

The Impact of ESG Performance on Stock Price Crash Risk: A Study Based on the Perspective of Auditor Opinion Influence

Yukun Li *

School of Science and Technology University, Henan 471000, China

* Corresponding Author Email: liyukun0525@163.com

Abstract. The Environmental, Social, and Governance (ESG) performance of companies has garnered widespread attention from all sectors of society in recent years. Studying its impact on the risk of stock price crashes is of great significance for maintaining the stable development of the securities market. This paper takes the listed companies on the Shanghai and Shenzhen A-share market from 2009 to 2022 as samples to explore the relationship between ESG performance, audit opinions, and the risk of stock price crashes. The study finds that: (1) Good ESG performance can significantly reduce a company's risk of stock price crashes; (2) Mechanism testing shows that companies with excellent ESG performance exhibit lower operational risks and significant misstatement risks, making them more likely to receive standard audit opinions. Companies that have received standard audit opinions will see a significant decrease in their future risk of stock price crashes; (3) Heterogeneity testing reveals that for companies in the manufacturing industry and small-scale listed companies, the negative effect of their ESG performance on the risk of stock price crashes is more pronounced. This research expands the understanding of the mechanism by which ESG performance affects the risk of stock price crashes, contributing to promoting sustainable corporate development and market stability.

Keywords: ESG Performance, Audit Opinion, Stock Price Crash Risk, Information Asymmetry.

1. Introduction

The United Nations officially introduced the concept of ESG in 2004 and integrated it into the core considerations of corporate management and investment decision-making. Since then, the ESG philosophy has gradually gained recognition and promotion worldwide. ESG stands for Environmental, Social, and Governance, which is an investment philosophy and corporate evaluation standard that focuses on a company's environmental, social, and corporate governance performance, rather than solely on financial performance. In recent years, government agencies such as the International Financial Reporting Standards Foundation, the State-owned Assets Supervision and Administration Commission, and the Securities Regulatory Commission have explicitly required companies to strengthen ESG information disclosure. The academic community has also conducted extensive research on corporate ESG performance, involving various aspects such as enterprise value (Wu, 2024), financing costs (Cui, 2024), and information disclosure (Liu, 2024), achieving fruitful results.

As the ESG philosophy increasingly becomes an indispensable part of corporate management and investment decision-making, people have started to delve into its relationship with the stability of the capital market, especially the role of ESG performance in reducing the risk of stock price crashes. The risk of a stock price crash refers to a situation where market indices or individual stock prices experience a significant decline over a short period, and this decline occurs without any warning signals. The risk of a stock price crash not only brings huge losses to investors but also severely disrupts the stability of the capital market. Scholars have offered various explanations for the causes of stock price crash risks, such as the leverage effect hypothesis (Black, 1976), volatility feedback hypothesis (Pindyck, 1984), and information hiding hypothesis (Jin & Myers, 2006). Existing research indicates that companies with better ESG performance tend to have a lower risk of stock price crashes, while those with poorer ESG performance face a higher risk (Xi, 2023). However, the existing literature has not yet formed a unified and systematic theoretical framework regarding the influencing mechanisms and heterogeneity. This indicates that although the relationship between ESG

and the risk of stock price crashes has been recognized to some extent, a deeper and more systematic understanding of its internal mechanisms and influencing factors is still needed.

Existing studies have indicated that companies with strong ESG performance exhibit robust risk resistance (Liu & Xu, 2023). However, the academic community's exploration in the field of ESG is still in its infancy, with a primary focus on how ESG practices can enhance corporate value and performance. Yet, the intrinsic relationship between ESG performance and the risk of stock price crashes, as well as its mechanism of action, has not been thoroughly discussed on the critical level of capital market stability. Therefore, examining how the disclosure of non-financial information such as ESG affects corporate stock prices is not only theoretically valuable for understanding new dimensions of corporate value assessment but also holds significant practical importance for maintaining the robust operation of the capital market. Building upon previous research, this paper selects Chinese A-share listed companies as samples to further investigate the relationship between corporate ESG performance and the risk of stock price crashes, and to examine the mediating role of audit opinions.

The potential marginal contributions of this paper are mainly reflected in the following three aspects: First, it enriches the research findings on ESG performance. Unlike most literature that focuses on the impact of corporate ESG performance on financial performance, this paper concentrates on the influence of ESG performance on non-financial factors such as the risk of stock price crashes. Second, it introduces a new research variable; this paper incorporates audit opinions as an intermediary variable into the research framework of stock price crash risk, expanding the mechanism by which ESG affects stock price crash risk and offering a new perspective for studying factors influencing stock price crash risk. Third, it expands research on heterogeneity. After considering the heterogeneity factors of corporate size and industry nature, this paper conducts further analysis. The research findings show that in small-scale enterprises and manufacturing enterprises, ESG practices play a more significant role in mitigating the risk of stock price crashes.

2. Literature review

2.1. ESG Performance and Stock Price Collapse Risk

Current studies on the link between ESG performance and the risk of stock price crashes are sparse and have not yet yielded a unified conclusion. Some academics propose that a company's ESG performance mitigates the risk of stock price crashes by attracting the attention of green investors, enhancing the expertise of analysts, and regulating managerial conduct. This mitigating effect is particularly pronounced in cities where the emphasis on environmental protection is low and the level of marketization is high (Gao & Chu, 2022). Conversely, financial constraints act as a negative moderator in the relationship between ESG performance and the risk of stock price crashes, with companies having higher debt-to-asset ratios and profitability experiencing a more pronounced moderating effect (Dong, 2023). Other researchers, examining board size, independence, and gender diversity, have discovered that corporate governance significantly enhances and mitigates the impact of ESG on stock price crash risk (Chebbi, 2023). Additionally, managerial capabilities have been identified as playing a crucial role in reinforcing the negative correlation between a company's ESG performance and the risk of stock price crashes (Jiang, 2024).

