

# The Impact of ESG Evaluation System on the Risk of Listed Enterprises under Dual-carbon Target

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## Abstract

**In recent years, ESG has developed rapidly in China. This paper starts from the dual carbon target and based on the requirements of high-quality development, explores the potential relationship between ESG disclosure and corporate risk. Drawing on a large number of references, this paper enriches the research results of ESG evaluation of enterprises. The data selected for this study are A-share listed companies in China from 2010 to 2021, and the OLS model is used for regression analysis, followed by further regression analysis using fixed effect models, etc. The study found that the ESG score distribution of Chinese listed companies is basically in line with a normal distribution, indicating that the ESG evaluation system data in China has statistical significance, and the ESG performance of enterprises has an important impact on investment decisions of investors.**

## Keywords

20th CPC Nati; ESG Evaluation System; Risk of Listed Enterprise.

## 1. Introduction

### 1.1. Research Background

The 20th Congress of the Communist Party of China pointed out that respecting nature, conforming to nature and protecting nature are the inherent requirements of building a socialist modern country in an all-round way. In the report of the 19th National Congress of the Communist Party of China in 2017, General Secretary Xi Jinping pointed out that Socialism with Chinese characteristics has entered a new era, and the main contradiction of our people has been transformed into the contradiction between the people's growing need for a better life and the unbalanced development. During the two sessions, Tong Jinnan, Gao Jixi and other representatives made judgments on the current environmental protection and social rights protection, and explained the role of establishing an environment-friendly system for the benign development of enterprises in the next economic period, and advocated the transformation of all enterprises to "energy-saving and green" development. It can be seen that environmental construction, as a part of China's long-term planning, is an inevitable requirement of enterprise construction. ESG, as a guiding scoring system that can effectively help enterprises achieve green reform, is closely related to the theme of the two sessions. This paper aims to study the relationship between ESG and the high-quality development of listed companies, and explore the help of ESG system to the long-term development of enterprises, which is also in line with the spirit of the two sessions.

In recent years, ESG has developed rapidly in China. According to Wind statistics, in the past three years, more and more A-share listed companies began to disclose ESG reports, from 1,002 in 2020 to 1,688 in 2022, and the disclosure rate rose from 26.93% in 2020 to 30.27% in 2022. ESG aims at "harmonious coexistence between man and nature", which is an in-depth

embodiment of the idea of sustainable development. Its concept is highly in line with the requirements of high-quality development put forward by the Party's 20th National Congress, the new development concept of "innovation, green, sharing, coordination and openness", the Tenth Five-Year Plan, the goal of double carbon and the vision of 2035. In recent years, many scholars have studied and demonstrated a series of logics that enterprises can obtain long-term benefits by disclosing information related to environmental protection on their own and combining with green credit policy or stock market financing. Enterprises can improve their competitive position by improving ESG performance. As an intermediary mechanism, this competitive position is an effective way for listed companies to achieve long-term value in green governance (ESG) (Feng Yongjie et al., 2022).

However, everything has many sides. Enterprise ESG disclosure can promote the high-quality development of enterprises, but environmental information disclosure in ESG will significantly inhibit the high-quality development of urban economy (Qiao Meihua, 2020), and it is urgent to discuss whether ESG will increase the impact of enterprise risks. At present, the international economic environment is complicated, and controlling enterprise risks is very important for the high-quality development of enterprises. When enterprises pursue high-quality development, it is still unknown whether there will be negative social feedback in ESG disclosure, or whether enterprises will invest a lot of capital in ESG activities, which will lead to insufficient internal funds for a period of time, thus increasing the related risks of enterprises. And after the completion of ESG information disclosure, if there is negative information about enterprise environmental protection, it is inevitable that the enterprise will come from social financing, thus increasing the risk of enterprise capital chain and even threatening the safety of enterprise operation. Based on the above questions, this paper explores the potential relationship between ESG disclosure and enterprise risk from the perspective of double carbon target and the requirements of high quality and quantity development.

## **1.2. Research Significance**

### **1.2.1. Theoretical Significance**

In this paper, the ESG disclosure of A-share listed companies and enterprise risks are studied under the same framework to observe what risks the ESG disclosure of listed companies will bring to enterprises. Compared with the research on the benefits of ESG disclosure, there is little research on whether ESG disclosure will bring negative effects to enterprises. This paper innovatively studies the information asymmetry between enterprises and investors from the perspective of enterprise risk. It enriches the micro perspective, and also provides micro-level evidence for ESG disclosure and high-quality development of enterprises.

