

The Impact of Firms' ESG Performance on Financing Constraints

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Abstract: *This paper explores the impact of corporate ESG performance on financing constraints based on the data of Huazheng's ESG ratings with a sample of Chinese A-share listed companies from 2012-2021. It is found that financing constraints are negatively correlated with the increase of corporate ESG ratings. Heterogeneity analysis shows that the mitigating effect of corporate ESG performance on financing constraints is more obvious in enterprises whose property rights are state-owned in nature, non-heavily polluted enterprises, and larger firms. The results of the mechanism test indicate that business risk, management power, shareholding ratio of institutional shareholders and are the main mechanisms through which ESG produces a mitigating effect on financing constraints. Theoretically, this paper enriches the study of the economic consequences of corporate ESG performance from the perspective of financing constraints, and at the same time broadens the path for alleviating corporate financing constraints; practically, it provides empirical evidence and policy references for strengthening the construction of the corporate ESG system and accelerating the construction of a fair and competitive financial market.*

Keywords: Firm ESG performance; Financing constraints; Business risk; Management power; Institutional investors' shareholding ratio.

1. INTRODUCTION

As the concepts of "sustainable development" and "dual-carbon" continue to evolve and develop into a global consensus, the development of ESG has also entered into a booming stage, which is an investment model that is a win-win situation for the environment, society and governance. Corporate ESG performance, as the epitome of corporate sustainability, is currently [1] the key indicator used internationally to measure corporate sustainability (Burke, 2022)[2], and is one of the three new pillars to support the sustainable development of business and society. Corporate ESG performance helps to implement the new development concept, accelerate the reform process, promote the healthy development of China's market, improve the efficiency of financial services for the real economy and support economic transformation, and better manage the relationship between the economy, nature and society. The report of the 20th CPC National Congress also emphasizes "accelerating the construction of a new development pattern, focusing on the real economy in economic development; promoting green development, advocating green consumption and developing low-carbon industries; actively promoting carbon peak carbon neutral, and responding to the global governance of climate change", which lays the theoretical and policy foundation for the development of ESG in China. In this context, the study of corporate ESG performance is of great significance to China's high-quality economic development.

As of 2019, more than thirty national and regional trading organizations around the world have already made requests regarding the disclosure of ESG information; KPMG's Sustainability Survey 2020 reports that 80% of the top 100 companies in 52 countries selected by the country chose to disclose their sustainability reports (Yuan Tian et al., 2021)[25]; According to the Global Sustainable Investment Coalition's statistics for selected regions around the world (Europe According to the Global Sustainable Investment Alliance's statistics for some regions of the world (Europe, the United States, Canada, Japan, and Oceania), the investment management scale of ESG has increased dramatically from US\$13.20 trillion in 2012 to US\$35.30 trillion by the beginning of 2020, and the data compiled by the Ministry of the Environment of Japan shows that in 2020, the global issuance of green bonds for ESG reaches US\$290.1 billion (Mo Li, 2021)[22]; In addition, according to the "China 2021 White Paper on ESG Development", the total management scale of China's sustainable development funds reached 339 billion yuan by the end of September 2021, nearly doubling the growth compared to the end of 2020, of which China's "Float-ESG" themed public funds are the largest, with their total scale exceeding 220 billion yuan for the first time (Li Sisi, 2022). (2022)[19]; In summary, corporate ESG performance has been increasingly emphasized by all walks of life, and has become a direction strongly advocated by all sectors of society.

Difficult and expensive financing for enterprises has long been a constraint on the development of enterprises in China, and is an important bottleneck for economic transformation and upgrading (Yu Jingwen et al., 2021)[27],

especially for small and medium-sized enterprises. According to the National Burden Survey and Evaluation Report 2021, 66% of enterprises reflect the problem of "high financing cost", which is 6 percentage points higher than last year. Can ESG performance, as a characteristic of high-quality development of enterprises, effectively alleviate the financing problem? Studies have shown that corporate ESG performance has a negative and positive impact on equity financing cost and debt financing cost respectively (Chen, Ruohong et al., 2022)[16] and Wang et al. (2022)[13] found that excellent ESG performance can help alleviate the financing constraints of corporations, improve operational efficiency, reduce the financial risk of corporations, and increase corporate value. Then, what is the impact of corporate ESG performance on financing constraints? The study of this issue not only reveals the economic results and influence mechanism of corporate ESG performance on financing constraints, but also can cause enterprises to pay attention to ESG and system construction, which provides a reference for accelerating the construction of a fair and competitive financial market.