2.2. ESG, Audit Opinions, and Stock Price Collapse Risk

Existing studies suggest that companies excelling in ESG performance tend to have reduced operational and material misstatement risks, which in turn makes auditors more inclined to provide standard audit opinions (Wang & Zhang, 2022). Additionally, it is believed that companies with higher ESG performance are more likely to seek higher audit quality to improve the integrity of financial reporting, thus increasing their chances of receiving an unqualified audit report (Diab & Eissa, 2023). The risk of a stock price crash significantly escalates when a listed company receives a non-standard audit opinion. When a listed company is under the control of local governments, the

positive correlation between non-standard audit opinions and the risk of future stock price crashes is notably diminished. In the case of companies controlled by the central government, the positive correlation between non-standard audit opinions and stock price crash risk is also somewhat weakened, although the effect is not pronounced. Conversely, for companies not under government control, the positive correlation between non-standard audit opinions and the risk of future stock price crashes is intensified (Pan & Wang, 2016).

2.3. Literature Review

In conclusion, researchers have explored the mechanisms through which ESG can influence the risk of stock price crashes, but there is a dearth of studies that examine these mechanisms from the external auditing perspective, and no unified conclusion has emerged. Consequently, this paper offers a novel perspective by examining the influence of ESG on the risk of stock price crashes through the lens of audit opinions. Such an analysis is of considerable practical importance, as it can guide companies in strengthening their ESG practices, elevating audit quality, and safeguarding against the risk of stock price crashes.

3. Theoretical analysis and research hypotheses

3.1. ESG Performance and Stock Price Collapse Risk

On the one hand, the theory of information asymmetry highlights an intrinsic information gap between corporate management and investors, which is exacerbated by the diversity of information sources that can hinder investors from systematically gathering and synthesizing all pertinent information (Wu & Zhao, 2023). When negative information that has been concealed by corporate management is abruptly and extensively revealed, it can provoke an intense emotional reaction among stock market investors (Song et al., 2017), potentially causing stock prices to plummet or even collapse. ESG ratings address this asymmetry by assessing a company's performance in environmental, social, and governance areas, providing investors with a clearer understanding of the company's actual condition. This facilitates more rational investment decisions by investors, bringing stock prices into closer alignment with their intrinsic values and averting market bubbles, while also diminishing the motivation for management to conceal negative information (Wang, 2022). Enhanced transparency can effectively prevent the hoarding of "bad news," thereby mitigating the risk of a precipitous decline in stock prices. Thus, improving ESG performance has become a crucial instrument for companies to manage capital market risks and preserve stock price stability.

On the other hand, investors' reactions to negative corporate news have a notable influence on stock price stability. Episodes of panic selling or herd behavior can send stock prices plummeting to unreasonable levels, which can not only disrupt stability but also jeopardize the company's long-term sustainable development (Rao, 2024). The significance of ESG performance as a critical measure of a company's capacity for sustainable development cannot be understated. A strong ESG performance aids in crafting a favorable corporate image and solidifying investor trust. Such trust can reduce the risk of stock price crashes, as a robust ESG reputation can increase investor tolerance for negative news, providing a buffer against stock price volatility. Furthermore, companies with exemplary ESG performance often demonstrate greater resilience to risks (Yu, 2024). By embodying responsible corporate behavior, a company can convey positive signals to the public, accumulate reputational capital, and bolster its long-term competitiveness and stock price stability. Therefore, robust ESG performance not only enriches external investors' understanding of the company's characteristics but also strengthens their capacity to respond to unforeseen risks, reducing the likelihood of future stock price crashes. Based on this analysis, H1 is proposed:

H1: A strong ESG performance is expected to reduce the risk of stock price crashes.

3.2. The Mechanism of Audit Opinions in Influencing Stock Price Collapse Risk under ESG

The corporate performance concerning ESG factors not only directly influences its operations and performance but also serves as a treasure trove of information for auditors tasked with auditing its financial reports. Audit opinions, encapsulating the overall audit quality, are a testament to the auditor's expertise and cautious approach. When formulating audit opinions, auditors consider the intricacies of their task and any potential legal ramifications. Thus, prioritizing a company's non-financial disclosures, particularly in ESG areas, has become a vital strategy for auditors to enhance audit quality. Firstly, when companies actively disclose ESG information, it aids auditors in efficiently compiling audit evidence, diminishing the information gap with public companies, and affects the auditors' level of trust, influencing the audit opinions they render (Wang et al., 2022). Secondly, ESG strengths can also bolster a company's reputation, facilitating stable and enduring relationships with stakeholders such as suppliers and customers, which can bring long-term value and reduce operational risks (Wu, 2024). This reduction in perceived risk by auditors can lead them to be more inclined to issue a standard audit opinion when the perceived audit risk is low.

Audit opinions are the professional evaluations and conclusions auditors provide regarding the fairness, reasonableness, and accuracy of an entity's financial statements. On one hand, these opinions enable investors to gain insights into the true and fair representation of an entity's operational outcomes, financial health, and cash flows, mitigating the information asymmetry between the company and its investors. This aids investors in making more informed investment decisions, which can help to reduce the risk of stock price crashes (Zhou & Wang, 2024). On the other hand, an unqualified audit opinion from auditors typically instills greater confidence in a company's financial and operational status among investors (Bu, 2023). This confidence can shield investors from the impact of market anomalies, thereby diminishing the risk of stock price crashes. Based on this analysis, H2 is proposed:

H2: A company's strong ESG performance, by enhancing audit quality, is expected to mitigate the risk of stock price crashes.

4. Research design

4.1. Sample Selection and Data Sources

The sample of this study consists of Chinese A-share listed companies from 2009 to 2022, with the following data processing steps: (1) Exclusion of financial and real estate companies; (2) Removal of enterprises marked as ST, ST*, and PT; (3) Exclusion of companies listed for less than one year; (4) Elimination of samples with missing or abnormal data; (5) To mitigate the influence of extreme values on the analysis results, a 1% trimming is applied to both ends of continuous variables. The final sample comprises 36,086 observations. ESG performance data are sourced from the Wind database, while other data are obtained from the CSMAR database. STATA 18.0 is used for analysis.

