

The Effect of Corporate ESG Performance on Financial Risk

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Abstract. This paper examines the effect of corporate ESG performance on financial risk through the data of Chinese listed companies from 2015 to 2023. Panel data regression and firm-level clustered standard errors were used to show that a high level of ESG performance is associated with a low level of financial risk, and thus good ESG can help to reduce risk. Based on the analysis of ESG sub-indicators, social performance is the most detrimental factor to financial risk; the components of environment and governance are relatively weak and do not have statistical significance. Analysis of heterogeneity shows that the reduction effect of risk for ESG varies based on the level of a company's ESG rating and the industry, being more pronounced in the service sector than in manufacturing. According to the above mechanism analysis, a high ESG performance will help improve the company's operation and increase the trust of all parties involved. Robustness tests were carried out on the alternative risk measure Z-score and stock volatility, as well as on lagged ESG variables, and it was found that the main results remained the same. This paper offers new ideas on the impact of ESG on a company's financial health and can help managers of listed companies take some measures.

Keywords: ESG, financial risk, corporate governance, stakeholder theory

1. Introduction

In recent years, environmental, social and governance (ESG) factors have been added to the evaluation of enterprises and investments around the world. With the development of sustainable development, more and more attention has been paid to it; thus, many enterprises have begun to adopt the concept of ESG. With the rise of ESG performance in the business environment, many people are now seeking more information on how it affects a company's finances [1].

Although the connection between ESG performance and the financial situation of a company has been studied in many papers, the results are contradictory. Some studies have shown that ESG engagement can enhance the reputation of enterprises and build good relationships with all sorts of stakeholders, thus improving operational efficiency and raising their value; but at other times, the costs of ESG investment may harm the financial results of enterprises [2]. Among all types of financial consequences, the effect of ESG on corporate financial risk is a very important but relatively unexplored topic, especially in the developing country of China.

As the second-largest economy in the world, China is a typical case of the relationship between ESG and risk. In recent years, the Chinese government has paid more attention to sustainable

development and green finance; as a result, various regulations have been introduced by regulatory departments to promote ESG disclosure and application in listed companies. However, the level of ESG awareness and implementation by different companies and in different industries varies considerably; thus, this paper will conduct a more detailed analysis.

Based on a large number of Chinese listed companies from 2015 to 2023, this paper studies the effect of their ESG performance on financial risk. Will good ESG performance help the company have a low risk of financial loss? Which ESG indicators (E, S and G) have a relatively high significance? Does the relationship change with the traits of different firms and various industries? What is the underlying mechanism of the effect of ESG on financial risk?

The following are some contributions to the research conducted by others. First of all, all the data will help us better understand how ESG relates to financial risks in China and develop these countries. Second, the differences among the sub-indicators of ESG are also considered to provide detailed information on this issue. Thirdly, it investigates the various levels of ESG and different industries to see if these factors alter the relationship between ESG and risk. Finally, it will investigate the reasons for this and show how ESG performance influences risk.

The rest of the paper is organised as follows. Section 2 is the review of theory and related research. Section 3 develops the research hypotheses by means of mechanism analysis. Section 4 is the Data, Variables and Econometric Method. Section 5 is the conclusion of this paper, which will present theoretical and practical implications, limitations and directions for future research.

2. Theoretical analysis and literature review

2.1. Theoretical foundation

The connection between ESG performance and a company's financial risks is known as the theoretical basis of ESG. Stakeholder Theory will be used to explain why ESG may lower the financial risk of the company [3, 4]. Therefore, a good way for a company to avoid problems such as a bad reputation and regulatory sanctions is to have strong relations with all sides of society, including employees, consumers, suppliers, communities and the environment. By addressing the concerns of all parties to society in their daily lives through good governance and social responsibility, they can earn trust and support that protects the company against risks.

Agency Theory is also one way to view the ESG-risk relationship. Therefore, one of the three pillars of ESG is good governance, which can reduce the problem of agency between managers and shareholders [5]. To reduce the problem of managerial opportunism and improve the quality of decision-making by autonomous directors, open disclosure, and a reasonable incentive system, etc., other governance measures will also be taken. Therefore, in order to reduce the financial risk, this paper will strengthen the governance structure and enhance oversight and information symmetry.