Specifically, this paper analyzes the sample data of Chinese A-share listed companies from 2012 to 2021 using the data of ESG ratings from a third-party agency, Huazheng. The marginal contributions of this paper are as follows: It enriches and expands the research on the economic consequences of corporate ESG performance from the perspective of financing constraints, and obtains the conclusion that corporate ESG performance has a mitigating effect on financing constraints. Although the literature has emphasized that corporate ESG performance can alleviate financing constraints, it has not explored the internal mechanism of corporate ESG performance to alleviate financing constraints from the aspects of "business risk" and "management power" and related issues. The literature has not explored the internal mechanism of corporate ESG performance to alleviate financing constraints and related issues from the perspectives of "business risk" and "management power". It analyzes the problem of heterogeneity under the different situations of enterprise property rights, industry characteristics, and enterprise scale; It has clear and important practical significance. This paper focuses on whether and how the financing constraints are affected by the ESG performance of enterprises, and explains how to build and improve the ESG performance of enterprises to alleviate the problem of financing constraints for enterprises and solve the problem of "difficult to expensive" financing to a certain extent, and help enterprises to achieve high-quality development of the economy.

The structure of the remaining text is organized as follows: the second part is the theoretical foundation and research hypotheses; the third part is the research design; the fourth part is the analysis of empirical results; and the fifth part is the research conclusions and implications.

2. THEORETICAL FOUNDATIONS AND RESEARCH HYPOTHESES

2.1 The Impact of Corporate ESG Performance on Financing Constraints

First of all, according to the theory of information asymmetry, the person who has more adequate information often occupies an advantageous and favorable position. The true objectivity of traditional financial statement disclosure can be affected by human factors, and financial fraud often occurs, leading to inadequate, untrue and incomplete information for investors. Unlike traditional financial statements, ESG disclosure is more standardized, ESG disclosure content and responsibility issues have certain requirements, is completed by a specialized third-party agency, the rated companies can not participate, the authenticity of the data can be guaranteed (Bai Murong et al., 2022)[15], and more and more companies voluntarily disclose company information, which can disseminate more information to the investor, and it is particularly important in the asymmetric information market is particularly important, and good disclosure information can enable investors to make more judgmental decisions. Studies have shown that companies that pay more attention to ESG performance typically have highly transparent financial reporting, more stable operating conditions, and high levels of investment efficiency. According to Cuadrado-Ballesteros et al. (2016)[8], high quality financial reporting and disclosure can reduce corporate finance constraints by reducing information asymmetry (Hsu and Ziedonis, 2013)[3].

Secondly, according to the stakeholder theory, in realizing its economic value, an enterprise, in addition to being accountable to its shareholders, also needs to assume due responsibility to other stakeholders. The support and trust of stakeholders is an important reason for the survival and development of enterprises in the competitive market. After enterprises protect the ecological environment, fulfill their social responsibility and improve their governance level, positive signals will be conveyed, and they will be praised by people at all levels and trusted by investors, and stakeholders will be more willing to cooperate with enterprises that have a better ESG performance, and enterprises that do a good job in environmental protection and social responsibility will be less prone to corporate crises, which is important for enterprises to get support from stakeholders. The enterprises that

do a good job in environmental protection and social responsibility are less likely to have a corporate crisis, which has a positive effect on the support of the enterprise by the stakeholders. After the enterprise gets the support, it can then enhance the investors' willingness to invest, expand the capital scale, improve the cash flow, and play an important role in enhancing the financing ability. As a result, the firm's access to external resources is enhanced and financing constraints are reduced.

In addition to the above two theoretical factors, on the one hand, the impact of firms' ESG performance on financing constraints also depends on how much investors value ESG. The more investors attach importance to ESG, the more they may pay more attention to the performance of corporate ESG scores rather than the data shown in traditional financial statements in the investment process. Richardson (1999)[12]found that, unlike traditional investors, there exists a portion of investors who, in the process of investment, consider the social responsibility situation of the project more than the traditional return on investment income. The investment preference of this part of investors is the fulfillment of corporate social responsibility, so for this kind of investors, the investment cost can be affected by improving the ESG performance of the enterprise; Heinkel et al. (2001)[6]found that when the investors have a strong sense of social responsibility, the more they will focus on observing the performance of the enterprise in this aspect, and even according to their own investment preferences in this aspect of social responsibility, they will decide whether to participate in the investment or not. In this case, investors basically will not consider enterprises with poor ESG performance scores. This shows that investors who prefer corporate ESG performance will influence whether or not to invest in the enterprise. On the other hand, the impact on financing constraints is explained when the explanatory variable ESG is split into three separate explanatory variables E, S, and G. Related research shows that studying environmental information disclosure under the heterogeneity perspective, empirical results show that: the disclosure of environmental protection information significantly reduces financing constraints, and the mitigating effect is particularly significant in enterprises such as industry competition (Xu Lin, 2021)[26]; Enterprises actively undertake social responsibility can effectively improve the corporate reputation and long-term interests of the enterprise in order to increase the value of the enterprise's strategy, which, among other things, increases social capital, which can effectively ease the financing constraints (Wang Lei et al., 2017)[24]; In the economic context, vigorously improving the corporate governance environment can alleviate the financing constraints suffered by enterprises in the process of financing, and realize the improvement of financing efficiency (Huang Xiaoling, 2022)[18].