4.2. Variable Definitions

4.2.1. Dependent Variable

The dependent variable in this study is the risk of stock price collapse, measured by the negative skewness of stock *i*'s weekly returns after market adjustments, denoted as NCSKEW. The specific calculation method is as follows:

First, regression is conducted on stock *i*'s weekly returns, as illustrated in Model (1).

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

Then, take the logarithm of the computed residuals to obtain weekly idiosyncratic returns, as shown in model (2).

In the model (1), $R_{i,t}$ represents the return of stock i in week t , $R_{m,t}$ denotes the market-weighted average return in week t , $\varepsilon_{i,t}$ represents the regression residual, where α is the intercept, and β is the coefficient.

Next, the logarithm of the calculated residuals is taken to derive the weekly idiosyncratic returns, as shown in Model (2).

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

Finally, based on the weekly idiosyncratic returns of stock i calculated in Model (2), the skewness of weekly returns (NCSKEW) and the volatility of stock price movements (DUVOL) are computed as two indicators. Models (3) and (4) are derived accordingly.

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

$$DUVOL_{i,t} = \ln[\sum_{Down} W_{i,t}^2 / (n_d - 1) / \sum_{Up} W_{i,t}^2 / (n_p - 1)] \quad (4)$$

In model (3) and model (4), n represents the number of trading weeks for company stock i , $W_{i,t}$ denotes the adjusted weekly returns. Following convention, a negative sign is added, indicating the negative skewness coefficient of returns. A higher value of this indicator suggests a greater risk of stock price collapse.

4.2.2. Independent Variable

This study draws on the research of Rao et al. (2024), which utilizes Huazheng ESG rating data to quantify the ESG performance of Chinese A-share listed companies from 2010 to 2020. The Huazheng ESG rating system comprises nine different levels of scores: AAA, AA, A, BBB, BB, B, CCC, CC, and C, which are arranged based on the quality of ESG performance. In this study, we assign numerical values to companies' ESG performance based on the ranking of these rating scores. Specifically, the highest rating, AAA, is assigned a value of 9, the second-highest rating, AA, is assigned a value of 8, and so forth, down to the lowest rating, C, which is assigned a value of 1. This assignment method allows for a more intuitive comparison of different companies' ESG performance.

4.2.3. Control Variable

This study selects the following control variables based on existing research: property rights nature (SOE), firm size (SIZE), return on investment (ROI), asset-liability ratio (LEV), current ratio (CR), inventory turnover ratio (ITO), and management shareholding (MSHARE). Detailed explanations of each variable category are provided in Table 1.

4.2.4. Model Construction

To validate whether ESG performance can influence the risk of stock price collapse, this study constructs Model (5).

$$RISK_{i,t+1} = \alpha_0 + \alpha_1 ESG_{i,t} + \alpha_2 SOE_{i,t} + \alpha_3 ROI_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 CR_{i,t} + \alpha_6 ITO_{i,t} + \alpha_7 MSHARE_{i,t} + \sum YAER_{i,t} + \sum IND_{i,t} + \varepsilon_{i,t} \quad (5)$$

Where $RISK_{i,t}$ represents the weekly skewness of returns (Model 3) and the volatility of stock price movements (Model 4). If α_1 is significantly negative, it indicates that good ESG performance can significantly reduce the risk of stock price collapse, thus supporting hypothesis H1.

To test the mediating effect of audit opinions, this study constructs Models (6) and (7).

$$MAO_{i,t+i} = \alpha_0 + \alpha_1 ESG_{i,t} + \alpha_2 SOE_{i,t} + \alpha_3 ROI_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 CR_{i,t} + \alpha_6 ITO_{i,t} + \alpha_7 MSHARE_{i,t} + \sum YAER_{i,t} + \sum IND_{i,t} + \varepsilon_{i,t} \quad (6)$$

$$RISK_{i,t+1} = \alpha_0 + \alpha_1 ESG_{i,t} + \alpha_2 MAO_{i,t} + \alpha_3 SOE_{i,t} + \alpha_4 ROI_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 CR_{i,t} + \alpha_7 ITO_{i,t} + \alpha_8 MSHARE_{i,t} + \sum YAER_{i,t} + \sum IND_{i,t} + \varepsilon_{i,t} \quad (7)$$

If α_1 is significant in Models (5) and (6), and both α_1 and α_2 are significant in Model (7), the mediating effect of audit opinions is confirmed. If α_2 is negative, then hypothesis H2 is supported.

Table 1. Variable Definitions and Descriptions

variable type	variable name	variable symbol	variable definition
Dependent Variable	Weekly Returns Skewness	<i>NCSKEW</i>	The calculation method of skewness of weekly returns is as shown in model (3).
	Stock price volatility	<i>DUVOL</i>	The calculation method for stock price volatility is as shown in model (4).
Explanatory Variables	ESG Performance	<i>ESG</i>	Assign values 1-9 sequentially according to the HuaZeng ESG rating from C to AAA.
	E Performance	<i>E</i>	Assign values 1-9 sequentially according to the HuaZeng E rating from C to AAA.
	S Performance	<i>S</i>	Assign values 1-9 sequentially according to the HuaZeng S rating from C to AAA.
	G Performance	<i>G</i>	Assign values 1-9 sequentially according to the HuaZeng G rating from C to AAA.
Mediating Variable	Audit opinion	<i>MAO</i>	Standard audit opinion is assigned a value of 1, non-standard audit opinion is assigned a value of 0.
Control Variable	Property Ownership	<i>SOE</i>	State-owned enterprises are assigned a value of 1, non-state-owned enterprises are assigned a value of 0.
	Enterprise Size	<i>SIZE</i>	Obtained by taking the logarithm of the total assets of the enterprise.
	Return on Investment	<i>ROI</i>	The ratio between the funds invested and the returns obtained
	Debt-to-Asset Ratio	<i>LEV</i>	The proportion of total liabilities to total assets, measuring the total debt of a company relative to its total assets.
	Current Ratio	<i>CR</i>	Reflects the ratio of current assets to current liabilities of a company.
	Inventory Turnover Ratio	<i>ITO</i>	Inventory Turnover Ratio
	Management Ownership	<i>MSHARE</i>	Management ownership refers to the ownership of company shares by company executives or senior management personnel.