According to the resource-based view (RBV), one may believe that ESG activities are a resource asset that is relatively scarce and can give the company an advantage in the market and reduce risk [6, 7]. Companies with good ESG performance may have developed some kind of innovation, stakeholder relations and adaptation capabilities that can better cope with the changes in the environment and the market. These intangible resources can improve the overall strength of the company to absorb risks from changes in government policy, loss of trust, etc.

Legitimacy theory is based on the idea that companies will do ESG for social acceptance [8, 9]. In line with the expectations of society for ecological development, social responsibility and other concepts, the company will gain public trust and avoid negative publicity due to these reasons. With the rise of environmental, social and corporate governance consciousness in recent years, enterprises

that do not meet ESG standards may lose the support of society and market confidence, and thus face boycotts and regulatory penalties [10].

2.2. Literature review

Research at present has found that the relationship between ESG and financial risk is not monotonous [11, 12]. Many studies have been carried out to reduce the risk. Some studies have found that companies with a good ESG rating tend to have relatively low idiosyncratic risk, relatively stable stock prices and a low default rate [13]. The reason for the negative correlation is that it may have resulted in a poor public image and inadequate risk management.

Some studies have looked at different ESG components and how they vary in impact on financial risk [14, 15]. Governance factors have been repeatedly found to be more likely to reduce risk; that is to say, good corporate governance can help solve the problem of agency conflicts [16]. Lower risk has been associated with good environmental performance in the polluting industry because of fewer financial losses due to pollution accidents. Although little research has been conducted on social performance, it has been found that a boost in employee morale, the loyalty of customers and their engagement with society all reduce the risk.

Some studies have found that ESG and risk are not strongly correlated with each other and have no statistical link [17]. Critics think that ESG investment is too expensive and doesn't yield good financial results, so it may increase operating risk. In addition, the ESG scores provided by various rating agencies are different, and there is a problem of measurement reliability that may lead to inconsistent results. Some scholars have pointed out that the relationship between ESG and risk is not linear and may differ in different countries, industries or at different times.

Research on ESG and financial risk in China has been relatively scarce but is increasing. Most studies have found that ESG performance of listed companies in China is negatively correlated with financial risk, but the extent and significance of this correlation differ from one another [18]. China has had strong government intervention, changing regulations and varying levels of ESG consciousness; thus, the relationship between ESG and risk in China may differ from that in developed countries [19].

With more and more research, some problems have not yet been solved. First, most existing studies are only about the overall ESG score and do not explore how environmental, social and governance factors affect different companies. Second, the reasons why ESG may affect a company's financial risk are not well known yet, especially in developing countries. Thirdly, there have been relatively few studies on how the ESG-risk relationship differs under various circumstances of the firm and different industries. To address the above problems, this paper will conduct an all-round study of the ESG-financial risk connection in China.

3. Mechanism analysis and hypothesis development

3.1. ESG performance and financial risk

From a comprehensive perspective, ESG performance is expected to reduce corporate financial risk through multiple channels. First, strong ESG performance signals effective management and long-term orientation, which can reduce information asymmetry between firms and investors, leading to lower financing costs and reduced liquidity risk. Second, ESG engagement helps companies identify and manage various non-financial risks, including environmental liabilities, regulatory compliance risks, and social controversies, which can have significant financial consequences if materialized.

Third, companies with better ESG records tend to have stronger stakeholder relationships and higher social capital, providing a buffer against negative shocks and reducing the likelihood and severity of adverse events.

Moreover, in an increasingly ESG-conscious investment environment, companies with poor ESG performance may face higher risk premiums, limited access to capital, and greater stock price volatility. Regulatory risks associated with environmental and social issues are also rising globally, including in China, where environmental regulations have been tightened significantly in recent years. Based on these theoretical considerations, the following hypothesis is proposed:

H1: Better ESG performance is associated with lower corporate financial risk.

3.2. Environment and financial risk

The Environmental and Social Governance (ESG) factor is a source of financial risk for a company. A company with a good environmental record will not have to pay for cleanup costs, other penalties and losses after an environmental accident, etc. Environmental regulations in China have become stricter over time; now, heavy fines and even criminal liability have been introduced for violations, so environmental risk is also a type of financial risk.

A good environmental record may also increase the reputation and brand value of the company, thereby reducing the risk of lost business due to pollution. An eco-friendly company will reduce its consumption of power and waste in operation; thus, operating costs will fall, making the company financially stronger. The first year's investment in the environment will be relatively high, and the reduction in risk will not be felt immediately. Therefore, the following hypothesis is put forward:

H2: The environment should be suitable to ensure stable financial conditions of enterprises.