### **1.2.2. Practical Significance**

As the backbone of the market economy, high-quality development at the enterprise level plays an important role in the overall economic development. The practical significance of this paper lies in:

First, based on the background of building a double carbon balance and pursuing high-quality development, this paper studies the influence of ESG disclosure on enterprise risks, adjusts the development direction of ESG, avoids enterprise risks, strengthens the ability of enterprise to predict and manage risks, and promotes high-quality development of enterprises.

Secondly, by analyzing the relationship between ESG disclosure and enterprise risk, we can improve the mechanism of ESG information disclosure and improve the quality and management ability of ESG data.

Thirdly, by studying A-share listed companies with ESG disclosure, we can comprehensively analyze their impact on enterprise risks, and provide suggestions for local governments to

formulate industry-related laws and regulations, stimulate the vitality of market participants and screen high-quality enterprises with the help of independent third parties in the market.

### 1.3. Main Innovation Points

Based on a large number of references, this paper enriches the research results of enterprise ESG evaluation. Early domestic scholars focused on the operation mechanism of ESG evaluation system itself and the internal logic of ESG evaluation system's influence on enterprise development from a macro perspective. However, in recent years, domestic scholars' research results on ESG evaluation system mainly focus on the mechanism that ESG disclosure of enterprises has a positive impact on its financial performance or A share price from a micro perspective.

But generally speaking, the existing literature on ESG evaluation is still small, and it has not been extended to the potential negative impact of ESG disclosure on enterprises. Compared with the traditional research results of ESG evaluation, this paper innovatively starts from the ESG evaluation of listed companies, and based on the perspective of enterprise risk, analyzes the relationship between ESG evaluation system under the dual-carbon goal and the hidden risks in the high-quality development of listed companies, enriching the relevant domestic research materials.

## 2. Literature Review and Research Hypothesis

### 2.1. Information Asymmetry

In economic life, the information held by the outside world is different from the real information of the enterprise, and the resulting information asymmetry will make the people with sufficient information in a favorable position, while the people with poor information in a disadvantageous position. It may even lead to adverse selection by the information-poor party, and the disclosure of enterprise ESG helps to reduce the unfavorable position of investors due to information asymmetry. First of all, ESG disclosure has significantly improved the information transparency of enterprises, allowing investors to master more enterprise information. Secondly, ESG disclosure can help investors better understand the future development trend of enterprises and reduce the risks faced by investors. Good ESG performance can provide investors with a "risk protection value" (Wang Linyi, Lian Yonghui, Dong Jie, 2022). At the same time, for listed companies, a good corporate image and reputation can help attract investors and reduce the risk of stock market crash. Because sustainable development is the core issue for investors to consider whether to invest, and good ESG performance directly conveys positive information in this regard, reducing the risk of "future cash flow" being cut off. (Wang Jitian, Ma Shan, Tian Boao, 2022).

### 2.2. ESG Performance and Enterprise Risk

#### 2.2.1. Environmental Performance and Enterprise Risk

In terms of environmental performance, most studies believe that environmental performance is negatively correlated with enterprise risk. For example, environmental information disclosure can significantly reduce the overall risk and systematic risk of enterprises, and it is negatively correlated with the non-systematic risk of enterprises, but not significantly (Huang Rong Peng Xiaofan, 2021). Among them, for listed companies in heavily polluting industries, the disclosure of environmental information in heavily polluting industries can transmit more enterprise information to the outside world, let investors and other stakeholders know more about the company, reduce the information asymmetry between the company and the external market, and thus reduce the risk of stock price collapse (Liu Guangyan, Zhang Wenjie, 2021). Environmental uncertainty will further aggravate the financialization of enterprises by

increasing their risk-taking, financing constraints and agency costs (Wang Zhiying, Zhao Ruxiang, 2021).

### **2.2.2. Social Responsibility and Enterprise Risk**

In terms of social responsibility, the academic community believes that the level of corporate social responsibility is negatively related to systemic risk. For example, in China, actively undertaking social responsibility helps to reduce the level of corporate risk (Feng Liyan et al., 2017), in which good social responsibility performance can strengthen the promotion of media emotions to corporate risk taking (Lu Jingmin Jian, 2021), and the better the social responsibility performance, the smaller the fluctuation of stock returns. That is, corporate social responsibility can help alleviate the risks of enterprises (Wang Mengyue, 2021), and fulfilling social responsibility can indeed alleviate the risks of financial distress of enterprises. (Chu Xuan, 2021).

