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ESG Performance and Corporate Financial Resilience: The Mediating Roles of Risk Mitigation and Financing Constraints

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Abstract

This study examines the impact of ESG performance on corporate financial resilience and the underlying mechanisms. Using a sample of Chinese A-share listed manufacturing firms from 2015 to 2022, we construct a multidimensional financial resilience index based on the "resist-recover-reorganize" paradigm and employ fixed-effects models and mediation analysis. The results show that ESG performance significantly enhances corporate financial resilience, with this effect operating through two parallel mediating channels: risk mitigation and financing constraints alleviation. Heterogeneity analyses reveal that the positive effect is more pronounced for firms with better financial health, firms in non-high-tech industries, heavily polluting firms, firms in the Eastern region, and larger firms. These findings provide theoretical contributions to the ESG and resilience literature and offer practical implications for managers, investors, and policymakers seeking to build more resilient organizations in an uncertain environment.

Keywords

ESG performance, corporate financial resilience, risk mitigation, financing constraints, heterogeneity analysis

1. Introduction: Research Background and Significance

The contemporary global business landscape is marked by unprecedented turbulence; acute disruptions such as the COVID-19 pandemic and escalating geopolitical tensions have exposed the fragility of global supply chains and financial systems, inflicting severe operational and financial distress on corporations, including supply chain interruptions, plummeting demand, liquidity crunches and restricted external financing. Amid growing market uncertainty, many organizations have shifted their strategic priorities from pursuing profits to pursuing resilience [1], and in this volatile environment, corporate financial resilience—defined as a firm's systemic capacity to anticipate, withstand, recover from and adapt to external shocks—has become a paramount determinant of survival and long-term value creation, with financial resilience being especially critical for firms to maintain viability during major crises such as the COVID-19 pandemic [2], while financial risk management via derivatives is mostly limited to well-defined near-term risks for non-financial firms [3]. Therefore, identifying the critical factors that underpin and enhance this resilience has become an urgent pursuit for managers, investors and policymakers alike.

Parallel to the focus on resilience, corporate performance evaluation has shifted from traditional financial metrics to ESG (Environmental, Social, and Governance) criteria. The environmental dimension assesses resource management and ecological risks; the social dimension evaluates stakeholder relationships; and governance concerns decision-making and ethical conduct. With rising stakeholder scrutiny, ESG has become a core strategic priority. ESG performance is viewed as a key indicator of firms' ability to manage systemic risks and achieve long-term resilience [4]. This raises a critical question: Can stronger ESG performance enhance firms' capacity to withstand external shocks? Theoretical perspectives—including stakeholder theory, resource-based view, risk management theory and signalling theory—suggest that high ESG performance builds stakeholder trust, develops intangible resources, mitigates operational risks and improves financing access, as firms with stronger ESG profiles often gain tangible benefits including lower capital constraints, better risk management and greater reputational capital [5]. Sound ESG practices effectively strengthen organizational resilience amid heightened economic uncertainty [6]. These linkages position ESG as a key determinant of financial resilience, warranting systematic investigation.

This study empirically examines the relationship between ESG performance and corporate financial resilience and its mechanisms. Using an integrated theoretical framework, we hypothesize ESG enhances resilience directly and indirectly via risk mitigation and financing constraints alleviation. Existing evidence indicates ESG disclosure eases financing constraints through the synergistic improvement of green innovation and green information transparency [7]. Similarly, ESG performance alleviates financing constraints to benefit corporate operations [8]. Using 2015–2022 panel data of Chinese A-share listed manufacturing firms, we use fixed-effects models, instrumental variable methods and mediation analysis to test these hypotheses. In addition, strong ESG performance enables enterprises to send positive market signals, improving their information environment and reducing internal-external information asymmetry, thereby alleviating financing constraints [9]. This study contributes to the literature by constructing a multi-dimensional financial resilience measure, verifying dual mediating mechanisms and exploring contextual differences in the ESG-resilience relationship. The findings offer managerial insights for using ESG in risk management and stable financing, and provide references for investors and policymakers on sustainability and corporate stability.

2. Literature Review

2.1 ESG-Related Research

With the global proliferation of sustainable development concepts, ESG has emerged as a prominent topic in academic discourse. Scholars have extensively investigated the economic consequences of ESG, primarily focusing on its impacts on corporate financial performance, risk mitigation, and financing constraints. Existing research indicates that board size and ESG disclosure can jointly promote better corporate financial performance [10].

2.1.1 ESG and Financial Performance

Regarding the relationship between ESG and financial performance, international studies have provided early evidence. Some scholars argue that strong ESG performance helps firms build competitive advantages and improve long-term financial performance, while others suggest that ESG investment may raise short-term costs and hurt performance. Although ESG disclosure may increase short-term costs, firms can gain goodwill and stronger competitive advantages through proactive ESG practices in the long run [11]. In China, with the improvement of ESG rating systems, empirical studies based on A-share listed firms show that good ESG performance improves information disclosure, eases financing constraints, reduces corporate costs, and enhances competitive advantages [12], with most verifying its positive contribution to financial performance.

2.1.2 ESG and Risk Mitigation

Concerning the relationship between ESG and risk mitigation, research indicates that ESG exhibits significant insurance-like effects. Long-term corporate social responsibility engagement mitigates the decline in stock and bond prices during negative events, a protective effect stemming from accumulated stakeholder trust and goodwill [13]. Furthermore, strong ESG performance helps reduce firms' operational and systematic risks, decreasing the likelihood of misconduct and reputational damage [14].

2.1.3 ESG and Financing Constraints

Regarding the relationship between ESG and financing constraints, information asymmetry theory provides an important perspective for understanding ESG's role. Firms that issue corporate social responsibility reports can reduce their cost of equity capital, and this effect is particularly pronounced for firms with better ESG performance [15]. The quality and type of environmental disclosure affect firms' cost of capital and cash flow expectations [16]. Green bonds, as a specialized ESG financing instrument, can signal firms' environmental commitment to the market and attract long-term investors [17]. Domestic research in the context of green credit policies has also confirmed that firms with superior ESG performance face fewer financing constraints and lower financing costs.

2.2 Research on Corporate Financial Resilience

Corporate financial resilience has attracted increasing scholarly attention as firms face more frequent and severe external shocks. Existing research primarily focuses on the conceptualization and measurement of financial resilience, as well as its influencing factors from both internal and external perspectives.

2.2.1 The Concept and Measurement of Financial Resilience

The concept of financial resilience originates from organizational resilience theory, which emphasizes a firm's capacity to anticipate, withstand, recover from, and adapt to external disruptions. Organizational resilience refers to the capability of organizations to resist emergencies, recover from disruptions and adapt to the uncertain and changing environment. It also reflects a firm's ability to cope with and recover from adversity by adjusting and preserving or improving its functions [18]. Building on this theoretical foundation, scholars have attempted to develop measurement frameworks for financial resilience. Some studies assess resilience through single financial indicators such as liquidity, profitability, or leverage, while others adopt multidimensional approaches that capture both defensive and adaptive capabilities. Despite these efforts, a unified and comprehensive measurement system for corporate financial resilience has yet to be established in the literature.