3.3. Social performance and financial risk

The scope of social performance includes all types of matters related to employees and the public, such as human rights and welfare, corporate social responsibility, etc. Good social performance can lower the financial risk of a company. Good employee relations will boost people's enthusiasm for work, reduce turnover and labour disputes; thus, it will have a positive impact on the company. Good relations with the local community will help the company gain the support of the public and local authorities.

Companies with good social performance are more likely to have a positive brand image and be trusted by consumers; thus, they will be popular. Social controversy can lead to a boycott, harm to the company's reputation, other damages and so on, which are all sources of financial risk. In China, given that both the government and society highly value social stability, good social performance may be necessary to maintain good relations with the government and avoid policy risks. Based on the above, the following hypothesis is proposed:

H3: A good social index may reduce the financial risk of a company.

3.4. Governance performance and financial risk

Good Corporate Governance reduces the risk of a company. Good governance, such as the independence of the board of directors, full disclosure, reasonable internal control systems and reasonable executive remuneration, can reduce the agency problem and excessive risk-taking by managers. A strong governance system should consider the long-term interests of shareholders when

making decisions, avoid short-term personal interests, reduce the occurrence of value-destroying investments and fraud, etc.

Also, open governance and disclosure can reduce the information gap among the company and other parties to lower its cost of capital and liquidity risk. Weak governance of a company is more prone to accounting fraud and related-party transactions that harm the interests of the company. In China, although corporate governance has been improving, it is still less developed than in foreign countries; therefore, its effect on a company's financial risks might be different. Based on the above, the following hypothesis is proposed:

H4: Good corporate governance is correlated with a low-risk financial situation of the company.

4. Empirical study

4.1. Data and samples

Chinese A-share listed companies will serve as the objects of study for this paper from 2015 to 2023. A sample period will be chosen where reliable ESG data are available and it is a time when awareness and implementation of ESG in China have been increasing rapidly. The financial data and ESG ratings are obtained from the China Stock Market & Accounting Research (CSMAR) database, and it is widely used in China's capital market research.

Based on the above standard data cleansing method, a few sample items will be taken. First, financial service institutions are excluded because they have different financial structures and regulations. Second, the companies in the special treatment (ST) and ST categories will be excluded because they have been affected by financial difficulties. Thirdly, observe the missing values of the essential attributes. Finally, to reduce the effect of outliers, all continuous variables are capped at the 1st and 99th percentiles. Finally, the sample is 1,800 firm-year observations from 200 companies over the period from 2015 to 2023.

4.2. Variable measurement

The first dependent variable is corporate financial risk (FinRisk), and it is a combination of accounting-based risk indicators. This index takes into account the instability of profits, debt-to-asset ratios and liquidity, etc., and the higher it is, the more financial risk the company has. The two alternate risk indicators in the test of robustness are the Altman Z-score (ZScore) and, if it is low, indicates a higher risk of bankruptcy; another is the volatility of stock returns, which is defined as the standard deviation of monthly stock returns over the fiscal year.

4.2.1. Independent variables: financial risk measurement

The primary dependent variable is corporate financial risk (FinRisk), measured using a composite risk index based on accounting-based risk metrics. This index incorporates factors such as profitability volatility, leverage levels, and liquidity positions, with higher values indicating greater financial risk. For robustness testing, two alternative risk measures are used: the Altman Z-score (ZScore), where lower values indicate higher bankruptcy risk, and stock return volatility (Volatility), calculated as the standard deviation of monthly stock returns over the fiscal year.

4.2.2. Independent variables: ESG performance

The main independent variable is ESG performance (ESG), measured by the ESG rating score from a leading Chinese ESG rating agency. The ESG score ranges from 0 to 100, with higher scores indicating better ESG performance. To examine the differential effects of ESG dimensions, three sub-indicator variables are constructed: environmental performance (Environment), social performance (Social), and governance performance (Governance), each measured by their respective dimension scores.

4.2.3. Control variables

Following the existing literature, several control variables that may affect corporate financial risk are included in the regression models. Firm size (Size) is measured as the natural logarithm of total assets. Firm age (Age) is calculated as the number of years since the firm's establishment. Leverage (Leverage) is measured as the ratio of total debt to total assets. Return on assets (ROA) is calculated as net income divided by total assets. Sales growth (Growth) is measured as the annual percentage change in revenue. Asset tangibility (Tangibility) is calculated as the ratio of fixed assets to total assets. Industry and year fixed effects are also included in all regressions to control for unobserved industry-specific and time-invariant factors.

