ESG Performance and Corporate Risk -- Based on Chinese Listed Companies

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Abstract. Based on 4829 A-share listed companies from 2009 to 2022, this study empirically examines the impact of corporate ESG performance on corporate risk. The results show that improving enterprise ESG performance can significantly reduce enterprise risk. Mechanism analysis shows that ESG performance can improve corporate performance, increase corporate information transparency and reduce agency costs, thus reducing corporate risks.

Keywords: ESG performance, Enterprise risk, Information transparency, Agency cost

1 Introduction

As a guiding principle for investment and corporate assessment, prioritizing the environmental, social, and governance (ESG) aspects of a company's performance, ESG has attracted much attention. With the increasing openness of capital market, international investors have put forward higher requirements for the ESG performance of Chinese enterprises, which will force domestic investors to pay more attention to the ESG performance of enterprises.

Among the three dimensions of ESG, existing studies generally believe that good corporate governance can reduce agency costs, enhance corporate competitiveness, and reduce corporate risks.Based on the theory of stakeholder relevance, some scholars believe that the initiative of enterprises to assume environmental and social responsibilities is conducive to reducing the potential risks of enterprises. In addition, both the tradeoff theory and the agency theory show that the risk of enterprises will increase when they assume environmental and social responsibility. In the case of limited resources and capabilities, enterprises must not only bear environmental and social responsibilities, but also occupy corporate resources, which will crowd out other projects, thus reducing the competitive advantage of enterprises. The majority of empirical research suggests that strong environmental or social responsibility practices can mitigate corporate risk (Albuquerque et al., 2019)[1]. Nonetheless, there are studies indicating that corporate social or environmental responsibility might be utilized by management to conceal negative news and pursue personal interests, potentially amplifying the risk of a stock price downturn (Gerard B., 2019)[2].

To sum up, on the one hand, due to the late emergence of ESG as a holistic concept, most relevant literature studies the effects of E, S and G on enterprise risk management, while there

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are relatively few studies that integrate the three factors to examine how ESG affects corporate risk, only Hoepner et al.(2018)[3] have been found. On the other hand, the bulk of empirical research in this field has primarily focused on companies in developed nations such as those in Europe and the United States. Given this gap in research, the present study undertakes an empirical analysis using a sample comprising 4829 A-share listed companies spanning from 2009 to 2022. The objective is to examine the influence of ESG performance on corporate risk and delve deeper into the underlying mechanisms and pathways. By doing so, this study aims to furnish empirical insights that can aid enterprises in implementing ESG strategies, conducting effective risk management, and fostering a mutually beneficial development for both enterprises and society(Vazquez.,2022)[4].

2 Theoretical Analysis and Research Hypotheses

Based on the perspective of stakeholder and resource dependence, ESG can reduce the company's risk from the following perspectives:

First, good ESG performance can improve business performance. First, good ESG performance can improve corporate profitability. On the one hand, by improving the level of ESG, enterprises can obtain higher product premiums. On the other hand, improving ESG performance can enhance the stability of corporate profits. Second, good ESG performance helps to improve corporate operating efficiency, and companies with good social reputation can attract more talents and improve production efficiency.

Second, Strong ESG performance tends to enhance the transparency of corporate information. Companies excelling in ESG practices are inclined to be more proactive in disclosing information regarding their environmental stewardship, social accountability, and corporate governance endeavors(Tykvová and Borell, 2012)[5], effectively reducing information asymmetry between enterprises and stakeholders. It not only helps to avoid stakeholders from taking measures that are not conducive to the development of enterprises because they do not understand the enterprises, but also helps to alleviate agency problems that may be caused by insiders' information advantages, thus preventing management from engaging in earnings manipulation, tax avoidance, over-investment and other behaviors that may increase the risks of enterprises(Oprean-Stan et al,2020)[6].

Thirdly, good ESG performance can reduce agency cost. From the internal perspective, firstly, the establishment of corporate social responsibility and environmental responsibility effectively inhibits the opportunistic behavior of management, protects and improves corporate reputation, and ultimately reduces corporate risks. Second,as the agent of shareholders, senior executives have high moral level and cherish the long-term mutually beneficial relationship between the company and creditors more, so they are less likely to damage the interests of creditors through asset substitution. In addition, corporate governance itself is a dimension of ESG. Enterprises exhibiting strong ESG performance typically demonstrate enhanced corporate governance, improved internal control quality, and reduced agency costs. These stakeholders serve as active supervisors, providing timely feedback to management, thereby facilitating improvements in management practices, processes, and efficiency levels.