### **2.2.3. Corporate Governance Level and Enterprise Risk**

In terms of corporate governance, there is a significant positive correlation between ownership concentration and corporate financial risk, but there is no significant correlation between board size, executive compensation and corporate financial risk (Yu Fusheng et al., 2009). There is a significant negative relationship between the intensity of corporate social responsibility and the risk of future stock price crash (Zhu Yu, 2015).

### **2.2.4. ESG Performance and Enterprise Risk**

ESG performance provides more enterprise information, which helps to solve the information asymmetry problem between investors and enterprises. ESG's foresight for the future development of the enterprise can help investors better understand the enterprise in all aspects, at the same time, it also enhances the information transparency of the enterprise and reduces the uncertainty faced by investors. For listed companies, a good corporate image and reputation will help attract investors and reduce the risk of corporate stock market crash. Sustainable development is the most important thing for investors to consider, and good ESG performance intuitively conveys positive information in this respect, reducing the risk of "cut-off" of "future cash flow". (Wang Jitian, Ma Shan and Tian Boao, 2022). On the other hand, neoclassical economic theory holds that ESG investment of enterprises has strong externalities, and managers may use it to make profits for themselves, so. Enterprise ESG performance may increase enterprise risk or be irrelevant to enterprise risk (Ruhaya et al, 2018; Duque-Grisales et al, 2021).

## **2.3. Research on the Effectiveness of ESG Performance in A-share Market**

Most listed companies in A-share market have larger scale and smaller operational risks than other markets. The huge size of the enterprise is reflected in its ability to bear the financial risk and systemic risk (Dannier, Shuo Yang, Zhao Yuxuan, Yuan Jiahai, 2019), and to bear the extra expenses and losses brought by the initial application of ESG evaluation system. On the other hand, the mature management of large enterprises in A-share market can accept the huge benefits brought by ESG in the later period, especially in terms of the company's share price and investment efficiency (Gao Jieying, Chu Dongxiao, Lian Yonghui, Jun Zheng 2021). In addition, corporate social responsibility can improve corporate performance by improving the innovation ability of enterprises (Cegarra-Navarro et al, 2016; Yang Jinkun, 2021). Corporate social responsibility can be that enterprises establish external multi-network relationships, and enterprises can obtain innovative knowledge resources through links with external stakeholders, thus promoting enterprise development (Luo et al, 2015; Li Jinglin et al., 2019).

To sum up, the stock prices of enterprises in the A stock market receive positive feedback from the ESG evaluation system. On the one hand, the environmental benefits improved by the ESG system, the valuation changes brought by employee rights and social friendliness have brought

about the stock price increase. On the one hand, the benefits brought by the application of the optimized structure of ESG system also improve the valuation of the enterprise itself. It can be said that ESG evaluation system has great utility for listed companies in A-share market.

## 2.4. Research Hypothesis

### 2.4.1. Enterprise ESG Disclosure and Enterprise Risk

#### 1) Environmental performance

When an enterprise has a good environmental performance, it can alleviate the policy pressure from the government and establish a good corporate image, thus obtaining more policy support and market investment, which is conducive to the stable development of the stock price of the enterprise and reducing the business risk of the enterprise. On the contrary, it may lead to the reduction of institutional investors' holdings, the decline of enterprise stock prices and the fluctuation of stock prices.

#### 2) Social performance

Enterprises can gain more social trust and capital favor by participating in social governance and assuming social responsibilities. With good social performance, we can manage the corporate social image through excellent social reputation, attract investment and promote the stable development of the company's operation. On the contrary, the market will gradually lose confidence in the enterprise, which will affect the financing and operation of the enterprise.

#### 3) Corporate governance

Enterprises can improve the internal governance system, strengthen the construction of the board of directors and the board of supervisors, and enhance the independent operation ability of enterprises. A good corporate governance mechanism can promote the endogenous motivation of enterprises and is conducive to the long-term development of the company. On the contrary, the possibility of opportunistic behaviors that harm the interests of the company will greatly increase, and the company's operating risks will increase accordingly.

Therefore, this paper puts forward the following research hypotheses:

H0: Controlling other factors, the good performance of ESG disclosure will reduce the business risk of enterprises. H1: Controlling other factors, when the ESG disclosure performance of the enterprise is poor, it will increase the business risk of the enterprise.

