http://dx.doi.org/10.18623/rvd.v22.n3.3439

THE ROLE OF ESG PERFORMANCE IN REDUCING STOCK PRICE CRASH RISK: EVIDENCE FROM CHINA'S A-SHARE MARKET

O PAPEL DO DESEMPENHO ESG NA REDUÇÃO DO RISCO DE QUEDA NOS PREÇOS DAS AÇÕES: EVIDÊNCIAS DO MERCADO DE AÇÕES A DA CHINA

Article received on: 7/29/2025
Article accepted on: 9/29/2025

Mengyi Zhang*
*Universiti Sains Malaysia (USM), Penang, Malaysia
Orcid: https://orcid.org/0009-0002-1630-2399
mengyizh@yeah.net

Zulnaidi Yaacob*
*Universiti Sains Malaysia (USM), Penang, Malaysia
Orcid: https://orcid.org/0000-0002-1222-1949
zulnaidi@usm.my

The authors declare that there is no conflict of interest

Abstract
In recent years, stock price crashes have frequently occurred in China's capital market, undermining investor confidence and threatening market stability. Identifying the determinants and preventive mechanisms of stock price crashes has become a critical research priority. In this context, the impact of Environmental, Social, and Governance (ESG) performance on stock price crash risk has attracted increasing attention from both academics and practitioners. Grounded in information asymmetry theory, agency theory, signaling theory, and stakeholder theory, this study investigates the relationship between corporate ESG performance and stock price crash risk. It further examines the moderating effect of digital transformation and the mediating role of corporate financial performance, measured by return on assets (ROA). The analysis is based on 16,297 firm-year observations from A-share listed companies during 2018-2023, with regressions controlling for industry and year fixed effects. The empirical results indicate that ESG performance significantly reduces the likelihood of stock price crashes, digital transformation strengthens this effect, and financial performance partially mediates the link between ESG and stock crash risk. These findings deepen the understanding of how ESG influences market stability and offer practical insights for promoting sustainable and transparent capital markets in emerging economies such as China.

Keywords: ESG. Stock Price Crash Risk. Digital Transformation. Corporate Financial Performance. China's A-Share Market.

Resumo
Nos últimos anos, quedas bruscas nos preços das ações têm ocorrido frequentemente no mercado de capitais da China, minando a confiança dos investidores e ameaçando a estabilidade do mercado. Identificar os determinantes e os mecanismos de prevenção dessas quedas tornou-se uma prioridade crítica de pesquisa. Nesse contexto, o impacto do desempenho ambiental, social e de governança (ESG) sobre o risco de queda nos preços das ações tem atraído crescente atenção tanto de acadêmicos quanto de profissionais. Fundamentado na teoria da assimetria de informação, na teoria da agência, na teoria da sinalização e na teoria das partes interessadas, este estudo investiga a relação entre o desempenho ESG corporativo e o risco de queda nos preços das ações. Além disso, examina o efeito moderador da transformação digital e o papel mediador do desempenho financeiro corporativo, medido pelo retorno sobre ativos (ROA). A análise baseia-se em 16.297 observações de empresas listadas na Bolsa de Valores de Xangai (A-shares) durante o período de 2018 a 2023, com regressões controlando os efeitos fixos de setor e ano. Os resultados empíricos indicam que o desempenho ESG reduz significativamente a probabilidade de quedas bruscas nos preços das ações, a transformação digital fortalece esse efeito e o desempenho financeiro medeia parcialmente a relação entre ESG e o risco de queda nos preços das ações. Essas descobertas aprofundam a compreensão de como os fatores ESG influenciam a estabilidade do mercado e oferecem insights práticos para a promoção de mercados de capitais sustentáveis e

transparentes em economias emergentes como a China.

Palavras-chave: *ESG. Risco de Queda Abrupta do Preço das Ações. Transformação Digital. Desempenho Financeiro Corporativo. Mercado de Ações A da China.*

1 INTRODUCTION

The stock price crash risk (hereafter, crash risk) is defined as the negative skewness of firm-specific stock returns, which reflects the likelihood of extreme negative returns (Habib et al., 2018). Prior research emphasizes that crash risk results from information asymmetry between shareholders and managers. Managers tend to withhold unfavourable information for career or compensation incentives until accumulated bad news reaches a threshold. Afterwards, a sudden release of negative firm-specific information triggered a sharp decline in stock prices (Hutton et al., 2009; Jin & Myers, 2006). As an emerging market, this phenomenon has been vividly visible in China's capital market. For instance, on June 15, 2018, a crash occurred when the Shanghai Composite, Shenzhen Composite, and GEM index fell by 3.78%, 5.31%, and 5.76%, respectively, while more than 1,100 stocks declined by over 8% (Zhang et al., 2022). At the firm level, Changsheng Bio-technology suffered consecutive price declines in 2018, due to a vaccine falsification scandal (Zhang, 2018). Likewise, the stock price of Kangmei Pharmaceutical had fallen by around 10% each day since its financial fraud was first revealed in 2019 (Reid, 2019). In 2021, *China Fortune Land Development* suffered prolonged stock weakness due to a sudden disclosure of a surge in overdue liabilities (Wang, 2021). Similarly, iFlytek's stock price slumped in 2023 following a negative public opinion incident (Ye, 2023). This trend has been particularly evident in the emerging capital market with immature regulation and supervision on firms' disclosure and governance, leading to sudden releases of bad news, and thereby causing market volatility and undermining investor confidence. As a result, it is essential to investigate how firms can enhance their transparency and governance quality to the public, thereby mitigating their crash risk.

ESG, which stands for environmental (E), social (S), and governance (G), was first proposed by the United Nations Global Compact in 2004. It is widely regarded as a tool for evaluating a firm's sustainability regarding its efforts on environmental protection, social responsibility fulfilment, and governance practices (da Cunha et al., 2025). ESG has further become a core criterion for global investment decision-making since the United Nations' Principles for Responsible Investment (PRI) was launched in 2006 (Khalil et al., 2024; Khan, 2019; Kim & Li, 2021). Unlike traditional financial indicators, ESG emphasizes long-term resilience and non-financial value, providing an essential supplement for assessing firms' operating quality and risk. In recent years, the concept of ESG has undergone rapid expansion in China, with government initiatives, such as the "14th Five-Year Plan", emphasizing "Green" and sustainable development. Similarly, regulators of capital markets, such as the China Securities Regulatory Commission (CSRC), the Shanghai Stock Exchange (SSE), and the Shenzhen Stock Exchange (SZSE), have successively issued disclosure guidelines to enhance disclosure quality and promote sustainable business practices among listed firms (CSRC, 2021; SSE, 2024). Simultaneously, domestic and international ESG index providers, such as the Syntao Green Finance, Wind Financial database, Sino-Securities Index, MSCI ESG ratings, FTSE Russell, and S&P Dow Jones, have incorporated a broad range of Chinese firms into their evaluation system, promoting the diffusion of ESG principles in China's capital market (Billio et al., 2021; Shen et al., 2023). Nevertheless, compared to developed markets, the accumulation of empirical evidence and academic research remains limited in China due to the relatively late introduction of ESG. Most empirical studies focus on ESG's financial outcomes, showing that strong ESG performance reduces firms' financing costs and capital constraints (Khalil et al., 2024; Shi et al., 2024; Zhao et al., 2025), enhances their transparency (Eliwa et al., 2021), improves corporate reputation and image (Meng et al., 2023a), and strengthens investor confidence (Sharma et al., 2025; Tang et al., 2024), thereby leading to better financial performance (Ademi & Klungseth, 2022; Agoraki et al., 2023; Buallay, 2022; Nguyen et al., 2022). However, limited attention has been paid to the potential of ESG performance to mitigate crash risk, especially to the moderating and mediating mechanisms underlying this relationship. Therefore, in the context of China's A-share market, where extreme stock crashes occur frequently, it becomes critical to investigate whether making an effort on ESG can help firms to reduce crash risk (Deng et al.; Luo et al., 2024).

The world has gone digital with the rapid emergence of big data, cloud, blockchain, and artificial intelligence technologies. In line with the UN 2030 Agenda, which emphasizes the importance of digital technologies for achieving the Sustainable Development Goals (SDGs) (Camodeca & Almici, 2021), China also promotes the integration of the digital economy with the real economy in the "14th Five-Year Plan" (Qi & Chu, 2022), which in turn has led to a steady rise in Chinese firms' investment in digital transformation. Digital transformation refers to a structural shift in the information systems and governance practices of firms by leveraging digital technologies (Gong & Ribiere, 2021). It makes firms more transparent and limits managerial opportunism (Yolanda & Mita, 2025), thereby improving their quality and timeliness of disclosure, reducing information asymmetry between external and internal, and creating additional value (Lin & Zhang, 2023; Morakanyane et al., 2017; Reddy & Reinartz, 2017; Verhoef et al., 2021). As prior studies suggest that firms with low transparency are more susceptible to stock price crashes (Hutton et al., 2009), digital transformation can thereby function as an important yet underexplored factor that affect the relationship between ESG performance and crash risk.

In addition, firms' financial performance offers another insight into the nuances of ESG and crash risk. As prior research indicates, better financial performance is not only an outcome of greater ESG engagement but also leads to a lower possibility of stock price crashes. Specifically, firms with stronger profitability (Jiang et al., 2024), higher operating efficiency (Yousefi et al., 2023), and healthier fundamentals (Meng et al., 2023b) can strengthen investor trust, thereby reducing the likelihood of crashes triggered by the concentrated release of bad news. Although prior studies have separately examined the relationship between ESG and financial performance and the nexus between financial performance and crash risk, few have explored how financial performance transmits the impact of ESG to crash risk, leaving this mediating pathway largely underexplored. Accordingly, this study evolves financial performance as a mediating factor, aiming to provide a more comprehensive account of how ESG performance relates to stock price crash risk.

