



# ESG Performance and Stock Price Collapse Risk of Listed Companies from the Perspective of Property Rights

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**Abstract.** At present, China's securities market is still in the development stage. Guiding investors to pay attention to the relationship between ESG performance and stock price collapse risk is of great significance to the improvement of domestic ESG rating system and the stability of financial market. From the perspective of the nature of property rights, taking A-share listed companies from 2015 to 2020 as a sample, this paper empirically tests the relationship between ESG performance and stock price collapse risk. The results show that the negative correlation between enterprise ESG performance and stock price collapse risk is more significant in state-owned enterprises. Due to the "reputation effect", state-owned enterprises can better inhibit the stock price collapse risk, which enlightens enterprises to make reasonable ESG investment and investors should reasonably treat the differences of the impact of ESG rating on different enterprises.

**Keywords:** ESG Performance · Risk of Share Price Collapse · State-owned Enterprise

## 1 Introduction

With the improvement of carbon neutral carbon peak in our country, the accumulation of practical experience of responsibility investment, domestic investment management institutions to take evaluation method is increasingly diversified. The indicators of social responsibility include traditional CSR and SRI. When transitioning to ESG, compared with traditional indicators, ESG performance incorporates employment, supply chain and carbon emissions into investment analysis with a set of comprehensive standards, which can better apply non-financial information to investment analysis. At the academic level, we have been very concerned about the correlation between social responsibility disclosure and the risk of stock price crash. Since the risk of stock price crash often affects the stable development of the company, leading to financial order disorder and loss of market financing ability, it is necessary to apply ESG performance to the analysis of stock price crash risk. A large number of literature has verified the relationship between social responsibility performance and the risk of stock price crash. In this paper, based

on the relationship, this paper further analyzes the difference in the impact of ESG performance on the stock price crash risk of different property rights, and broadens the relevant literature.

## 2 Literature Review and Research Hypothesis

In the impact of social responsibility disclosure on the risk of stock price crash, controlling the risk of stock price crash by increasing corporate information symmetry is published [6]; taking American listed companies as research samples, empirical analysis found that poor ESG companies have greater share price volatility and higher investment risk is proved [1]; Xili Ma (2019) [9] believes that companies that avoid low ESG rating can avoid investment risks such as stock crash; Jianhong Tao (2021) [5] concluded that the ESG rating level is negatively associated with the risk of crash and is more significant in the heavy pollution industry by Fixed-effect model regression. And Xiaofeng Quan (2015) [10] has found that forced disclosure of social responsibility data can make it a weapon for management rather than a price creation tool for investors, and cannot effectively resist the risk of stock price crash; Lihui Tian et al. (2017) [4] used the DID-PSM method to verify that mandatory disclosure of corporate social responsibility data exacerbates the risk of stock price crash.

At present, most of the ESG information disclosure regulations in China are “voluntary” disclosure, and the content of mandatory disclosure is less. Under the condition of voluntary disclosure, combined with the research results, it can be found that the higher the company’s ESG rating, the more the risk of stock price crash can be suppressed. However, the samples selected in each research did not distinguish the property rights of listed companies, while another empirical research shows the difference of enterprise property rights, compared with non-state enterprises [3]; Hongxu Liu and Xianhu Xiang (2014) [8] believe that state-owned enterprises are more regulated, and due to social reputation and the responsibility of stabilizing social economy, they form higher requirements and standards for the quality of information disclosure, thus reducing the asymmetry of information disclosure; Qi Fan (2013) [2] proposed that disclosure of social responsibility would increase the cost of enterprises in the short term and weaken the competitiveness of enterprises. Therefore, the author believes that state-owned enterprises enjoy the support of government funds and policies and have good talent organization advantages, so they can integrate resources with less investment in ESG rating. Therefor even if there is no corresponding mark-to-market return from increased exposure to ESG, it does not increase the risk of a crash. When non-state-owned enterprises increase their ESG investment, without bringing corresponding benefits to the enterprises, it will affect the market value, the share price, and the investors’ expectations. This does not curb the risk of a stock price crash, and this paper proposes the hypothesis that:

Suppose H1: The negative correlation between ESG performance and the risk of stock price crash is more significant.