## 3. Research Design

### 3.1. Samples and Data Sources

In this paper, China A-share listed companies from 2010 to 2021 are selected as research samples, among which ESG.

The data adopts Hexun ESG index, and the financial data comes from CSMAR database. In order to make the data more accurate, firstly, the data are processed as follows: (1) First, the quarterly data are eliminated and only the annual data are kept; (2) Delete financial industry companies; (3) Delete listed companies marked as ST, \* ST and PT; (4) Delete the missing variables in the sample; (5) All data were subjected to 1% and 99% Winsorize processing, and finally 28,665 observation samples were obtained.

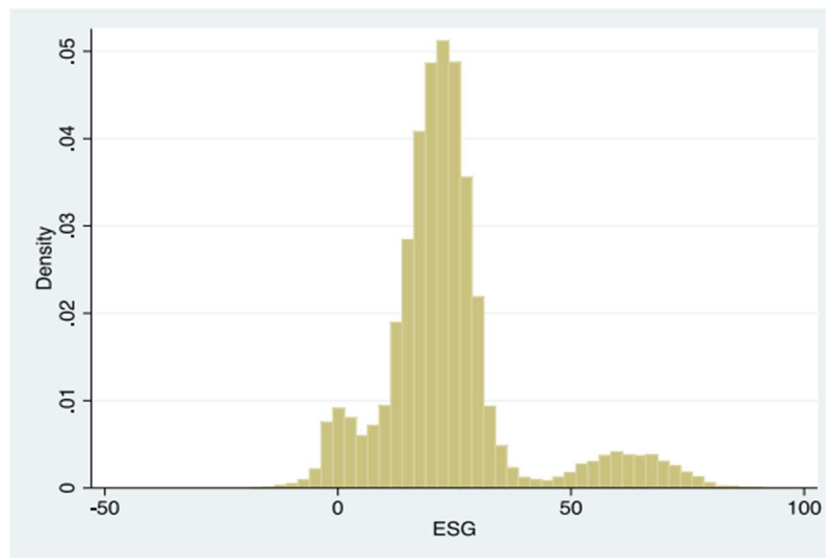
### 3.2. Definition of Variables

#### 3.2.1. Explanatory Variables

ESG, the variable explained in this paper is Hexun. com ESG index. Hexun. com is the earliest financial website established in China, and the earliest institution to conduct ESG evaluation. Its ESG index has great influence and attention. According to the actual situation of China Company, Hexun ESG evaluation system has passed five inspections: shareholder responsibility,

employee responsibility, rights and interests responsibility of suppliers, customers and consumers, environmental responsibility and social responsibility. This evaluation system takes into account the differences between China companies and foreign companies, fully considers the characteristics of different industries in China, and sets different rating index weights for consumption, manufacturing and service industries. This paper selects Hexun to evaluate the total score of enterprise environment, social responsibility and corporate governance, and constitutes the enterprise ESG score as the explanatory variable. According to the density distribution map, we can see that the ESG distribution of listed companies in China basically conforms to the normal distribution.

**Table 1.** Distribution Table



**3.2.2. Explained Variables**

The variable explained in this paper is enterprise Risk. There have been a lot of literatures to analyze the risk-taking level by studying the asset-liability ratio, stock return volatility (Sharla Cheung et al., 2015), earnings volatility (Boubakri et al., 2013) and other related data. However, due to the short development time of China stock market and the stock market fluctuation caused by policy uncertainty, most articles on China enterprises choose earnings volatility to measure the level of risk taking. This paper also refers to the relevant literature, and selects ROA volatility to measure the risk-taking level of enterprises. The greater the ROA fluctuation of an enterprise, the greater its risk-taking.