In summary, this paper proposes hypothesis H1:

H1: The better the firm's ESG performance, the more significant the mitigating effect on financing constraints.

2.2 Analysis of the impact mechanism of corporate ESG performance in reducing financing constraints

From the perspective of operational risk (Risk) of corporate ESG performance, according to the reputation mechanism, enterprises with good corporate ESG performance will demonstrate their strong strength and outstanding competitiveness to the market and investors through various methods. Enterprises actively transmit positive signals, inform investors, shareholders and the public about environmental protection, social responsibility and corporate governance, focus social resources, and shape a positive and good corporate image, bringing the enterprise reputational credit at all levels of society. When enterprises face bad events, reputation can also play a role in insuring to a certain extent, reducing the impact of negative news about the enterprise, thus mitigating the business risks suffered by the enterprise in the course of operation. Therefore, good corporate ESG performance can reduce operational risk to achieve the trust of stakeholders and investors, and achieve access to capital to alleviate the financing constraints faced by enterprises. Based on this, this paper proposes hypothesis H2:

H2: There is a mediating effect of firm business risk between ESG performance and financing constraints.

From the point of view of enterprise management power (Power), according to the risk appetite and principal-agent theory, enterprise management power will have great disadvantages, different decision-makers hold different views of risk, if the management is risk-averse, will choose bold and risky pull investment strategy; and when is risk-averse, will be careful to consider the plan, which will lead to the enterprise to miss a good opportunity, can not be in the first time to fully and effectively obtain external resources. The result is that the company misses the opportunity and is unable to obtain the external resources in the first time adequately and effectively. In addition, too much power in management can lead to personal gain at the expense of the company. When a company has a good ESG performance, it will have perfect and sound internal control in corporate governance. It can effectively supervise and regulate the behavior of management, thus reducing the financing constraints faced by the enterprise

to a certain extent. Based on this, this paper proposes hypothesis H3:

H3: Excessive corporate management power mediates the effect between ESG performance and financing constraints.

In terms of institutional investors' shareholding ratio (INST), they prefer enterprises with effective corporate governance and high corporate transparency. Compared with individual investors, institutional investors are more able and interested in obtaining corporate ESG information, allocating corporate resources efficiently, enhancing corporate value, and seeking more benefits for this purpose; early studies have shown that there is a positive correlation between institutional investor shareholding ratio (INST) and CSR performance, using data from both the United States and Canada as samples (Graves et al. (1994), Mahoney et al. (2007))[4][11]. The better the ESG performance of the enterprise, the more institutional investors' shareholding joins, which can make the enterprise to obtain external stable capital and alleviate the financing constraint more obvious. Therefore, in this paper, the proportion of institutional investor shareholding is used as a cross-multiplier term to formulate hypothesis H4:

H4: The mitigating effect of firms' ESG performance on financing constraints is more pronounced for firms with higher institutional investors' shareholding.

3. RESEARCH DESIGN

3.1 Sample selection and data sources

This paper selects the data of Chinese A-share listed companies from 2012 to 2021 as the research sample to study the impact of corporate ESG performance on their financing constraints. Huazheng ESG ratings are selected as the data used for this corporate ESG, and all other company-related data come from CSMAR database and Wind database, based on which: companies in the financial industry; ST and PT companies; and companies with significant missing data are excluded. In addition, in order to eliminate the impact of extreme values on the results of empirical research, all continuous variables at the 1% and 99% quantile were subjected to shrinking.

3.2 Variable Definition

Explained variable: financing constraints (WW)

Financing constraint: the phenomenon that occurs when the external cost of financing is higher than the internal cost. Existing literature measures corporate financing constraints mainly include WW index (Whited and Wu, 2006)[14], SA index (Hadlock and Pierce, 2010)[5], KZ index (Kaplan and Zingales, 1997)[10], constructing financing constraints indicators based on textual analysis methods (Hoberg and Maksimovic, 2015)[7] and so on. In this paper, with the help of WW index as the main explanatory variable, the larger the value of WW index, the greater the financing constraint. The specific calculation model is:

$$WW = -0.091CFit - 0.062DIVPOSit + 0.021TLTDit - 0.044LNTAit + 0.102ISGit - 0.035SGit \quad (1)$$

Where CFit stands for cash flow/total assets, DIVPOSit is a dummy variable taken by the firm at the time of dividends, TLTDit is the result of dividing the firm's long-term liabilities by its total assets, LNTAit is the natural logarithm of total assets, ISGit is the sales growth rate of the industry in which the firm operates, and SGit is the firm's sales growth rate.

