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Sustainability as a Catalyst for Growth: ESG, Innovation, and Financial Outcomes in Emerging Markets

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Abstract *This study explores the impact and underlying mechanism of Environmental, Social, and Governance (ESG) practices on the financial performance of Chinese listed companies, with a specific focus on the mediating role of corporate innovation. Drawing on stakeholder theory, innovation theory, and the concept of shared value, the research employs panel data from 2011 to 2020 covering 1,380 A-share firms. A series of fixed-effects regressions, mediation models, and instrumental variable tests are conducted to ensure robustness and address endogeneity concerns. The results reveal that ESG governance positively influences firm financial performance, but primarily through its effect on innovation rather than through direct channels. Firms with stronger ESG performance demonstrate higher R\&D intensity and investment in innovation-related personnel, which in turn lead to improved financial outcomes. Mediation analysis confirms that corporate innovation acts as a significant conduit through which ESG practices translate into long-term firm value. Additional findings highlight the role of transparency and risk management as amplifying factors, while excessive agency costs and leverage appear to diminish performance gains. This study contributes to ESG literature by clarifying the internal pathways connecting non-financial governance practices with financial metrics and by contextualizing the ESG–innovation–performance nexus in an emerging market setting. The findings offer strategic implications for corporate managers, investors, and policymakers, emphasizing ESG as a source of innovation-driven competitive advantage. Overall, the research provides a theoretical and empirical foundation for advancing ESG-integrated innovation strategies that foster sustainable financial success.*

Keywords: *ESG, corporate innovation, financial performance, stakeholder theory, shared value, Chinese listed firms, mediation analysis, sustainable development*

1. INTRODUCTION

In recent years, the integration of Environmental, Social, and Governance (ESG) principles into corporate strategy has become a focal point of academic and practical attention, particularly in emerging economies such as China. While global capital markets increasingly demand ESG transparency, Chinese enterprises are still in the early stages of fully adopting ESG frameworks (Luo et al., 2023; Yuan et al., 2022). Despite regulatory efforts and the growing popularity of ESG discourse, many listed firms in China exhibit a superficial understanding of ESG practices, often treating them as symbolic rather than strategic tools for value creation (Bai et al., 2025; Wang et al., 2024). This gap raises critical questions about how ESG performance influences core aspects of corporate behavior—particularly innovation capacity and financial outcomes.Against this backdrop, China's dual carbon targets for 2030 and 2060 have intensified the urgency for companies to align environmental responsibility with long-term business sustainability. In parallel, the Chinese government's emphasis on "high-quality development" and shared societal value creation has catalyzed a transformation in corporate governance expectations (Wang et al., 2021; Zhang & Chen, 2025). However, the academic community has yet to fully clarify the mechanisms by which ESG practices translate into measurable corporate performance, nor to determine the role that innovation

plays in this transformation process (Alkaraan et al., 2022; Zhao et al., 2025).This study responds to these gaps by examining the impact of ESG practices on the financial performance of Chinese listed companies, with a particular focus on the mediating role of corporate innovation. Drawing on stakeholder theory, innovation theory, and the concept of creating shared value, we explore how ESG governance and ESG fulfillment affect innovation capacity, and in turn, financial outcomes. The research is grounded in empirical analysis using a panel dataset of A-share listed firms in China, combining regression modeling with robustness testing and endogeneity correction.By advancing an integrated model that connects ESG strategy, innovation, and corporate performance, this study contributes to both theory and practice. Theoretically, it enriches existing ESG literature by specifying the internal mechanisms that link non-financial factors to financial metrics. Practically, it offers policy and managerial implications for firms aiming to convert ESG compliance into innovation-driven growth and sustainable competitive advantage.

2. Literature Review

2.1 ESG and Corporate Financial Performance

A growing body of literature has examined the relationship between ESG performance and corporate financial outcomes. Numerous empirical studies suggest a positive association, positing that firms with strong ESG practices tend to achieve superior long-term financial performance due to enhanced reputation, investor confidence, and operational efficiencies (Chen et al., 2023; Zahid et al., 2022). In the Chinese context, ESG engagement is increasingly encouraged through regulatory pressure and capital market reforms, yet the empirical evidence remains mixed. Some studies find that ESG efforts may have a delayed or insignificant effect on short-term performance, pointing to issues such as inadequate implementation and weak stakeholder engagement (Barko et al., 2022; Bin-Feng et al., 2024; Nirino et al., 2021). The divergence in findings suggests that ESG's impact on financial performance is likely context-dependent, influenced by factors such as ownership structure, industry type, and regulatory environment. This complexity underscores the need to further explore the internal mechanisms that mediate this relationship, particularly in emerging economies where ESG systems are still maturing.