Referring to the research methods of John et al.(2008) and Yu Minggui (2013), this paper selects the ratio of EBITDA to the total assets of the enterprise at the end of the year. In the calculation, the industry average is used to adjust the ROA of each year, and then the standard deviation of ROA after adjustment in each observation period is calculated. The calculation process is as follows:

$$Adj\_Roai,t = \frac{EBITDA_{i,t}}{ASSET_{i,t}} - \frac{1}{N} \sum_{k=1}^N \frac{EBITDA_{k,t}}{ASSET_{k,t}}$$

$$Risk1_{i,t} = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (AdjRoai,t - \frac{1}{T} \sum_{t=1}^T AdjRoai,t)^2} \quad |T = 3$$

$$Risk2_{i,t} = Max(AdjRoa_{i,t}) - Min(AdjRoa_{i,t})$$

### 3.2.3. Control Variables

In this paper, by referring to the relevant literature of corporate governance, the control variables selected in this paper are mainly corporate governance data. Including the separation between the chairman and the general manager. In China listed companies, there are a large number of cases where the chairman and CEO are held by the same person. Principal-agent theory points out that if a company has the same chairman and CEO, it will weaken the supervisory function of the board of directors, which will lead to poor performance and less transparency of financial reports. Many scholars have found that the higher the independence of the board of directors, the stronger the supervision of the company, and the more willing to reveal the company's information. Compared with ShareManager, there are principal-agent problems between the board of directors and senior management and shareholders, but when the board of directors and management hold the company's shares, their interests are consistent with the company's shareholders, which can greatly reduce the principal-agent problem. Shareholder ratio (Shareholder) of the largest shareholder, many scholars have found that the high concentration of equity is beneficial to corporate governance by studying the related issues of enterprises with centralized and decentralized equity. Shleife and Vishny (1986) pointed out that a high concentration of equity can motivate shareholders, thus achieving a better supervisory role, and can well solve the problem of hitchhiking caused by the decentralization of equity. In addition to the above variables, the board of directors (DirectorNumb), the size of the board of supervisors (SupervisorNumb) and the sum of the salaries of the top three executives (ManagerComp) are also added.

**Table 2.** Description of variables

Variable	Obs	Mean	Std.Dev.	Min	Max
ESG	28,665	23.80648	15.31623	-18.45	90.87
Risk2	28,665	0.0644214	.077107	.000187	.8476343
CeoNotPres~ t	28,665	0.7139717	.4519106	0	1
DirectorNumb	28,665	8.558695	1.652469	5	15
Supervisor~ b	28,665	3.524089	1.010233	2	8
IndDirectR~ o	28,665	0.3751017	0.0533064	0.2727273	.6
ShareDirec~ s	28,665	0.1371305	0.1973971	0	.6862194
ShareManager	28,665	0.0786101	0.1456783	0	.6400896
ShareContH~ r	28,665	34.6416	14.91036	8.26	75.9
ManagerComp	28,665	2256996	2066208	151643.4	1.83e+07

According to the variable description in Table 2, the average ESG score of listed companies in China is 23.8, with a variance of 15.3, of which the score is at least -18.45 and the highest score is 90.87, indicating that there is a big gap in ESG scores among enterprises in China. The average value of enterprise risk is 0.064, the minimum value is 0.00018, and the maximum value is 0.85, and the differences among enterprises are also quite large. The data description also suggests that 70% of enterprises in China have the situation that the CEO and the chairman are the same person. The average number of corporate boards in China ranges from 8 to 9, with the minimum board consisting of 5 directors and the maximum consisting of 15 directors, of which 30% are independent directors. The average number of supervisors of listed companies in China is 3 to

4. The data also shows the shareholding ratio of directors, executives and the largest shareholder, in which directors hold an average of 0.375, executives hold an average of 0.078 and the largest shareholder holds an average of 34.6. According to the shareholding ratio, it can be seen that China's shares are highly concentrated, and the largest shareholder generally holds higher shares of the company, which has an impact on corporate governance and enterprise risk prevention. Finally, this paper also counts the salary of the top three managers, with an average value of 2.25 million. The salary of managers and the proportion of holding shares in the company will affect their work efficiency and work objectives, which will also have an impact on enterprise risks.

**Table 3. Correlation coefficient matrix**

	ESG	Risk2	CeoNot ~t	Direct ~b	Superv ~b	IndDir ~o	ShareD ~s	ShareM ~r	ShareC ~r	Manage ~p
ESG	1.0000	-0.209 0								
Risk2		1.0000								
CeoNotPres~ t	0.0570	-0.056 6	1.0000							
DirectorNumb	0.1343	-0.093 9	0.1761	1.0000						
Supervisor~ b	0.1115	-0.077 5	0.1776	0.3397	1.0000					
IndDirectR~ o	-0.014 9	0.0326	-0.1036	-0.502 5	-0.1002	1.0000				
ShareDirec~ s	-0.037 6	0.0353	-0.2626	-0.203 4	-0.2765	0.0708	1.0000			
ShareManager	-0.029 6	0.0423	-0.4941	-0.170 5	-0.2174	0.0916	0.7787	1.0000		
ShareContH~ r	0.1633	-0.118 0	0.0367	0.0149	0.0837	0.0444	-0.0549	-0.0187	1.0000	
ManagerComp	0.1522	-0.047 4	-0.0166	0.0843	0.0004	-0.005 9	-0.0925	-0.0659	-0.0140	1.0000