5. Results of empirical analysis

5.1. Descriptive Statistics

The main descriptive statistics of this study are presented in Table 2. The mean values of the two proxy variables for stock price collapse risk, *NCSKEW* and *DUVOL*, are -0.419 and -0.293 respectively, with standard deviations of 0.719 and 0.467. This indicates significant variability in stock price collapse risk among different companies. The mean value of *ESG* is 4.114, suggesting overall poor performance, indicating insufficient emphasis on ESG by listed companies in China.

Table 2. Descriptive Statistics Results

variable	observation	mean	standard deviation	minimum	maximum
<i>NCSKEW</i>	36086	-0.419	0.719	-2.646	1.616
<i>DUVOL</i>	36086	-0.293	0.467	-1.460	0.922
<i>ESG</i>	36086	4.114	1.045	1	8
<i>E</i>	36086	1.911	1.147	1	9
<i>S</i>	36086	4.178	1.136	1	9
<i>G</i>	36086	5.391	1.370	1	9
<i>MAO</i>	36086	0.972	0.166	0	1
<i>SOE</i>	36086	0.357	0.479	0	1
<i>ITO</i>	36086	0.135	0.544	-0.569	2.381
<i>LEV</i>	36086	0.422	0.204	0.054	0.898
<i>CR</i>	36086	2.455	2.538	0	16.286
<i>MSHARE</i>	36086	13.358	19.512	0	68.122
<i>ROI</i>	36086	8.254	14.245	0	73.048

5.2. Basic Regression Results

Table 3 displays the regression results of two sets aimed at analyzing the relationship between ESG disclosure and the risk of stock price collapse. In columns (1) and (3), without incorporating control variables, the coefficients for ESG disclosure are -0.014 and -0.006, both significant at the 5% level. These initial findings suggest that ESG disclosure may potentially help mitigate the risk of stock price collapse. However, for a more precise analysis of this relationship, this study further introduces control variables and controls for annual and industry effects in columns (2) and (4). Even after incorporating these variables and controlling factors, the coefficients for ESG disclosure remain at -0.013 and -0.005, still significant at the 5% level. This outcome provides firmer support for the hypothesis that ESG disclosure can suppress the risk of stock price collapse.

Table 3. Basic Regression Results

	(1)	(2)	(3)	(4)
	<i>NCSKEW</i>	<i>NCSKEW</i>	<i>DUVOL</i>	<i>DUVOL</i>
<i>ESG</i>	-0.014*** (-4.13)	-0.013*** (-3.76)	-0.006** (-2.52)	-0.005** (-2.35)
<i>SOE</i>		-0.077*** (-8.25)		-0.051*** (-8.45)
<i>ITO</i>		-0.200*** (-22.32)		-0.163*** (-26.42)
<i>LEV</i>		-0.059** (-2.21)		-0.038** (-2.20)
<i>CR</i>		-0.000 (-0.23)		0.001 (1.13)
<i>MSHARE</i>		0.000 (0.34)		0.000 (1.14)
<i>ROI</i>		-0.000 (-0.36)		-0.000 (-0.36)
<i>YEAR</i>	<i>YES</i>	<i>YES</i>	<i>YES</i>	<i>YES</i>
<i>INDUSTRY</i>	<i>YES</i>	<i>YES</i>	<i>YES</i>	<i>YES</i>
<i>cons</i>	-0.474*** (-13.22)	-0.137*** (-3.36)	-0.378*** (-15.68)	-0.116*** (-4.25)
<i>N</i>	36086	36086	36086	36086
<i>r</i> ²	0.026	0.042	0.031	0.055
<i>r</i> ² <i>a</i>	0.026	0.041	0.030	0.054
<i>F</i>	29.944	39.657	35.349	51.358

Note: The numbers in parentheses are t-values, *, **, *** represent significance levels at 10%, 5%, 1%, respectively, the same applies to the following table.

5.3. Robustness Tests

5.3.1. Substitute Independent Variable

This study replaces the ESG score with separate scores for Environmental (E), Social (S), and Governance (G), while keeping the assignment method unchanged. Each score is regressed individually against NCSKEW. The regression results are presented in the table. It can be observed that the coefficients for E, S, and G are -0.006, -0.011, and -0.013 respectively, compared to the coefficient for ESG in the main regression, which is -0.013.

Table 4. Substitute Independent Variables

	(1)	(2)	(3)
	<i>NCSKEW</i>	<i>NCSKEW</i>	<i>NCSKEW</i>
<i>E</i>	-0.006*		
	(-1.92)		
<i>S</i>		-0.011***	
		(-3.36)	
<i>G</i>			-0.013***
			(-4.65)
<i>LEV</i>	-0.048*	-0.056**	-0.074***
	(-1.79)	(-2.09)	(-2.74)
<i>CR</i>	-0.000	-0.000	0.000
	(-0.25)	(-0.23)	(0.00)
<i>MSHARE</i>	-0.000	0.000	0.000
	(-0.05)	(0.28)	(0.41)
<i>ROI</i>	-0.000	-0.000	-0.000
	(-0.33)	(-0.34)	(-0.26)
<i>SOE</i>	-0.081***	-0.078***	-0.074***
	(-8.70)	(-8.36)	(-7.81)
<i>ITO</i>	-0.201***	-0.200***	-0.200***
	(-22.34)	(-22.31)	(-22.29)
<i>YEAR</i>	<i>YES</i>	<i>YES</i>	<i>YES</i>
<i>INDUSTRY</i>	<i>YES</i>	<i>YES</i>	<i>YES</i>
<i>_cons</i>	-0.176***	-0.153***	-0.091**
	(-4.50)	(-3.83)	(-2.06)
<i>N</i>	36086	36086	36086
<i>r²</i>	0.042	0.042	0.043
<i>r_{2_a}</i>	0.041	0.041	0.042
<i>F</i>	39.532	39.597	39.938

5.3.2. Lagged Independent Variable

To more accurately capture short-term fluctuations between the independent and dependent variables and address potential issues of reverse causality, this study introduces lagged explanatory variables (i.e., the values of the independent variables from the previous period) into the model. These lagged variables (referred to as ESG2) are used to account for the influence of historical factors on the current dependent variable. The regression results are presented in Table 5, where column (1) represents the results without control variables and column (2) represents the results with control variables included. In the regression analysis, the coefficient for the lagged explanatory variable ESG2 is significant at the 5% and 10% confidence levels, with specific values of -0.009 and -0.007, respectively. This outcome indicates that even after considering historical factors, the lagged value of the independent variable ESG still has a significant impact on the dependent variable.