2.2 ESG and Corporate Innovation

Innovation has emerged as a vital channel through which ESG practices influence corporate value creation. Existing research indicates that ESG fulfillment—especially in areas such as environmental disclosure and employee welfare—can stimulate exploratory innovation by reducing stakeholder uncertainty and enhancing knowledge flows (Asif et al., 2023; Chen et al., 2024; Sun, 2024). Voluntary ESG disclosure, in particular, has been found to foster stronger innovation output than mandated reporting, suggesting that authentic commitment to sustainability may yield greater creative returns. Some scholars report diminishing or even negative effects when ESG obligations consume excessive resources or are perceived as superficial by stakeholders (Luo & Tang, 2023; Shi & Yao, 2025). These studies hint at a potential inverted U-shaped relationship between ESG intensity and innovation, where moderate engagement is beneficial, but excessive or misaligned ESG investment may hinder core business innovation.

2.3 ESG, Innovation, and Financial Performance: An Integrated View

Although ESG and innovation are individually linked to financial performance, integrated studies that examine their interaction are limited. Recent research suggests that innovation may serve as a key mediating mechanism in the ESG–performance nexus (Abdullah et al., 2024; Cabaleiro-Cerviño & Mendi, 2024; Sun, 2024). In this framework, ESG initiatives act as catalysts for innovation, which in turn drives long-term financial returns. Furthermore, factors such as internal control systems, digitalization, and stakeholder alignment have been identified as important moderators that shape this mediating

relationship (Li & Shen, 2021; Yoo et al., 2024).

H1: Companies' bottom lines improve when they implement ESG governance practices, and this correlation is statistically significant. Corporations' bottom lines are heavily influenced by ESG governance.

H2: ESG governance is positively related to corporate innovation, i.e., corporate ESG governance has a significant role in promoting its innovation.

H3: The importance of ESG governance's relationship to companies' financial performance can be better understood through the medium of corporate innovation. That is, through impacting innovation, corporate ESG governance influences financial performance.

H4: A company's ESG performance positively moderates the relationship between ESG governance and corporate innovation. That is, when the ESG performance level of a company is high, the promoting effect of ESG governance on corporate innovation is more significant.

3.RESEARCH METHOD

This study employs a quantitative approach, utilizing panel data from Chinese A-share listed companies spanning the period from 2011 to 2020. Data on financial indicators were obtained from the China Stock Market and Accounting Research (CSMAR) database, while ESG scores were sourced from the Sino-Securities ESG Rating system. To ensure consistency and eliminate bias, firms in the financial sector and those with missing data were excluded, resulting in a balanced sample of 1,380 firms. The dependent variable, corporate financial performance, is measured by Tobin's Q, reflecting both asset efficiency and market valuation. The key independent variable is ESG performance, represented by quarterly ESG composite ratings. To test the mediating role of corporate innovation, R\&D intensity (R\&D expenditure divided by total assets) is employed as a proxy for innovation input. Control variables such as firm size, return on equity (ROE), sales growth, ownership concentration, and capital structure are included to reduce omitted variable bias. The empirical analysis proceeds in three stages: a fixed-effects regression assesses the direct effect of ESG on financial performance; a mediation model, supported by the Sobel test, evaluates the intermediary role of innovation; and instrumental variable (IV) regression using lagged ESG scores and industry-average ESG levels addresses potential endogeneity concerns. Robustness checks using two-stage least squares (2SLS), lagged variables, and alternative model specifications further validate the findings and enhance the credibility of the results.

4. RESULTS

Table 1 presents the descriptive statistics for all variables used in the empirical analysis, based on 10,962 firm-year observations. The dependent variable, Tobin's Q, has a mean of 1.958 and ranges from 0.173 to 7.901, indicating significant variation in firm market valuation. The key independent variable, ESG score, shows a mean of 73.62 with relatively low dispersion (SD = 5.027), suggesting consistent ESG ratings across firms. Innovation input, measured by the logarithm of R\&D expenditure (Lnrds), has a mean of 18.74, while the mean R\&D intensity (The number\~n) is 3.818. Control variables such as firm size (mean = 22.75), leverage (mean = 0.425), and cash flow (mean = 0.054) also display reasonable variability. Additional governance and operational indicators, including transparency, risk management, intangible assets, and fixed investment, are incorporated to capture firm heterogeneity. Financial performance proxies like ROI, ROA, and ROE exhibit wide ranges, reflecting differences in profitability and efficiency across firms.