This study raises three research questions. First, does ESG performance significantly affect stock price crash risk? Second, does digital transformation moderate the relationship between ESG and crash risks? Third, does financial performance play a mediating role in this relationship? The objective of this study is to examine how ESG

performance affects stock price crash risk and to identify the underlying mechanisms and contextual factors that shape this relationship, thereby providing new empirical evidence for both academic research and capital market practice.

Moreover, this study contributes to existing literature in three ways. First, it sets ESG performance as a key stabilizing factor in capital markets, demonstrating that strong ESG performance can diminish information asymmetry, limit managerial opportunism, and boost investor confidence, and consequently effectively lowers the likelihood of stock price crashes, thereby enhancing market stability. Second, it opens a new research front on the moderating role of digital transformation to enhance the governance and transparency effects of ESG and further reduce the risk of stock price crashes. Third, the study reinforces the necessity for firms to make efforts to translate ESG strategies into improved profitability, given that enhanced financial performance is an avenue through which ESG mitigates capital market risks.

The remaining part of this paper is organized as follows. Section 2 develops the theoretical foundation and hypotheses. Section 3 describes the research methodology, including sample selection, variable construction, and model specification. Section 4 illustrates the empirical results obtained from baseline, moderating, and mediating regressions, as well as robustness and heterogeneity tests. Section 5 discusses the findings regarding the research hypotheses. Section 6 concludes the study, highlights theoretical and practical implications, and offers recommendations and directions for future research.

2 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Literature review

Crash risk involves the probability of a sudden and significant decline in a firm's stock price. It is measured using extreme negative returns or negative skewness in the distribution of firm-specific returns (Nguyen & Dang, 2023). Early research indicates that stock price crashes result from information asymmetry between corporate managers and external investors, as the managers tend to hoard bad news until it accumulates to a significant level. The subsequent sudden release leads to a sharp decline in stock prices (Jin & Myers, 2006). Empirical evidence further confirms that firms with lower transparency (Hutton et al., 2009), weaker disclosure, and greater information asymmetry

(Kim et al., 2011) are more likely to experience future crashes. More recently, Zhong et al. (2024) reach the same conclusion in China's A-share capital market, as poor corporate transparency is a predictor of future crash risk. San et al. (2025), on the other hand, highlights that governance mechanism, such as strengthening board monitoring, can effectively mitigate this risk. Collectively, these studies show that crash risk is associated with the degree of information asymmetry and the quality of the corporate disclosure.

Given the growing importance of ESG, scholars and practitioners are paying significant attention to its economic consequences, particularly in firms' financial outcomes. Most empirical studies show that firms with stronger ESG performance achieve better profitability, greater stock returns, and higher market values (Buallay, 2022; Nguyen et al., 2022).However, the evidence regarding how ESG performance affects stock price crash risk remains limited, particularly in emerging markets. Gao et al. (2022) find that firms with superior ESG performance are less prone to stock price crashes, as ESG initiatives attract greater green investor attention, enhance analysts' ability to interpret information, and constrain managerial opportunism. Similarly, Luo et al. (2024) also confirm that ESG performance tends to decrease the possibility of stock price crashes. Nevertheless, Zhou et al. (2024) discover a U-shaped correlation between ESG performance and crash risk, where crash risk decreases as ESG performance improves up to a threshold and then increases after that level. Overall, the evidence on the relationship between ESG and crash risk remains limited and mixed.

The development of digital transformation offers a timely addition to this literature. Existing studies demonstrate that firms with greater effort on digital transformation tend to have higher ESG ratings through a more transparent information environment. Specifically, digital transformation enhances firms' disclosure quality *(Liu et al., 2025),* **i**mproves their transparency (Liu et al., 2024a), mitigates agency conflicts and management overconfidence (Li et al., 2024a), optimizes internal control and corporate governance (Cheng & Li, 2025), strengthens media attention (Guo & Pang, 2025; Lu et al., 2023), broadens analyst coverage (Cai et al., 2023), and increases stock price informativeness (Wang & Xing, 2025), thereby alleviating information asymmetry and supporting for higher ESG ratings (Yang et al., 2023). In parallel, it reduces crash risk via the same channel by increasing information transparency (Zhang & Wang, 2025), strengthening internal governance and expanding analyst attention (Liang & Zhao, 2024), and improving accounting information quality (Tang & Li, 2025), which limits

managerial delay of negative information. These findings indicate that digital transformation can amplify the risk-mitigating effect of ESG by improving transparency, reducing information asymmetry, and limiting managerial opportunism.

Furthermore, Meng et al. (2023b), Yousefi et al. (2023), and Jiang et al. (2024) find that lower future crash risk is also driven by stronger fundamental strength of firms, especially higher profitability and operating efficiency. In conjunction with the literatures that document gains in financial performance regarding ESG practices, suggesting the necessity of treating firms' profitability as a mediating channel between ESG and crash risk. Overall, prior studies had paid limited attention to the effect of ESG on the risk of stock price crashes. To address this gap, this study examines how ESG performance influences crash risk and further considers the potential moderating and mediating mechanisms underlying this relationship.

2.2 Hypothesis development

2.2.1 The relationship between ESG performance and stock price crash risk

Prior studies link stock price crash risk to opacity in a firm's information environment, where the delayed disclosure of adverse information allows negative news to accumulate and ultimately leads to a sharp price decline once it is suddenly revealed (Jin & Myers, 2006). In particular, whether and when negative information is disclosed is determined by the level of transparency and the degree of agency problems within the firm (Dumitrescu & Zakriya, 2021). Against this backdrop, ESG performance is expected to reduce crash risk through three complementary channels that map directly into established theories.

Regarding the information channel, as supported by information asymmetry theory (Akerlof et al., 2001), uneven access to firms' information leads investors to misjudge firms' performance, thereby harming capital allocation in the market (Xie et al., 2019). Therefore, sustained ESG engagement strengthens firms' corporate governance (Hao et al., 2025), improves the quality and credibility of the disclosed information and reduces information asymmetry between the insiders and outsiders (Xu et al., 2022), and attracts oversight from analysts and investors (Zhang & Ding, 2023), which together

constrain managerial opportunism (Gao et al., 2022; Zhang et al., 2024) and thereby limit bad-news hoarding that could otherwise trigger crashes.

Under the agency channel that is grounded in agency theory (Jensen & Meckling, 1976), the separation of ownership and control offers self-interested managers a chance and incentive to withhold or delay negative information. Such concealment is typically motivated by managers' own benefits, such as on-the-job consumption (Wang & Zhang, 2024) and career concerns (Li et al., 2023), rather than shareholders' interests. According to Dumitrescu and Zakriya (2021), action on the social (S) pillar of ESG signals firms' responsibility and accountability, thereby strengthening external monitoring, reducing agency problems, and ultimately limiting managers' hiding of bad news. Similarly, the more enhanced governance (G) pillar of ESG, with respect to board independence, competent internal controls, and productive resource allocation, helps mitigate agency conflicts and hence, reduces managers' motivation to hide unfavourable information, which in turn improves overall transparency of firms (Alves & Meneses, 2024).

Furthermore, through the signaling channel grounded in signaling theory (Spence, 1973), the plausible ESG engagement sends an observable signal to external stakeholders regarding firms' long-term orientation and sustained efforts to improve the information environment (Huang et al., 2024), thus building a trustworthy corporate image, enhancing the firms' reputation and stakeholder trust, and bolstering investor confidence, and ultimately lowers stock price crash risk. Therefore, this study proposes the following hypothesis:

H1: ESG performance negatively affects stock price crash risk.

2.2.2 The moderating effect of digital transformation on the relationship between ESG performance and stock price crash risk

While earlier studies emphasize the beneficial role of ESG engagement, recent research shifts the focus from the mere existence of ESG disclosure to its quality. For instance, Huang et al. (2024) and Hao et al. (2025) highlight the importance of the quality of ESG disclosures. Moreover, Zadeh and Hammami (2025) suggest the inconsistency between ESG performance and its disclosure, such as "green-washing", can distort market perceptions and ultimately heighten the probability of future crashes. This shift in

focus underscores the fact that ESG is not merely a matter of "whether to disclose" but rather "how to disclose" in a way that enhances market trust.

According to agency theory, ESG engagement may not always ideally serve its intended purpose due to the separation of ownership and control of firms (Jensen & Meckling, 1976). Rather than actually enhancing the firms' sustainability, managers can engage in ESG activities to pursue their own purpose, such as building personal reputation and concealing other misconduct (Dumitrescu & Zakriya, 2021). This behaviour further results in increased agency costs and heightened information asymmetries, thereby driving future crash risk. In this context, with the advancements in information system driven by digital transformation, firms can enhance their capacity for data extraction and processing, tighten internal controls, and narrow the window for concealment, thereby improving overall disclosure quality and strengthening the effect of the governance (G) dimension of ESG in crash risks (Liu et al., 2024b).