Explanatory variables: corporate ESG performance (ESG)

With the rise of the ESG concept, many ESG rating standards have appeared at home and abroad, and there are differences in their respective standards, this paper adopts the more widely used Huazheng ESG rating data. The ESG ratings are rated every quarter, and the average value is derived as the ESG score for the year through the weighted average of four times a year to obtain the ESG score and the final AAA-C rating of nine grades. To facilitate the empirical study, AAA-C are assigned separately with reference to Lian, Yonghui et al. (2019).[17]

Control variables

Based on and drawing on the existing literature, this paper selects firm size, financial leverage, corporate growth,

profitability, shareholding of top shareholders, number of directors, proportion of independent directors, dual positions, nature of ownership, SOE, balance of equity, and management shareholding as control variables, while adding year dummy variables and industry dummy variables. (SOE), equity checks and balances (Balance), and management shareholding (Mshare) are used as control variables, while year dummy variables and industry dummy variables are added, and the specific variable definition table is shown in Table 1:

Table 1: Variable Definition Table

name (of a thing)	notation	define
Financing constraints	WW	$-0.091CFit-0.062DIVPOSit+0.021TLTDit-0.044LNTAit+0.102ISGit-0.035SGit$
Corporate ESG performance	ESG	Huazheng ESG Rating, Assignment 1-9
Enterprise size	Size	Natural logarithm of total assets for the year
financial leverage	Lev	Total liabilities at year-end/total assets at year-end
Corporate Growth	Growth	(Current year's operating income/previous year's operating income)-1
profitability	ROA	Net profit/average balance of total assets
Shareholding of the largest shareholder	Top1	Number of shares held by the largest shareholder/total number of shares
Number of Directors	Board	The number of board members is taken as a natural logarithm
Proportion of independent directors	Indep	Number of independent directors/directors
two jobs in one	Dual	Chairman and general manager of the same person for 1, otherwise 0
Nature of property rights	SOE	State-controlled enterprises take the value of 1, others 0
Shareholding checks and balances	Balance	Shareholding ratio of second largest shareholder/shareholding ratio of first largest shareholder
Management shareholding	Mshare	Management shareholding data/total share capital
sector	Industry	Industry dummy variables
particular year	Year	Year dummy variable

3.3 Model design

The following empirical models were constructed to test the research hypotheses H1 to H4 respectively.

$$WW_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_i controls_{i,t} + \sum ind + \sum year + \varepsilon_{i,t} \quad (2)$$

$$Risk/Power_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_i controls_{i,t} + \sum ind + \sum year + \varepsilon_{i,t} \quad (3)$$

$$WW_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 Risk/Power_{i,t} + \beta_i controls_{i,t} + \sum ind + \sum year + \varepsilon_{i,t} \quad (4)$$

$$WW_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 INST_{i,t} + \beta_3 interact_{i,t} + \beta_i controls_{i,t} + \sum ind + \sum year + \varepsilon_{i,t} \quad (5)$$

Where financing constraints (WW) are the explanatory variables in regression models (2)(4)(5), ESG performance is the explanatory variable in regression models (2) to (5), operational risk (Risk) and management power (Power) are the explanatory variables in regression model (3) and the mediating variables in regression model (4), respectively, and controls denote the control variables in regression models (2) to (5). i and t represent different industries and years, respectively, ind and year are the control industries and years, and ε is the random disturbance term. Controls denote the control variables of regression models (2) to (5). i and t represent different industries and years, respectively, ind and year are the control industries and years, and ε is the random perturbation term.

4. ANALYSIS OF EMPIRICAL RESULTS

4.1 Descriptive statistical analysis

From the descriptive statistics analysis in Table 2, it can be seen that there are 24,207 sample observations from 2012 to 2021. From the perspective of the explanatory variables, the degree of financing constraints of China's A-share listed companies varies greatly, with a mean of -1.023, a minimum of -1.233 and a maximum of -0.847. From the perspective of the explanatory variables, the ESG score has a mean of 6.546, a median of 6, a maximum of 9, and a minimum of 1. From the table, it can be seen that most of the A-share listed companies have reached the average level of ESG, and their performance is better, but there is still room for improvement.

Table 2: Descriptive statistics

Var	obs	mean	sd	min	p50	max
WW	24207	-1.023	0.073	-1.233	-1.019	-0.847
ESG	24207	6.546	1.155	1.000	6.000	9.000
Size	24207	22.361	1.316	19.525	22.175	26.430
Lev	24207	0.444	0.202	0.035	0.440	0.925
ROA	24207	0.039	0.063	-0.398	0.037	0.254
Growth	24207	0.176	0.426	-0.660	0.107	4.330
Board	24204	2.128	0.197	1.609	2.197	2.708
Indep	24204	0.376	0.054	0.286	0.364	0.600
Dual	24207	0.275	0.447	0.000	0.000	1.000
Balance	24206	0.361	0.285	0.006	0.281	1.000
SOE	24207	0.362	0.481	0.000	0.000	1.000
Mshare	23550	0.130	0.192	0.000	0.006	0.708
Top1	24207	0.344	0.149	0.081	0.322	0.758

4.2 Correlation analysis

Prior to the regression analysis, correlation analysis was performed on the data of the main variables to test the relationship between the variables, whether there is correlation and whether there is significant covariance, the results are shown in Table 3, the results of the correlation test indicate that the ESG performance of the firms can significantly alleviate the financing constraints, and the results are significant at the level of 1%.