2.2.2 Internal Factors Influencing Financial Resilience

A substantial body of research examines how internal firm characteristics shape financial resilience. Corporate governance factors, including board structure, executive compensation, and ownership concentration, have been shown to influence a firm's ability to navigate crises. Financial factors such as leverage levels, cash holdings, and profitability also play critical roles in determining resilience capacity, as cash holdings provide firms with financial flexibility essential for maintaining liquidity and responding to unexpected external shocks [19]. Furthermore, innovation capabilities, measured through R&D investment and intangible assets, contribute to a firm's adaptive capacity in turbulent environments. Firm resilience can counterbalance the negative impact of weak internal governance, while simultaneously reinforcing the positive effects of strong external governance [20]. SMEs are particularly vulnerable to external disruptions due to their limited financial, technological and infrastructural resources, which directly weaken their ability to resist shocks and achieve recovery [21]. These internal factors collectively determine the foundational strength from which firms can resist and recover from external shocks.

2.2.3 External Factors Influencing Financial Resilience

External environmental factors also significantly impact corporate financial resilience. Macroeconomic conditions, including economic policy uncertainty, market volatility, and financial crises, create varying degrees of pressure on firms' financial stability. Economic uncertainty has a significantly positive contemporaneous effect on financial volatility, and this effect varies with economic conditions and the degree of investors' risk aversion [22]. Institutional factors such as regulatory changes, industry policies, and environmental regulations shape the context in which firms operate and respond to disruptions. Better ESG responsibility performance can significantly strengthen corporate resilience, helping firms resist external uncertainties, reduce bankruptcy risk and maintain operational stability [23]. ESG performance significantly enhances supply chain resilience and plays a long-term role in resisting external uncertainties and stabilizing industrial chains [24].

2.3 Literature Review and Research Gap

The preceding review has systematically examined two streams of literature. Research on ESG has established its positive effects on corporate financial performance, risk mitigation, and financing constraints, as ESG performance can effectively enhance firm value, reduce corporate risks, and ease financing constraints, which lay a solid foundation for firms to cope with external shocks [25], and ESG performance significantly reduces firm-specific idiosyncratic risk during external crises and enhances corporate resilience against sudden shocks by sustaining stable revenue growth [26], demonstrating the broad economic consequences of sustainability practices. Research on corporate financial resilience has identified various internal and external factors that shape firms' capacity to withstand and recover from external shocks, including governance structures, financial conditions, innovation capabilities, and macroeconomic environments.

Despite the valuable insights provided by existing studies, several research gaps remain unaddressed. First, the direct relationship between ESG performance and corporate financial resilience has yet to be systematically examined. While extensive research confirms ESG's impacts on firm performance, risk and financing, few studies extend analysis to firms'dynamic adaptive capacity during crises. Existing ESG frameworks and reporting standards lack cross-regional and cross-sectoral uniformity, and no universally applicable multidimensional system has been established to assess ESG-related risks and corporate resilience [27]. Second, existing mechanism analyses tend to examine individual pathways in isolation. Although evidence supports risk mitigation and financing constraints alleviation as dual channels, an integrated framework testing both mechanisms simultaneously is lacking. Third, the measurement of financial resilience remains oversimplified in the literature, with most studies relying on single indicators rather than multidimensional constructs capturing resistance, recovery and adaptive capacities. Most prior literature measures firm resilience or growth using single indicators, and rarely constructs a multi-dimensional system reflecting corporate resistance, recovery and adaptive capabilities to external shocks [28]. Fourth, research focusing on the Chinese context, especially manufacturing firms, remains limited despite China's key role in global supply chains and its unique institutional environment.

This study aims to address these gaps with four key contributions. First, we construct a multidimensional measurement system for corporate financial resilience under the "resist-recover-reorganize" paradigm, capturing defensive and restorative attributes via the entropy method, as existing studies often use single or simplistic indicators that fail to reflect resilience's multi-dimensional and dynamic features [29]. Second, we build an integrated framework testing risk mitigation and financing constraints alleviation as dual mediators linking ESG to financial resilience; integrating stakeholder, legitimacy and resource-based view theories provides a comprehensive perspective for analyzing ESG's economic consequences [30], while ESG alleviates financing constraints by improving corporate transparency and stabilizing investor sentiment, with heterogeneous effects across firm traits [31]. Third, we provide empirical evidence from Chinese A-share listed manufacturing firms in the emerging market context. Fourth, we conduct heterogeneity analyses to examine variations in the ESG-resilience relationship across firm characteristics, offering clear insights into its boundary conditions. By filling these gaps, this study enriches the ESG and financial resilience literature and provides practical implications for managers, investors and policymakers.

3. Theoretical Analysis and Research Hypotheses

3.1 Definition of Core Concepts

3.1.1 The Connotation and Dimensions of ESG Performance

ESG, which stands for Environmental, Social, and Governance, offers a structured framework for assessing a company's sustainability and non-financial outcomes in a systematic way. ESG criteria serve to gauge a company's sustainability and societal impact [32]. The environmental dimension addresses the company's role in managing natural resources, controlling pollution, and protecting ecological systems. Firms with strong environmental performance are better positioned to comply with regulatory requirements, avoid environmental penalties, and gain support from environmentally conscious stakeholders. The social dimension encompasses areas such as employee well-being, consumer protection, community engagement, and charitable activities. Positive social performance helps firms build goodwill and trust with employees, customers, and local

communities, and strong ESG performance enables companies to gain support from both external and internal stakeholders [33], creating a reservoir of social capital that can be drawn upon during difficult times.

The governance dimension concerns internal decision-making structures, shareholder rights protection, ethical business conduct, and executive incentive systems. Sound governance practices reduce agency conflicts, enhance transparency, and ensure that management decisions align with long-term value creation. Strong ESG practices can improve governance and align management interests with those of shareholders [34]. Together, these three dimensions form an integrated system that reflects a firm's overall commitment to sustainable development and responsible business practices. In this study, the Hua Zheng ESG rating system is employed as the measurement tool, scoring companies from 9 (the highest) down to 1 (the lowest) to effectively quantify their ESG performance.

3.1.2 The Concept and Characteristics of Corporate Financial Resilience

Corporate financial resilience reflects an organization's systemic capacity when facing external shocks, encompassing the strength to withstand financial risks, the efficiency in adapting to changing operating environments, and the speed of recovery after incurring losses. Economic resilience reflects an economy's ability to resist, recover, reorganize, and innovate [35]. Unlike traditional financial performance measures that capture static conditions, financial resilience emphasizes dynamic capabilities that enable firms to navigate turbulence and emerge stronger. This study designs an evaluation framework based on the "Resist-Recover-Reorganize" theoretical paradigm, which incorporates both defensive and restorative attributes.

The defensive attribute, measured by short-term solvency indicators such as the current ratio and cash ratio, reflects the company's static resistance level during the initial phase of a shock—its ability to absorb immediate financial pressures without breaking. The restorative attribute, gauged through growth indicators such as operating profit margin and operating revenue growth rate, characterizes the company's dynamic potential to return to a growth trajectory after experiencing volatility and to adapt its business model to new circumstances. Resilience evaluation frameworks typically incorporate dimensions of resistance and recovery, and the entropy method is widely utilized to quantitatively integrate indicators into a comprehensive resilience index [36]. Utilizing the entropy method for comprehensive integration, a financial resilience index is constructed to objectively reflect a company's potential for ongoing operations and growth in uncertain environments.