Table 3 shows the correlation coefficient between the variables. Among them, the correlation coefficient between the proportion of independent directors and the number of directors is -0.50, the correlation coefficient between the proportion of directors and the proportion of executives is 0.77, and the absolute values of the correlation coefficients of all other variables are less than 0.5, which means that there is no linear correlation among all variables and regression can be carried out.

### 3.3. Model Construction

#### 3.3.1. Basic Regression-Mixed OLS Model

In this paper, OLS model is used to regression. Pooled OLS model is based on OLS model, which considers the intra-group deviation (different years) and inter-group deviation (different industries) with equal weight, which can make the regression result more accurate. Its expression is:

$$Risk_{i,t} = \alpha + \beta_1 ESG_{i,t} + \beta_2 ControlVariables_{i,t} + \epsilon_{i,t}$$

i=1,2,...,N t=1,2,...,N

Where I stands for different industries and T stands for different years.  $Risk_{i,t}$  For that variable to be explain,  $\alpha$  Is the intercept term,  $ESG_{i,t}$  To explain the variables,  $ControlVariables_{i,t}$  As a control variable,  $\epsilon_{i,t}$  Is the error term.

### 3.3.2. Solving Endogenous Problems-Fixed Effect Model

This paper studies the corporate governance, because the control variables can't be found out completely, so the regression will exist in the endogenous problem, which leads to the regression result is not causal. To this end, this paper uses the fixed effect model for further regression, which can eliminate the endogenous problems caused by the omitted variables that cannot be counted and do not change with time, such as corporate culture, etc. The regression model is as follows:

$$Risk_{i,t} = \alpha_i + \beta_1 ESG_{i,t} + \beta_2 ControlVariables_{i,t} + \epsilon_{i,t}$$

$i=1,2,\dots,N$   $t=1,2,\dots,N$

Where  $t$  stands for different years,  $Risk_{i,t}$  For that variable to be explain,  $\alpha_i$  Is the intercept term,  $ESG_{i,t}$  To explain the variables,  $ControlVariables_{i,t}$  As a control variable,  $\epsilon_{i,t}$  Is the error term.

## 4. Empirical Results

### 4.1. Mixed Ols Model

**Table 4.** Pooled OLS

VARIABLES	(1) Model
Risk	-34.286*** (1.019)
CeoNotPresident	1.162*** (0.216)
DirectorNumb	1.010*** (0.076)
SupervisorNumb	0.869*** (0.111)
IndDirectRatio	13.381*** (2.128)
ShareDirectors	1.349** (0.606)
ShareManager	2.067** (0.848)
ShareContHolder	0.140*** (0.006)
ManagerComp	0.000*** (0.000)
Industry	Yes
Year	Yes
Constant	0.905 (1.295)
Observations	28,665
R-squared	0.101
Adj. R-squared	0.100

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Firstly, the Robust regression of mixed OLS model is adopted. As shown in Table 4, the risk of an enterprise is negatively correlated with the ESG score of the enterprise under the 99% confidence interval. When the ESG score of the enterprise increases by one unit, the risk of the enterprise will decrease by 34.28 units, which means that when the enterprise has a better ESG, the risk of the relative enterprise will also decrease.

#### 4.2. Fixed Effect Model

In order to solve the endogenous problem, the causal relationship between ESG and enterprise risk is obtained, and Hausman test results show that this sample is more suitable for using the fixed effect model, so the fixed effect model is further controlled by industry and time. The regression results are similar to those of Pooled OLS. The results are shown in Table 5. The risk of an enterprise is negatively correlated with the ESG score of the enterprise under the 99% confidence interval. When the ESG score of the enterprise increases by one unit, the risk of the enterprise will decrease by 20.08 units, which means that when the enterprise has a better ESG, the risk of the relative enterprise will also decrease.