For the control variables, firm size (Size), financial leverage (Lev), profitability (ROA), firm growth (Growth), the number of directors (Board), the first largest shareholder's shareholding (Top1), and the nature of ownership (SOE) are significantly and negatively related to financing constraints; two positions (Dual), and the degree of equity checks and balances (Balance), Dual, Balance, and Mshare are significantly positively related to financing constraints.

Because of the limitations of the correlation test itself, the results are for reference only, and the correlation between the variables has yet to be verified by regression analysis.

Table 3: Pearson correlation test of variables

	WW	ESG	Size	Lev	ROA	Growth	Board
WW	1						
ESG	-0.368***	1					
Size	-0.843***	0.373***	1				
Lev	-0.321***	0.086***	0.512***	1			
ROA	-0.245***	0.140***	-0.017***	-0.379***	1		
Growth	-0.288***	-0.015**	0.034***	0.012*	0.233***	1	
Board	-0.228***	0.145***	0.257***	0.138***	0.00100	-0.033***	1
Indep	0.003	0.004	0.006	-0.010	-0.008	0.004	-0.545***
Dual	0.137***	-0.107***	-0.176***	-0.123***	0.052***	0.038***	-0.176***
Top1	-0.238***	0.149***	0.200***	0.058***	0.127***	-0.00900	0.024***
Balance	0.051***	-0.057***	-0.057***	-0.082***	-0.00200	0.037***	0.024***
SOE	-0.267***	0.271***	0.355***	0.274***	-0.104***	-0.088***	0.257***
Mshare	0.219***	-0.148***	-0.354***	-0.310***	0.178***	0.070***	-0.193***
	Indep	Dual	Top1	Balance	SOE	Mshare	
Indep	1						
Dual	0.104***	1					
Top1	0.041***	-0.063***	1				
Balance	-0.021***	0.047***	-0.601***	1			
SOE	-0.049***	-0.300***	0.256***	-0.212***	1		
Mshare	0.064***	0.244***	-0.102***	0.188***	-0.473***	1	

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.3 Regression analysis

To further test the impact of corporate ESG performance on financing constraints, the regression analysis is continued and the results are shown in Table 4. First of all, the relationship between corporate ESG performance and financing constraints is empirically examined, column (1) considers time and industry effects for the basic regression, and the result is -0.0023 and significantly negative at 1% level, indicating that there is a negative effect between corporate ESG performance and slow financing constraints, and the better the ESG performance is, the lower financing constraints it faces, which supports the hypothesis H1. In addition, in order to avoid the endogenous issues for lagged processing, this paper will lag the explanatory variables by one period, the regression results are shown in column (2) of the table, and the results are significant at the 1% level, -0.0032, which leads to the same conclusion as in (1), that is, this year's corporate ESG performance will have a significant mitigating effect on the degree of financing constraints in the previous period and the significant effect is more pronounced, which further supports the hypothesis H1 put forward in this paper. In addition, on top of column (1), the regression with the product of industry and year effects shows a coefficient of -0.0022, which is significantly negative at the 1% level, confirming the robustness of this paper's findings.

In addition, the possible problem of multicollinearity in the correlation analysis is determined by the R^2 of the variables in the regression analysis, and when the R^2 is less than 0.9, i.e., the variance inflation factor is less than 10, there is no need to worry about the problem of multicollinearity. The reliability of this empirical study is further confirmed. The R^2 of all three models is less than 0.9, i.e., the maximum variance inflation factor of the model is less than 10, therefore, there is no need to worry about multicollinearity.

Table 4: Regression analysis

	(1)	(2)	(3)
	WW	F.WW	WW
ESG	-0.0023*** (0.000)	-0.0032*** (0.000)	-0.0022*** (0.000)
Size	-0.0474*** (0.000)	-0.0454*** (0.000)	-0.0473*** (0.000)
Lev	0.0214*** (0.001)	0.0170*** (0.002)	0.0216*** (0.001)
ROA	-0.1938*** (0.004)	-0.2057*** (0.007)	-0.1942*** (0.004)
Growth	-0.0406*** (0.001)	-0.0036*** (0.001)	-0.0412*** (0.001)
Board	-0.0032*** (0.001)	-0.0031 (0.002)	-0.0029** (0.001)
Indep	0.0043 (0.004)	-0.0034 (0.007)	0.0044 (0.004)
Dual	0.0002 (0.000)	-0.0010 (0.001)	0.0001 (0.000)
Top1	-0.0200*** (0.002)	-0.0228*** (0.003)	-0.0191*** (0.002)
Balance	-0.0035*** (0.001)	-0.0014 (0.001)	-0.0034*** (0.001)
SOE	0.0006 (0.000)	0.0018** (0.001)	0.0003 (0.000)
Mshare	-0.0135*** (0.001)	-0.0181*** (0.002)	-0.0123*** (0.001)
_cons	0.0743*** (0.005)	0.0399*** (0.008)	0.0716*** (0.007)
year	Yes	Yes	Yes
ind	Yes	Yes	Yes
ind-year	No	No	Yes
N	23547	18272	23547
r2	0.851	0.699	0.873