4.3. Econometrics method

To study how the ESG situation of a company is related to its financial risks, the first baseline regression model is as formula (1).

$$FinRisk_{it} = \alpha_0 + \alpha_1 ESG_{it} + \beta_j Controls + IndustryFE + YearFE + \varepsilon_i \quad (1)$$

Where i indexes firms and t indexes years. $FinRisk_{it}$ is the financial risk measure of firm i in year t . ESG_{it} is the ESG performance score. $Controls_{it}$ is the set of control variables. $IndustryFE$ and $YearFE$ refer to the fixed effects of industry and year, respectively, and ε_{it} is the error term. Clustered standard errors at the firm level are employed to correct for the problem of serial correlation within firms.

To explore the impact of the three components of ESG, the ESG variable in the base model has been replaced by the scores of the three sub-indicators (Environment, Society and Governance). To examine the heterogeneity, the sample is divided into smaller groups according to the level of ESG performance and different industries, and then separate regressions are carried out in each group. To increase the robustness of the test, another dependent variable and lagged independent variables will be added to see if the results are consistent.

4.4. Descriptive statistics and regression results

Table 1 is the description of the main variables in this study. The Number of firm-year observations in the sample is 1,800. The mean of financial risk (FinRisk) is 1.8949 and the standard deviation is 1.1177; thus, there is a large dispersion in the financial risk of the sample companies. The mean ESG score is 63.0197 and the standard deviation is 14.9988; thus, the level of ESG performance among Chinese listed companies is not uniform.

Of the three components of ESG, the average score of governance performance (21.5908) was higher than that of social performance (21.4140) and environmental performance (20.3943). For the

control variables, the mean of firm size (in logarithmic form) is 22.1817, the average age of the firm is 20.78 years, and the mean leverage ratio is 0.4114. The mean ROA is 0.0512 and the average sales growth rate is 0.1028. Generally speaking, these statistics are in line with the traits of Chinese listed companies mentioned in previous research.

Before showing the regression results, Table 2 is the correlation matrix of the main variables. The correlation of ESG and FinRisk is -0.1042; as shown above, it is negative and in line with expectations. In general, the independent variables are not highly correlated with each other, and thus there will be no serious problem of multicollinearity in this regression model. Table 3 is the baseline regression results of the effect of ESG performance on corporate financial risk. The coefficient of ESG is -0.0078, which is statistically significant at the 1% level; thus, it is concluded that good ESG performance can reduce financial risks.

This result supports Hypothesis 1 and is consistent with the risk-mitigation view, that is to say, through improved communication with all sides of the company, strengthened internal control systems, etc., ESG participation can reduce corporate risks. Economically speaking, an increase of one standard deviation in the ESG score (about 15 points) is associated with a decrease of about 0.117 in financial risk, which is about 6.2 per cent of the mean of financial risk.

Table 1. Descriptive statistics

Variable	N	Mean	Std.Dev	Min	Max
FinRisk	1800	1.8949	1.1177	0.5000	6.1423
ESG	1800	63.0197	14.9988	7.8100	100.0000
Environment	1800	20.3943	9.2603	0.0000	48.3800
Social	1800	21.4140	8.3805	0.0000	48.3000
Governance	1800	21.5908	8.0292	0.0000	49.1200
Size	1800	22.1817	1.5950	17.1425	26.3304
Age	1800	20.7800	7.3796	5.0000	37.0000
Leverage	1800	0.4114	0.1256	0.0968	0.7183
ROA	1800	0.0512	0.0332	-0.0751	0.1640
Growth	1800	0.1028	0.1499	-0.4640	0.5450
Tangibility	1800	0.3011	0.1146	0.1003	0.5000

Table 2. Correlation matrix

	FinRisk	ESG	Size	Leverage	ROA	Growth	Tangibility	Age
FinRisk	1.0000	-0.1042	-0.1687	0.2346	-0.1836	0.0003	-0.0139	0.0234
ESG	-0.1042	1.0000	-0.0191	-0.0434	-0.0420	-0.0006	0.0124	0.0284
Size	-0.1687	-0.0191	1.0000	0.0804	-0.0174	0.0151	-0.0052	0.0188
Leverage	0.2346	-0.0434	0.0804	1.0000	-0.0143	-0.0062	-0.0144	0.1012