Table 5. Lagged Independent Variables

	(1)	(2)
	<i>NCSKEW</i>	<i>NCSKEW</i>
<i>ESG2</i>	-0.009**	-0.007*
	(-2.38)	(-1.73)
<i>SOE</i>		-0.084***
		(-8.34)
<i>ITO</i>		-0.215***
		(-21.01)
<i>LEV</i>		-0.062**
		(-2.11)
<i>CR</i>		-0.001
		(-0.44)
<i>MSHARE</i>		0.000
		(0.45)
<i>ROI</i>		-0.000
		(-0.23)
<i>YEAR</i>	YES	YES
<i>INDUSTRY</i>	YES	YES
<i>_cons</i>	-0.389***	-0.276***
	(-9.98)	(-6.45)
<i>N</i>	30507	30507
<i>r2</i>	0.026	0.043
<i>r2_a</i>	0.025	0.042
<i>F</i>	25.398	34.690

5.3.3. Narrowing the Time Interval

Table 6. Narrowing the Time Interval

	(1)	(2)	(3)	(4)
	<i>DUVOL</i>	<i>DUVOL</i>	<i>NCSKEW</i>	<i>NCSKEW</i>
<i>ESG</i>	-0.008***	-0.007***	-0.015***	-0.016***
	(-2.69)	(-2.59)	(-3.54)	(-3.58)
<i>SOE</i>	-0.048***		-0.068***	
	(-6.77)		(-6.13)	
<i>ITO</i>	-0.185***		-0.240***	
	(-23.02)		(-20.49)	
<i>LEV</i>	-0.028		-0.052*	
	(-1.40)		(-1.65)	
<i>CR</i>	0.002		-0.000	
	(1.22)		(-0.02)	
<i>MSHARE</i>	0.000		-0.000	
	(0.05)		(-0.82)	
<i>ROI</i>	0.000		-0.000	
	(0.04)		(-0.49)	
<i>YEAR</i>	YES	YES	YES	YES
<i>INDUSTRY</i>	YES	YES	YES	YES
<i>_cons</i>	-0.083**	-0.362***	-0.088*	-0.464***
	(-2.57)	(-12.93)	(-1.85)	(-11.25)
<i>N</i>	25251	25251	25251	25251
<i>r2</i>	0.067	0.041	0.053	0.034
<i>r2_a</i>	0.066	0.040	0.051	0.033
<i>F</i>	49.034	38.125	37.411	30.579

In the process of analyzing the dynamics of the Chinese stock market, to enhance the reliability of the research and mitigate the influence of external factors such as market turbulence in specific years, this study opted to exclude data from 2012, 2015, 2019, and 2020. Regression analysis was then conducted using the adjusted dataset, with the results presented in Table 6. The post-regression results were all significant at the 1% level. Excluding the turbulent years from the dataset revealed a more pronounced effect of ESG on reducing stock price risk, thereby validating the hypothesis H1 drawn in this study.

5.4. Endogeneity Test

To address sample selection bias and potential endogeneity issues, this study employed the propensity score matching (PSM) method. Specifically, the sample was divided into two groups based on the median ESG score: those with ESG scores above the median were labeled as the high group and assigned a value of "1," while those with scores below or equal to the median were labeled as the low group. Two outcome variables, *NCSKEM* and *DUVOL*, were defined. Subsequently, a series of control variables including *SOE*, *ITO*, *LEV*, *CR*, *MSHANRE*, and *ROI* were selected as matching variables for a 1:1 nearest neighbor matching. After conducting a balance test, regression analysis was performed again, with the results presented in Table 7. It can be observed that ESG is significant with *NCSKEW* and *DUVOL* at the 5% level, demonstrating the robustness of the conclusions even after addressing endogeneity issues in variable selection.

Table 7. PSM Propensity Score Matching Results

	(1)	(2)
	<i>NCSKEW</i>	<i>DUVOL</i>
<i>ESG</i>	-0.009** (-2.18)	-0.005** (-2.01)
<i>SOE</i>	-0.068*** (-6.04)	-0.035*** (-5.09)
<i>ITO</i>	-0.195*** (-18.21)	-0.134*** (-19.08)
<i>LEV</i>	-0.064* (-1.95)	-0.014 (-0.70)
<i>CR</i>	-0.000 (-0.07)	0.001 (0.64)
<i>MSHARE</i>	0.000 (0.28)	0.000 (0.63)
<i>ROI</i>	0.000 (1.16)	-0.000 (-0.44)
<i>YEAR</i>	YES	YES
<i>INDUSTRY</i>	YES	YES
<i>_cons</i>	-0.153*** (-3.09)	-0.166*** (-5.44)
<i>N</i>	25164	28602
<i>r2</i>	0.040	0.042
<i>r2_a</i>	0.039	0.041
<i>F</i>	26.764	30.892

5.5. Mechanism Analysis

To validate the mediating effect of audit opinions, following the approach of Lin et al. (2023), an analysis was conducted using the comprehensive operating model (5)(6)(7), and the regression results are presented in Table 8. In column (3), the coefficient between ESG and MAO is 0.025, significant at the 1% level, indicating that ESG significantly enhances the likelihood of companies receiving a standard audit opinion. Columns (2) and (5) display the regression results after including audit

opinions as control variables. ESG is significant with NCSKEW and DUVOL at the 1% and 10% levels, respectively. Meanwhile, MAO is significantly negative with NCSKEW and DUVOL at the 1% level, demonstrating that standard audit opinions can significantly reduce the risk of stock price collapse. These results collectively confirm the mediating role of audit opinions in restraining the risk of stock price collapse in the process of corporate ESG performance.