Additionally, information asymmetry theory (Akerlof et al., 2001) adds to the understanding of how digital transformation strengthens the risk-reducing effect of ESG. When disclosure is delayed or inefficient, bad news accumulates and may lead to a sharp price decline once it is eventually revealed (Jin & Myers, 2006). Hence, the extent to which the effectiveness of ESG in reducing crash risk depends on how efficiently firms generate and release information to external users. Digital transformation strengthens these capabilities by digitizing data collection, standardizing records, and expanding distribution through online channels. Specifically, real-time data sharing and digital platforms enhance the quality of information disclosure by improving its accuracy, timeliness, and integrity, while also enhance the availability of firms' information to the public, thereby reducing costs of information retrieval and processing for investors, and helping them to assess the firm more accurately and prevent panic selling, ultimately enhance the stability of stock prices (Chen & Alexiou, 2025). Regarding ESG disclosure, digital transformation improves the quality, consistency, and verifiability of sustainability information, enabling investors to assess firms' ESG performance more effectively and respond more rapidly to unfavourable information. These improvements collectively strengthen the risk-reducing effect of ESG. Based on the above discussion, this study proposes the following hypothesis H2:

H2 : Digital transformation strengthens the negative relationship between ESG performance and stock price crash risk.

2.2.3 The mediating role of financial performance on the relationship between ESG performance and stock price crash risk

The hypothesis regarding mediating role of financial performance is structured into two stages. The first stage is grounded in stakeholder theory, which analyses whether higher ESG performance leads to better financial performance. The second stage further examines if financial performance transmits the effect of ESG on crash risk, as supported by agency theory and signaling theory.

Stakeholder theory posits that when companies actively fulfil their responsibilities toward their stakeholders, they strengthen stakeholder relationships, build reputation, and improve organizational effectiveness (Freeman, 1983). Regarding the context of ESG, prior studies also show that such engagement can raise employee performance, increase customer loyalty, boost investor confidence, and deepen supplier partnerships (Chen & Xie, 2022; Nguyen-Anh et al., 2022; Pinheiro et al., 2023). These benefits contribute to higher operating profitability, thereby establishing the first-stage link from ESG to improved financial performance through enhanced stakeholder relationships.

On the other hand, firms with poor financial performance tends to increases managerial incentives to conceal unfavourable information to meet their personal prescribed performance benchmarks, according to agency theory (Jensen & Meckling, 1976). For instance, managers under earnings pressure are willing to sacrifice long-term value to avoid reporting shortfalls (Graham et al., 2006). In contrast, firms with higher profitability, mitigate the need for such opportunism, and thereby lower likelihood of future stock price crash risk (Meng et al., 2023b; Jiang et al., 2024). Also, firms' financial performance can function as a credible signal to the capital market as to whether they are operating soundly, according to signaling theory. Such a signal raises investor confidence and lowers the possibility of a crash occurrence (Karasan et al., 2025). These findings establish the second-stage link from financial performance to crash risk, showing that stronger profitability mitigates firms' exposure to crash risk. Therefore, this discussion leads to the hypothesis H3 as follows:

H3: Corporate financial performance mediates the relationship between ESG performance and stock price crash risk.

3 DATA AND METHODOLOGY

3.1 Sample selection and data source

The sample of this study consists of all Chinese A-share listed firms for the period 2018-2023. This timeframe is particularly significant because 2018 marked two critical events in China's capital market and corporate development. First, in 2018, the China Securities Regulatory Commission (CSRC), the primary capital market regulator of China, amended the Corporate Governance Code. It is marked as the country's first introduction of an ESG disclosure framework, indicating formal incorporation of ESG into the governance agenda (Hu et al., 2023). Simultaneously, the National Development and Reform Commission (NDRC), the primary body for economic planning of China, proposed accelerating the development of the digital economy, as well as pushing for the digital transformation of traditional industries, which was a national initiative for the transformation of firms towards a digital economy (Wang, 2018). Moreover, as most firm-level data are available up to 2023, the research sample covers the period from 2018 to 2023.

The data of ESG ratings are obtained from the Wind Financial Database (WIND), one of the most widely used third-party financial data providers in China. The data of stock price crash risk, digital transformation, and financial accounting data are collected from the China Stock Market and Accounting Research Database (CSMAR). In accordance with prior research, the sample is refined by excluding the following types of observations to ensure the accuracy of the analysis:

1. Financial institutions, due to their distinct financial structures and regulatory regimes, differ from non-financial firms.
2. Firms designated as ST or *ST to avoid distortions caused by financial distress and delisting risk.
3. Firms with incomplete data.

In addition, continuous variables are winsorized at the 1% level to mitigate the impact of outliers. As a result, the final sample of this study contains 16,297 firm-year observations.

3.2 Variables measurement

3.2.1 Dependent variables

The dependent variable in this study is stock price crash risk, proxied by the negative conditional skewness of returns (NCSKEW) of firm-specific weekly return distributions based on the methodology of Chen et al. (2001). A larger NCSKEW value indicates more left-skewness and thus a higher likelihood of extreme negative returns. Following Kim et al. (2011), firms' crash risk is computed in three steps.

First, firm-specific weekly returns are obtained by estimating the following Equation (1) for each firm *i* in week *t* :

$$R_{i,t} = \alpha_i + \beta_{1,i}R_{m,t-2} + \beta_{2,i}R_{m,t-1} + \beta_{3,i}R_{m,t} + \beta_{4,i}R_{m,t+1} + \beta_{5,i}R_{m,t+2} + \varepsilon_{i,t} \quad (1)$$

where $R_{i,t}$ denotes the stock return of firm *i* in week t, adjusted for cash dividends and reinvestment, while $R_{m,t}$ is the value-weighted market return of all A-share stocks in week *t*. The residual term $\varepsilon_{i,t}$ represents the firm-specific weekly return after removing market-wide effects.

Second, the firm-specific residual returns are log-transformed using Equation (2) to reduce the influence of extreme values and to stabilize the distribution for subsequent crash-risk estimation:

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

Third, crash risk is then measured by the **NCSKEW** using Equation (3) as follows.

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

where *n* is the number of trading weeks for firm *i* in year t. A higher value of $NCSKEW_{i,t}$ indicates a greater negative skewness in firm-specific weekly returns, thereby reflecting a higher crash risk.

3.2.2 Independent variables

To measure ESG performance for A-share listed firms, this study uses the ESG ratings developed by the Wind database (WIND). WIND, as a leading domestic financial data provider, customizes its methodology in line with China's localized context, such as high technology patents and participation in poverty alleviation, making them suitable for Chinese listed firms (Li et al., 2024b). Additionally, WIND evaluates and classifies firms' ESG performance into nine levels, namely C, CC, CCC, B, BB, BBB, A, AA, and AAA, with C being the lowest and AAA the highest (Zhang et al., 2025). For empirical analysis, these categorical ratings are converted into numerical scores ranging from 1 to 9 in this study, consistent with Wang et al. (2023). Specifically, a rating of C corresponds to a score of 1, CC corresponds to 2, CCC to 3, B to 4, BB to 5, BBB to 6, A to 7, AA to 8, and AAA to 9.

3.2.3 Moderating variables

In this study, the level of digital transformation (DT) is employed as a moderating variable, which is achieved by adopting a methodology consistent with Lu et al. (2023). Specifically, Python-based text analysis and word frequency statistics are applied to the annual reports of A-share listed firms. Following Lu et al. (2023), the analysis identifies and quantifies the occurrence of digital-related terms such as *"artificial intelligence technology", "big data technology", "cloud computing technology", "blockchain technology",* and *"digital technology application"* within Management Discussion and Analysis (MD&A), which is part of annual reports. The "jieba" word segmentation tool in Python helps segment the text and then calculate the keyword frequencies to assess digital transformation efforts. Afterwards, the *resulting word frequency is used to construct a proxy for each firm's degree of digital transformation, which captures the extent to which enterprises emphasize digital strategies and technologies in their*

disclosures. Subsequently, the processed data are organized using STATA and transformed into a panel data structure for empirical analysis.

To reduce the influence of outliers and heteroskedasticity, the measure is transformed using the natural logarithm as Equation (4):

$$DT_i = \ln(1 + \text{word count of digital} - \text{related terms in firm i's annual report}) \quad (4)$$

A higher value of DT_i indicates a greater emphasis on digital transformation within the firm.

3.2.4 Mediating variables

In this study, firms' financial performance is employed as the **mediating variable,** proxied by return on assets (ROA). ROA is a widely used accounting indicator in prior research to reflect corporate financial performance (Husna & Satria, 2019), and is calculated as Equation (5):

$$ROA_{i,t} = \frac{Net\ Profit_{i,t}}{Total\ Assets_{i,t}} \quad (5)$$

Where $Net\ Profit_{i,t}$ represents the net profit of firm i in year *t*, and $Total\ Assets_{i,t}$ denotes the book value of total assets. A higher $ROA_{i,t}$ indicates stronger profitability and more efficient use of assets.

3.2.5 Control variables

To account for factors that may influence stock price crash risk, this study includes several control variables. Firm size (Size) is measured as the natural logarithm of a firm's total assets, while the book-to-market ratio (BM) is defined as the ratio of a firm's book value to its market value. Stock liquidity is measured by the change in stock turnover (Dturn), defined as the variation in the ratio of trading volume to the number of tradable shares from year *t-1* to year *t*. Ownership concentration (Herfindahl3) is computed as the sum of squares of the shareholding ratios of the top three largest shareholders for each firm. A higher Herfindahl3 value indicates greater ownership concentration, whereas a

lower value reflects a more dispersed ownership structure. Moreover, listing age (ListAge) is measured as the natural logarithm of the number of years since the firm's listing. Finally, CEO duality (Dual) is controlled as a dummy variable equal to 1 if the chairman of the board concurrently serves as general manager, and 0 otherwise.

Overall, all continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of extreme values. Industry and year fixed effects are further included to control for unobserved heterogeneity. Detailed definitions of these variables are provided in the Appendix.