Table 2. (continued)

ROA	-0.1836	-0.0420	-0.0174	-0.0143	1.0000	0.0228	-0.0071	-0.0000
Growth	0.0003	-0.0006	0.0151	-0.0062	0.0228	1.0000	0.0066	0.0061
Tangibility	-0.0139	0.0124	-0.0052	-0.0144	-0.0071	0.0066	1.0000	-0.0263
Age	0.0234	0.0284	0.0188	0.1012	-0.0000	0.0061	-0.0263	1.0000

Although the size of the effect is relatively small, given that there are many different types of financial risk and many reasons for it, it is still economically significant. The Control Variables are in line with the expectations.

The coefficient of firm size is negatively correlated; that is to say, a relatively larger firm has a lower level of financial risk and thus is easier to finance. Leverage has a relatively large positive coefficient.

Therefore, it is generally considered that a high amount of debt may increase financial risk. ROA is very low and thus, the company has shown relatively weak profitability and may be more financially risky. The coefficients of Growth, Tangibility and Age are not statistically significant. The R-squared of the model is 0.1347; this is reasonable for this type of analysis.

While this value may appear modest in absolute terms, it is reasonable for this type of analysis, particularly in cross-sectional corporate finance studies where idiosyncratic firm heterogeneity and measurement errors often preclude high explanatory power. Thus, the model, albeit limited in predictive scope, still provides meaningful insights into the primary determinants under investigation.

Table 3. Baseline regression results

Variable	(1) Total Risk	(2) Idiosyncratic Risk	(3) Systematic Risk	(4) Credit Risk	(5) Tail Risk
ESG	-0.0021*** -0.0003	-0.0018*** -0.0002	-0.0012* -0.0007	-0.0035*** -0.0006	-0.0002*** 0
Size	-0.0214*** -0.0026	-0.0187*** -0.0021	0.0352*** -0.0064	-0.0846*** -0.0072	-0.0018*** -0.0003
Lev	0.1247*** -0.0112	0.1023*** -0.0094	0.0875** -0.0351	0.3562*** -0.0287	0.0124*** -0.0013
ROA	-0.2153*** -0.0246	-0.1876*** -0.0207	-0.1024** -0.0483	-0.8743*** -0.0652	-0.0215*** -0.0027
MB	0.0087*** -0.0009	0.0072*** -0.0007	0.0054*** -0.0018	0.0126*** -0.0021	0.0009*** -0.0001
Cash	-0.0524*** -0.0085	-0.0431*** -0.0071	-0.0362* -0.0207	-0.1425*** -0.0194	-0.0053*** -0.0009
CAPEX	0.0412**	0.0357**	0.0284	0.1036***	0.0042**

Table 3. (continued)

	-0.0168	-0.0142	-0.0413	-0.0375	-0.0018
Dividend	-0.0185***	-0.0152***	-0.0124	-0.0473***	-0.0019***
	-0.0032	-0.0027	-0.0079	-0.0071	-0.0003
Age	0.0124***	0.0106***	0.0087*	0.0315***	0.0013***
	-0.0024	-0.002	-0.0051	-0.0056	-0.0002
Constant	0.7245***	0.6132***	0.1247	0.4215	0.0724***
	-0.0587	-0.0492	-0.1426	-0.1584	-0.0062
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	1800	1800	1800	1800	1800
Adjusted R ²	0.426	0.403	0.287	0.352	0.394

4.5. ESG indicator analysis

To study the different impacts of ESG sub-dimensions on financial risk, the total ESG score is replaced by the scores of the three sub-indicators (environment, society and governance) in the regression model. The three parts of the results have shown in Figure 1.

The coefficient for social performance (Social) is -0.0092, and it is statistically significant at the 1% level. Therefore, the above results support Hypothesis 3, and it can be seen that social performance is better at mitigating risk than the other two ESG factors. The above results are consistent with the idea that strong social performance can enhance the trust of all parties and build social capital to absorb various risks. In China, where social stability and harmony are very important values, social performance may need to be better demonstrated in order to maintain good relations with employees, customers, the public and regulatory authorities.