### 3 Study Design

#### 3.1 Sample Design

Considering the timeliness and availability of data, this paper selects Chinese A-share listed companies from 2015 to 2020 as the sample data of stock price crash risk and ESG rating, processes the data as follows:

- (1) Excluding companies with annual weekly earnings of less than 30 weeks;
- (2) Excluding financial industry companies, ST, \* ST and delisted companies;
- (3) Excluding companies whose nature of property rights has changed between 2015 and 2020;
- (4) Excluding the listed companies with a serious lack of ESG index.

The treatment yielded 6,642 effective sample observations. The ESG rating is from the Bloomberg SASB ESG index, and the other data are from the National Tai'an database. In addition, in this paper, all continuous variables in the model were reduced at 1% to exclude the influence of outliers. The data processing and regression analysis involved in the study were all completed by Excel and Stata 16.0.

variable-definition

- (1) Risk of a stock price crash

Drawing on Kim & Zhang (2014) [7], the risk of stock price crash is measured by the following methods:

First, the weekly yield of stock “i” is used to calculate the market-adjusted week “t” yield of stock according to formula (1).

$$R_{i,t} = \alpha_i + \beta_1 R_{m,t-2} + \beta_2 R_{m,t-1} + \beta_3 R_{m,t} + \beta_4 R_{m,t+1} + \beta_5 R_{m,t+2} + \varepsilon_{i,t} \quad (1)$$

$R_{i,t}$  indicated as the yield rate of stock “i” at week “t”, and  $R_{m,t}$  shows the weighted average market return rate,  $\varepsilon_{i,t}$  the residual difference is calculated by formula (1), and the adjusted “t” yield rate of stock week “i” is calculated as:

$$W_{i,t} = \ln(1 + \varepsilon_{i,t}) \quad (2)$$

$W_{i,t}$  Based on formula (2), the negative return skewed coefficient (NCSKEW) and return volatility (DUVOL)

$$NCSKEW_{i,t} = -\frac{n(n-1)^{3/2} \sum W_{i,t}^3}{(n-1)(n-2)(\sum W_{i,t}^2)^{3/2}} \quad (3)$$

$$DUVOL_{i,t} = \ln \frac{(n_u - 1) \sum_{down} W_{i,t}^2}{(n_d - 1) \sum_{up} W_{i,t}^2} \quad (4)$$

- (2) ESG grade

Bloomberg not only provides an ecosystem of sustainable financial solutions, but also works with external ESG ratings, framework, and data providers to develop a wealth of optional indices. The Bloomberg ESG index is used for this score.

**Table 1.** Variables Table

type of variable	Variable meaning	Variable name	computational method
explained variable	Stock price crash risk	$NCSKEW_{i,t+1}$	negative return skewness coefficient for the last year, calculated in formula (3)
		$DUVOL_{i,t+1}$	The volatility of the following year is shown in formula (4)
explanatory variable	Corporate Social Responsibility	$ESG_{i,t}$	Bloomberg index
controlled variable	Negative return skewed coefficient	$NCSKEW_{i,t}$	Negative return skewed coefficient of the current period
	The volatility of earnings	$DUVOL_{i,t}$	The income fluctuation ratio of the current period
	scale	$Size_{i,t}$	Natural logarithm of the total assets of the company
	asset-liability ratio	$Lev_{i,t}$	Total ending liabilities/total ending assets
	Net profit margin of assets	$ROA_{i,t}$	Net profit/average total assets
	Investor heterogeneity	$DTURN_{i,t}$	The detrending monthly turnover rate, the difference between the total number of shares of this year/the total number of shares turnover rate of this year
	Book market value ratio	$BM_{i,t}$	Total assets/stock market value
	Weekly yield of individual stocks	$RET_{i,t}$	See formula (1)
	market fluctuations	$Sigma_{i,t}$	The company's t-year weekly earnings standard deviation, reflecting stock price volatility

## (3) controlled variable

Control variables were selected from Kim (2014), Xiaofeng Quan (2015), Yuan Zhang (2021) [11] and other documents. The specific variables are shown in Table 1.