Building on these conceptual foundations, it becomes essential to understand the mechanisms through which ESG performance may influence financial resilience. The multifaceted nature of ESG—spanning environmental, social, and governance dimensions—suggests that its effects on resilience cannot be explained by a single theoretical lens. Instead, a comprehensive analytical framework based on multiple theories is needed to reveal how ESG affects firms' ability to withstand and recover from shocks [37]. The following section draws on stakeholder theory, the resource-based view, information asymmetry and signalling theory, and risk management theory to establish a robust theoretical foundation for our hypotheses.

3.2 Theoretical Foundation and Analytical Framework

To systematically analyze how ESG performance influences corporate financial resilience, this study draws on four complementary theoretical perspectives. Stakeholder theory explains how ESG builds relational capital that buffers against external shocks; the resource-based view highlights the strategic value of ESG-related intangible assets in sustaining competitive advantage; information asymmetry and signalling theory clarify the role of ESG in improving access to external financing; and risk management theory elucidates how ESG practices systematically reduce operational and financial risks. Together, these theories provide an integrated analytical lens for understanding the direct and mediated pathways through which ESG shapes a firm's capacity to withstand and recover from disruptions.

3.2.1 Stakeholder Theory

Stakeholder theory holds that firms should balance the interests of diverse stakeholders including employees, customers, suppliers, communities and the environment, rather than only pursuing shareholder profits. In 2019, the Business Roundtable explicitly stated that businesses exist to serve multiple stakeholders—including customers, employees, communities, the environment, and suppliers—in addition to shareholders [38]. Indeed, the emphasis on ESG factors signifies a major shift in corporate strategy, influenced by stakeholder theory, which advocates for creating value for all stakeholders, not just shareholders [39].

Strong ESG performance helps firms fulfill these responsibilities and build reputational and trust capital. Such "ethical capital" fosters more resilient stakeholder networks, which can provide tangible support during external shocks, such as extended supplier payment terms, employee risk-sharing and regulatory preferential treatment. These mechanisms improve fund liquidity and operational stability in turbulent periods, thus enhancing corporate financial resilience. Therefore, stakeholder theory offers a key theoretical basis for understanding how ESG acts as a relational buffer to protect firms from external shocks.

While stakeholder theory emphasizes the importance of external relationships, understanding how these relationships translate into enduring competitive advantages requires a complementary perspective on firms' internal resources and capabilities.

3.2.2 Resource-Based View

The Resource-Based View holds that sustainable competitive advantage comes from unique, valuable, rare and hard-to-imitate resources and capabilities. ESG practices are a key way to build such strategic resources, as strong ESG performance can generate growth options and enhance stakeholder influence capacity [40]. Environmental innovation creates exclusive green technologies and operational efficiencies; social initiatives build reputational capital and stakeholder trust; sound governance forms stable organizational routines. This ESG-based resource system boosts financial resilience by cushioning losses during crises and enabling strategic agility for recovery, with dynamic capabilities helping convert resilience potential into sustainable value [41]. Thus, ESG is not just a risk management tool but an investment in capabilities that benefits firms amid adversity.

The resource-based view explains how ESG builds internal capabilities, but it does not fully address how these capabilities are communicated to and recognized by external capital providers, which is essential for understanding ESG's role in facilitating access to financing.

3.2.3 Information Asymmetry Theory and Signalling Theory

Information asymmetry theory indicates that uneven information between firms and external capital providers leads to inefficient resource allocation. In capital markets, managers hold more information about firm value and prospects than outside investors, creating adverse selection and moral hazard risks. Firms may engage in greenwashing due to such information asymmetry, as they possess private information on their actual ESG investment levels that external stakeholders cannot easily observe [42]. Corporate ESG performance effectively reduces information asymmetry and improves the firm's overall information environment [43]. Disclosing high-quality ESG information directly helps bridge this information gap. From a signalling theory perspective, strong ESG performance acts as a credible positive signal of managerial quality, long-term orientation, and commitment to sustainable value creation. Unlike short-term financial metrics that can be manipulated, ESG practices require sustained investment and organizational commitment, making them reliable and hard to fake. This signalling effect reduces investors' risk premium, attracts sustainability-oriented capital, and improves access to favorable financing. Consequently, firms with strong ESG credentials are better able to secure external funding during market crises, providing a crucial financial buffer that supports resilience.

While signalling theory explains how ESG improves access to external resources, understanding how ESG directly reduces the likelihood and severity of negative outcomes requires a perspective focused on risk management.

3.2.4 Risk Management Theory

Risk management theory emphasizes that firms need systematic risk identification, assessment and control. ESG practices implement this by addressing unmanaged environmental, social and governance risks. ESG issues are a core risk management concern, and effective ESG practices reduce firms'exposure to material ESG risks, lowering their overall risk profile and enhancing stability and resilience [44]. Environmental practices mitigate regulatory and operational tail risks, social practices boost stakeholder support and reputational resilience, and sound governance cuts information asymmetry and agency risks, all of which reduce overall risk uncertainty [45]. Strong environmental compliance avoids penalties and reputational harm, social practices lower labor and consumer risks, and good governance reduces strategic errors and agency conflicts. By mitigating these interconnected risks, ESG lowers overall risk, cuts unexpected losses and stabilizes earnings, acting as strategic insurance for organizational stability. The risk reduction from systematic

ESG management strengthens firms' ability to withstand financial shocks, maintain operations, access credit and retain stakeholder trust during crises.

Collectively, these four theoretical perspectives suggest that ESG performance can enhance financial resilience through multiple interconnected channels. Stakeholder theory explains the external relational capital that provides support during crises; the resource-based view accounts for the internal capabilities that enable adaptation and recovery; signalling theory clarifies how ESG improves access to financial resources; and risk management theory elucidates the direct reduction of threats to stability. Together, they form an integrated framework that captures both the protective and enabling functions of ESG. This theoretical integration directly informs the development of our research hypotheses in the following section, where we propose that ESG affects financial resilience both directly and through the mediating mechanisms of risk mitigation and financing constraints alleviation.

3.3 Research Hypotheses Development

3.3.1 ESG Performance and Corporate Financial Resilience

Building on the theoretical foundations established in the previous section, this study proposes that ESG performance positively contributes to corporate financial resilience. The environmental, social, and governance dimensions of ESG each play distinct yet complementary roles in building the resources, relationships, and capabilities that enable firms to withstand and recover from external shocks.

From the environmental perspective, firms with strong environmental performance demonstrate commitment to sustainable resource management and ecological responsibility. Such commitment signals long-term orientation and regulatory compliance, which enhances organizational legitimacy in the eyes of government agencies and regulators [46]. When crises occur, environmentally responsible firms are more likely to receive government support, preferential policy treatment, or regulatory forbearance, as they are viewed as valuable contributors to societal sustainability goals [47]. Additionally, strong environmental practices reduce the risk of environmental penalties, cleanup costs, and reputational damage from environmental incidents, all of which could otherwise drain financial resources precisely when they are most needed.

From the social perspective, firms that actively fulfill social responsibilities build deep trust-based relationships with employees, customers, suppliers, and communities. Social capital derived from trust-based partnerships with external stakeholders provides critical external support for firms to enhance organizational resilience during and after crises [48]. This social capital usually appears as lower employee turnover, higher customer loyalty, and stable supplier partnerships in normal times. During crises, it translates into tangible support: employees may accept temporary pay cuts or extended work hours to help the firm, suppliers offer more flexible payment terms, customers maintain purchasing relationships, and communities and governments provide greater support based on the firm's past contributions. Visible CSR engagement helps firms build trust-based relationships with stakeholders and gain understanding and support from the government and society when facing crises [49]. CSR strengthens the trust-based ties between firms and stakeholders, forming a social trust network that serves as an important buffer against external shocks [50].