3.3 Model specifications

To test H1, this study estimated a panel regression model as specified in Model (1).

$$NCSKEW_{i,t} = \alpha_0 + \alpha_1 ESG_{i,t} + \alpha_2 Size_{i,t} + \alpha_3 Dturn_{i,t} + \alpha_4 BM_{i,t} + \alpha_5 Herfindahl3_{i,t} + \alpha_6 Dual_{i,t} + \alpha_7 ListAge_{i,t} + Year_{i,t} + Industry_{i,t} + \varepsilon_{i,t} \quad \text{Model (1)}$$

Where $NCSKEW_{i,t}$ represents the stock price crash risk of firm *i* in year t. $ESG_{i,t}$ represents the ESG performance score of firm i, obtained from WIND. ESG ratings and converted into a numerical scale ranging from 1 (C) to 9 (AAA). $Year_{i,t}$ and $Industry_{i,t}$ represent year and industry fixed effects, respectively.

To test H2, this study estimated the following Model (2).

$$NCSKEW_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 DT_{i,t} + \beta_3 ESG_{i,t} \times DT_{i,t} + \beta_4 Size_{i,t} + \beta_5 Dturn_{i,t} + \beta_6 BM_{i,t} + \beta_7 Herfindahl3_{i,t} + \beta_8 Dual_{i,t} + \beta_9 ListAge_{i,t} + Year_{i,t} + Industry_{i,t} + \varepsilon_{i,t} \quad \text{Model (2)}$$

Where $DT_{i,t}$ captures the degree of digital transformation, measured through text analysis of firms' annual reports. The interaction term $ESG_{i,t} \times DT_{i,t}$ is included to test the moderating effect of digital transformation on the relationship between ESG performance and crash risk.

To test H3, this study examines the mediation effect of ROA is in three steps as follows. First, the direct effect of ESG performance on crash risk is estimated, as shown

in Model (1). Second, the effect of ESG performance on ROA is tested, as specified in Model (3):

$$ROA_{i,t} = \gamma_0 + \gamma_1 ESG_{i,t} + \gamma_2 Size_{i,t} + \gamma_3 Dturn_{i,t} + \gamma_4 BM_{i,t} + \gamma_5 Herfindahl3_{i,t} + \gamma_6 Dual_{i,t} + \gamma_7 ListAge_{i,t} + Year_{i,t} + Industry_{i,t} + \varepsilon_{i,t} \quad \text{Model (3)}$$

Where $ROA_{i,t}$ denotes firm profitability, measured as the ratio of net profit to average total assets, and serves as the mediator in Model (4). Third, both ESG performance and ROA are included in the crash risk regression to examine whether ROA mediates the relationship between ESG and crash risk as shown in Model (4):

$$NCSKEW_{i,t} = \delta_0 + \delta_1 ESG_{i,t} + \delta_2 ROA_{i,t} + \delta_3 Size_{i,t} + \delta_4 Dturn_{i,t} + \delta_5 BM_{i,t} + \delta_6 Herfindahl3_{i,t} + \beta_7 Dual_{i,t} + \delta_8 ListAge_{i,t} + Year_{i,t} + Industry_{i,t} + \varepsilon_{i,t} \quad \text{Model (4)}$$

If γ_1 is statistically significant in Model (3) and δ_2 in Model (4) are both statistically significant, while the absolute value of δ_1 in in Model (4) is smaller than α_1 in Model (1), it would suggest the presence of a mediating effect of ROA in the relationship between ESG and crash risk.

To ensure the robustness of the estimation results, variance inflation factor (VIF) tests were conducted to examine potential multicollinearity. The results show that all explanatory variables have VIF values between 1 and 2, with a maximum value below the conventional threshold of 10 and an average VIF of 1.39, indicating no serious multicollinearity issue. In addition, heteroskedasticity tests reveal the presence of heteroskedasticity. Accordingly, all regressions are estimated using firm-clustered robust standard errors. Year and industry fixed effects are also included to control for unobservable heterogeneity across time and industries.

4 RESEARCH RESULTS

4.1 Descriptive statistics

The descriptive statistics for all variables of this study are shown in Table 1. The NCSKEW has a mean value of -0.304 with a standard deviation of 0.593, suggesting that there is considerable variation in crash risk across firms. The mean of the ESG score is 5.473 and ranges from 4 to 8, representing that most A-share listed companies cluster around medium to high ESG ratings. The mean value of DT is 2.392 with a standard deviation of 1.262, indicating a significant variation in the extent of digital transformation that firms undergo. Moreover, the mediator variable, ROA, has a mean of 0.038 and an extent of -0.191 and 0.184, implying differences in profitability across firms.

In relation to control variables, Size has an average of 22.309, indicating relatively large-scale listed firms in the sample. Dturn averages -0.131 and varies significantly, while BM has an average of 1.061 which implies that the majority of firms are of moderate value. The average Herfindahl3 value of 0.141 shows that the shareholding of the three largest shareholders contains a large but not dominant proportion of the equity. Concerning the dummy variable, Dual equals 1 for roughly 31.5% of firms, indicating that CEO duality exists in approximately a third of the sample. Finally, ListAge has an average of 2.193 which implies that the firms in the sample have generally been established for a long time, although there is considerable variation across the firms.

Table 1

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
NCSKEW	16297	-.304	.593	-2.165	1.297
ESG	16297	5.473	.768	4	8
DT	16297	2.392	1.262	0	5.333
ROA	16297	.038	.053	-.191	.184
Size	16297	22.309	1.136	20.206	25.85
Dturn	16297	-.131	.44	-1.963	.901
BM	16297	1.061	.93	.138	6.378
Herfindahl3	16297	.141	.096	.015	.456
Dual	16297	.315	.464	0	1
ListAge	16297	2.193	.793	.693	3.367

Source: Author's Own Work

4.2 Correlation analysis

Table 2 shows the correlation matrix of the main variables. Findings reveal that the negative correlation between ESG and NCSKEW is insignificant, providing preliminary but insufficient evidence for the effect of ESG on crash risk. This correlation will be tested more thoroughly in the regression analysis. Concerning the moderating role of DT, it has a significant positive correlation with ESG and a significant negative correlation with crash risk, suggesting that firms with higher level of digital transformation tend to perform better on ESG and have a lower crash risk. It provides partial evidence in favour of Hypothesis H2. With respect to the mediation mechanism, ESG has a positive and significant relation to ROA which indicates that firms that engage more in ESG activities are more profitable and fulfils the necessary condition to sustain Hypothesis H3. Nevertheless, ROA has an insignificant relation to NCSKEW, suggesting that the mediation effect will be formally tested in the following regression analysis.

Regarding the control variables, Dturn and ListAge show significant and negative relationships with crash risk, while Size shows a significant but positive correlation with NCSKEW. Other variables exhibit small correlations. Overall, the correlation coefficients fall within an acceptable range, suggesting no serious multicollinearity concerns and supporting the validity of subsequent regression analyses.

Table 2

Correlation Analysis

Variables	NCSKEW	ESG	DT	ROA	Size	Dturn	BM	Herfindahl3	Dual	ListAge
NCSKEW	1.000									
ESG	-0.003 (0.661)	1.000								
DT	-0.018** (0.022)	0.143*** (0.000)	1.000							
ROA	0.002 (0.775)	0.164*** (0.000)	0.018** (0.024)	1.000						
Size	0.026*** (0.001)	0.094*** (0.000	0.019** (0.017	0.031*** (0.000	1.000					

		)	)	)						
Dturn	-0.101***	-0.051***	-0.007	-0.094***	0.164***	1.000				
	(0.000)	(0.000)	(0.398)	(0.000)	(0.000)					
BM	0.005	-0.102***	-0.103***	-0.246***	0.592***	0.104***	1.000			
	(0.501)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
Herfindahl3	0.012	0.036***	-0.060***	0.155***	0.141***	-0.078***	0.085***	1.000		
	(0.130)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
Dual	0.007	-0.003	0.079***	0.022***	-0.195***	-0.098***	-0.175***	-0.037***	1.000	
	(0.405)	(0.684)	(0.000)	(0.006)	(0.000)	(0.000)	(0.000)	(0.000)		
ListAge	-0.033***	-0.096***	-0.124***	-0.186***	0.467***	0.422***	0.381***	-0.089***	-0.275***	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

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

Source: Author's Own Work

4.3 Regression results

4.3.1 ESG performance and stock price crash risk

Table 3 illustrates the regression analysis on the relationship between ESG and crash risk. Column (1) contains the results from the baseline model where only ESG is included. Column (2) adds all control variables. The results consistently show that ESG is significantly and negatively related to NCSKEW, with coefficients of -0.0198 in column (1) and -0.0227 in column (2). This finding supports Hypothesis H1, suggesting that firms with higher ESG scores are less likely to experience stock price crashes.

Among the control variables, Dturn is negatively and significantly associated with crash risk, indicating that higher stock turnover reduces the likelihood of crashes. Conversely, BM, Herfindahl3, and ListAge have a significant but positive association with crash risk. Size has an insignificant effect. Meanwhile, Dual has a negative and significant coefficient, suggesting that CEO duality may be associated with lower crash

risk in the Chinese context. Overall, these results confirm that ESG has a stabilizing effect on mitigating downside risk in China's A-share market.