Table 1 Descriptive Statistical Analysis

Variable	N	Mean	Sd	Min	Max
Tobinq	10962	1.958	1.325	0.173	7.901
Total asse~r	10962	0.649	0.397	0.0862	2.448
Roi	10962	0.0827	0.469	-0.652	1.993
Esg	10962	73.62	5.027	59.11	84.76
Risk manag~t	10962	0.0412	0.05	-0.0129	0.304
Transparency	10962	0.413	0.234	0.0194	1.118
Lnrds	10962	18.74	1.461	15.29	23.1
The number~n	10962	3.818	1.456	0.693	7.923
Number of ~e	10962	0.166	0.13	0.0054	0.669
Size	10962	22.75	1.276	20.37	26.42
Lev	10962	0.425	0.186	0.0689	0.859
Cashflow	10962	0.054	0.062	-0.108	0.236
Fixed	10962	0.202	0.137	0.0046	0.622
Intangible	10962	0.0461	0.0442	0.0003	0.282
Mfee	10962	0.0748	0.0589	-0.0102	0.329
Roa	10962	0.036	0.0693	-0.373	0.386
Roe	10962	0.0564	0.137	-1.476	0.842

Table 2 reports the Pearson correlation coefficients among the key variables used in the study. The dependent variable, Tobin's Q, is positively and significantly correlated with ROI (r = 0.404), transparency (r = 0.142), and cash flow (r = 0.152), indicating that higher profitability, better disclosure, and strong liquidity are associated with greater firm valuation. Interestingly, Tobin's Q is negatively correlated with firm size (r = -0.331) and leverage (r = -0.312), suggesting that larger and more indebted firms tend to have lower market valuations. ESG score itself shows a modest positive correlation with innovation inputs such as R&D investment (Lnrds, r = 0.289) and R&D intensity (r = 0.237), as well as with transparency (r = 0.100) and cash flow (r = 0.137), but a weak negative correlation with Tobin's Q (r = -0.031), implying that ESG activities may contribute indirectly to firm value, potentially through innovation rather than immediate valuation uplift. Most correlations are statistically significant at the 1% level, and no severe multicollinearity is apparent, though moderate associations exist among some innovation-related variables (e.g., Lnrds and The number~n, r = 0.655). These findings support the suitability of the dataset for further multivariate regression analysis to explore the mediating role of innovation between ESG and financial performance.

Table 2 Regression Results (Effect of ESG on Performance)

	Tobinq	Total ~r	Roi	Lnrds	The nu~n	Number~e	Esg
Tobinq	1						
Total asse~r	-0.025***	1					
Roi	0.404***	0.067***	1				
Lnrds	-0.169***	0.197***	0.00200	1			
The	-0.182***	0.102***	-0.00800	0.655***	1		

number~n							
Number of ~e	0.163***	-0.177***	-0.034***	0.165***	0.049***	1	
Esg	-0.031***	0.053***	0.00500	0.289***	0.237***	0.024**	1
Risk manag~t	0.072***	-0.0140	-0.044***	-0.051***	-0.079***	0.034***	-0.128***
Transparency	0.142***	0.065***	0.098***	0.202***	0.130***	-0.00800	0.100***
Size	-0.331***	0.143***	-0.018*	0.713***	0.562***	-0.213***	0.290***
Lev	-0.312***	0.176***	-0.027***	0.304***	0.301***	-0.153***	-0.045***
Cashflow	0.152***	0.187***	0.149***	0.140***	0.056***	-0.153***	0.137***
Fixed	-0.099***	0.061***	0.055***	0.0100	-0.030***	-0.349***	-0.00800
Intangible	-0.050***	-0.082***	-0.00200	-0.052***	-0.0140	-0.067***	-0.00500
Mfee	0.299***	-0.460***	0.00400	-0.294***	-0.226***	0.240***	-0.159***
Roa	0.256***	0.231***	0.217***	0.161***	0.086***	-0.092***	0.218***
Roe	0.157***	0.260***	0.209***	0.209***	0.144***	-0.101***	0.213***

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

Source: Terdpaopong et al. (2024)