### 3.2 Model Design

To test the relationship between ESG performance and stock price crash under different property properties, we constructed a model (1):

$$\begin{aligned} Crash_{t+1} = & \alpha + \beta ESG_{i,t} \\ & + \gamma CV_{i,t} + Ind + YR + \varepsilon_{i,t} \end{aligned} \quad (5)$$

$Crash_{t+1} \propto ESG_{i,t} CV_{i,t} YR Ind$  It is  $t + 1$  stock price crash risk, intercept item, CSR assignment value, control variable, and annual fixed effect and industry fixed effect, respectively, and random disturbance term  $\varepsilon_{i,t}$ .

## 4 Empirical Analysis

### 4.1 Descriptive Statistics

This paper use EXCEL to analysis the descriptive statistics of the data. Table 2 shows the statistical results, and the mean values of the two proxy variables  $NCSKEW^{i,t+1}$  and  $DUVOL^{i,t+1}$  of stock price crash risk were  $-0.315$  and  $-0.109$ . The standard deviations are  $0.692$  and  $0.487$  respectively, indicating that the risk of stock price crash varies greatly among different enterprises. The average ESG rating of enterprises of  $21.824$  is at a low level, and the gap between the minimum value of  $1.240$  and the maximum value of  $64.115$  is wide. This phenomenon shows that there are listed companies with poor ESG performance and most of them still have a lot of room for improvement.

**Table 2.** Descriptive statistics of the variables

variable	sample number	average value	standard error	median	least value	crest value
$NCSKEW_{i,t+1}$	6642	$-0.315$	$0.692$	$-0.372$	$-2.610$	$3.736$
$DUVOL_{i,t+1}$	6642	$-0.109$	$0.487$	$-0.179$	$-1.423$	$2.370$
$ESG_{i,t}$	6642	$21.824$	$7.521$	$20.574$	$1.240$	$64.115$
$NCSKEW_{i,t}$	6642	$-0.436$	$0.682$	$-0.236$	$-2.254$	$3.247$
$DUVOL_{i,t}$	6642	$-0.214$	$0.466$	$-0.189$	$-1.674$	$1.329$
$Size_{i,t}$	6642	$23.262$	$1.280$	$23.148$	$19.716$	$26.395$
$Lev_{i,t}$	6642	$0.475$	$0.196$	$0.483$	$0.053$	$1.128$
$ROA_{i,t}$	6642	$0.042$	$0.064$	$0.036$	$-0.415$	$0.244$
$DTURN_{i,t}$	6642	$-0.043$	$0.318$	$-0.006$	$-2.487$	$1.585$
$BM_{i,t}$	6642	$1.465$	$1.601$	$0.901$	$0.051$	$9.945$
$RET_{i,t}$	6642	$0.002$	$0.011$	$0.002$	$-0.084$	$0.264$
$Sigma_{i,t}$	6642	$0.063$	$0.029$	$0.055$	$0.014$	$0.325$

## 4.2 Regression Analysis

Table 3 lists the regression results of model (1). It can be seen that the ESG performance of state-owned enterprise sample groups is significantly negatively correlated with the risk of stock price crash under different property rights properties. There was a significant negative correlation between the ESG performance and the backward negative return bias coefficient, but not with the fluctuation of the backward income, which may be due to the sample selection structure in non-state-owned enterprises. Comparing columns