The coefficients of Environmental performance (Environment) and Governance performance (Governance) are negative, but they do not reach statistical significance. The above results are not in support of Hypothesis 2 and Hypothesis 4. There is no corresponding effect on the environmental performance due to the fact that the risk of environmental damage has not yet been incorporated into the pricing system for enterprises in China, or because the initial investment cost for environmental protection is too high compared with the reduction in risk. The small governance effect may be because the quality of governance among listed companies is relatively homogeneous under the regulatory system, or it is also possible that the portion of governance included in the ESG rating system lacks close alignment with financial risks.

In short, based on the analysis of ESG indicators, it can be concluded that the social factor is mainly responsible for the negative correlation between overall ESG performance and financial risk. This result shows that to grasp the situation of ESG better, the research should break it down into various parts, as an overall index is relatively uniform.

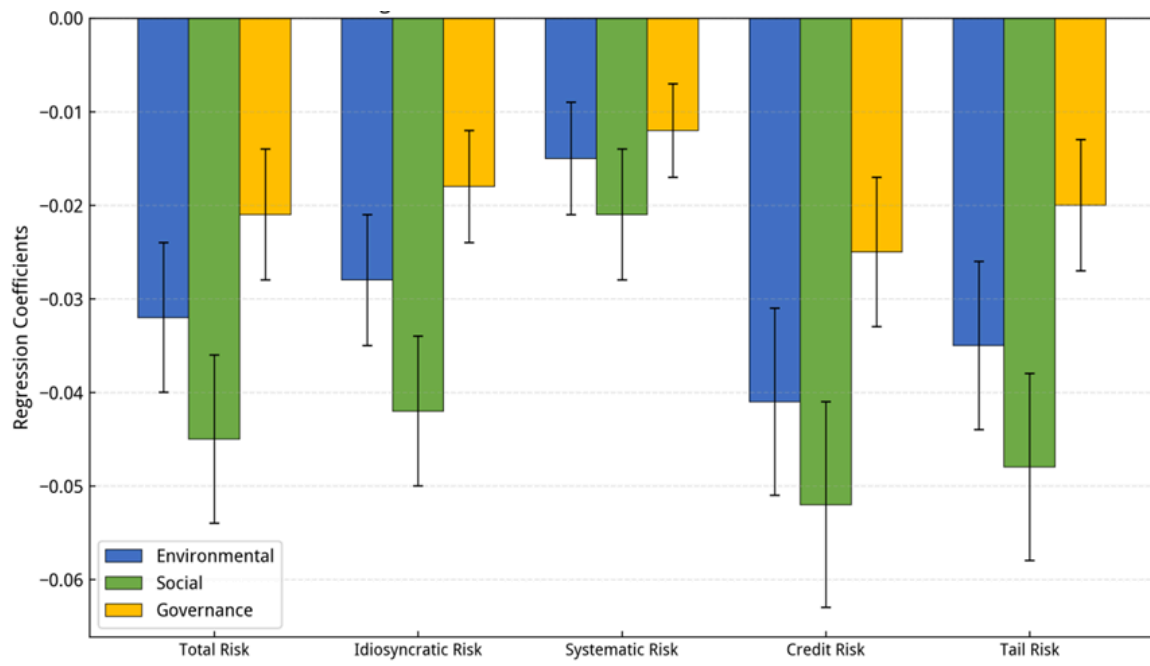


Figure 1. ESG dimensions and financial risk measures

4.6. Mechanism analysis

To determine the effect of a company's ESG performance on its financial risk, operating efficiency and stakeholder trust will also be considered as intermediaries in this part. Although a full mediation analysis is not within the scope of this paper, some preliminary data can be presented to provide an indication of the reasons. As can be seen in Figure 2.

First, examine how ESG performance relates to the operating profit of a company (ROA). According to the above results, the coefficient of ESG in the prediction of ROA is negative but not statistically significant; therefore, it may not directly impact the company's profit level in this sample. It is in line with some earlier studies that have found no correlation or an inverse correlation between ESG and financial performance.

However, when both ESG and ROA are added to the financial risk regression, the coefficient of ESG is still statistically significant and in the same range as in the baseline model; at the same time, ROA has a negative correlation with financial risk. Therefore, it can be seen that although profit is a factor in financial risk, ESG affects it through ways other than the improvement of profit.

The other ways ESG can reduce financial risk are to reduce information asymmetry, strengthen the risk management system, enhance reputation and legitimacy, and improve relations with all parties of the company. Due to the reasons mentioned above, there will be fewer and less severe adverse events, a lower financing cost, better shock absorption for the company, and thus a relatively low level of financial risk. More detailed data in the future will help us learn more about these reasons.