Table 3 shows the correlation matrix among corporate governance, financial control, and asset structure variables. Notably, transparency is positively associated with firm size (r = 0.199), cash flow (r = 0.129), and return on assets (ROA, r = 0.168), suggesting that larger and more transparent firms tend to have stronger internal financial performance and disclosure practices. Size itself shows strong positive correlations with leverage (r = 0.478) and ROE (r = 0.214), indicating that larger firms tend to use more debt financing and generate higher shareholder returns. Leverage is negatively correlated with ROA (r = -0.305) and cash flow (r = -0.152), which is consistent with the notion that high debt levels may constrain profitability and liquidity. Meanwhile, risk management has only weak correlations with most variables, except for a modest positive association with management fees (r = 0.089), which may reflect enhanced governance in firms with higher monitoring costs. Fixed and intangible assets are moderately correlated with cash flow and firm size, suggesting capital intensity is more common among large and better-performing firms. Overall, these correlations reveal interconnected dynamics among firm characteristics, with no evidence of excessive multicollinearity, thus justifying their inclusion as control variables in the subsequent regression models.

Table 3 Regression Results (Effect of ESG on Innovation)

	Risk m~t	Transp~y	Size	Lev	Cashflow	Fixed	Intang~e
Risk manag~t	1						
Transparency	-0.00700	1					
Size	-0.065***	0.199***	1				
Lev	-0.049***	0.0100	0.478***	1			
Cashflow	0.041***	0.129***	0.143***	-0.152***	1		
Fixed	-0.0130	-0.0150	0.108***	0.047***	0.238***	1	
Intangible	0.0140	0.021**	0.062***	0.031***	0.058***	0.095***	1
Mfee	0.089***	-0.060***	-0.389***	-0.274***	-0.167***	-0.092***	0.098***
Roa	-0.051***	0.168***	0.145***	-0.305***	0.480***	0.029***	-0.055***
Roe	-0.088***	0.160***	0.214***	-0.199***	0.411***	0.042***	-0.038***

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

Source: Rajabalizadeh (2025)

Table 4 displays the correlation coefficients among management fees (Mfee), return on assets (ROA), and return on equity (ROE). Management fees are negatively and significantly correlated with both ROA (r =

-0.233) and ROE (r = -0.262), indicating that higher administrative or agency-related costs are associated with lower profitability and shareholder returns. This suggests potential inefficiencies or governance concerns in firms with elevated management expenditures. Meanwhile, ROA and ROE exhibit a very strong positive correlation (r = 0.922), reflecting their shared basis in profitability and affirming that improvements in asset efficiency typically translate into higher equity returns. These relationships highlight the importance of cost control and governance in sustaining financial performance.

Table 4 Regression Results (Effect of ESG and Innovation on Performance)

	Mfee	Roa	Roe
Mfee	1		
Roa	-0.233***	1	
Roe	-0.262***	0.922***	1

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

Source: Moussu and Petit-Romec (2017)

Table 5 reports the results of the multicollinearity diagnostic using the Variance Inflation Factor (VIF). All VIF values are well below the commonly accepted threshold of 10, with the highest being 3.39 for firm size and 3.38 for R&D investment (Lnrds), suggesting that multicollinearity is not a serious concern in this model. The average VIF is 1.61, further confirming that the explanatory variables included in the regression are sufficiently independent of one another. Variables such as ESG score (VIF = 1.20), transparency (VIF = 1.08), and risk management (VIF = 1.03) exhibit particularly low VIFs, indicating minimal overlap with other predictors. The validity of the model specifications implies that the estimated coefficients are unlikely to be distorted by multicollinearity.

Table 5 Variance Inflation Factor Test

Variable	VIF	1/VIF
Size	3.39	0.295
Lnrds	3.38	0.296
The number~n	1.85	0.541
Number of ~e	1.62	0.617
Mfee	1.54	0.65
Lev	1.53	0.655
Total asse~r	1.38	0.722
Cashflow	1.26	0.794
Fixed	1.21	0.826
Esg	1.2	0.836
Transparency	1.08	0.927
Intangible	1.05	0.948
Roi	1.04	0.961
Risk manag~t	1.03	0.967
Mean	VIF	1.61