Table 3

Regression results regarding the impact of ESG performance on stock crash risk

Variables	(1) NCSKEW	(2) NCSKEW
ESG	-0.0198**	-0.0227**
	(-2.03)	(-2.31)
Dturn		-0.152***
		(-10.31)
Size		-0.0129
		(-0.52)
BM		0.102***
		(6.60)
Herfindahl3		0.696***
		(3.32)
Dual		-0.0421**
		(-2.01)
ListAge		0.120***
		(2.86)
constant	0.0116	-0.183
	(0.09)	(-0.33)
Year FE	YES	YES
Industry FE	YES	YES
N	16297	16297
adj. R^2	0.013	0.028

Note: Year and industry fixed effects included; standard errors clustered at the firm level.
t statistics in parentheses. ** p < 0.1, ** p < 0.05, *** p < 0.01.*
Source: Author's Own Work

4.3.2 ESG performance and stock price crash risk: moderating effect of digital transformation

Table 4 shows how DT influences the relationship between ESG performance and crash risk. Columns (1) and (2) show the results from baseline regression, including ESG, DT, and the control variables. Column (3) includes the interaction term ESG×DT to test the moderating effect. The negative and statistically significant coefficient of ESG×DT in column (3) indicates that DT strengthens the negative impact of ESG on crash risk. In other words, the greater the level of digital transformation, the more effective ESG is in lowering crash risk, thereby supporting Hypothesis H2. Moreover, the coefficients of the control variables in column (3) remain stable in both sign and significance in comparison to column (1) and (2), confirming the robustness of the results. The evidence overall

indicates that DT contributes to strengthening the negative relationship between ESG performance and crash risk in China's A-share market.

Table 4

Regression results for the moderating effect of digital transformation in the relationship between ESG performance and stock crash risk

Variables	(1) NCSKEW	(2) NCSKEW	(3) NCSKEW
ESG	-0.0227**	-0.0227**	0.0176
	(-2.31)	(-2.31)	(0.92)
DT		0.00107	0.0908**
		(0.11)	(2.35)
ESGxDT			-0.0167**
			(-2.42)
Dturn	-0.152***	-0.152***	-0.153***
	(-10.31)	(-10.31)	(-10.32)
Size	-0.0129	-0.0132	-0.0121
	(-0.52)	(-0.53)	(-0.48)
BM	0.102***	0.102***	0.103***
	(6.60)	(6.60)	(6.61)
Herfindahl3	0.696***	0.695***	0.689***
	(3.32)	(3.32)	(3.29)
Dual	-0.0421**	-0.0422**	-0.0413**
	(-2.01)	(-2.02)	(-1.97)
ListAge	0.120***	0.121***	0.122***
	(2.86)	(2.86)	(2.89)
constant	-0.183	-0.178	-0.423
	(-0.33)	(-0.32)	(-0.75)
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
N	16297	16297	16297
adj. R^2	0.028	0.028	0.028

Note: Year and industry fixed effects included; standard errors clustered at the firm level.
t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Author's Own Work

4.3.3 ESG performance and stock price crash risk: mediating effect of financial performance

Table 5 reports the mediating effect of financial performance in the relationship between ESG performance and stock price crash risk. Following the three-step approach, Column (1) shows that ESG is significantly and negatively related to NCSKEW, suggesting that better ESG performance helps reduce crash risk. Column (2) shows the regression results where ROA is the dependent variable. The finding suggests that ESG significantly and positively affects firms' profitability, implying that companies with favourable ESG ratings attain superior profitability. In Column (3), which has both ESG

and ROA, reveals that ROA is significantly and negatively associated with NCSKEW, while the coefficient of ESG decreases in magnitude (from -0.0227 to -0.0222) but remains significant. This pattern confirms that ROA partially mediates the effect of ESG on crash risk, thereby supporting Hypothesis H3.

Of the control variables in Column (3), Dturn has a consistently adverse effect on NSCSKEW, while BM, Herfindahl3, and ListAge are positively related to crash risk. Also, Dual is negatively correlated, and Size remains insignificant. In conclusion, the results highlight profitability as an important channel through which ESG reduces the likelihood of stock price crashes.

Table 5

Regression results for the mediating effect of financial performance in the relationship between ESG performance and stock crash risk

Variables	(1) NCSKEW	(2) ROA	(3) NCSKEW
ESG	-0.0227**	0.00136**	-0.0222**
	(-2.31)	(2.19)	(-2.26)
ROA			-0.359**
			(-2.38)
Dturn	-0.152***	0.000697	-0.152***
	(-10.31)	(0.81)	(-10.30)
Size	-0.0129	0.0331***	-0.00101
	(-0.52)	(15.16)	(-0.04)
BM	0.102***	-0.0274***	0.0923***
	(6.60)	(-22.39)	(5.74)
Herfindahl3	0.696***	0.0302*	0.707***
	(3.32)	(1.86)	(3.39)
Dual	-0.0421**	-0.00134	-0.0426**
	(-2.01)	(-0.88)	(-2.04)
ListAge	0.120***	-0.0335***	0.108**
	(2.86)	(-12.19)	(2.56)
constant	-0.183	-0.599***	-0.398
	(-0.33)	(-11.75)	(-0.71)
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
N	16297	16297	16297
adj. R^2	0.028	0.143	0.028

Note: Year and industry fixed effects included; standard errors clustered at the firm level.
t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Author's Own Work

4.4 Robustness checks

To ensure the robustness of the regression results, this study further employs alternative samples. Specifically, given that the COVID-19 pandemic in 2020-2021 imposed significant shocks on firms and capital markets, potentially biasing the empirical results, the observations for 2020-2021 are dropped from the sample. The regressions are then re-estimated using the adjusted dataset, which contains 10,956 firm-year observations.

As Table 6 reports, column (1), the baseline regression, shows that ESG is significantly and negatively related to NCSKEW, which is consistent with the main results and supports Hypothesis H1. Column (2), which tests the moderating effect, shows that the interaction term ESG×DT is significantly negatively correlated to NCSKEW, suggesting that DT continues to strengthen the mitigating role of ESG on crash risk and thereby supports Hypothesis H2. Column (3) and (4) examine the mediation effect of ROA in the nexus between the ESG and crash risks. Specifically, column (3) shows that ESG is significantly and positively related to ROA. Moreover, after including ROA in column (4), ROA is significantly and negatively associated with NCSKEW, while the ESG coefficient decreases in magnitude but remains significant. This result confirms a partial mediation effect and supports Hypothesis H3. Overall, the regression results based on the alternative sample that excludes the pandemic years remain consistent with the baseline findings, thereby reinforcing the robustness of the study's conclusions.

Table 6

Robustness checks by using alternative samples

	Baseline Regression	Moderating Regression	Mediation Regression	
	(1)	(2)	(3)	(4)
Variables	NCSKEW	NCSKEW	ROA	NCSKEW
ESG	-0.0257**	0.0252	0.00139*	-0.0251**
	(-2.05)	(1.02)	(1.69)	(-2.01)
DT		0.106**		
		(2.12)		
ESGxDT		-0.0213**		
		(-2.37)		
ROA				-0.403**
				(-1.97)
Dturn	-0.128***	-0.128***	-0.000263	-0.129***
	(-6.43)	(-6.40)	(-0.22)	(-6.44)
Size	-0.00402	-0.0000792	0.0267***	0.00672
	(-0.14)	(-0.00)	(10.89)	(0.24)

BM	0.0559***	0.0566***	-0.0271***	0.0450**
	(3.04)	(3.07)	(-18.52)	(2.31)
Herfindahl3	0.639**	0.644***	0.0348*	0.653***
	(2.56)	(2.60)	(1.81)	(2.63)
Dual	-0.0622**	-0.0611**	-0.00231	-0.0632**
	(-2.40)	(-2.35)	(-1.21)	(-2.43)
ListAge	0.0786	0.0778	-0.0303***	0.0664
	(1.54)	(1.53)	(-9.26)	(1.29)
constant	-0.0960	-0.446	-0.455***	-0.280
	(-0.16)	(-0.71)	(-7.68)	(-0.45)
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
N	10956	10956	10956	10956
adj. R^2	0.025	0.025	0.157	0.025

Note: Year and industry fixed effects included; standard errors clustered at the firm level.
t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Author's Own Work

4.5 Heterogeneity test

The study further splits the sample by ownership to examine the heterogeneity in the ESG-crash risk relationship (Table 7). In state-owned enterprises (SOEs, Column (1)), the ESG coefficient is -0.0259 and is statistically insignificant, suggesting that the marginal effect of ESG on reducing crash risk in SOEs is weak or linearly unstable. In non-state-owned enterprises (non-SOEs, Column (2)), the ESG coefficient is -0.0214 and significant. It suggests that ESG is associated with lower crash risk where market discipline and reliance on external financing are stronger. Regarding control variables, Dturn is negative and significant in both subsamples, while BM is positive and significant. Herfindahl3, Dual, and ListAge are significant only in the non-SOE subsample, while Size is not significant in either subsample. Overall, the risk-mitigating effect of ESG appears only in non-SOEs and is not significant in SOEs.