**Table 5. Fixed Effect**

VARIABLES	(1) Model
Risk	-20.084***
	(1.140)
CeoNotPresident	0.410
	(0.284)
DirectorNumb	1.082***
	(0.104)
SupervisorNumb	0.225
	(0.201)
IndDirectRatio	6.904***
	(2.633)
ShareDirectors	8.362***
	(1.261)
ShareManager	3.170**
	(1.433)
ShareContHolder	0.224***
	(0.012)
ManagerComp	-0.000***
Industry	(0.000)
Year	Yes
	Yes
Constant	4.929***
	(1.766)
Observations	28,665
Number of code01	3,893
R-squared	0.055
Adj. R-squared	-0.094

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$

### 4.3. Heterogeneity Test

Literature research shows that the nature of corporate ownership will have an impact on corporate governance performance (Xin Yu et al., 2008), social performance (Liu Chunji et al., 2018), corporate performance (Wang Zhen et al., 2016) and corporate environmental performance (Li Yue et al., 2018). Therefore, the further lectures in this paper will be divided into state-owned enterprise groups and non-state-owned enterprise groups according to the different nature of corporate ownership. The test results in Table 6 show that the regression coefficient of enterprise ESG performance to enterprise risk-taking is significantly negative in the 1% confidence interval, which further confirms that enterprise ESG performance plays a significant role in reducing enterprise risk, which is consistent with previous research conclusions. It is worth noting that compared with non-state-owned enterprises, ESG performance of state-owned enterprises is more obvious in reducing enterprise risks. The regression results show that under different ownership, ESG performance has different risk-taking for enterprises, that is, compared with non-state-owned enterprises, ESG performance of state-owned enterprises has more obvious risk reduction for enterprises. It shows that under the current situation that state-owned enterprises and non-state-owned enterprises coexist in China, state-owned enterprises have social responsibilities and other missions, and their ESG performance has greater impact on enterprise risks than non-state-owned enterprises, which shows that from the perspective of instrumental corporate social responsibility, state-owned enterprises shoulder more corporate social responsibilities, which can reduce enterprise risks more than non-state-owned enterprises that do not have to bear corporate social responsibilities.

**Table 6.** Heterogeneity test

VARIABLES	(1) state-owned enterprise	(2) Non-state-owned enterprises
Risk2	-30 585*** (4.654)	-24 180*** (2.478)
CeoNotPresident	- 1.097 ( 1.272)	0.884* (0.462)
DirectorNumb	0.628** (0.305)	0.185 (0.204)
SupervisorNumb	0.666* (0.362)	0.371 (0.377)
IndDirectRatio	6.092 (8.194)	1.036 (5.144)
ShareDirectors	-5 956 (4.550)	3 201*** ( 1.224)
ShareManager	10.191 (6.266)	3.200* ( 1.649)
ShareContHolder	0.137*** (0.025)	0.097*** (0.013)
ManagerComp	0.000*** (0.000)	0.000*** (0.000)
Constant	7.996 (4.983)	13.711*** (3.534)
R-squared	0.085	0.095
Adj. R-squared	0.079	0.092

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 5. Conclusion

### 5.1. Research Conclusion

With the continuous promotion of the concept of sustainable development and the proposal of double carbon target, the sustainable development of enterprises has become the focus of more and more attention of external investors and internal managers. This paper takes China A-share listed companies as the research object, and the time span of the research sample is 2010-2021, to investigate the relationship between ESG score and enterprise risk.

It is found that the distribution of ESG scores of listed companies in China basically conforms to the normal distribution, which shows that the data of ESG evaluation system in China is statistically significant. However, there is a big gap in ESG scores among enterprises in China, which is related to the big difference in enterprise risk level, so there are significant differences in ESG scores among enterprises.

Further research shows that when the ESG performance of enterprises is better, the corresponding enterprise risk level will also be reduced. The results of Robust regression of mixed OLS model show that there is a significant negative correlation between the enterprise's ESG score and the enterprise's risk within 99% confidence interval. When the enterprise's ESG score increases by one unit, the enterprise's risk will decrease by 34.28 units. At the same time, in order to solve the endogenous problem.

The regression results of the fixed effect model used in the problem are similar to those of Pooled OLS, and the risk of enterprises and enterprises.

The ESG score of the enterprise is negatively correlated with the 99% confidence interval. When the ESG score of the enterprise increases by one unit, the risk of the enterprise will decrease by 20.08 units. In other words, when the company shows better ESG performance, it will send a positive signal to the outside world that the company has good sustainable development potential. At the same time, it will also improve the transparency of the company's information, thus enhancing the confidence of investors. Therefore, the ESG performance of enterprises has an important impact on investors' investment decisions.