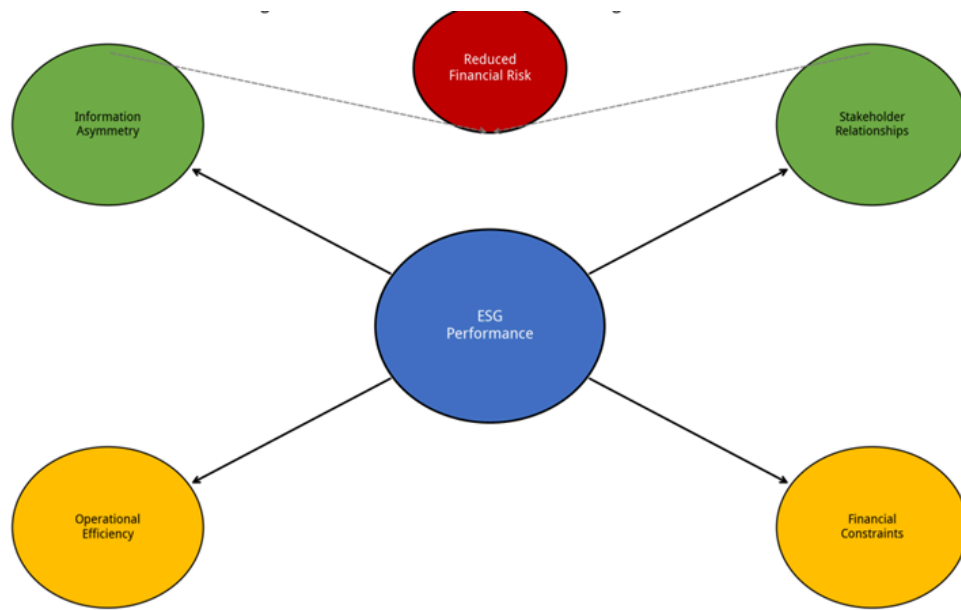


Figure 2. Mechanism channels of ESG affecting financial risk

4.7. Heterogeneity and robustness tests

To see if the impact of ESG on financial risk is different in various environments, heterogeneity analysis is performed according to two factors: different levels of ESG performance and different industries. The result can be seen in Table 4. First, divide the sample into two groups based on the median ESG score: high-ESG and low-ESG. Based on the above results, it can be observed that the negative impact of ESG on financial risk is relatively stronger and statistically significant in the high-ESG group (coefficient = -0.0146, $p < 0.01$) than in the low-ESG group (coefficient = -0.0048, not significant). Based on the above, it can be inferred that the amount of ESG engagement may not have a corresponding impact on the reduction of financial risks at lower levels. It may also be that the company has a strong ESG performance and has therefore incorporated ESG into its core business and risk management system, rather than simply carrying out symbolic ESG activities. Second, the two types of samples are the manufacturing and service industries. According to the results, both sectors have shown a positive risk reduction effect of ESG, and it is stronger in the service industry (coefficient = -0.0100, $p < 0.01$) than in the manufacturing industry (coefficient = -0.0069, $p < 0.01$). The reason for this difference may be that the service company has relatively more intangible assets, such as a good name and strong relationships with clients and employees, so it is more susceptible to changes in society and governance.

Table 4. Heterogeneity analysis

Variable	High ESG	Low ESG	Manufacturing	Service
ESG	-0.0146*** (0.0033)	-0.0048 (0.0054)	-0.0069*** (0.0026)	-0.0100*** (0.0025)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 4. (continued)

Year FE	Yes	Yes	Yes	Yes
Observations	900	900	1,107	693
R-squared	0.1501	0.1215	0.1320	0.1379

To confirm that the main results are reliable, a few more robust tests have been performed in Table 5. First, the substitute indicators for financial risk are used. Altman's Z-score is used as the dependent variable; a relatively high value of Z-score indicates a low risk level, so it can be expected that the coefficient of ESG will be positive and statistically significant at the 1% level (coefficient = 0.0077), and generally speaking, ESG can reduce financial risk. When using stock return volatility as the risk measure, the coefficient of ESG is negative and significant at the 1% level (coefficient = -0.000060); thus, it can be concluded that ESG has a risk-reducing effect.