Table 7

Heterogeneity test

Variables	(1) SOEs NCSKEW	(2) non-SOEs NCSKEW
ESG	-0.0259	-0.0214*
	(-1.48)	(-1.77)
Size	0.000778	-0.0329
	(0.01)	(-1.15)
Dturn	-0.205***	-0.148***
	(-6.14)	(-8.83)
BM	0.0643***	0.140***
	(2.69)	(6.77)
Herfindahl3	0.512	0.574**

	(1.46)	(2.01)
Dual	-0.0451	-0.0507**
	(-0.93)	(-2.09)
ListAge	0.0656	0.159***
	(0.51)	(3.19)
constant	-0.563	0.212
	(-0.42)	(0.34)
Year FE	YES	YES
Industry FE	YES	YES
N	4649	11648
adj. R^2	0.037	0.027

Note: Year and industry fixed effects included; standard errors clustered at the firm level.
t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Author's Own Work

5 DISCUSSION

The empirical findings confirm that firms with stronger ESG performance are less likely to be exposed to stock price crash risk, thereby providing strong support for Hypothesis H1. In the context of the China's capital market, where information asymmetry and weak investor protection are key structural issues, credible ESG practices reduce agency conflicts regarding bad-news concealment, enhance information transparency, and signal responsibility to external investors, ultimately strengthening investor trust and lowering the probability of sudden price declines. This finding aligns with the theories of information asymmetry, agency, and signaling. With regard to information asymmetry theory, the proactive ESG practices of the firm improve information transparency, thereby reducing the likelihood of a stock price crash. In tandem with agency theory, ESG practices improve governance, which reduces the divergence of the managers' and stockholders' interests, thereby reducing the managerial concealment and delaying the disclosure of negative information. In line with signaling theory, ESG initiatives act as a strong signal to external investors that the firm is committed to corporate responsibility and long-term sustainability, thereby fostering greater trust and confidence in the firm. This conclusion is also consistent with Luo et al. (2024), who documented that ESG mitigates crash risk among Chinese firms.

In addition, the moderating regression results show that digital transformation significantly strengthens the impact of ESG in reducing stock price crash risk, thus supporting Hypothesis H2. Specifically, digital transformation amplifies the risk-mitigating role of ESG by improving the quality, timeliness, and transparency of information disclosure, which allows capital markets to assess firms' ESG performance

better. Theoretically, this finding supports both information asymmetry theory and agency theory. From the perspective of information asymmetry theory, digital transformation utilizes advanced technologies such as big data, artificial intelligence, and blockchain to improve the accuracy and accessibility of corporate information. With the information and communication gap narrowed, allowing firms to showcase their ESG efforts to the public better, which in turn significantly enhances the stabilizing impact of ESG on stock price volatility. In terms of agency theory, digital transformation enhances governance efficiency by improving monitoring mechanisms and curbing managerial opportunism. Managers thus become better aligned with shareholders, which in turn ensure that ESG engagement is effectively translated into reduced crash risk in capital markets. These findings are also consistent with Gong and Ribiere (2021), who document that digital transformation improves the corporate information environment and further reveal how it amplifies the risk-mitigation effects of ESG.

In addition, the mediation analysis illustrates that financial performance has a partial mediation effect on the relationship between ESG and stock price crash risk, thus confirming Hypothesis H3. More specifically, engaging in ESG practice not only reduces crash risk directly but also improves firms' profitability, thereby indirectly mitigating the likelihood of crashes. This finding is supported by stakeholder theory, agency theory, and signaling theory. From the perspective of stakeholder theory, the positive relationship between ESG and profitability suggests that credible ESG engagement strengthens stakeholder relations, reduces frictions, and improves operational efficiency, which together translate into superior profitability. These results are also consistent with the findings of Chen and Xie (2022), Nguyen-Anh et al. (2022), and Pinheiro et al. (2023). In addition, the results are in line with agency theory and signaling theory, which together explain the link between profitability and crash risk. Regarding the perspective of agency cost, firms with higher and more stable profitability reduce short-term performance pressures on managers and curbs incentives to conceal negative information, thereby lowering the risk of a sudden release of accumulated bad news, as shown by Jiang et al. (2024) and Meng et al. (2023b). At the same time, firms' higher profitability conveys a credible signal of sound operations and effective governance to the market, enhancing investor confidence and reducing perceived risks of extreme price declines, consistent with the evidence provided by Karasan et al. (2025). Overall, the findings of the mediation analysis in this study deepen the understanding of the linkage between ESG and crash

risk. This mechanism is particularly pronounced in the Chinese market, where profitability remains a key indicator for investors in assessing firm value and risk.

6 CONCLUSIONS, IMPLICATION AND FUTURE STUDY

6.1 Conclusion

This study investigates the relationship between ESG performance and the risk of a stock price crash and further examines the moderating role of digital transformation and the mediating role of financial performance, using data from Chinese A-share listed companies over the period of 2018 to 2023. Also, this study is theoretically grounded in the theories of information asymmetry, agency, signaling, and stakeholder. The results indicate that firms engaging in ESG can significantly reduce their crash risk, highlighting the role of ESG in managing risks in capital markets. It further reveals that greater level of digital transformation accentuates the marginal impact of ESG in mitigating crash risk through a more advanced information environment, greater disclosure transparency, and improved governance effectiveness. In addition, it shows that corporate financial performance partially mediates the ESG-crash risk relationship, implying that ESG engagement reduces crash risk indirectly by improving profitability, which conveys a credible signal of operational stability to the market. Moreover, robustness tests confirm these conclusions, while heterogeneity analysis reveals that the effect is particularly pronounced in non-SOEs.

6.2 Implication

These findings have several theoretical and practical implications. From a theoretical perspective, this study offers novel insights into the mechanisms by which ESG performance affects stock price crash risk. The negative correlation between ESG and crash risk supports the notion that strong ESG engagement enhances firms' transparency and credibility. This enhancement reduces information asymmetry between firms and investors and mitigates firms' accumulation of undisclosed negative information, ultimately decreasing the likelihood of stock price crashes. Furthermore, the moderating analysis highlights that digital transformation reinforces the governance and

disclosure functions of ESG, thereby strengthening the effect of ESG on reducing the risks of a stock crash. In addition, the mediating role of corporate financial performance demonstrates that ESG contributes to lower crash risk not only by improving transparency but also by strengthening financial profitability, thereby connecting sustainability performance with financial outcomes within the same framework of risk mitigation. Practically, the results emphasize that managers should view ESG not merely as a compliance tool but as a strategic means to enhance information quality and financial resilience, thereby reducing crash risk, especially for non-SOEs, where ESG exhibits more substantial stabilizing effects. In addition, firms investing in digital transformation can further amplify the benefits of ESG by improving data processing, disclosure timeliness and quality, and monitoring efficiency, thus reducing the chance of abrupt value loss. Policymakers and regulators may also draw on these findings to design integrated sustainability and digital transformation policies that encourage both ESG disclosure and technological adoption. Finally, investors can use ESG performance, level of digital transformation, and financial performance indicators jointly as effective signals for evaluating a firm's crash-risk exposure and long-term value stability.

6.3 Limitation and future study

This study has several limitations that can be explored in further research. First, this study focuses on Chinese A-share listed firms, providing valuable insights into an emerging market context. However, the insights may not apply to other country contexts. Future research could extend the research scope to cross-country comparisons, particularly between emerging and developed markets, to explore whether the mechanisms identified in this study hold under different regulatory conditions. Second, ESG performance is measured based on third-party ratings. Although this rating is widely used, it may involve methodological biases and incomplete reflections of firms' actual practices. Future studies could complement these measures with alternative ESG rating providers to enhance robustness. Besides, while this study incorporates digital transformation and financial performance as key moderating and mediating mechanisms, other potential channels may also explain how ESG influences crash risk, such as corporate culture, innovation capacity, or market sentiment. Future research could integrate these additional perspectives to provide a more comprehensive understanding

of the ESG-crash risk nexus. By addressing these limitations, future studies can build upon the present findings and further enrich theoretical and practical knowledge of the role of ESG in mitigating extreme downside risk.

REFERENCES

Ademi, B., & Klungseth, N. J. (2022). Does it pay to deliver superior ESG performance? Evidence from US S&P 500 companies. *Journal of Global Responsibility*, *13*(4), 421–449. https://doi.org/10.1108/jgr-01-2022-0006

Agoraki, M. E. K., Giaka, M., Konstantios, D., & Patsika, V. (2023). Firms? sustainability, financial performance, and regulatory dynamics: Evidence from European firms. *Journal of International Money and Finance*, *131*, Article 102785. https://doi.org/10.1016/j.jimonfin.2022.102785

Akerlof, G. A., Spence, A. M., & Stiglitz, J. E. (2001). *Markets with Asymmetric information*. Nobel Foundation.

Alves, C. F., & Meneses, L. L. (2024). ESG scores and debt costs: Exploring indebtedness, agency costs, and financial system impact. *International Review of Financial Analysis*, *94*, 103240. https://doi.org/10.1016/j.irfa.2024.103240

Billio, M., Costola, M., Hristova, I., Latino, C., & Pelizzon, L. (2021). Inside the ESG ratings: (Dis)agreement and performance [Article]. *Corporate Social Responsibility and Environmental Management*, *28*(5), 1426–1445. https://doi.org/10.1002/csr.2177

Buallay, A. (2022). Sustainability reporting and retail sector performance: worldwide evidence. *The International Review of Retail, Distribution and Consumer Research*, *32*, 311–330. https://doi.org/10.1080/09593969.2022.2048410

Cai, C., Tu, Y., & Li, Z. (2023). Enterprise digital transformation and ESG performance. *Finance Research Letters*, *58*, Article 104692. https://doi.org/10.1016/j.frl.2023.104692

Camodeca, R., & Almici, A. (2021). Digital Transformation and Convergence toward the 2030 Agenda's Sustainability Development Goals: Evidence from Italian Listed Firms. *Sustainability*, *13*(21).

Chen, J., Hong, H., & Stein, J. C. (2001). Forecasting crashes: Trading volume, past returns, and conditional skewness in stock prices. *Journal of Financial Economics*, *61*(3), 345–381.