Board leadership stays composed under pressure, equips directors with the right information and leads timely, focused discussions that prioritize informed decision-making [51]. Good governance enables boards to independently evaluate management decisions, align executive incentives with long-term value creation, and timely identify problems through internal controls. Firms with effective governance can make rapid and rational decisions during external shocks, reduce risks of financial fraud and managerial self-dealing, and maintain transparent communication with stakeholders [52]. When external shocks occur, well-governed firms can make correct decisions more quickly, as board leadership stays composed under pressure, equips directors with the right information and leads timely, focused discussions that prioritize informed decision-making [53], avoiding strategic errors caused by excessive concentration of power and preserving market confidence. Furthermore, strong governance structures inherently reduce the risks of financial fraud, managerial self-dealing, and major strategic mistakes—risks that may be amplified during crises and lead to corporate collapse.

Taken together, the three dimensions of ESG jointly construct a firm's relational capital, reputational capital, and institutional capital. The environmental dimension secures government trust and policy support; the social

dimension builds broad social support networks; and the governance dimension ensures decision quality and risk control. High ESG performance boosts corporate reputation and secures support from financial institutions, regulators and other stakeholders, thereby enhancing solvency [54]. These forms of capital may manifest as competitive advantages during normal operations, but they play an even more critical role during crisis periods—they act as "cushions" absorbing the impact of shocks, as "stabilizers" maintaining key operations, and as "navigators" guiding firms toward recovery and reorganization pathways. Companies with high ESG scores are better positioned to navigate market uncertainties and achieve long-term financial stability [55]. Firms that effectively integrate ESG practices into their operations tend to perform better in terms of market valuation and financial resilience [56]. Therefore, firms with superior ESG performance can mobilize broader resource networks, secure greater stakeholder support, and make more informed strategic decisions when facing external shocks, thereby demonstrating stronger financial resilience. Based on the above analysis, this study proposes the core hypothesis:

H1: ESG performance has a significant positive impact on corporate financial resilience.

3.3.2 Mediating Mechanism: The Risk Mitigation Pathway

Financial resilience inherently encompasses a firm's capacity to withstand risks, and risk mitigation represents an important channel through which ESG enhances resilience. This study proposes that ESG strengthens financial resilience by improving firms' risk mitigation capacity, and this effect operates through two primary channels.

First, based on risk management theory, sound ESG practices help firms establish systematic risk identification, assessment and management mechanisms. Environmental management addresses risks related to climate change, resource scarcity and pollution; social management focuses on labor relations, product safety and community engagement; and governance ensures effective internal controls, compliance and ethical standards. Better CSR relates to reduced systematic and firm-specific risks [57]. Good ESG performance can significantly reduce the risk profile of firms [58]. Sound ESG practices mitigate idiosyncratic risks through efficient compliance and monitoring [59]. By integrating these risks into daily management, firms can identify potential threats in advance, take preventive measures, and reduce the probability and severity of risks. When facing external shocks, firms with mature ESG systems possess complete response plans and organizational capabilities, enabling faster and more effective reactions to reduce shock-induced losses.

Second, based on stakeholder theory, strong ESG performance builds trust-based relationships with key stakeholders, reducing the likelihood of adverse actions during crises. Corporations bring all stakeholders closer through improved ESG performance [60]. High ESG commitment could be indicative of improvements in transparency and greater support from stakeholders [61]. During a crisis, high-ESG firms can more easily gain support from stakeholders and reduce adverse impacts [62]. When firms face difficulties, trusting employees are more likely to share burdens rather than strike or quit; loyal customers are more likely to maintain purchasing relationships rather than switch to competitors; good supplier relationships may translate into more flexible payment terms or priority supply guarantees; and regulators may grant policy flexibility based on the firm's positive track record. Conversely, firms with poor ESG performance may face stakeholder "voting with their feet". Suppliers may tighten credit, investors may sell shares, customers may leave, and employees may depart. These actions exacerbate financial distress and create vicious cycles during crises.

Integrating these two aspects, sound ESG practices both reduce the objective level of risk firms face through systematic risk management and decrease the occurrence of subjective risk behaviors through stakeholder trust. This dual risk mitigation effect collectively enhances firms' overall risk resistance capacity, enabling them to maintain more stable financial conditions and operational continuity when facing external shocks. In other words, firms with superior ESG performance possess stronger risk resistance capabilities, and these capabilities constitute a core component of financial resilience. Therefore, we propose:

H2: ESG enhances corporate financial resilience by improving the firm's risk mitigation capacity.

3.3.3 Mediating Mechanism: The Financing Constraints Alleviation Pathway

In addition to the risk mitigation channel, ESG may also enhance corporate financial resilience by alleviating financing constraints. Information asymmetry theory and signalling theory provide a solid theoretical foundation for this pathway.

In capital markets characterized by information asymmetry, firm insiders possess more information about true firm value and future prospects than external investors. This information gap may lead investors to demand higher risk premiums or to withdraw funding entirely when market uncertainty increases, leaving firms facing financing difficulties. ESG disclosure, as a form of voluntary information disclosure, can effectively mitigate this information asymmetry. Firms may use ESG disclosure to build a more transparent image and decrease information asymmetry [63]. Compared to financial information, ESG information reflects firms' long-term strategies, risk management capabilities, and commitments to sustainable development. Such information is of significant value for assessing firms' crisis response capabilities. High-quality ESG disclosure can mitigate the uncertainty facing investors and facilitate more reliable assessments [64]. Proactive ESG disclosures and transparency help reduce uncertainty for investors [65]. Through high-quality ESG disclosure, firms transmit credible signals to the market regarding management quality, risk control, and long-term orientation, reducing perceived uncertainty among investors.

This signalling effect directly translates into financing advantages. First, firms with stronger ESG performance can more easily access green loans and sustainability-linked loans (SLLs) with favorable interest rates and flexible terms; transparent disclosure of SLL contract details allows firms to credibly signal their ESG commitments [66]. Such firms also mitigate agency costs, face fewer financial constraints and achieve more efficient investments [67]. Second, a growing number of institutional investors incorporate ESG performance into investment decisions by establishing ESG-themed funds or setting portfolio standards; green bonds enable firms to diversify their investor base by tapping into ESG-focused funds and sustainability mandates [68], broadening their access to investors. Third, during crises when traditional financing channels tighten, firms with strong ESG performance can still obtain stable external funding, as long-term investors prioritize sustainable development capabilities over short-term fluctuations.

The alleviation of financing constraints has direct positive implications for financial resilience, as digital transformation mainly enhances enterprise resilience by alleviating financing constraints [69], and supply chain finance effectively broadens financing channels and relieves corporate financing constraints [70]. Lower financing costs mean firms retain more internal cash flow for maintaining operations and strategic investments during crises; broader financing channels provide more options when external funding is needed; and continued access to financing support during crises enables firms to avoid abandoning critical projects or selling assets at discounted prices due to funding gaps. Furthermore, firms with fewer financing constraints are better positioned to seize market opportunities and achieve recovery and growth in post-crisis periods.