Based on the above analysis, this paper proposes the hypothesis that the better the ESG performance is, the lower the enterprise risk is.

3 Empirical Research Design

3.1 Model Setting and Variable Definition

In order to test the impact of ESG performance on enterprise risk, this paper uses the ordinary least square method to run the following model:

$$Zsore_{i,t} = \alpha + \beta ESG_{i,t-1} + \vec{\gamma}\vec{X}_{i,t-1} + \sum ind + \sum year + \varepsilon_{i,t} \quad (1)$$

Where, $Zscore_{i,t}$ is the corporate financial risk score of corporation i in year t, and $ESG_{i,t-1}$ is the numerical form of ESG rating of company i in year t-1.

To be specific, in terms of explained variables, referring to Altman (2002)[7], we use the modified Zscore to measure the company's risk. The revised Zscore= (0.718× working capital+0.846×retained earnings+3.108×EBIT+0.998×sales revenue)/(total assets +0.42×book value of shares/total liabilities), the higher the value is, the lower the financial risk faced by the company.

In terms of major explanatory variables, consistent with Xi Longsheng and Zhao Hui(2022)[8], we compute enterprises' ESG performance based on China Securities ESG Rating. We transform the ESG rating into a number format: when the rating is the lowest level C, the value is 1, and on this basis, the value is increased by 1 for each step up in the rating, such as 3 for CCC, 6 for BBB, and 9 for AAA. On this basis, the average of the results of the four annual ESG reviews is used to measure the ESG performance of the company for the year.

Regarding control variables, in alignment with prevailing research, this study incorporates company size (SIZE) as a control variable. Additionally, the leverage ratio (LEV), representing the proportion of all liabilities to all assets, is included as another control variable.; Enterprise growth GR is the increasing rate of enterprise's main business income; ROE is the Return on equity; Operating cash flow CF is the ratio of the net cash flow generated by operating activities in the current period to the total assets at the beginning of the period; The ratio of tangible assets to total assets TANG is the ratio of the sum of fixed assets and inventory to total assets; The nature of equity SOE is 1 if it is a state-owned enterprise, and 0 for others. At the same time, the benchmark model also controls industry fixed effects[1] and year fixed effects. In order to avoid the influence of firm-level clustering effect on the standard error, the regression is clustered at the firm-level.

3.2 Data source and sample selection

This study takes A-share listed companies in Shanghai and Shenzhen from 2009 to 2022 as the initial research sample, and excludes the samples according to the following criteria:①

[1] The industry classification shall be subject to the 2012 industry Classification guidelines of Listed Companies issued by CSRC. Secondary classifications are used for manufacturing and broad categories are used for other industries.

ignoring the companies in the financial and real estate industries; ②Eliminate the T-class listed companies with ST or ST* status; ③Delete the samples with missing key financial data. Finally, 20797 corporation-year observations are collected, which is an unbalanced panel data with N=4829 cross sections and T=13 time span. In terms of data sources, except for ESG rating from China Securities ESG Rating Database, other variables are from CSMAR database. In order to avoid the possible impact of outliers on the regression results, this paper winsorizes all continuous variables by 1%.

4 Results

4.1 Basic regression results

Table 1. reports the benchmark regression results of ESG's impact on corporate risk. Column (1) reports the regression results without adding other control variables, Column (2) further controls the industry fixed effect and time fixed effect on the basis of Column (1), and Column (3) adds to column (2) other control variables such as indebtedness, development and cash flow. In all regressions, ESG coefficients are positive at the 1% significance level. In terms of economic significance, taking the results in Column (3) as an example, if company's ESG rating is improved by one notch (for example, from BBB to A), the resulting Zscore increases by 0.046, which accounts for 3.71% (7.52%) of the average (standard deviation) of the sample company's Zscore. The regression results in **Table 1.** support the hypothesis that good ESG performance can help reduce enterprise risks.

Table 1. Impact of ESG on firm risk.