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.4 Endogenous issues

There may be an endogeneity problem between corporate ESG performance and financing constraints, so this paper uses the instrumental variable method to solve the endogeneity problem. This paper cites the industry annual average of corporate environmental responsibility as an instrumental variable, and adopts the 2sls method. In the weak instrumental variable test, if the F value is much larger than all the critical values, the original hypothesis of "weak instrumental variable" is rejected. In the second stage of regression, it shows that there is a significant negative relationship between corporate ESG performance and financing constraints. This indicates that the instrumental variables selected in this paper are appropriate, and the instrumental variables test is consistent with the results of the previous regression analysis. The above test results support that corporate ESG performance has a mitigating effect on financing constraints.

Table 5: Endogeneity test results

VARIABLES	(1)	(2)
	First ESG	Second WW
ESG-environment	0.0671*** (0.002)	
ESG		-0.0014*** (0.001)
Constant	-0.3266* (0.179)	0.0627*** (0.005)
Controls	Yes	Yes
year	Yes	Yes
ind	Yes	Yes
Observations	20,108	20,108
R-squared	0.313	0.862

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.5 Robustness test

In order to ensure that the empirical results are robust, this section uses the following three approaches to conduct robustness tests, and the results and descriptions are as follows:

1) Replacing the explanatory variables, there have been a number of rating agencies at home and abroad that release data on corporate ESG scores on a fixed basis every year, so this paper replaces the explanatory variable Huazheng ESG scores with the use of Bloomberg scores. The regression results show that it is significant at the 1% level, and the regression results do not produce significant differences compared with the previous paper, indicating that the results of this paper are robust.

2) Replacing the instrumental variable, this paper replaces the instrumental variable environmental responsibility with social responsibility, the regression result is 0.0444 and significantly negative at 1% level, indicating that the more the financing constraints faced by the firms can be mitigated, the regression result is displayed in column (2) of Table 6.

3) Changing the time period, the benchmark regression selects the data for the decade 2012-2021, and now narrows the time horizon and changes to the last five years of 2017-2020, and the regression results are shown in column (3) of Table 6 as -0.0028, which is significant at the 1% level, suggesting that after the change in time, the firms' ESG performance is still able to alleviate the financing constraints.

Table 6: Robustness Tests

Variables	(1)	(2)	(3)	
	WW	ESG first	WW second	WW
ESG	-0.0001*** (0.000)		-0.0444*** (0.006)	-0.0028*** (0.000)
ESG-society		0.0147*** (0.002)		

Constant	0.0751*** (0.008)	-1.5465*** (0.189)	0.0118 (0.014)	0.0780*** (0.007)
Controls	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes
ind	Yes	Yes	Yes	Yes
Observations	8,367	20,108	20,108	12,234
R-squared	0.856	0.254	0.504	0.854

Standard errors in parentheses* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.6 Heterogeneity test

4.6.1 Nature of property rights

Nowadays, there is a serious "ownership discrimination problem" in China's credit market, with non-State-owned enterprises being in a significantly weaker position than State-owned enterprises when it comes to securing external financing such as loans. Commercial banks are more likely to lend to SOEs under the given conditions. In addition, according to the reputation theory, state-owned enterprises usually actively take responsibility, participate in charitable activities, and cooperate in accomplishing their work, etc. Therefore, stakeholders and the public perceive that state-owned enterprises are substantially ahead of non-state-owned enterprises in terms of industry norms and fulfillment ability. In summary, this paper expects that the ESG performance of SOEs has a more significant mitigating effect on financing constraints than that of non-SOEs. From columns (1) and (2) of Table 7, it can be seen that regardless of the nature of the property rights of state-owned enterprises can alleviate the financing constraints faced by enterprises, but the ESG performance of state-owned enterprises has a more significant effect on alleviating the financing constraints.

4.6.2 Nature of the industry

Environmental protection is a key component of ESG. When industries are characterized by serious or excessive emissions of waste gas and sewage, which can harm the lives and health of local residents, people are resistant to the idea, and heavily polluting companies will be concerned by the government and health regulators, and face a more severe situation than non-heavily polluting companies. And with the rise of the "green economy", investors will seize the current economic trends, more favorable to non-polluting enterprises. In summary, this paper expects that the ESG performance of non-polluting firms is more effective in alleviating financing constraints than that of heavily polluting firms. From columns (3) and (4) of Table 7, it can be seen that although the ESG performance of both heavily polluting and non-heavily polluting firms is negative for financing constraints, the ESG performance of non-heavily polluting firms has a more pronounced effect of reducing financing constraints.