Therefore, ESG alleviates corporate financing constraints by improving firms' information environments, reducing information asymmetry, and attracting sustainable investment. This alleviation of financing constraints, in turn, provides critical financial buffers and support during crises, thereby enhancing overall financial resilience. Based on this reasoning, we propose:

H3: ESG enhances corporate financial resilience by alleviating corporate financing constraints.

4. Empirical Research Design

4.1 Data Sources and Sample Selection

The initial sample of this study comprises Chinese A-share listed manufacturing firms over the period 2015 to 2022. Corporate ESG ratings are obtained from the Hua Zheng ESG Ratings Database, while financial and governance data are sourced from the CSMAR Database. Following standard practices, we exclude: (1) firms in the financial industry; (2) firms labeled as ST, *ST, PT, or delisted; (3) observations with missing key variables. All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers. After these screenings, the final sample consists of 21,572 firm-year observations.

4.2 Variable Selection

4.2.1 Dependent Variable

The dependent variable in this study is corporate financial resilience. To systematically capture a firm's overall ability to withstand risks, resume operations, and even achieve renewed growth following internal or external shocks, we develop a multidimensional assessment system grounded in organizational resilience

theory. This system integrates four key dimensions: resistance capacity, recovery capacity, reorganization capacity, and growth capacity. It incorporates fifteen specific indicators, including the current ratio, quick ratio, fixed asset turnover ratio, operating profit margin, number of employees, executive compensation, operating revenue growth rate, and administrative expense ratio. The full set of indicators and their corresponding calculation methods are detailed in Table 1.

During data preprocessing, the raw data for each indicator were first normalized to eliminate dimensional differences and ensure comparability. To avoid potential bias from subjective weighting, this study applies the entropy method to assign weights to the indicators and integrates them into a composite score (Score). The entropy method determines weights according to the information entropy reflected by each indicator's observed values, which helps retain the underlying statistical properties of the data. Finally, to improve the intuitive interpretability of the results, the composite score is rescaled to a range of 0 to 100 (Score_rescaled) for use in subsequent empirical analysis. A higher value indicates a greater level of financial resilience for the firm in that year.

Table 1: Evaluation Indicator System for Financial Resilience of Listed Manufacturing Companies

Primary Indicator	Secondary Indicator	Tertiary Indicator	Specific Indicator	Indicator Measurement Method
Corporate Financial Resilience	Resistance Capacity	Liquidity Status	Current ratio	Current assets / Current liabilities
			Quick ratio	(Current assets - Inventory) / Current liabilities
			Cash ratio	(Cash holdings + Marketable securities) / Current liabilities
	Recovery Capacity	Operational Efficiency	Fixed asset turnover ratio	Operating revenue / Fixed assets
			Inventory turnover ratio	Operating costs / Ending inventory balance
		Profitability	Operating profit margin	Net profit / Operating revenue
			Return on invested capital	Net profit / Invested capital
	Reorganization Capacity	Human Resources	Number of employees	Number of employees
			Employee compensation ratio	Employee compensation payable / Total assets
		Governance Structure	Executive compensation	Total annual compensation of top three executives
	Growth Capacity	—	Proportion of independent directors	Number of independent directors / Total board size
		Innovation Capacity	Proportion of intangible assets	Intangible assets / Total assets
		Revenue Growth Ability	Operating revenue growth rate	Year-over-year growth rate of operating revenue
		Reinvestment Ability	Retained earnings ratio	Retained earnings / Total assets
		Brand Development Capacity	Organizational Input	Management expenses / Operating revenue
			Promotional Input	Selling expenses / Operating revenue

4.2.2 Explanatory Variable

The core explanatory variable in this study is corporate ESG performance, measured using data from the Hua Zheng ESG Ratings Database. As a mainstream ESG assessment system in China, its ratings are widely referenced in academic research and recognized for their authority and market acceptance. Following established academic practice, we convert the annual letter ratings issued by Hua Zheng into a numerical variable (ESG). The conversion follows this rule: a rating of AAA is assigned a value of 9, AA becomes 8, A becomes 7, BBB becomes 6, BB becomes 5, B becomes 4, CCC becomes 3, CC becomes 2, and C becomes 1. This transformation turns ordinal rating data into a continuous variable suitable for econometric modeling,

while preserving the nuanced distinctions between different rating levels. A higher value indicates stronger overall performance in environmental, social, and governance dimensions.

To further examine the heterogeneous effects of ESG, this study also aggregates the ratings into three broader categories: ratings from C to CCC are classified as the Low ESG group, those from B to BBB form the Medium ESG group, and ratings from A to AAA constitute the High ESG group. This classification creates grouping variables for use in subsequent analysis.

4.2.3 Mediating Variables

This study examines two mediating mechanisms through which ESG performance may influence corporate financial resilience: risk mitigation capacity and financing constraints. The measurement approaches for these mediating variables are outlined below.

The first mediating mechanism, risk mitigation capacity, is captured by the cash ratio, which serves as a proxy for a firm's ability to withstand unexpected shocks through conservative liquidity management. Following standard practice in the literature, the cash ratio is calculated as:

Cash Ratio = (Cash Holdings + Marketable Securities) / Current Liabilities

This measure reflects a firm's most conservative liquidity position and its capacity to meet short-term obligations without relying on external financing or asset sales. Firms with higher cash ratios are better positioned to absorb financial shocks, maintain operations during crises, and avoid distress sales of assets. Following prior literature, this measure serves as an indicator of corporate risk aversion and financial prudence, directly reflecting the risk mitigation pathway through which ESG may enhance resilience.

The second mediating mechanism, the degree of financing constraints firms face in accessing external capital, is assessed using the SA index developed by Hadlock and Pierce (2010). The SA index is constructed based on firm size and age, two relatively exogenous firm characteristics, which helps mitigate potential endogeneity concerns associated with other financing constraint measures. The index is calculated as:

$$SA = -0.737 \times Size + 0.043 \times Size^2 - 0.040 \times Age$$

where Size is the natural logarithm of total assets and Age represents the number of years since the firm's listing. A higher SA index value indicates more severe financing constraints. This measure has been widely validated in the literature as a reliable indicator of firms' access to external financing and offers the key advantage of relying on relatively exogenous firm characteristics, thereby mitigating potential endogeneity concerns associated with other financing constraint measures.

By examining both the cash ratio and the SA index as parallel mediators, this study aims to disentangle the relative importance of risk mitigation versus financing channels in explaining how ESG performance translates into enhanced financial resilience.

4.2.4 Control Variables

To isolate the net effect of ESG on financial resilience, this study controls for a range of firm-level characteristics following established research practice. These variables include firm size (Size), leverage (Lia), profitability (ROA and ROE), growth opportunity (Tobin), and corporate governance factors (Stock, Post, Bala, and Prop). Detailed definitions and measurement methods for all control variables are provided in Table 2. All continuous variables have been winsorized at the 1st and 99th percentiles to minimize the potential influence of extreme observations.