### 5.2. Suggestions and Countermeasures

In the above two models, we find that the ESG performance of enterprises has a significant negative correlation with their risks. Considering that large enterprises in China are characterized by the concentration of shares at the upper level, in order to reduce the risk of A-share listed companies, we put forward the following suggestions and countermeasures:

- 1) Expand the scope of ESG evaluation and standardize the disclosure of ESG information. By introducing a third-party evaluation agency to independently evaluate the ESG performance of an enterprise, the fairness and authority of the evaluation can be improved, and ESG information can be disclosed in a more standardized and detailed way, so that the internal structural problems of the company can be presented more comprehensively (Leirunzhou, 2022), which is helpful for the enterprise to adjust itself and thus reduce the operational risk.
- 2) Adjust business strategy according to ESG evaluation. Under the policy background of deepening the construction of ecological civilization, strengthening environmental protection, improving environmental protection standards and pollution discharge penalties, and promoting the eco-environmental protection and green transformation and upgrading of enterprises, enterprises will not only face risks such as fines and production restrictions, but also be negatively affected by public opinion such as investors and the media. According to the social and environmental scores in ESG evaluation, strengthening environmental management and social responsibility in business strategy is helpful to reduce enterprise risks.

- 3) Improve the distribution of salary and equity according to ESG evaluation. The ratio of salary to equity is the key factor to determine the working attitude and efficiency of senior management. By improving the distribution of salary and equity, we can better mobilize the enthusiasm of the top management of enterprises and promote the supervisory role of the board of directors and the supervisory Committee. At the same time, an equity incentive plan can be adopted to link the executive's salary with the company's ESG performance and encourage them to make greater efforts in the enterprise's ESG performance, which is conducive to the long-term stable development of the enterprise.
- 4) Guide business decision-making according to ESG evaluation. According to ESG evaluation results, enterprises can adjust the positioning of products or services, transform and upgrade to adapt to market changes and future trends (Hao Xiaoyan, Yao Ruizhen, 2022) and reduce business risks.
- 5) Adjust the post structure according to ESG score. ESG score is a favorable indicator to reflect the rationality of post structure, which is helpful to expose the problems existing in post allocation and talent flow of enterprises, so as to adjust the post structure, improve the efficiency and productivity of enterprises, increase the income of enterprises (Zhang Chenxi, 2022) and reduce the risk of capital.
- 6) Increase the disclosure of social ESG information. By disclosing ESG reports to the society every quarter, we can increase the social supervision of enterprises and improve the comprehensive evaluation of society, thus reducing the distrust of society on enterprises and helping to reduce the risks of enterprises in social evaluation.
- 7) Establish ESG information sharing mechanism and collaboration platform. Through cooperation and communication with all social parties, we can jointly promote the formulation and implementation of ESG-related standards, establish an ESG information disclosure platform, improve the transparency and comparability of ESG information, effectively promote the benign interaction between enterprises and all social parties, and reduce the social credit risk of enterprises.

### 5.3. Limitations and Prospects

In this paper, the sample analysis method is used to study the influence of ESG rating on the risk of listed companies by selecting the wind rating data and company risk coefficient of Hexun.com's 2017-2022 A shares and constructing a model for analysis. The conclusions are basically in line with the assumptions of this paper, but there are still some shortcomings and limitations in this study.

First, due to the late introduction of ESG rating in China, China's ESG rating is still in the initial stage of development, and the degree of development is not sufficient, which makes the sample less representative, which may lead to a decline in the explanation of ESG rating and corporate risk impact in this paper.

Secondly, the data cited in this paper are limited in the ESG rating of Hexun.com listed companies, and the sample range is limited, which affects the universality of this conclusion on ESG rating research.

Thirdly, this paper only deals with the endogenous problems caused by the omitted variables that do not change with time, and there are other reasons that can also produce endogenous problems, such as reverse causality, etc., and the treatment of endogenous problems is not comprehensive enough.

Based on the limitations of this study, we will improve the study from the following two aspects in the future: First, select more comprehensive data, expand the sample size and range, and increase the representativeness of the sample. Second, select more regression models to solve

the endogenous problems caused by other reasons, such as system GMM model, tool variables, double difference and other methods.

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