4.6.3 Asset size

Generally speaking, enterprises with larger asset sizes have higher operating revenues, higher capital turnover, which is conducive to improving market share, core competitiveness, and stronger external financing ability, thus financing constraints are relatively smaller. To summarize, this paper expects that the ESG performance of large asset-size firms has a more pronounced mitigation effect on financing constraints than that of small asset-size firms. From columns (5) and (6) of Table 7, it can be seen that although the ESG performance of both small and large asset-size firms is negative for financing constraints, the ESG performance of large asset-size firms has a more pronounced effect in reducing financing constraints.

Table 7: Heterogeneity test

	(1)	(2)	(3)	(4)	(5)	(6)
	government owned WW	non- municipal WW	heavy pollution WW	non-heavy pollution WW	Size WW	Size (small) WW
ESG	-0.0235*** (0.001)	-0.0178*** (0.000)	-0.0193*** (0.001)	-0.0233*** (0.000)	-0.0167*** (0.000)	-0.0087*** (0.000)
_cons	-0.8244*** (0.007)	-0.8703*** (0.005)	-0.9245*** (0.006)	-0.8310*** (0.004)	-0.9264*** (0.006)	-0.9076*** (0.004)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes	Yes	Yes

ind	Yes	Yes	Yes	Yes	Yes	Yes
N	8756	15451	6507	17700	12104	12103
r2	0.2624	0.1755	0.2073	0.2628	0.1797	0.0796
F	124.2201	121.5551	141.4846	233.3147	101.7613	38.6891

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5. MECHANISM TESTING

From the above conclusions, it can be seen that corporate ESG performance can significantly alleviate financing constraints, but only through the above conclusions can not directly observe the specific path of ESG performance affecting corporate investment efficiency, so this paper will carry out the analysis of mediating and moderating effects to further analyze the specific path of ESG performance affecting financing constraints.

5.1 Intermediary effect

5.1.1 Business Risk: Corporate ESG Performance→Reducing Corporate Business Risk→Easing Financing Constraints

According to the reputation mechanism and other related theories, the good ESG performance of enterprises can help to improve corporate image and gain good reputation from the public, which in turn establishes the social capital of corporate reputation, which can play the role of insurance of the reputation mechanism and minimize the impact of negative events on the enterprise, so as to mitigate the business risk of the enterprise. In this paper, with reference to scholars John et al. (2008)[9], Acharya et al. (2011)[1], and Wang Zhuquan (2017)[25], the cumulative distribution probability of the standard deviation of EBITDA margins, which represents the operational risk, is calculated to serve as the data of operational risk. Based on this, this paper tests whether firms' ESG performance mitigates financing constraints by reducing operational risk and thus alleviating financing constraints, and the results of the test of the operational risk effect on the impact of firms' ESG performance on financing constraints are reported in Columns (1), (2), and (3) of Table 8. Columns (1) and (3) indicate that ESG performance significantly mitigates the financing constraints faced by firms; column (2) illustrates that ESG performance indeed reduces the business risk faced by firms; and column (3) shows that the higher the business risk of firms, the greater the financing constraints. This shows that there is a mediating effect between corporate business risk on ESG performance to alleviate financing constraints, supporting hypothesis H2.

5.1.2 Management power: corporate ESG performance → reduce management power → ease financing constraints

According to the risk preference and principal-agent theory, when the management of an enterprise has too much power, it will not be able to make objective and correct choices because of the different risk preferences of the management in the face of different financing strategies; the problems of "empire building" and so on will make the management harm the wealth of the shareholders and reduce the value of the enterprise for the sake of their personal self-interests. To summarize, when the management has too much power, it will make the enterprise decision deviate from the right track, thus affecting the financing constraints faced by the enterprise. This paper refers to the practice of scholars Lu Rui et al. (2008)[21], and integrates five indicators, namely, the year of general manager's tenure, director's two positions, management's shareholding ratio, board size, and the proportion of internal directors, through the method of Principal Component Analysis (PCA). Based on this, this paper tests whether corporate ESG performance mitigates financing constraints by reducing management power and thus alleviating financing constraints, and Table 8(4), (5), and (6) reports the results of the management effect test on the impact of corporate ESG performance on financing constraints. The fourth and sixth columns indicate that ESG performance significantly alleviates the financing constraints faced by firms; the second column illustrates that ESG performance indeed reduces management power; the sixth column shows that management power is significantly positively related to financing constraints, indicating that the greater the management power, the greater the financing constraints. This shows that there is a mediating effect between corporate management power on ESG performance to alleviate financing constraints, which supports hypothesis H3.