Table 2: Variable Definitions and Measurements

Variable	Variable Name	Variable Code	Variable Measurement and Description
Dependent variable	Corporate Financial Resilience	Score	Calculated using the entropy method
Independent variable	Corporate ESG Performance	ESG	Assigned values from 9 to 1 based on the Huazheng ESG rating data in descending order
Mediating variable	Financial Constraints	SA	SA = (-0.737 × Size) + (0.043 × Size²) - (0.040 × Age)
	Corporate Innovation	Inno	R&D expenditure / Total assets
Control variable	Firm Size	Size	Logarithm of year-end total assets

	Liability-to-Asset Ratio	Lia	Total liabilities / Total assets
	Return on Assets	ROA	Net profit / Total assets balance
	Return on Equity	ROE	Net profit / Shareholders' equity balance
	Tobin's Q	Tobin	(Market value of equity + Market value of debt) / Total assets
	Ownership of the Largest Shareholder	Stock	Shareholding ratio of the largest shareholder
	Duality	Post	Whether the chairman and general manager are the same person
	Equity Balance	Bala	Shareholding ratio of the 2nd to 5th largest shareholders / Shareholding ratio of the largest shareholder
	Nature of Property Rights	Prop	1 for state-owned enterprises, otherwise 0

4.3 Model Specification

To examine the relationship between ESG performance and corporate financial resilience, this study estimates a baseline panel regression model and a set of mediation models to test the underlying mechanisms. The specifications are outlined below.

4.3.1 Baseline Model Specification

To test the direct effect of ESG performance on corporate financial resilience (H1), this study estimates the following panel regression model:

$$Score\_rescaledit=\beta 0+\beta 1\ ESGit+\beta \mathbf{X}it+\mu i+\lambda t+\varepsilon it$$

where i and t index firms and years, respectively. $\text{Score\_rescaled}_{it}$ represents the financial resilience score for firm i in year t. ESG_{it} denotes the numerical ESG rating. X_{it} comprises the vector of control variables. μ_i captures firm fixed effects, while λ_t represents year fixed effects. Standard errors are clustered at the firm level.

4.4.2 Mediation Model Specification

To investigate the mediating mechanisms through which ESG influences financial resilience—namely risk mitigation and financing constraints alleviation (H2 and H3)—this study adopts a mediation analysis framework. Following established practices in the literature, we estimate the following system of equations:

$$\text{Mediator Model: Mediator}_{it} = \alpha_0 + \alpha_1 \text{ESG}_{it} + \boldsymbol{\alpha}\mathbf{X}_{it} + \mu_i + \lambda_t + \eta_{it}$$

Outcome Model:

$$\text{Score\_rescaled}_{it} = \theta_0 + \theta_1 \text{ESG}_{it} + \theta_2 \text{Mediator}_{it} + \boldsymbol{\theta}\mathbf{X}_{it} + \mu_i + \lambda_t + \xi_{it}$$

where the mediators include risk aversion and financing constraints.

All continuous variables are winsorized at the 1st and 99th percentiles. The empirical analysis is implemented using STATA 17.0.

5. Empirical Results and Analysis

This section presents and discusses the empirical results of the study. It begins with descriptive statistics and correlation analysis to outline the basic features of the data, followed by reporting and interpreting the baseline regression results. Subsequently, it presents findings from robustness and endogeneity tests, explores heterogeneity across different subsamples, and examines the underlying mechanisms.

5.1 Descriptive Statistics

Table 3 reports the descriptive statistics for all variables used in this study. The dependent variable, corporate financial resilience (Score), shows a mean of 30.91 with a standard deviation of 6.86 across the 21,572 firm-year observations. The notable standard deviation relative to the mean, along with the range from 14.47 to 100, reflects substantial variation in financial resilience across the sample firms. The core explanatory

variable, ESG performance (ESG), averages 4.27 on a scale of 1 to 9 with a standard deviation of 1.09, suggesting that most listed firms fall within the medium rating categories. The distributions of control variables, including firm size (Size), leverage (Lia), profitability (ROA, ROE), and corporate governance measures (Stock, Post, Bala, Prop), all fall within ranges commonly observed for Chinese A-share listed companies, supporting the reasonableness and representativeness of our sample for empirical analysis.

Table 3: Descriptive Statistics of Variables

Variable	N	Mean	Std. Dev.	Min	Max
Score	21572	30.90911	6.857246	14.47384	100
ESG	21572	4.272066	1.088718	1	7
Size	21572	22.32805	1.310165	20.00762	26.41525
Lia	21572	0.387087	0.188958	0.055024	0.854233
ROA	21572	0.056882	0.045778	-0.00761	0.226539
ROE	21572	0.092828	0.070189	-0.0207	0.364248
Tobin	21572	1.890049	1.142721	0.822672	8.069163
Stock	21572	33.7906	14.40127	8.45	73.82
Post	21572	0.347766	0.476272	0	1
Bala	21572	0.79282	0.601563	0.0385	2.8276
Prop	21572	0.269933	0.443935	0	1

5.2 Correlation Analysis

Table 4 presents the Pearson correlation coefficients for the main variables. Most notably, a significant positive correlation exists between ESG performance and corporate financial resilience (coefficient = 0.190, $p < 0.01$). This preliminary finding provides initial, though non-causal, support for our main hypothesis (H1) that better ESG performance is associated with stronger financial resilience. Regarding correlations among the independent variables, most pairwise coefficients have absolute values below 0.5, indicating that severe multicollinearity is unlikely to significantly affect the multivariate regression results. The notably high correlation (0.986) between the SA index, which measures financing constraints, and firm size is expected given that the SA index's construction explicitly includes firm size as a core component (Hadlock & Pierce, 2010). Since these two variables are not used together in the same regression model, this high correlation does not pose a practical issue for model estimation.

Table 4: Correlation Analysis Matrix

Variable	Score	ESG	SA	Inno	Size	Lia	ROA	ROE	Tobin	Stock	Post	Prop
Score	1	0.19	-0.127	0.321	-0.147	-0.452	0.439	0.309	0.287	0.031	0.142	-0.185
ESG	0.19	1	0.218	0.132	0.203	-0.078	0.154	0.134	0.012	0.072	-0.005	0.06
SA	-0.127	0.218	1	-0.233	0.986	0.517	-0.078	0.116	-0.249	0.158	-0.189	0.38
Inno	0.321	0.132	-0.233	1	-0.25	-0.21	0.197	0.134	0.328	-0.131	0.142	-0.221
Size	-0.147	0.203	0.986	-0.25	1	0.535	-0.096	0.102	-0.258	0.144	-0.211	0.408
Lia	-0.452	-0.078	0.517	-0.21	0.535	1	-0.376	-0.032	-0.251	0.015	-0.14	0.269
ROA	0.439	0.154	-0.078	0.197	-0.096	-0.376	1	0.895	0.381	0.098	0.065	-0.155
ROE	0.309	0.134	0.116	0.134	0.102	-0.032	0.895	1	0.292	0.109	0.018	-0.067
Tobin	0.287	0.012	-0.249	0.328	-0.258	-0.251	0.381	0.292	1	-0.083	0.091	-0.138
Stock	0.031	0.072	0.158	-0.131	0.144	0.015	0.098	0.109	-0.083	1	-0.041	0.208
Post	0.142	-0.005	-0.189	0.142	-0.211	-0.14	0.065	0.018	0.091	-0.041	1	-0.319
Bala	0.066	0.001	-0.11	0.111	-0.124	-0.087	0.043	0.015	0.062	-0.695	0.051	-0.218
Prop	-0.185	0.06	0.38	-0.221	0.408	0.269	-0.155	-0.067	-0.138	0.208	-0.319	1

5.3 Baseline Regression Results

5.3.1 Analysis of Model (1) Results

Column (1) of Table 5 presents results from the most basic specification including only the ESG variable. The coefficient on ESG is positive and statistically significant at the 1% level (coefficient = 1.1551), providing initial evidence supporting H1 that stronger ESG performance correlates with improved financial resilience.