Table 8. Mediating Effect of Audit Opinion

	(1)	(2)	(3)	(4)	(5)
	<i>NCSKEW</i>	<i>NCSKEW</i>	<i>MAO</i>	<i>DUVOL</i>	<i>DUVOL</i>
<i>ESG</i>	-0.013**	-0.011***	0.025***	-0.005**	-0.004*
	(-3.76)	(-3.19)	(21.46)	(-2.35)	(-1.87)
<i>MAO</i>		-0.073***			-0.041***
		(-2.92)			(-2.63)
<i>ITO</i>	-0.200***	-0.199***	0.016***	-0.163***	-0.163***
	(-22.32)	(-22.17)	(7.62)	(-26.42)	(-26.30)
<i>LEV</i>	-0.059**	-0.069***	-0.143***	-0.038**	-0.044**
	(-2.21)	(-2.58)	(-16.22)	(-2.20)	(-2.53)
<i>CR</i>	-0.000	-0.001	-0.004***	0.001	0.001
	(-0.23)	(-0.37)	(-8.96)	(1.13)	(1.00)
<i>MSHARE</i>	0.000	0.000	0.000***	0.000	0.000
	(0.34)	(0.45)	(7.64)	(1.14)	(1.24)
<i>ROI</i>	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.36)	(-0.38)	(-0.87)	(-0.36)	(-0.38)
<i>SOE</i>	-0.077***	-0.075***	0.026***	-0.051***	-0.050***
	(-8.25)	(-8.03)	(11.40)	(-8.45)	(-8.25)
<i>YEAR</i>	YES	YES	YES	YES	YES
<i>INDUSTRY</i>	YES	YES	YES	YES	YES
<i>_cons</i>	-0.137***	-0.071	0.900***	-0.116***	-0.079**
	(-3.36)	(-1.53)	(76.11)	(-4.25)	(-2.56)
<i>N</i>	36086	36086	36086	36086	36086
<i>r2</i>	0.042	0.043	0.058	0.055	0.055
<i>r2_a</i>	0.041	0.042	0.057	0.054	0.054
<i>F</i>	39.657	38.797	19.819	51.358	50.140

5.6. Heterogeneity Analysis

5.6.1. Industry Heterogeneity

Considering the pronounced divergences in operational practices and service models between manufacturing and non-manufacturing enterprises, these variances may account for the discrepancies in their focus and financial input towards ESG initiatives. The question arises, then, whether such divergent ESG practices exert a differentiated effect on the risk of stock price crashes? To delve into this inquiry, this study bifurcates listed companies into two broad sectors—manufacturing and non-manufacturing—to more accurately scrutinize how ESG performance specifically impacts the risk of stock price crashes within different industrial contexts. The findings are detailed in Table 9. Columns (1) and (2) correspond to manufacturing firms, with regression coefficients that are notably negative, whereas columns (3) and (4) pertain to non-manufacturing firms, where the negative regression coefficients are not statistically significant. This suggests that, in contrast to non-manufacturing, the mitigating effect of manufacturing ESG on stock price crash risk is considerably more pronounced.

This distinction may stem from several factors: (1) The manufacturing sector is often characterized by substantial production activities that can significantly affect the environment, including energy use and waste emissions. Consequently, the environmental component of ESG performance among manufacturing companies has a more palpable influence on their risk of stock price crashes. Superior environmental stewardship in manufacturing can, therefore, mitigate risks of stock price crashes

associated with environmental concerns. (2) Manufacturing firms typically exert a considerable influence on societal and economic factors, such as job creation and tax revenue. Hence, the social responsibilities fulfilled by these companies significantly influence their risk of stock price crashes. The social dimension of ESG, encompassing employee welfare, community engagement, and product quality, allows manufacturing firms to bolster their societal standing and reputation, in turn, lessening the risk of stock price crashes. (3) In recent years, as the ESG investment philosophy has gained traction and investor focus on ESG factors has intensified, the ESG performance of manufacturing firms has emerged as a pivotal criterion for investors assessing investment value. Robust ESG practices among manufacturing companies can draw heightened investor interest and capital, consequently diminishing the risk of stock price crashes.

Table 9. Industry Heterogeneity

	(1)	(2)	(3)	(4)
	Manufacturing	Non-Manufacturing	Manufacturing	Non-Manufacturing
	<i>NCSKEW</i>	<i>NCSKEW</i>	<i>DUVOL</i>	<i>DUVOL</i>
<i>ESG</i>	-0.015***	-0.009	-0.006**	-0.004
	(-3.56)	(-1.55)	(-2.28)	(-0.95)
<i>SOE</i>	-0.063***	-0.096***	-0.042***	-0.064***
	(-5.52)	(-5.83)	(-5.71)	(-6.01)
<i>ITO</i>	-0.188***	-0.223***	-0.155***	-0.179***
	(-17.55)	(-13.43)	(-21.00)	(-15.68)
<i>LEV</i>	-0.042	-0.087*	-0.022	-0.063**
	(-1.25)	(-1.95)	(-1.02)	(-2.19)
<i>CR</i>	0.003	-0.010***	0.004**	-0.005**
	(1.23)	(-2.78)	(2.56)	(-2.23)
<i>MSHARE</i>	-0.000	0.001**	0.000	0.001*
	(-0.62)	(1.99)	(0.41)	(1.72)
<i>ROI</i>	-0.003***	0.000	-0.002***	0.000
	(-3.11)	(0.87)	(-2.90)	(0.91)
<i>YEAR</i>	<i>YES</i>	<i>YES</i>	<i>YES</i>	<i>YES</i>
<i>INDUSTRY</i>	<i>YES</i>	<i>YES</i>	<i>YES</i>	<i>YES</i>
<i>_cons</i>	-0.177***	-0.075	-0.148***	-0.073*
	(-4.71)	(-1.34)	(-5.82)	(-1.96)
<i>N</i>	24147	11939	24147	11939
<i>r2</i>	0.039	0.050	0.052	0.065
<i>r2_a</i>	0.038	0.048	0.051	0.062
<i>F</i>	46.097	16.094	60.024	21.014