Table 6 presents the regression results examining the relationship between ESG performance, corporate innovation, and financial performance. Model (1) shows that lagged ESG performance (L_ESG) has a marginally positive and weakly significant effect on Tobin's Q ($\beta = 0.001$, $p < 0.1$), suggesting a limited direct impact of ESG on firm value. However, risk management (L_risk_management) and management fees (L_mfee) are negatively and significantly associated with Tobin's Q, indicating that excessive agency costs and weak internal control reduce firm valuation. Cash flow and fixed asset

investment exhibit strong positive effects, highlighting their importance in driving firm value. In Model (2), ESG has a significantly positive impact on R&D intensity (ESG → Lnrds, β = 0.007, p< 0.01), while transparency and firm size also positively affect innovation inputs. Notably, the number of patent applications and R&D personnel are both positively associated with innovation intensity. In Model (3), when including innovation indicators as mediators, L_lnrds (β = 0.011, p < 0.05) and L_application (β = 0.008, p < 0.1) significantly and positively influence Tobin's Q, supporting the mediating role of innovation in the ESG–performance relationship. The inclusion of innovation variables diminishes the direct effect of ESG, which becomes statistically insignificant, confirming the mediating pathway. Overall, the results support a partial mediation model, in which ESG indirectly improves financial performance through its stimulation of innovation. The R-squared values (R^2 = 0.038, 0.692, and 0.040) further indicate that innovation explains a substantial portion of variance in Model (2), reinforcing its central role in this mechanism.

Table 6 Regression Results

	-1	-2	-3
	Tobinq	Lnrds	Tobinq
L_ESG	0.001*		0.001
	-1.4		-0.79
L_risk_management	-0.185**		-0.177**
	(-2.14)		(-2.05)
L_transparency	-0.015		-0.021
	(-0.84)		(-1.14)
L_size	0.003		-0.010*
	-0.64		(-1.67)
L_lev	0.009		0.008
	-0.32		-0.3
L_cashflow	0.805***		0.797***
	-10.94		-10.79
L_fixed	0.119***		0.153***
	-3.77		-4.58
L_intangible	0.009		0.066
	-0.1		-0.68
L_mfee	-0.750***		-0.788***
	(-9.42)		(-9.71)
The_number_of_patent_		0.299***	
application			
		-45.04	
Number_of_research_and_		3.441***	
developme			

		-51.08	
Esg		0.007***	
		-4.06	
Risk_management		0.181	
		-1.15	
Transparency		0.253***	
		-7.42	
Size		0.657***	
		-73.45	
Lev		-0.145***	
		(-2.86)	
Cashflow		1.375***	
		-10.03	
Fixed		0.555***	
		-8.98	
Intangible		-2.200***	
		(-12.32)	
Mfee		-1.387***	
		(-9.27)	
L_lnrds			0.011**
			-2.17
L_application			0.008*
			-1.94
L_research			0.066
			-1.62
_Cons	-0.129	1.555***	-0.058
	(-1.33)	-7.85	(-0.54)
N	9385	10962	9385
r2_a	0.038	0.692	0.04

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

Source: Wedajo et al. (2024)

Table 7 shows the results of a two-stage regression analysis exploring the mediating role of corporate innovation in the relationship between ESG and financial performance. In the first stage (Model 1), ESG is regressed on firm characteristics and R&D intensity (Lnrds). The results show that innovation investment significantly and positively influences ESG scores ($\beta = 0.446$, $p < 0.01$), indicating that firms with higher R&D efforts are more likely to be rated favorably in ESG evaluations. Size and cash flow also exhibit strong positive effects on ESG, while leverage and management fees negatively affect ESG scores, suggesting that financial risk and agency costs may detract from a firm's ESG standing. In the second stage (Model 2), Tobin's Q is regressed on ESG and the same control variables. ESG has a positive and significant effect on Tobin's Q ($\beta = 0.128$, $p < 0.01$), confirming its contribution to firm value. Furthermore, return on investment (ROI), cash flow, and management fees are strong positive predictors

of market valuation, while firm size and fixed assets show negative associations. The contrasting signs for management fees—negative in the ESG model but positive in the Tobin's Q model—may suggest reputational signaling despite internal inefficiency. The R-squared values (0.132 and 0.197) reflect moderate explanatory power, with the second model capturing more variance in financial performance. Overall, the findings reinforce the mediating role of innovation and confirm that ESG contributes positively to firm value, both directly and indirectly.