**Table 3.** Empirical study findings

	state-owned enterprises		Non-state-owned enterprises	
	(1)	(2)	(3)	(4)
variable	NCSKEW <sub><i>i,t+1</i></sub>	DUVOL <sub><i>i,t+1</i></sub>	NCSKEW <sub><i>i,t+1</i></sub>	DUVOL <sub><i>i,t+1</i></sub>
ESG <sub><i>i,t</i></sub>	−0.021*** (−26).7	−0.016** (−2.60)	−0.019** (−1.97)	−0.015 (−1.55)
NCSKEW <sub><i>i,t</i></sub>		0.057*** (7.62)		0.056*** (7.61)
DUVOL <sub><i>i,t</i></sub>	0.048*** (7.45)		0.046*** (7.35)	
Size <sub><i>i,t</i></sub>	0.322*** (2.82)	0.228*** (2.63)	0.153*** (2.56)	0.039** (1.97)
Lev <sub><i>i,t</i></sub>	−0.014 (−0.12)	−0.012 (−0.15)	−0.006 (−0.14)	−0.004 (−0.12)
ROA <sub><i>i,t</i></sub>	0.331 (1.34)	0.185 (0.16)	0.391 (1.21)	0.205* (1.83)
DTURN <sub><i>i,t</i></sub>	−0.006 (−0.33)	−0.008 (−0.17)	−0.002 (−0.39)	−0.004 (−0.45)
BM <sub><i>i,t</i></sub>	−0.083*** (−5.21)	−0.067*** (−4.96)	−0.056** (−2.13)	−0.038** (−2.46)
RET <sub><i>i,t</i></sub>	8.845*** (5.56)	6.378*** (5.94)	8.053* (1.87)	5.111* (1.90)
Sigma <sub><i>i,t</i></sub>	−0.540 (−1.03)	−0.351 (−1.01)	−0.401 (0.97)	−0.322 (1.08)
CONSTANT	−0.106* (−1.82)	0.202** (2.18)	−0.005 (−0.06)	0.163 (1.02)
Ind	YES	YES	YES	YES
YR	YES	YES	YES	YES
N	3069	3069	3573	3573
R <sup>2</sup>	0.104	0.117	0.101	0.107

Note: \* \* \*, \* \* and \* are significant at 1%, 5% and 10% levels, respectively, with t-values in parentheses.

(1) and (3) of Table 3, the correlation coefficient between ESG ratings and semi-annual monthly earnings volatility was  $-0.021$  ( $t = -2.76$ ), significant at the 1% confidence level and  $-0.019$  ( $t = -1.97$ ), only at the 10% confidence level. Therefore, the better the ESG performance, the more it reduces the risk of enterprise stock price crash, and at the same ESG performance level, state-owned enterprises can reduce the risk more significantly than non-state-owned enterprises, assuming that H1 is established.

### 4.3 Robustness Test

In order to test the robustness of the research results, in this paper, the Bloomberg ESG index was replaced with the ESG rating Index (1–9 from C-AAA) by Stata16.0. Both the total sample group and the sample group after distinguishing property rights, the conclusions are consistent with the previous conclusions.

## 5 Conclusion, Along with the Recommendations

This paper verifies the correlation between ESG performance and the risk of stock price crash under different property rights, and concludes that the negative correlation between ESG performance of state-owned enterprises and the risk of stock price crash is more significant, and the negative correlation between ESG performance of non-SOE enterprises and the two indicators is not significant.

Because state-owned enterprises have more profit, economic, political and social responsibilities in social and economic development, ESG voluntary disclosure has higher quality, and the positive effect can restrain the risk of stock price crash. Non-state-owned enterprises should be more cautious when increasing ESG investment, considering whether it should fit the local market. If they blindly make ESG investment without considering the actual situation of the market, it is impossible to improve economic benefits, let alone curb the risk of stock price crash.

However, in general, enterprises should improve ESG performance with stable operation, so as to obtain good social reputation and reduce the risk of stock price crash; for market managers, relevant policies should be introduced to reduce the cost and difficulty of ESG disclosure, rather than create the “illusion” of ESG disclosure by macro policy guidance and external environment; for investors, they should combine the property rights of E, S and G, and avoid “thunder” when making investment decisions.

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