	(1) Zscore	(2) Zscore	(3) Zscore
$ESG_{i,t-1}$	0.068***	0.069***	0.046***
	(7.53)	(8.28)	(5.92)
$SIZE_{i,t-1}$			-0.006
			(-0.62)
$LEV_{i,t-1}$			-0.371***
			(-6.61)
$GR_{i,t-1}$			-0.066***
			(-5.08)
$ROE_{i,t-1}$			0.364**
			(2.41)
$CF_{i,t-1}$			1.804***
			(14.68)
$TANG_{i,t-1}$			-0.156***
			(-2.76)
$SOE_{i,t}$			0.027
			(1.24)
Constant term	0.859***	0.886***	1.231***
	(21.89)	(12.07)	(6.21)
Individual fixation effect	NO	YES	YES
Time fixation effects	NO	YES	YES
Observations	20797	20797	20797

Note: The value in () below the regression coefficient is the t value calculated by using the firm level clustering robust standard error; *, **, ***denotes that the significance levels of regression coefficients are 10%, 5% and 1%, respectively. Unless otherwise specified, the following table is the same.

4.2 Robustness analysis

Firstly, the original Zscore proposed by Altman (1968)[9] (denoted as Zscore1) is used to measure enterprise risk. Zscore1=(1.25×working capital+1.35×retained earnings+3.25×EBIT +1.1×sales revenue)/total assets+0.6×all stock market value/all liabilities. Second, the annual standard deviation Rv_idol of the model residual obtained by the CAPM model with daily frequency is estimated to reflect the company's idiosyncratic risk (Zou and Li, 2022)[10]. Thirdly, considering that companies with high financial risk are prone to violations, we also calculate the number of violations NV of listed companies to reflect corporate risk. The explained variables were replaced with these indicators of business risk and regression was performed separately. The regression results are shown in **Table 2**. The results show that ESG significantly increases Altman's Z-score, reduces the idiosyncratic risk of enterprise stock, and significantly reduces the frequency of enterprise violations, indicating that replacing the measurement method of enterprise risk can not change the major conclusion.

Table 2. Regression results of replacing financial risk measurement methods.

	(1)	(2)	(3)
	Zscore1	Rv_idol	NV
$ESG_{i,t-1}$	0.064***	-0.018**	-0.037***
	(7.14)	(-2.52)	(-5.97)
$SIZE_{i,t-1}$	-0.005	-0.204***	-0.007
	(-0.51)	(-28.70)	(-1.23)
$LEV_{i,t-1}$	-0.890***	0.471***	0.221***
	(-13.87)	(10.28)	(5.43)
$GR_{i,t-1}$	-0.049***	0.021	0.000
	(-3.18)	(1.51)	(0.01)
$ROE_{i,t-1}$	0.454**	-0.159***	-0.185***
	(2.37)	(-3.34)	(-3.76)
$CF_{i,t-1}$	2.029***	-0.321***	-0.358***
	(13.99)	(-3.41)	(-4.62)
$TANG_{i,t-1}$	-0.266***	-0.255***	-0.128***
	(-4.16)	(-5.58)	(-2.99)
$SOE_{i,t}$	0.034	-0.138***	-0.106***
	(1.40)	(-8.75)	(-7.93)
Constant term	1.588***	6.496***	0.700***
	(6.95)	(43.12)	(4.83)
Individual fixation effect	YES	YES	YES
Time fixation effects	YES	YES	YES
Observations	20797	20797	20797

5 Analysis of Action Mechanism

Theoretical analysis indicates that ESG performance has the potential to mitigate corporate risks by enhancing corporate performance, augmenting corporate information transparency, and diminishing corporate agency costs. Subsequently, we elucidate the measurement methodologies for each variable associated with these mechanisms:

First, business performance mechanism. This paper mainly measures business performance from two aspects: corporate profit level ROA and earnings volatility ROA_SD. The higher the profit level is and the lower the profit volatility is, the more stable the operating performance is and the lower the financial risk is.

Second, corporate information transparency mechanism. This paper mainly measures the information transparency of listed companies from two dimensions: the information disclosure quality of listed companies and the analyst forecast divergence. Specifically, the information disclosure quality of listed companies is divided into four grades: A, B, C and D from high to low, and the four grades are assigned 4, 3, 2 and 1 respectively. Analysts' earnings per share forecasts diverge:

$$DIS_{i,t} = \frac{SD_{i,t}}{P_{i,t,0}} = \frac{1}{P_{i,t,0}} \times \sqrt{\frac{1}{(N_{i,t}-1)} \sum_{j=1}^{N_{i,t}} (FEPS_{i,t,j} - \overline{FEPS_{i,t}})^2} \quad (2)$$

Where $EPS_{i,t}$ is the EPS published by company i in year t, $FEPS_{i,t,j}$ is the JTH EPS forecast obtained by company i in year t, $N_{i,t}$ is the number of EPS forecasts obtained by company i in year t, and $P_{i,t,0}$ is the stock price at the beginning of the year.