Chen, S., & Alexiou, C. (2025). Digital Transformation as a Catalyst for Resilience in Stock Price Crisis: Evidence from A 'New Quality Productivity' Perspective. *Asia-Pacific Financial Markets*. https://doi.org/10.1007/s10690-025-09517-7

Chen, Z., & Xie, G. (2022). ESG disclosure and financial performance: Moderating role of ESG investors. *International Review of Financial Analysis*, *83*, 102291.

Cheng, Y., & Li, H. (2025). The impact of ESG performance on corporate digital transformation. *Environment Development and Sustainability*. https://doi.org/10.1007/s10668-025-06012-x

Commission, N. D. a. R. (2021). *The Outline of the 14th Five-Year Plan for Economic and Social Development (2021–2025) and Long-Range Objectives through the Year 2035 of the People's Republic of China*.

da Cunha, Í. G. F., Policarpo, R. V. S., de Oliveira, P. C. S., Abdala, E. C., & do Nascimento Rebelatto, D. A. (2025). A systematic review of ESG indicators and corporate performance: proposal for a conceptual framework. *Future Business Journal*, *11*(1), 106. https://doi.org/10.1186/s43093-025-00539-1

Deng, B., Peng, Z., & Huang, K. ESG rating declines and stock price crash risk. *Applied Economics Letters*, 1–7. https://doi.org/10.1080/13504851.2024.2448250

Dumitrescu, A., & Zakriya, M. (2021). Stakeholders and the stock price crash risk: What matters in corporate social performance? *Journal of Corporate Finance*, *67*, 101871. https://doi.org/10.1016/j.jcorpfin.2020.101871

Eliwa, Y., Aboud, A., & Saleh, A. (2021). ESG practices and the cost of debt: Evidence from EU countries. *Critical Perspectives on Accounting*, *79*, Article 102097. https://doi.org/10.1016/j.cpa.2019.102097

Freeman, R. E. (1983). *Strategic management: A stakeholder approach*. Cambridge university press.

Gao, J., Chu, D., Zheng, J., & Ye, T. (2022). Environmental, social and governance performance: Can it be a stock price stabilizer? *Journal of Cleaner Production*, *379*, Article 134705. https://doi.org/10.1016/j.jclepro.2022.134705

Gong, C., & Ribiere, V. (2021). Developing a unified definition of digital transformation. *Technovation*, *102*, 102217. https://doi.org/10.1016/j.technovation.2020.102217

Graham, J. R., Harvey, C., & Rajgopal, S. (2006). Value Destruction and Financial Reporting Decisions. *Financial Analysts Journal*, *62*(6), 27.

Guo, X., & Pang, W. (2025). The impact of digital transformation on corporate ESG performance. *Finance Research Letters*, *72*, 106518.

Habib, A., Hasan, M. M., & Jiang, H. (2018). Stock price crash risk: review of the empirical literature. *Accounting & Finance*, *58*(S1), 211–251. https://doi.org/10.1111/acfi.12278

Hao, J., Sun, R., Gong, X., & Zhu, X. (2025). ESG and stock price crash risk revisited: Evidence from mandatory ESG disclosure policy in China. *Pacific-Basin Finance Journal*, *91*, Article 102729. https://doi.org/10.1016/j.pacfin.2025.102729

Hu, J., Zou, Q., & Yin, Q. (2023). Research on the effect of ESG performance on stock price synchronicity: Empirical evidence from China's capital markets. *Finance Research Letters*, *55*. https://doi.org/10.1016/j.frl.2023.103847

Huang, J., Li, Y., & Han, F. (2024). Walk well and talk well: Impact of the consistency of ESG performance and disclosure on firms' stock price crash risk. *International Review of Economics & Finance*, *93*, 1154–1174. https://doi.org/10.1016/j.iref.2024.03.067

Husna, A., & Satria, I. (2019). Effects of return on asset, debt to asset ratio, current ratio, firm size, and dividend payout ratio on firm value. *International Journal of Economics and Financial Issues*, *9*(5), 50–54.

Hutton, A. P., Marcus, A. J., & Tehranian, H. (2009). Opaque financial reports, R2, and crash risk. *Journal of Financial Economics*, *94*(1), 67–86. https://doi.org/10.1016/j.jfineco.2008.10.003

Jensen, M. C., & Meckling, W. H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure. In K. Brunner (Ed.), *Economics Social Institutions: Insights from the Conferences on Analysis & Ideology* (pp. 163–231). Springer Netherlands. https://doi.org/10.1007/978-94-009-9257-3_8

Jiang, F., Ma, T., & Zhu, F. (2024). Fundamental characteristics, machine learning, and stock price crash risk. *Journal of Financial Markets*, *69*, 100908. https://doi.org/10.1016/j.finmar.2024.100908

Jin, L., & Myers, S. C. (2006). R2 around the world: New theory and new tests. *Journal of Financial Economics*, *79*(2), 257–292.

Karasan, A., Alp, O. S., & Weber, G.-W. (2025). Machine learning approach to stock price crash risk. *Annals of Operations Research*, *350*(3), 1053–1074. https://doi.org/10.1007/s10479-025-06596-7

Khalil, M. A., Khalil, S., & Sinliamthong, P. (2024). From ratings to resilience: The role and implications of environmental, social, and governance (ESG) performance in corporate solvency. *Sustainable Futures*, *8*, 100304. https://doi.org/10.1016/j.sftr.2024.100304

Khan, M. (2019). Corporate Governance, ESG, and Stock Returns around the World. *Financial Analysts Journal*, *75*(4), 103–123. https://doi.org/10.1080/0015198x.2019.1654299

Kim, J.-B., Li, Y., & Zhang, L. (2011). Corporate tax avoidance and stock price crash risk: Firm-level analysis. *Journal of Financial Economics*, *100*(3), 639–662. https://doi.org/10.1016/j.jfineco.2010.07.007

Kim, S., & Li, Z. (2021). Understanding the impact of ESG practices in corporate finance. *Sustainability*, *13*(7), 3746.

Li, Q., Tang, W., & Li, Z. (2024b). ESG systems and financial performance in industries with significant environmental impact: a comprehensive analysis [Original

Research]. *Frontiers in Sustainability*, *Volume 5 - 2024*. https://doi.org/10.3389/frsus.2024.1454822

Li, Y., Zheng, Y., Li, X., & Mu, Z. (2024a). The impact of digital transformation on ESG performance. *International Review of Economics & Finance*, *96*, Article 103686. https://doi.org/10.1016/j.iref.2024.103686

Li, Z., Chen, Y., & Li, Y. (2023). Top management abnormal turnover and stock price crash risk: Evidence from China. *International Review of Financial Analysis*, *89*, 102817. https://doi.org/10.1016/j.irfa.2023.102817

Liang, Z., & Zhao, Y. (2024). Enterprise digital transformation and stock price crash risk. *Finance Research Letters*, *59*, Article 104802. https://doi.org/10.1016/j.frl.2023.104802

Lin, B., & Zhang, Q. (2023). Corporate environmental responsibility in polluting firms: Does digital transformation matter? *Corporate Social Responsibility and Environmental Management*, *30*(5), 2234–2246. https://doi.org/10.1002/csr.2480

Liu, H., Duan, H., & Li, M. (2024a). Enterprise digital transformation and ESG performance. *Energy & Environment*. https://doi.org/10.1177/0958305x241246186

Liu, H., Zhang, X., & He, Y. (2025). Digital Transformation and ESG Performance-Empirical Evidence from Chinese Listed Companies. *Sustainability*, *17*(13), Article 6165. https://doi.org/10.3390/su17136165

Liu, H., Zhu, J., & Cheng, H. (2024b). Enterprise digital transformation's impact on stock liquidity: A corporate governance perspective. *Plos One*, *19*(3), Article e0293818. https://doi.org/10.1371/journal.pone.0293818

Lu, Y., Xu, C., Zhu, B., & Sun, Y. (2023). Digitalization transformation and ESG performance: Evidence from China [Article]. *Business Strategy and the Environment*. https://doi.org/10.1002/bse.3494

Luo, W., Tian, Z., Fang, X., & Deng, M. (2024). Can good ESG performance reduce stock price crash risk? Evidence from Chinese listed companies. *Corporate Social Responsibility and Environmental Management*, *31*(3), 1469–1492. https://doi.org/10.1002/csr.2646

Meng, T., Dato Haji Yahya, M. H., Ashhari, Z. M., & Yu, D. (2023a). ESG performance, investor attention, and company reputation: Threshold model analysis based on panel data from listed companies in China. *Heliyon*, *9*(10), e20974. https://doi.org/10.1016/j.heliyon.2023.e20974

Meng, Y., Shen, D., & Xiong, X. (2023b). When stock price crash risk meets fundamentals. *Research in International Business and Finance*, *65*, 101975. https://doi.org/10.1016/j.ribaf.2023.101975

Morakanyane, R., Grace, A. A., & O'reilly, P. (2017). Conceptualizing digital transformation in business organizations: A systematic review of literature.

Nguyen, D. T., Hoang, T. G., & Tran, H. G. (2022). Help or Hurt? The Impact of ESG on Firm Performance in S&P 500 Non-Financial Firms. *Australasian Accounting Business and Finance Journal*, *16*(2), 91–102. https://doi.org/10.14453/aabfj.v16i2.7

Nguyen, Q. K., & Dang, V. C. (2023). Does the financial flexibility prevent stock price crash risk during COVID-19 crisis? Evidence from the Vietnamese stock market. *Heliyon*, *9*(11), e22287. https://doi.org/10.1016/j.heliyon.2023.e22287

Nguyen-Anh, T., Hoang-Duc, C., Nguyen-Thi-Thuy, L., Vu-Tien, V., Nguyen-Dinh, U., & To-The, N. (2022). Do intangible assets stimulate firm performance? Empirical evidence from Vietnamese agriculture, forestry and fishery small-and medium-sized enterprises. *Journal of Innovation & Knowledge*, *7*(3), 100194.