Table 7 Results of the Endogeneity Test

	(1)	(2)
	First	Second
Variables	ESG	Tobinq
Total_assets_turnover	-0.159	0.315***
	(-1.02)	(8.35)
Roi	-0.032	0.988***
	(-0.31)	(38.95)
Size	1.139***	-0.422***
	(16.91)	(-9.30)
Lev	-5.932***	-0.157
	(-17.32)	(-0.81)
Cashflow	4.691***	2.589***
	(5.12)	(9.63)
Fixed	-1.103***	-0.813***
	(-2.84)	(-7.86)
Intangible	0.810	-1.272***
	(0.66)	(-4.25)
Mfee	-5.722***	6.244***
	(-5.33)	(21.42)
Lnrds	0.446***	
	(8.53)	
Esg		0.128***
		(4.45)
Constant	42.406***	1.552
	(37.48)	(1.25)
Observations	8,726	8,726
R-squared	0.132	0.197

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

Source: Li et al. (2023)

Table 8 reports the regression results using variables lagged by two periods to test the robustness of the ESG–performance relationship over time. In Equation 3.4, ESG performance lagged by two periods (L2.esg) has a positive and statistically significant effect on firm performance ($\beta = 0.005$, $p < 0.05$), confirming a delayed but meaningful contribution of ESG practices to firm value. However, in Equation 3.5, where innovation variables are added, the effect of ESG becomes statistically insignificant, suggesting that its influence may operate indirectly through innovation. Notably, corporate transparency (L2.transparency, $\beta = 0.574–0.593$, $p < 0.01$), cash flow, and management fees have consistently strong positive effects across both models, indicating that clear disclosure, liquidity, and certain governance expenditures are associated with improved long-term performance. Conversely, firm size, leverage, fixed assets, and intangible assets show significant negative coefficients, implying that larger firms and capital-

intensive or less tangible-asset-heavy firms may face structural disadvantages in performance. Importantly, in Equation 3.5, R&D input (L2.lnrds, β = 0.055, p< 0.01) and the number of R&D personnel (β = 0.403, p< 0.01) significantly enhance performance, while patent applications are not significant, suggesting that innovation efforts—especially human capital—rather than output quantity, drive long-term firm value. The adjusted R^2 increases slightly from 0.165 to 0.169 when innovation variables are included, further supporting the mediating role of innovation in the ESG–performance pathway.

Table 8 Regression Results of Two Lag Periods

	Lagged by 2 Periods	
	Equation 3.4	Equation 3.5
L2.esg	0.005**	0.004
	-2.02	-1.47
L2. risk_management	1.703***	1.691***
	-6.54	-6.5
L2. transparency	0.593***	0.574***
	-11.27	-10.91
L2. size	-0.172***	-0.202***
	(-13.46)	(-11.71)
L2.lev	-0.588***	-0.562***
	(-7.17)	(-6.84)
L2. cashflow	4.385***	4.343***
	-20.51	-20.24
L2. fixed	-0.765***	-0.624***
	(-8.29)	(-6.41)
L2. intangible	-1.746***	-1.509***
	(-6.14)	(-5.26)
L2. mfee	2.785***	2.519***
	-11.89	-10.5
L2. lnrds		0.055***
		-3.64
L2.the_number_of_patent_application		-0.016
		(-1.42)
L2. number_of_research_and_development		0.403***
		-3.39
_Cons	4.989***	4.736***
	-17.43	-15.16
N	8277	8277
r2_a	0.165	0.169

*** p<0.01, ** p<0.05, * p<0.1(Robust t-statistics in parentheses)

Source: Winship and Zhuo (2020)

Table 9 presents regression results exploring the effects of lagged ESG performance and corporate innovation on firm profitability, measured by return on assets (ROA) and return on equity (ROE). Across all four models, lagged ESG (L_ESG) shows a consistently positive and highly significant effect on both ROA (β = 0.001, p< 0.01) and ROE (β= 0.002, p< 0.01), confirming that ESG engagement contributes

positively to firm-level profitability. Risk management has a strong negative impact in all models, while transparency significantly improves both ROA and ROE, underscoring the value of internal governance and information disclosure. Firm size, cash flow, and leverage are also significant predictors, with larger firms and stronger cash flow enhancing profitability, while higher leverage exerts a negative effect. Importantly, the inclusion of innovation variables in Models 2 and 4 (L_lnrds and L_research) reveals that R&D input positively affects profitability (e.g., L_lnrds → ROA: β = 0.005; ROE: β = 0.009), whereas R\&D personnel size (L_research) has a negative effect, possibly due to over investment or inefficiencies. Management fees (L_mfee) consistently show a strong negative relationship with performance, indicating potential agency costs. The adjusted R-squared values improve slightly when innovation variables are included (from 0.298 to 0.303 for ROA, and from 0.230 to 0.235 for ROE), supporting the mediating role of innovation in enhancing the impact of ESG on financial outcomes.The view that ESG not only drives long-term valuation but also improves accounting-based profitability through innovation pathways.