Thirdly, the agency cost mechanism of the enterprise. This paper uses the management expense ratio to measure the first type of agency cost (AC1), and the ratio of other receivables to total assets to measure the second type of agency cost (AC2). The higher the management expense ratio is, the more serious the first type of agency problem is. The higher the proportion of other receivables, the more serious the second type of agency problem.

On this basis, we replace the explained variable in Model (1) with the above mechanism variable and run regression again. The matching regression results are shown in **Table 3**. The results show that ESG improves business performance, increases corporate transparency and reduces agency costs. This further clarifies the specific mechanism behind the finding that "ESG reduces enterprise risk" and opens the "Black-box" of ESG affecting enterprise risk.

Table 3. Analysis of the mechanism by which ESG performance affects enterprise risk.

	(1)	(2)	(3)	(4)	(5)	(6)
	Operational performance mechanism		Information transparency mechanism		Agency cost mechanism	
	ROA	ROA_SD	IDQ	DIS	AC1	AC2
ESGi,t-1	0.054***	-0.019***	0.108***	-0.053**	-0.047***	-0.116***
	(11.65)	(-9.94)	(14.45)	(-2.07)	(-2.95)	(-3.87)
SIZEi,t-1	0.025***	0.003	0.116***	0.411***	-0.093***	0.002
	(4.71)	(1.25)	(14.37)	(14.69)	(-8.40)	(0.06)

LEVi,t-1	-0.563***	-0.063***	-0.529***	0.245	-0.820***	2.460***
	(-17.49)	(-4.67)	(-10.50)	(1.54)	(-11.34)	(10.36)
GRi,t-1	0.034***	-0.010***	0.048***	-0.212***	0.102***	0.145**
	(3.96)	(-2.77)	(3.46)	(-4.62)	(3.41)	(2.18)
ROEi,t-1	0.251	-0.058***	0.265**	-0.806***	-0.427***	-1.182***
	(1.63)	(-3.47)	(2.51)	(-3.68)	(-4.47)	(-5.50)
CFi,t-1	2.257***	0.012	1.060***	-1.977***	-0.282	-1.896***
	(22.87)	(0.46)	(9.89)	(-6.70)	(-1.64)	(-3.57)
TANGi,t-1	-0.244***	0.005	0.034	0.804***	-0.599***	-1.668***
	(-8.84)	(0.38)	(0.68)	(4.71)	(-6.56)	(-7.26)
SOE i,t	-0.052***	-0.019***	0.095***	-0.563***	-0.005	-0.142
	(-4.94)	(-3.57)	(4.97)	(-9.71)	(-0.18)	(-1.54)
Constant term	-0.046	0.358***	0.087	-6.734***	3.569***	2.035**
	(-0.42)	(6.97)	(0.49)	(-10.94)	(12.85)	(2.16)
Individual fixation effect	YES	YES	YES	YES	YES	YES
Time fixation effects	YES	YES	YES	YES	YES	YES
Observations	20797	20797	17489	20054	20797	20797

6 Conclusions and Implications

The study finds that good ESG performance is of great significance to reduce the risk of enterprises. By examining the mechanism of action, we find that the risk decreasing effect of ESG comes from the fact that excellent ESG performance can enhance enterprise commercial performance, improve enterprise information transparency, and reduce enterprise agency cost.

Based on the research conclusions of this paper, good ESG performance can help reduce enterprise risks and achieve the healthy development of multiple subjects such as the company, customers and society. Therefore, enterprises should strive to improve their ESG performance: first, they can accelerate the top-level system design of ESG management system under the development framework of "carbon neutral" and "carbon peak", and actively seek technical support and comprehensive path of ESG information disclosure methods to quantify the quality of their ESG performance; Second, it is necessary to integrate ESG concept into the company's development strategy, employee performance appraisal, cultural atmosphere construction and other internal aspects of the company; The third is to consider the establishment of efficient investor relations management, ESG as a communication medium, actively coordinate and mobilize the professional advantages of all parties, enabling enterprises to achieve "carbon neutral" and "carbon peak" efficiency.

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