Pinheiro, A. B., Panza, G. B., Berhorst, N. L., Toaldo, A. M. M., & Segatto, A. P. (2023). Exploring the relationship among ESG, innovation, and economic and financial performance: evidence from the energy sector [Article]. *International Journal of Energy Sector Management*. https://doi.org/10.1108/IJESM-02-2023-0008

Qi, Y., & Chu, X. (2022). Development of the digital economy, transformation of the economic structure and leaping of the middle-income trap. *China Political Economy*, *5*(1), 14–39.

Reddy, S. K., & Reinartz, W. (2017). Digital transformation and value creation: Sea change ahead. *NIM Marketing Intelligence Review*, *9*(1), 10–17.

Reid, D. (2019). One of China's biggest pharma stocks is falling in value by 10% every day. *CNBC*. https://www.cnbc.com/2019/05/08/chinas-kangmei-pharmaceutical-is-falling-in-value-by-10-percent-every-day.html

San, Z., Wang, S., Xiu, Z., Zhou, L., & Zhou, Z. (2025). Political control, corporate governance and stock-price crash risk: Evidence from China. *Emerging Markets Review*, *65*, 101260. https://doi.org/10.1016/j.ememar.2025.101260

Sharma, R., Chawla, S., Dagar, V., Kagzi, M., & Rao, A. (2025). SDG adoption and firm risk: The impact of ESG performance, investor confidence, and agency cost. *International Review of Economics & Finance*, *101*, 104205. https://doi.org/10.1016/j.iref.2025.104205

Shen, H., Lin, H., Han, W., & Wu, H. (2023). ESG in China: A review of practice and research, and future research avenues. *China Journal of Accounting Research*, 100325.

Shi, Y., Zheng, S., Xiao, P., Zhen, H., & Wu, T. (2024). ESG performance and cost of debt. *China Journal of Accounting Research*, *17*(4), 100390. https://doi.org/10.1016/j.cjar.2024.100390

Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics*, *87*(3), 355–374. https://doi.org/10.2307/1882010

SSE. (2024). *Solicits Public Opinions on Guidelines No. 14 of Shanghai Stock Exchange for Self-Regulation of Listed Companies—Sustainability Report*. SSE. http://english.sse.com.cn/news/newsrelease/c/c_20240222_10751120.shtml

Tang, H., Xiong, L., & Peng, R. (2024). The mediating role of investor confidence on ESG performance and firm value: Evidence from Chinese listed firms. *Finance Research Letters*, *61*, 104988. https://doi.org/10.1016/j.frl.2024.104988

Tang, L., & Li, M. (2025). Is financial digitalization an effective strategy to prevent stock price crash? *Finance Research Letters*, *72*, Article 106523. https://doi.org/10.1016/j.frl.2024.106523

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, *122*, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

Wang, H., Jiao, S., Bu, K., Wang, Y., & Wang, Y. (2023). Digital transformation and manufacturing companies' ESG responsibility performance. *Finance Research Letters*, *58*, 104370.

Wang, J. P., Qinqin; Niu, mujiangqu; Guo, Yingzhe. (2021). Developer China Fortune Defaults on 5.3 Billion Yuan in Debt. *Caixin Global*. https://www.caixinglobal.com/2021-02-02/developer-china-fortune-defaults-on-53-billion-yuan-in-debt-101659497.html

Wang, N., & Zhang, C. (2024). The greed factor of executives and the risk of a company stock price crash. *Finance Research Letters*, *62*, Article 105092. https://doi.org/10.1016/j.frl.2024.105092

Wang, Y. (2018). Digital push to revitalize economy. *China Daily*. https://www.chinadaily.com.cn/a/201809/27/WS5bac2ebea310eff30327fb53.html

Wang, Z., & Xing, T. (2025). ESG information disclosure, stock price informativeness and corporate digital transformation. *Applied Economics*, *57*(6), 600–616.

Xie, J., Nozawa, W., Yagi, M., Fujii, H., & Managi, S. (2019). Do environmental, social, and governance activities improve corporate financial performance? *Business Strategy and the Environment*, *28*(2), 286–300. https://doi.org/10.1002/bse.2224

Xu, N., Liu, J., & Dou, H. (2022). Environmental, social, and governance information disclosure and stock price crash risk: Evidence from Chinese listed companies. *Frontiers in Psychology*, *13*, Article 977369. https://doi.org/10.3389/fpsyg.2022.977369

Yang, P., Hao, X., Wang, L., Zhang, S., & Yang, L. (2023). Moving toward sustainable development: the influence of digital transformation on corporate ESG performance. *Kybernetes*, *53*(2), 669–687. https://doi.org/10.1108/k-03-2023-0521

Ye, J. (2023). Shares in China's iFlyTek tumble after reports AI-powered device criticised Mao. *Reuters*. https://www.reuters.com/technology/shares-chinas-iflytek-tumble-after-reports-ai-powered-device-criticised-mao-2023-10-24/

Yolanda, V., & Mita, A. F. (2025). Can Digital Transformation and Governance Control Managerial Opportunistic Behavior in Earnings Management? *Jurnal Akuntansi*, *29*(1), 107–126.

Yousefi, H., Yung, K., & Najand, M. (2023). From low resource slack to inflexibility: The share price effect of operational efficiency. *International Review of Financial Analysis*, *90*, 102927. https://doi.org/10.1016/j.irfa.2023.102927

Zadeh, M., & Hammami, A. (2025). ESG greenwashing and stock price crash risk: a channel analysis. *Applied Economics*. https://doi.org/10.1080/00036846.2025.2521040

Zhang, M. Y., Lee Chyen (2018). China's Changsheng Bio-technology hit by heavy penalties in vaccine scandal. *Reuters*. https://www.reuters.com/article/business/healthcare-pharmaceuticals/chinas-changsheng-bio-technology-hit-by-heavy-penalties-in-vaccine-scandal-idUSKCN1MQ1KI/

Zhang, P., Sha, Y., Wang, Y., & Wang, T. (2022). Capital market opening and stock price crash risk – Evidence from the Shanghai-Hong Kong stock connect and the Shenzhen-Hong Kong stock connect. *Pacific-Basin Finance Journal*, *76*, 101864. https://doi.org/10.1016/j.pacfin.2022.101864

Zhang, P., & Wang, Y. (2025). Digital finance and stock price crash: Evidence from China. *Emerging Markets Review*, *66*, Article 101287. https://doi.org/10.1016/j.ememar.2025.101287

Zhang, X., Sun, X., & Gao, Y. (2025). Corporate sustainable development: ESG rating divergence and stock liquidity in China. *Borsa Istanbul Review*, *25*(4), 746–755. https://doi.org/10.1016/j.bir.2025.04.002

Zhang, Y., Zhang, C., Zhang, S., Yang, Y., & Lan, K. (2024). Insight into the risk-resistant function of ESG performance: An organizational management perspective. *Chinese Management Studies*, *18*(3), 818–846. https://doi.org/10.1108/cms-02-2023-0085

Zhang, Z., & Ding, Y. (2023). The impact of green financial development on stock price crash risk from the perspective of information asymmetry in Chinese listed companies. *Environmental Science and Pollution Research*, *30*(37), 87199–87214. https://doi.org/10.1007/s11356-023-27771-y

Zhao, Y., Gao, Y., & Hong, D. (2025). Sustainable Innovation and Economic Resilience: Deciphering ESG Ratings' Role in Lowering Debt Financing Costs. *Journal of the Knowledge Economy*, *16*(1), 4309–4343. https://doi.org/10.1007/s13132-024-02129-y

Zhong, Q., Song, Q., & Lee, C.-C. (2024). Managing crash risks through supply chain transparency: evidence from China. *Financial Innovation*, *10*(1), 126. https://doi.org/10.1186/s40854-024-00633-3

Zhou, X., Yang, Y., & Zhang, H. (2024). The curvilinear effect of environmental, social, and governance performance on stock price crash risk in China. *Business Ethics the Environment & Responsibility*. https://doi.org/10.1111/beer.12737

APPENDIX

Variable definitions

Variables	Description
NCSKEW	Negative conditional skewness of firm-specific weekly returns, measuring stock price crash risk. See Equation (3) for details.
ESG	ESG rating from WIND database, converted into numerical scores from 1 (C) to 9 (AAA).
DT	Digital transformation index, measured by log-transformed frequency of digital-related keywords in annual reports. See Equation (4) for details.
ROA	Return on assets, calculated as net profit divided by average total assets
Size	Natural logarithm of total assets
BM	Book-to-market ratio, measured as book value divided by market value
Dturn	Change in stock turnover ratio, calculated as the change in trading volume divided by number of tradable shares from year *t–1* to year *t*.
Herfindahl3	Ownership concentration, calculated as the sum of squares of the shareholding ratios of the top three shareholders
Dual	Dummy variable equal to 1 if the chairman and general manager positions are held by the same person, 0 otherwise
ListAge	Natural logarithm of the number of years since the firm's listing

Authors' Contribution

Both authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA):

Zhang, M. Z., & Yaacob, Z. (2025). THE ROLE OF ESG PERFORMANCE IN REDUCING STOCK PRICE CRASH RISK: EVIDENCE FROM CHINA'S A-SHARE MARKET. *Veredas Do Direito*, 22(3), e223439. https://doi.org/10.18623/rvd.v22.n3.3439