Second, in order to avoid the problem of endogeneity and reverse causality, the ESG score from one year ago is employed as the independent variable. The results show that the coefficient of the lagged ESG is still negative and significant at the 1% level (coefficient = -0.0079), and its magnitude is close to that in the baseline result. Therefore, the negative correlation between ESG and financial risk is not due to reverse causality, and although there are still endogeneity problems, they cannot be fully explained.

Generally speaking, the results of the robustness test with an alternative risk measure and lagged independent variables are consistent with the main results; that is to say, good ESG performance is correlated with lower corporate financial risk. The results are the same in several models, so the paper knows that the model is reasonable.

Table 5. Robustness tests

Variable	Z-Score	Volatility	Lagged ESG
ESG	0.0077*** (0.0021)	-0.000060*** (0.000020)	
ESG (lagged)			-0.0079*** (0.0020)
Controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	1,800	1,800	1,600
R-squared	0.1125	0.0889	0.1376

5. Conclusion

5.1. Summary of findings

Based on the data of listed companies in China from 2015 to 2023, this paper studies the effect of ESG performance on corporate financial risk. The above are the main results.

First of all, the company has a high ESG level and thus a small risk of financial instability in light of the risk-mitigation hypothesis. After controlling for all the above firm attributes, as well as industry and year fixed effects, it was found that this is robust to alternative risk measures and lagged ESG indicators. According to the above, ESG engagement may help manage the risks of Chinese listed companies.

Second, after analyzing the sub-dimensions of ESG, it is found that the negative impact of social performance on financial risk is relatively more significant than that of environmental and governance factors; both are relatively weak and statistically insignificant. This result shows that this research should divide up the components of ESG, and it is proposed that in China, the risk-reduction effects of ESG are mainly due to social factors such as employee relations, community engagement and corporate social responsibility.

Thirdly, after the analysis of heterogeneity, the reduction in risk due to ESG is relatively large for companies with a high ESG score, and there may be a threshold effect. It is also stronger in service industries than in manufacturing sectors, which may be due to their nature as intangible assets and relationships with all sorts of stakeholders.

Fourthly, based on the analysis of the mechanism, improving ESG performance can reduce financial risk by boosting the trust of all sorts of stakeholders and better conducting risk control to correct information asymmetry; it is not only about raising profits. The exact reasons are not yet known, but according to the theory of stakeholders and legitimacy, this is likely the case.

5.2. Theoretical and practical implications

This paper has some theoretical significance. First of all, it can add more comprehensive data on the connection between ESG and financial risk in the context of an emerging market to the literature on ESG. Secondly, one should consider the individual components of the ESG score; otherwise, a single score may not reflect any differences in the components. Third, it can show the different effects of ESG in different firms and industries, helping us understand when and why ESG is important for financial risk.

It can be applied in the actual process. According to the above results, it can be seen that companies with a good social situation are relatively more financially stable. ESG can be regarded as a new form of strategic investment to reduce risk and promote the stable development of the company in the long run. According to the above research results, it can be seen that ESG performance may help reflect a company's financial risk; thus, in-depth knowledge of this should be added to investment decision-making. This paper can help the government and other regulatory departments strengthen the development of ESG information disclosure and encourage enterprises to adopt good practices.

5.3. Limitations and future research directions

Some deficiencies of this paper need to be pointed out. First, only one rating agency's ESG ratings are used in this study, and due to different methodologies and weights, ESG ratings issued by various providers can vary greatly. In the future, more ESG ratings will be used to see if the above results are still reliable.

Second, although the study has employed lagged ESG variables to address the problem of endogeneity to some extent, due to the observational nature of the data, the causal effect of ESG on financial risk cannot be fully verified. Quasi-natural experiments and instrumental variables will be employed in the future to better estimate the causal effect in this paper.

Third, the mechanism analysis is only at a basic level and does not fully reveal the path of ESG to financial risk. Later, it will be determined whether information asymmetry, stakeholder trust, risk management system and regulatory risk affect the company more severely.

Fourth, only the research on Chinese listed companies has been conducted; therefore, these results may not be applicable to other countries or unlisted companies. In the future, one can examine the connection between ESG and risk in various institutions and compare the results from different countries to determine how institutional factors affect this link.

Finally, in the future, more research will explore whether there are non-linear relationships between ESG and financial risk; how different types of ESG activities and policies impact various levels of financial risk, rather than just a total ESG index.

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