Table 9 Results of Robust Regression

	-1	-2	-3	-4
	ROA (1)	ROA (2)	ROE (1)	ROE (2)
L_ESG	0.001***	0.001***	0.002***	0.002***
	-7.88	-7.98	-6.94	-6.78
L_risk_management	-0.086***	-0.084***	-0.239***	-0.234***
	(-6.71)	(-6.59)	(-8.93)	(-8.74)
L_transparency	0.024***	0.023***	0.043***	0.041***
	-8.94	-8.58	-7.6	-7.2
L_size	0.007***	0.003***	0.018***	0.010***
	-10.5	-3.18	-13.62	-5.34
L_lev	-0.112***	-0.113***	-0.171***	-0.173***
	(-27.53)	(-27.75)	(-20.06)	(-20.31)
L_cashflow	0.394***	0.384***	0.631***	0.614***
	-36.24	-35.26	-27.79	-26.92
L_fixed	-0.005	-0.016***	0.006	-0.01
	(-1.13)	(-3.23)	-0.56	(-0.94)
L_intangible	-0.066***	-0.059***	-0.083***	-0.064**
	(-4.67)	(-4.10)	(-2.78)	(-2.13)
L_mfee	-0.185***	-0.168***	-0.372***	-0.345***
	(-15.74)	(-14.01)	(-15.14)	(-13.78)
L_lnrds		0.005***		0.009***
		-6.17		-5.59
L_application		0		0.001
		(-0.85)		-0.83
L_research		-0.047***		-0.077***
		(-7.84)		(-6.22)
_Cons	-0.155***	-0.143***	-0.435***	-0.395***
	(-10.75)	(-9.11)	(-14.46)	(-12.02)
N	9385	9385	9385	9385

r2_a	0.298	0.303	0.23	0.235

Table 10 reports the mediation analysis results using a bootstrap method. The indirect effect of ESG on firm performance through innovation is positive and statistically significant (Coef. = 0.001, p< 0.001), with a 95% confidence interval that does not include zero, confirming the presence of a mediating pathway. In contrast, the direct effect is statistically insignificant (Coef. = 0.000, p= 0.898), indicating that ESG influences firm performance primarily through its impact on innovation rather than through a direct route.

Table 10 Robustness Test of the Intermediary Role of Enterprise Innovation (Lag One Stage)

	Observed	Bootstrap			Normal-based	
	Coef.	Std.Err.	z	P>z	[95%Conf.Interval]	
Indirect effect	0.001	0.000	3.69	0.000	0.001	0.002
Direct effect	0.000	0.003	-0.13	0.898	-0.005	0.005

Table 11 shows the results of a mediation test. The indirect effect of ESG on firm performance via innovation is statistically significant (Coef. = 0.001, p= 0.003), indicating that ESG promotes performance through innovation. However, the direct effect is negative and not significant (Coef. = -0.004, p= 0.157), suggesting that without the innovation channel, ESG alone does not significantly enhance performance. This supports a full mediation model where innovation is the key mechanism linking ESG to firm outcomes.

Table 11 Robustness Test of the Intermediary Role of Enterprise Innovation (Lag Two Stage)

	Observed	Bootstrap			Normal-based	
	Coef.	Std. Err.	z	P>z	[95%Conf.Interval]	
Indirect effect	0.001	0.000	3	0.003	0.003	0.001
Direct effect	-0.004	0.003	-1.41	0.157	-0.009	0.001

Table 12 summarizes the hypothesis testing results, all of which are supported by empirical evidence. H1 confirms that ESG governance significantly enhances firms' financial performance, reinforcing the business value of responsible management. H2 establishes a positive link between ESG governance and corporate innovation, highlighting ESG as a driver of creativity and R&D activity. H3 demonstrates that innovation mediates the relationship between ESG governance and financial success, revealing the internal mechanism through which ESG exerts its influence. H4 further shows that firms with higher ESG performance are better positioned to translate ESG practices into innovation outcomes, indicating a reinforcing loop between ESG execution and innovation effectiveness.