5.6.2. Firm Size Heterogeneity

Considering the potential disparities in corporate governance frameworks, the execution of social responsibilities, and the caliber of information disclosure among enterprises of different sizes, these factors might influence how effectively ESG performance can suppress the risk of stock price crashes. To dissect this with greater precision, the study stratified the sample companies according to the median size, designating those surpassing the median as large-scale and those falling short as small-scale entities. Such categorization enables a more granular examination of the variances in ESG's capacity to mitigate stock price crash risk across companies of varying scales. The findings are delineated in Table 10. It becomes evident that within the cohort of large-scale listed companies, ESG's role in stemming the risk of stock price crashes is not markedly significant. In contrast, a pronounced negative effect is observed within the small-scale group. The rationale could be multifaceted: (1) Small-scale listed companies may benefit from more agile and efficient governance structures. The reduced size of these entities potentially facilitates more immediate and expedited interactions and decision-making processes between management and shareholders. This streamlined

decision-making dynamic empowers companies to address ESG concerns with greater dispatch, diminishing the prospects of information asymmetry and agency conflicts, and thus, more potently curbing the risk of stock price crashes. (2) In comparison with their large-scale counterparts, small-scale listed companies might initially garner less attention from investors. However, when these smaller companies demonstrate excellence in ESG practices, they become more adept at capturing investor interest and endorsement. This upsurge in attention can amplify investor confidence, consequently lowering the risk of stock price crashes. (3) Amidst the escalating rigor of ESG regulatory demands, listed companies are compelled to allocate more substantial resources and endeavors to comply with these stipulations. Small-scale listed companies might exhibit greater dexterity in adjusting to these regulatory demands, mitigating the risk of stock price crashes through enhancements in corporate governance, environmental conservation, and the proactive fulfillment of social responsibilities.

Table 10. Firm Size Heterogeneity

	(3)	(1)	(4)	(2)
	Small size	Big size	Small size	Big size
	<i>NCSKEW</i>	<i>NCSKEW</i>	<i>DUVOL</i>	<i>DUVOL</i>
<i>ESG</i>	-0.033*** (-6.07)	-0.002 (-0.39)	-0.015*** (-4.17)	0.000 (0.04)
<i>SOE</i>	-0.075*** (-5.10)	-0.077*** (-6.31)	-0.058*** (-6.20)	-0.044*** (-5.46)
<i>ITO</i>	-0.227*** (-17.63)	-0.191*** (-15.07)	-0.175*** (-20.25)	-0.163*** (-18.07)
<i>LEV</i>	0.011 (0.27)	-0.189*** (-4.84)	0.027 (1.04)	-0.121*** (-4.77)
<i>CR</i>	0.004* (1.68)	0.004 (0.88)	0.005*** (3.00)	0.005 (1.57)
<i>MSHARE</i>	0.000 (0.55)	0.002*** (4.15)	0.000 (0.68)	0.001*** (4.48)
<i>ROI</i>	-0.000 (-0.71)	-0.000 (-0.07)	-0.000 (-0.54)	-0.000 (-0.16)
<i>YEAR</i>	YES	YES	YES	YES
<i>INDUSTRY</i>	YES	YES	YES	YES
<i>_cons</i>	-0.075 (-1.31)	-0.127** (-2.01)	-0.103*** (-2.70)	-0.101** (-2.39)
<i>N</i>	18115	17971	18115	17971
<i>r²</i>	0.038	0.066	0.049	0.078
<i>r²_a</i>	0.036	0.064	0.047	0.076
<i>F</i>	18.785	30.938	22.938	37.286

6. Conclusions and recommendations

This study empirically analyzes the relationship between ESG performance, audit opinions, and stock price collapse risk using data from A-share listed companies from 2009 to 2022. The empirical results indicate the following:

1. There is a significant negative correlation between a company's ESG performance and its risk of stock price collapse. The better a company's ESG performance, the relatively lower its risk of stock price collapse.

2. Mechanism analysis reveals that companies with excellent ESG performance tend to have lower operational and significant misstatement risks, making them more likely to receive standard audit opinions. Consequently, companies receiving standard audit opinions significantly reduce the risk of future stock price collapse.

3. Heterogeneity analysis finds that in the manufacturing industry and among small-scale listed companies, the effect of ESG performance on reducing the risk of stock price collapse is more pronounced.

Based on these findings, the study offers the following recommendations from four perspectives: the corporate, investor, certified public accountant (CPA), and government regulatory levels:

1. Corporate Level: Companies should prioritize and enhance ESG practices. This not only enhances the company's long-term competitiveness but also effectively reduces the risk of stock price collapse. By strengthening environmental protection, fulfilling social responsibilities, and optimizing corporate governance structures, companies can build a positive social image, boost investor confidence, and consequently reduce the risk of stock price collapse.

2. Investor Level: Investors should consider a company's ESG performance when making investment decisions. Companies with strong ESG performance typically have lower stock price collapse risks, providing investors with more stable market expectations. Therefore, investors should incorporate ESG factors into their investment decision framework to achieve long-term, robust investment returns.

3. CPA Level: CPAs should pay attention to companies' ESG practices during the audit process. For companies with outstanding ESG performance, CPAs should provide higher evaluations and tend to issue standard audit opinions. This helps enhance the credibility of audit reports and provides investors with more accurate decision-making basis.