Table 8: Results of mediation effect tests

	(1)	(2)	(3)	(4)	(5)	(6)
	WW	Risk	business risk WW	WW	Management authority Power	WW
ESG	-0.0233***	-0.0350***	-0.0225***	-0.0222***	-0.0437***	-0.0220***

	(0.000)	(0.002)	(0.000)	(0.000)	(0.005)	(0.000)
Risk			0.0226***			
			(0.002)			
Power						0.0028***
						(0.000)
_cons	-0.8314***	0.8049***	-0.8495***	-0.8406***	1.2434***	-0.8440***
	(0.005)	(0.020)	(0.005)	(0.004)	(0.056)	(0.004)
year	Yes	Yes	Yes	Yes	Yes	Yes
ind	Yes	Yes	Yes	Yes	Yes	Yes
N	18885	18885	18885	23886	23886	23886
r2	0.2441	0.0642	0.2508	0.2407	0.0502	0.2417
F	225.4835	47.8865	225.4661	280.0658	46.6977	271.5386

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.2 Moderating effect

When institutional investors have a higher shareholding ratio and a higher degree of concern, it means that they stand in a united front with the enterprise and share the same interest goal, they will play their important monitoring role to prevent the enterprise from facing severe financing constraints and other problems due to the excessive power of the management to make private profits. In order to explore the impact of ESG performance on financing efficiency under different institutional investor shareholding ratios, this paper uses institutional investor shareholding ratio (INST) as a moderating variable and centers the interaction term. As can be seen from Table 9, the coefficient of corporate ESG performance on financing constraints is -0.018, which is significant at the 1% level, and the cross-multiplier term (INTERACT) is also significantly negative, which indicates that the proportion of institutional investor shareholding affects the relationship between corporate ESG performance and financing constraints when all else remains unchanged, i.e., when the higher the proportion of institutional investor shareholding, the corporate ESG performance on financing constraints mitigation effect is stronger. Hypothesis H4 is supported.

Table 10: Moderating effect test results

	(1)	(2)
	WW	WW
ESG	-0.0176***	-0.0097***
	(0.000)	(0.001)
INST	-0.0903***	-0.0900***
	(0.002)	(0.002)
interact		-0.0189***
		(0.001)
_cons	-0.8347***	-0.8866***
	(0.004)	(0.006)
N	24207	24207
r2	0.3183	0.3227
F	403.0951	397.2710

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

6. CONCLUSIONS AND IMPLICATIONS OF THE STUDY

The alleviation of financing constraints is of great significance to national enterprise development and economic development, especially for small and medium-sized enterprises (SMEs). Based on the existing literature, this paper studies the relationship between the ESG performance of enterprises and their financing constraints by taking the enterprises of listed A-share companies in China from 2012 to 2021 as a sample, and using the ESG rating data of Huazheng and the financial data of the enterprises as a research sample, and the research results are as follows:

First, Corporate ESG performance can effectively alleviate financing constraints. According to the signaling theory, the stronger and better the enterprise's awareness of environmental protection, social responsibility and corporate governance, the more positive the signal to the outside world will be, and the more it will gain the favor of investors and institutional investors, the more it will be able to obtain external funds to reduce the financing constraints

faced by the enterprise.

Second, Business risk and management power are the main mediating variables of corporate ESG performance affecting financing constraints, and the proportion of institutional investors' shareholding is the main regulating variable of corporate ESG performance affecting financing constraints. This paper shows that the reduction effect of corporate ESG performance on financing constraints is mainly realized by reducing corporate business risk and management power; the higher the shareholding ratio of institutional investors, the more corporate ESG performance can alleviate financing constraints.

Third, The mitigating effect of ESG performance on financing constraints is more pronounced among SOEs, non-heavy polluters, and firms with larger assets.

Based on the above findings, in order to improve corporate ESG performance and effectively alleviate the financing constraint problem, this paper has the following two suggestions:

First, As far as the government is concerned, it should firstly play a macro-control role to solve the phenomenon of "ownership discrimination" and actively guide the market towards a fair and rationalized competitive market environment. Second, the government should optimize the functions of government regulators based on ESG, and draw the attention of enterprises to ESG by incorporating their ESG performance into the regulators' system of assessing enterprises. In addition, the public awareness of enterprises is not enough, so the government can develop a sound system of rewards and penalties to actively encourage enterprises to take the initiative to improve their ESG performance and help China's sustainable, high-quality economic development.

Second, In order to alleviate financing constraints, "how to have a good or even excellent ESG performance" is a question that enterprises need to think deeply about. First of all, culturally, enterprises should constantly emphasize the ESG concept, constantly improve the ESG system, enhance the understanding of their own sense of social responsibility, awareness of environmental information disclosure, and corporate governance, and organically combine them with the corporate strategic culture, so that the ESG concept is integrated into the production and operation activities and decision-making; and then, in terms of action, enterprises should actively and voluntarily disclose their own information, publish their corporate environmental reports, actively assume social responsibility and other activities, and realize the use of resource allocation through corporate governance. In terms of actions, enterprises should actively and voluntarily disclose their own information, publish corporate environmental reports, actively undertake social responsibility and other activities, and optimize the allocation and use of resources through corporate governance. Through good ESG performance, enterprises can convey their business philosophy and future development path to investors and stakeholders, and then obtain financing funds and social capital support to alleviate financing constraints.

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