5.3.2 Analysis of Model (2) Results

Column (2) introduces the full set of firm-level control variables. The ESG coefficient remains positive and significant at the 1% level, though its magnitude decreases to 0.6047. This attenuation suggests that part of the initial relationship can be attributed to firm characteristics captured by the control variables. The control variables generally exhibit expected signs: firm size (Size) shows a positive coefficient, indicating potential scale advantages in resilience building; leverage ratio (Lia) demonstrates a strong negative relationship, highlighting the risks associated with high debt levels; and profitability (ROE) appears as a strong positive contributor to financial resilience.

5.3.3 Analysis of Model (3) Results

Column (3) presents our preferred specification incorporating both industry and year fixed effects. The ESG coefficient remains positive and statistically significant at the 1% level (coefficient = 0.3906), confirming that the positive association between ESG performance and financial resilience persists after controlling for firm-specific characteristics, industry heterogeneity, and time trends. This finding provides strong evidence in support of H1, indicating a robust "net effect" of ESG on financial resilience. The substantial increase in R-squared from 0.0336 in Model (1) to 0.4429 in Model (3) demonstrates the importance of comprehensive model specification.

Table 5: Baseline Regression Results

Variable	(1) Score_rescaled	(2) ESG + Control Variables	(3) ESG + Control Variables + Industry and Year Fixed Effects
ESG	1.1551***	0.6047***	0.3906***
	-0.0419	-0.0369	-0.0349
Size		0.6296***	0.7043***
		-0.0422	-0.0426
Lia		-15.3028***	-13.4300***
		-0.4268	-0.408
ROA		4.6043	7.4569**
		-3.9757	-3.7504
ROE		17.9672***	17.2876***
		-2.258	-2.1358
Tobin		0.7503***	0.4840***
		-0.0469	-0.0463
Stock		0.0228***	0.0362***
		-0.0038	-0.0035
Post		0.9693***	0.8182***
		-0.089	-0.0821
Bala		0.5551***	0.7619***
		-0.0901	-0.084
Prop		-1.0159***	-0.7887***
		-0.097	-0.0899
Constant	25.9744***	15.5708***	2.7180***
	-0.1794	-0.9155	-0.9958
Industry Fixed Effects	No	No	Yes
Year Fixed Effects	No	No	Yes
N	21572	21572	21572
r2	0.0336	0.3167	0.4429
r2_a	0.0336	0.3164	0.4412

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.4 Robustness Tests and Endogeneity Treatment

To verify the robustness of our core findings and address potential endogeneity concerns, we conduct a series of supplementary tests, with results reported in Table 6.

5.4.1 Lagged ESG Variable Analysis

To mitigate reverse causality concerns, we re-estimate our model using one-period lagged ESG values (ESG_L1). As shown in Column (1) of Table 6, the coefficient on lagged ESG remains positive and statistically significant at the 1% level (coefficient = 0.0834). This indicates that past ESG performance significantly predicts current financial resilience, strengthening the causal interpretation that ESG contributes to resilience rather than the reverse.

5.4.2 Exclusion of Municipalities Analysis

Since firms headquartered in major municipalities (Beijing, Shanghai, Tianjin, Chongqing) may operate under distinct regulatory and economic conditions, we test our results excluding these observations. Column (2) of Table 6 demonstrates that the ESG coefficient remains positive and highly significant (coefficient = 0.0769, $p < 0.01$) in this restricted sample. This confirms that our main findings are not driven by the unique characteristics of firms located in these special administrative regions.

5.4.3 Instrumental Variable (2SLS) Analysis

To address endogeneity concerns from omitted variables and measurement error, we employ a two-stage least squares (2SLS) approach using the average ESG performance of other firms in the same province and year as an instrumental variable. The first-stage regression shows a strong instrumental variable with an F-statistic of 25.06, well above the conventional threshold of 10, indicating no weak instrument problem. In the second stage (Column 3 of Table 6), the coefficient on the instrumented ESG variable remains positive and statistically significant at the 1% level (coefficient = 4.8088). The larger coefficient magnitude, compared to the baseline model, may reflect correction for attenuation bias due to measurement error in the ESG variable. This finding provides stronger evidence for a causal effect of ESG on financial resilience after accounting for potential endogeneity.

Table 6: Robustness Test and Endogeneity Test Results

Variable	(1) Lagged ESG	(2) Excluding Municipalities	(3) IV - 2SLS
ESG_L1	0.0834***		
	-0.0311		
Firm Size	-0.0755	-0.0136	-0.6140*
	-0.1796	-0.1698	-0.3343
Liability-to-Asset Ratio	-7.8959***	-8.0025***	-8.7546***
	-0.5624	-0.5471	-1.2768
Return on Total Assets	13.7748***	19.1615***	-7.3452
	-3.809	-3.8172	-6.0046
Return on Equity	11.2235***	8.1625***	19.6862***
	-2.2121	-2.1469	-2.8517
Tobin's Q	-0.0435	-0.0176	0.5496***
	-0.0419	-0.0423	-0.0553
Ownership Concentration	0.0125	0.0157	0.0072
	-0.0111	-0.0109	-0.0087
During the COVID-19 Pandemic	0.4011***	0.3045***	0.5969***
	-0.1066	-0.103	-0.1196
Balanced Panel	0.0744	0.0592	0.2408
	-0.2066	-0.196	-0.1745
Nature of Property Rights	-0.5949*	-0.5214	-1.0785***
	-0.3471	-0.3099	-0.1448
ESG Performance		0.0769***	4.8088***
		-0.0281	-1.1139
Constant	32.1810***	22.7091***	27.8089***
	-4.1262	-4.1007	-3.7769
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	1.60e + 04	1.76e + 04	2.16e + 04
R-squared	0.2127	0.2306	0.0271

First-stage F-statistic: 25.05760621277316 Standard errors in parentheses;

*** p<0.01, ** p<0.05, * p<0.1
* p < 0.10, ** p < 0.05, *** p < 0.01

6. Further Analysis

While the baseline results establish an average positive effect, contingency theory suggests that the ESG-resilience relationship is not uniform but varies with firms' internal and external contexts. To provide a nuanced understanding, this section examines heterogeneity across dimensions such as firm size, industry characteristics, regional distribution, and financial condition.

6.1 Heterogeneity Analysis

While our baseline results confirm a generally positive relationship between ESG performance and corporate financial resilience, contingency theory suggests this effect may vary across different contexts. The effectiveness of strategic initiatives such as ESG is likely influenced by both internal and external factors. To examine this proposition (H4), we test whether the connection between ESG and resilience differs along several key dimensions. The following subgroup analyses reveal substantial and meaningful variation in this relationship.

6.1.1 Heterogeneity by Financial Health

We first examine whether a firm's prior financial condition affects the benefits gained from ESG by dividing the sample into “Good” and “Poor” financial health groups according to the median Z-Score. The positive effect of ESG on financial resilience is observed in both subsamples. However, this effect is significantly more pronounced among financially healthy firms. This pattern indicates that firms with stronger financial foundations, likely owing to greater resource availability and investment capacity, are better positioned to convert ESG commitments into concrete resilience advantages. For firms in poorer financial condition, the challenge of addressing immediate operational and financial pressures may constrain their capacity to leverage ESG as effectively for building resilience.

