on their financing constraints from the perspective of property rights; Compared to non heavy polluting industries, the improvement of ESG ratings for companies in heavy polluting industries has a more significant effect on alleviating financing constraints; Enterprises in the eastern region are more susceptible to changes in ESG performance due to financing constraints than those located in the central and western regions. Based on the above research conclusions, this article proposes the following suggestions:

(1) Continuously promote the construction of ESG system and deepen the development of ESG concepts in enterprises. As the carrier of the concepts of "environment, social responsibility, and corporate governance", ESG has become an important concept for sustainable development. At present, there is no unified standard for the construction of ESG indicator system both domestically and internationally. Therefore, the construction of ESG indicator system in China can be based on the industry characteristics and economic development model, taking into account the upgrading of traditional industries and low-carbon green development. The government encourages third-party review agencies and enterprises to participate in the disclosure and review of ESG information, and establish a high-quality and high standard ESG evaluation system. We need to continuously improve policy systems and assessment mechanisms, and focus on integrating ESG management requirements into various aspects of corporate governance and operations. As the main service platform for equity financing of listed companies, exchanges provide new vitality for the development of enterprises. Based on the current development status of enterprises, guidelines for EGS information disclosure can be developed to enhance awareness and attention to ESG information, guide more enterprises to participate in ESG information disclosure and rating, and better promote corporate ESG performance to achieve sustainable development. In addition, we will increase the promotion and publicity of ESG concepts to enhance the awareness of ESG among corporate entities.

(2) Implement differentiated policies and implement tailored controls. Compared to state-owned holding enterprises, non-state-owned holding enterprises face stricter financing

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constraints, mainly due to their inadequate management level. Therefore, non-state-owned enterprises should strengthen their management awareness, improve their internal governance structure, closely follow national policies to increase investment in scientific and technological innovation, and enhance the competitiveness of their enterprises and products in the market. Actively introducing professional third-party guarantee agencies to build a bridge between non-state-owned holding enterprises and investment institutions, reducing risks for investment institutions and lowering financing constraints for non-state-owned holding enterprises. The government should allocate resources reasonably to different types of enterprises and promote the alignment of the development pace between non-state-owned enterprises and state-owned enterprises. At the same time, government departments can formulate relevant policies for enterprises operating in heavy polluting industries, provide funding and technological support for environmental protection in heavy polluting industries, and offer environmental subsidies, preferential loan policies, and other measures to alleviate financing constraints. Enterprises themselves should actively strengthen environmental governance and protection, increase investment in pollution control, reduce pollutant emissions, and improve their environmental protection level to enhance their reputation and ESG rating. For enterprises in the eastern and central western regions, there are problems such as relatively backward production technology, low production efficiency and economic benefits, and a lack of talent resources. At the enterprise level, it is necessary to adopt a combination of scientific and technological innovation, introduce high-quality professional talents, and enhance the vitality of the enterprise. The government should further improve the market-oriented construction in the central and western regions, and establish a sound financing mechanism for banks and other institutions in the central and western regions. According to regional differences, provide varying degrees of material, financial, and other resource support to enterprises to promote their sustainable development.

(3) Expand diversified financing channels and alleviate financing constraints. Expanding financing channels is an effective way to alleviate corporate financing constraints. The more financing options a company has, the lower the degree of financing constraints it faces. In addition to relying on bank loan funds, enterprises should also make good use of non bank funds, such as government fiscal funds, private funds, as well as direct or indirect channels such as foreign investment, equity financing, and bond financing, in order to alleviate the financing pressure on enterprises. At the same time, we will amplify the government's financing guarantee function, encourage local governments to establish credit guarantee institutions for small and medium-sized enterprises through fiscal appropriations, social capital injections, donations, and other means, improve freight forwarding rates and lending speed, in order to alleviate financing constraints. Encourage the development of financial leasing business. When a company lacks funds but needs to use certain equipment, it can rent the equipment to the company for use. This not only helps the company to carry out normal production activities but also eliminates the need to worry about financial issues, helping the company achieve green transformation and promote the achievement of sustainable development goals.

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