4. Government Regulatory Level: Government regulators should strengthen supervision and guidance on corporate ESG practices. By formulating and improving relevant laws and policies, governments can encourage companies to fulfill environmental, social, and governance responsibilities. Additionally, regulators should encourage investor attention to ESG factors, guiding capital markets towards green, sustainable investment principles. Furthermore, government regulators should pay more attention to ESG practices in the manufacturing industry and among small-scale listed companies to promote these companies' improvement in ESG performance and reduce the risk of stock price collapse.

References

- [1] Bax K, Sahin Ö, Czado C, et al. ESG, risk, and (tail) dependence [J]. *International Review of Financial Analysis*, 2023, 87: 102513.
- [2] Bu Meiwen. Accounting integrity, audit quality and firm value: Empirical evidence based on Chinese A-share listed companies [J]. *Economic Review*, 2023, 10 (04): 163 - 197.
- [3] Cui Zhiwei, Liu Zimin, Tian Lulu, et al. Corporate ESG performance and financing constraints: A re-discussion based on the quantity and quality of information disclosure [J/OL]. *Industrial Economic Review*, 1 - 20 [2024 - 05 - 28].
- [4] Dong Xianglan, Deng Jianhong, Jiang Xi, et al. Corporate ESG performance and stock price crash risk: An analysis of the moderating effect of financing constraints [J]. *Finance Theory and Practice*, 2023, (09): 98 - 108.
- [5] Feng J, Goodell J W, Shen D. ESG rating and stock price crash risk: Evidence from China [J]. *Finance Research Letters*, 2022, 46: 102476.
- [6] Fiorillo P, Meles A, Pellegrino L R, et al. Geopolitical risk and stock price crash risk: The mitigating role of ESG performance [J]. *International Review of Financial Analysis*, 2024, 91: 102958.
- [7] Gao J, Chu D, Zheng J, et al. Environmental, social and governance performance: Can it be a stock price stabilizer? [J]. *Journal of Cleaner Production*, 2022, 379: 134705.
- [8] He Chengying, Liu Minghan, Zhao Songhui, et al. ESG rating, institutional investor shareholding ratio, and stock price crash risk [J]. *Financial Forum*, 2023, 28 (08): 47 - 58.
- [9] Jiang Haiyun. Corporate ESG performance, management ability, and stock price crash risk [J]. *Finance and Accounting Communication*, 2024, (05): 61 - 65.

- [10] Lashkaripour M. ESG tail risk: The Covid-19 market crash analysis [J]. *Finance Research Letters*, 2023, 53: 103598.
- [11] Li Zongze, Li Zhibin. Study on the same group effect of corporate ESG information disclosure [J]. *Nankai Management Review*, 2023, 26 (05): 126 - 138.
- [12] Lin Lijie, Li Panpan. ESG performance and stock price crash risk [J]. *National Certified Public Accountant*, 2023, (04): 46 - 53.
- [13] Liu Jianqiu, Xu Yulu. ESG performance and corporate resilience [J]. *Audit and Economic Research*, 2024, 39 (01): 54 - 64.
- [14] Liu Junwei, Liang Qiuchen, Liu Hua. The impact of dual motivations of ESG information disclosure on corporate green innovation performance: The mediating role of green image and the moderating role of value perception [J/OL]. *Science and Technology Progress and Countermeasures*, 1 - 9 [2024 - 05 - 28].
- [15] Luo D, Yan J, Yan Q. The duality of ESG: Impact of ratings and disagreement on stock crash risk in China [J]. *Finance Research Letters*, 2023, 58: 104479.
- [16] Pan Xiuli, Wang Juan. Government hierarchy, audit opinions and stock price crash risk [J]. *Journal of Central University of Finance and Economics*, 2016, (11): 57 - 65.
- [17] Rao Jing, Jin Panpan, Zeng Wenying. How does the ESG performance of listed companies affect stock price crash risk: An empirical study based on information path and confidence path [J]. *Finance and Accounting Communication*, 2024, (02): 35 - 40.
- [18] Shi Yongdong, Wang Haomiao. Corporate social responsibility and firm value: A perspective based on ESG risk premium [J]. *Economic Research*, 2023, 58 (06): 67 - 83.
- [19] Shuai Zhenghua. ESG performance of Chinese listed companies and market stability [J]. *Southern Finance*, 202 (10): 47 - 62.
- [20] Song Xianzhong, Hu Jun, Li Sihai. Social responsibility information disclosure and stock price crash risk: A path analysis based on information effect and reputation insurance effect [J]. *Financial Research*, 2017, (04): 161 - 175.
- [21] Wang Jitian, Ma Shan, Tian Boao. ESG performance and stock price crash risk: The moderating effects of investor sentiment and managerial overconfidence [J]. *Research on Financial Development*, 2022, (10): 65 - 72.
- [22] Wang L, Ji Y, Ni Z. Spillover of stock price crash risk: Do environmental, social and governance (ESG) matter? [J]. *International Review of Financial Analysis*, 2023, 89: 102768.
- [23] Wang Yao, Zhang Yunmeng, Hou Deshuai. Does corporate ESG performance affect audit opinions? [J]. *Audit and Economic Research*, 2022, 37(05): 54 - 64.
- [24] Wu Di, Zhao Qifeng. Dynamic game of capital market, information asymmetry and corporate innovation: Based on the perspective of analyst forecasts [J]. *Nankai Economic Research*, 2023, (02): 140 - 160.
- [25] Wu Peng, Li Tongle. Does MSCI pay attention to key audit matters disclosure? [J]. *Journal of Nanjing Audit University*, 2024, 21 (03): 14 - 23.
- [26] Wu Yongxia, Yan Fei. ESG responsibility fulfillment, green innovation and enterprise value [J]. *Statistics and Decision*, 2024, 40 (07): 178 - 182.
- [27] Xi Longsheng, Wang Yan. Corporate ESG information disclosure and stock price crash risk [J]. *Economic Issues*, 2022, (08): 57 - 64.
- [28] Zhou Xuefeng, Wang Daying. A review and prospect of corporate ESG performance research [J]. *Finance and Accounting Monthly*, 2024, 45 (02): 56 - 62.