Table 9: Financial Heterogeneity Results

	Better Financial Status	Poorer Financial Status
ESG	0.1024**	0.0713**
	-0.0496	-0.0304
Control variable	Yes	Yes
r^2	0.2027	0.149
N	10786	10786

6.1.2 Heterogeneity by Technological Intensity

The industry's technological intensity also serves as an important contextual factor. A clear divergence appears when comparing high-tech and non-high-tech industries. The resilience-enhancing effect of ESG is strong and statistically significant in non-high-tech industries, but becomes negligible and statistically insignificant in high-tech sectors. This pattern suggests that in industries where technological innovation drives competitive advantage, ESG contributes less noticeably to financial resilience. In contrast, for firms operating in more traditional, non-high-tech sectors, strong ESG performance appears to function as a crucial differentiating factor that substantially strengthens stakeholder confidence and financial stability.

Table 10: Technological Heterogeneity Results

	High-tech Industry	Non-high-tech Industry
ESG	0.0452	0.1048***
	-0.036	-0.0405
Control variable	Yes	Yes
r^2	0.212	0.1844
N	12920	8652

6.1.3 Heterogeneity by Environmental Impact

The analysis across environmental impact groups shows that ESG's role is particularly vital for firms in heavily polluting industries. While the coefficient is positive in both groups, it is substantially larger for heavy

polluters. This result highlights the increased importance of ESG for firms facing strong regulatory oversight and public scrutiny. For these companies, proactive ESG practices are not just supplementary but essential for reducing major tail risks, managing regulatory expenses, and protecting their reputation—all of which directly strengthen financial resilience.

Table 11: Environmental Heterogeneity Results

	Heavily Polluting Industry	Non-polluting Industry
ESG	0.0913*	0.0584*
	-0.0497	-0.0316
Control variable	Yes	Yes
r^2	0.2292	0.1877
N	6024	15548

6.1.4 Heterogeneity by Geographical Region

China's substantial regional differences in economic development and institutional quality are evident in our findings. The analysis separates firms based in the more developed Eastern region from those in the Central and Western regions. The positive effect of ESG on financial resilience is significant and substantial for firms in the Eastern region, but it does not reach statistical significance for firms in the Central and Western regions. This suggests that the benefits of ESG investment depend on a supportive external environment, which features stronger market discipline, more engaged stakeholders, and more developed institutional frameworks—conditions more commonly found in the Eastern provinces.

Table 12: Regional Heterogeneity Results

	Eastern Region	Central and Western Region
ESG	0.0767**	0.0581
	-0.0328	-0.0452
Control variable	Yes	Yes
r^2	0.2005	0.2061
N	15764	5808

6.1.5 Heterogeneity by Firm Size

Finally, firm size stands out as an important internal factor. The results from comparing large and small firms indicate that the positive effect of ESG is both economically and statistically significant only for larger firms, while the coefficient for small firms remains insignificant. This aligns with the resource-based view: larger companies possess the financial resources, managerial capacity, and market presence needed to implement substantial ESG strategies and realize their scale advantages. Smaller firms, constrained by limited resources and facing less external pressure, may struggle to translate ESG activities into tangible resilience improvements.

Table 13: Firm Size Heterogeneity Results

	Large Enterprises	Small Enterprises
ESG	0.0970***	0.0336
	-0.0346	-0.0469
Control variable	Yes	Yes
r^2	0.2002	0.2009
N	10786	10786

6.2 Mechanism Test Analysis

To identify the underlying channels through which ESG performance strengthens corporate financial resilience, we formally test the two mediating mechanisms outlined in our theoretical framework: risk mitigation and the easing of financing constraints. We adopt a established causal steps approach to assess the significance of these transmission pathways.

6.2.1 The Risk Mitigation Channel

We examine the risk mitigation channel using the cash ratio as an indicator of corporate risk aversion. Table 7 presents the three-step mediation analysis results. First, ESG shows a significant positive total effect on financial resilience (coefficient = 0.073, $p < 0.01$). Second, ESG has a statistically significant positive effect

on the cash ratio (coefficient = 0.017, $p < 0.01$), indicating that high-ESG firms maintain larger liquidity buffers. Third, when both ESG and the cash ratio are included, the cash ratio coefficient remains positive and significant (coefficient = 1.410, $p < 0.01$), while the ESG coefficient decreases but remains significant (coefficient = 0.053, $p < 0.05$). This pattern confirms that risk aversion, reflected in higher cash holdings, partially mediates the ESG-resilience relationship, suggesting that ESG encourages more conservative financial management that helps firms endure external shocks.

Table 7: Mechanism Test Results Based on Risk Aversion

Variable	Score_rescaled	ESG and Risk Aversion	Mediation Effect Test
ESG	0.073***	0.017***	0.053**
	-0.027	-0.006	-0.023
Risk Aversion			1.410***
			-0.056
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	21572	21572	21572
R-squared	0.21	0.525	0.436

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1*

6.2.2 The Financing Constraints Alleviation Channel

We test the financing constraints alleviation channel using the SA index (Hadlock & Pierce, 2010). Table 8 presents the mediation analysis results. First, the path from ESG to financing constraints is negative and significant (coefficient = -0.0027, $p < 0.01$), indicating that stronger ESG performance alleviates external financing constraints. Second, the path from financing constraints to financial resilience is also negative and significant (coefficient = -2.5547, $p < 0.05$), confirming that tighter constraints undermine resilience. Finally, when including both ESG and the SA index, the indirect effect is significant while the direct effect of ESG remains positive and significant (coefficient = 0.0735, $p < 0.01$), though slightly attenuated compared to the total effect. This confirms that financing constraints alleviation serves as a partial mediating mechanism through which ESG enhances financial resilience.

Table 8: Mechanism Test Results Based on Financing Effects

Variable	Score_rescaled	ESG and Financing Effects	Mediation Effect Test
ESG	0.0736***	-0.0027***	0.0735***
	-0.0267	-0.0005	-0.0228
SA			-2.5547**
			-1.1077
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	21572	21572	21572
R-squared	0.2078	0.9902	0.48

7. Conclusion

This study investigates the relationship between ESG performance and corporate financial resilience using a sample of Chinese A-share listed manufacturing firms from 2015 to 2022. The empirical results demonstrate that ESG performance has a significant positive impact on corporate financial resilience, a finding that remains robust after addressing endogeneity concerns through lagged variables and instrumental variable approaches. Furthermore, mediation analysis reveals that ESG enhances financial resilience through two parallel channels: risk mitigation, reflected in higher cash ratios, and financing constraints alleviation, captured by the SA index. Heterogeneity analyses indicate that this positive effect is more pronounced for firms with better financial health, firms in non-high-tech industries, heavily polluting firms, firms in the Eastern region, and larger firms.

These findings offer important theoretical and practical implications. Theoretically, this study extends the ESG literature by establishing a direct link between ESG performance and financial resilience, while providing an integrated framework that simultaneously tests dual mediating mechanisms. Practically, the results suggest that managers should view ESG as a strategic investment in organizational resilience rather than merely a

compliance activity. For investors, ESG performance serves as a useful indicator for assessing firms' long-term viability and capacity to withstand external shocks. For policymakers, the findings underscore the importance of promoting ESG disclosure and sustainable business practices as mechanisms for enhancing overall economic stability.

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