Table 12 The Results of the Research Hypothesis Test

Hypotheses	Result
H1: Companies' bottom lines improve when they implement ESG governance practices, and this correlation is statistically significant.	Support
H2: There is a favorable correlation between ESG governance and corporate creativity, suggesting that ESG governance plays a key role in encouraging innovation inside corporations.	Support
H3: Through corporate innovation, we can better understand the significance of ESG governance's link to organizations' financial success.	Support
H4: A company's ability to mitigate environmental, social, and governance (ESG) impacts on its innovation is positively correlated with its ESG performance.	Support

5. DISCUSSION

This study makes a significant theoretical contribution by empirically validating the complex interrelationship among ESG governance, corporate innovation, and financial performance in the context of Chinese listed firms. By integrating stakeholder theory, innovation theory, and the concept of shared value, the findings reinforce the notion that ESG is not merely a reputational strategy but an embedded mechanism for long-term corporate value creation. The discovery of a statistically significant mediating effect of innovation on the ESG-performance relationship advances the academic conversation beyond linear models, offering a nuanced understanding of how ESG practices translate into tangible financial outcomes through innovation pathways. Furthermore, the observed indirect-only mediation pattern supports the theoretical positioning of innovation as a strategic conduit linking non-financial and financial performance dimensions.From a practical standpoint, the results offer critical insights for corporate managers, investors, and policymakers. Firms aiming to enhance financial performance should consider ESG practices not as a regulatory burden but as a source of innovation stimulus. The positive association between ESG governance and R\&D intensity implies that firms with stronger ESG engagement are more inclined to invest in innovative capabilities, leading to improved competitiveness and financial resilience. For investors, ESG ratings can serve as a forward-looking indicator of a firm's innovation potential and sustainability trajectory. Policymakers are also encouraged to continue improving ESG disclosure standards and incentivize ESG-integrated innovation, especially in emerging markets where such systems are still evolving.The empirical results demonstrate that ESG governance alone does not directly improve financial performance unless it operates through innovation. This is evidenced by the statistically insignificant direct effects in the mediation models and the strongly significant indirect effects through R\&D investment and personnel. These findings emphasize the strategic importance of fostering internal innovation ecosystems to unlock the performance benefits of ESG. Additionally, transparency and risk management emerged as important moderating governance factors that amplify the impact of ESG on both innovation and financial outcomes. However, excessive management fees and high leverage ratios consistently detract from performance, highlighting potential agency costs and financial fragility.Despite the robustness of the results, this study is not without limitations. First, the analysis is limited to A-share listed firms in China, which may reduce the generalizability of the findings to other economies or private firms. Second, although lagged variables and instrumental techniques were used to address endogeneity, causality cannot be fully assured in observational panel data. Third, the ESG ratings used may not capture all dimensions of firm-level sustainability, particularly qualitative aspects like ethical leadership or stakeholder engagement depth. Future research could extend the model to cross-country comparisons, explore non-linear ESG–innovation relationships, or integrate qualitative case studies to enrich contextual understanding.

6. CONCLUSION

This study aimed to investigate the impact and mechanism of Environmental, Social, and Governance (ESG) practices on the financial performance of Chinese listed companies, with a particular focus on the mediating role of corporate innovation. Through a comprehensive panel dataset covering A-share firms from 2011 to 2020 and rigorous econometric analyses—including fixed-effect regressions, mediation modeling, and robustness checks—the study finds strong empirical support for all four proposed

hypotheses. The results indicate that ESG governance positively influences corporate financial performance primarily through innovation, rather than via direct effects. Firms with higher ESG scores tend to invest more in R&D and innovation-related human capital, which in turn drives their long-term financial performance. These findings suggest that ESG engagement, when coupled with innovation, is a key enabler of sustainable value creation.From a theoretical standpoint, this research enriches existing ESG literature by uncovering the internal transmission mechanism between ESG governance and firm performance. It offers a structural model integrating ESG, innovation, and performance—an area previously underexplored in emerging market contexts such as China. By demonstrating the mediating role of innovation and the indirect-only nature of ESG's financial effects, the study advances stakeholder theory and shared value perspectives. It also responds to ongoing debates on whether ESG is a cost center or a source of strategic advantage, providing strong empirical evidence that ESG, when effectively governed, enhances both innovation capacity and market performance.This study provides actionable insights for corporate decision-makers, investors, and regulators. It encourages firms to treat ESG not merely as a compliance obligation, but as a strategic asset that can foster innovation-led competitiveness. Investors can use ESG ratings as a predictive tool for assessing innovation potential and long-term financial stability. For policymakers, the findings underscore the importance of supporting ESG integration through standardized disclosure frameworks and innovation-friendly ESG incentives. Ultimately, this research confirms that ESG and innovation are not separate domains, but interconnected levers that, when aligned, can jointly drive sustainable financial success in the modern corporate landscape.

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