

ESG Performance and Corporate Value: The Mediating Role of Green Innovation

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Abstract

ESG performance, or corporate environmental, social, and governance, has become a key indicator of a company's sustainability. This study employs a fixed-effect model to assess the nexus between ESG performance and corporate value using data from China's A-share listed companies between 2015 and 2022. The research results confirm that companies with superior ESG performance have better corporate value. Further mechanism test results show that green innovation partially mediates the relationship between company value and ESG performance. This conclusion still holds true in both robustness tests and Bootstrap tests. It shows that the execution of corporate ESG strategies is not only about improving green innovation capabilities but is also likely to directly promote the growth of corporate value by improving brand image, reducing capital costs, and enhancing market trust.

Keywords: ESG Performance, Green Innovation, Corporate Value, Sustainable Development, Green Transformation

Introduction

In recent years, the problems of resource scarcity and environmental protection that accompanied the process of global industrialization and development had aroused widespread concern in all sectors of society. Therefore, the concept of promoting sustainable development of the global economy has reached a consensus in the international community (Ng & Rezaee, 2015). Sustainable growth places a strong emphasis on steadily improving the enterprise's long-term worthwhile while satisfying stakeholders' fair demands. In regard to this, ESG (corporate environmental, social, and governance) performance has become a key indicator of a company's sustainability (Zhang et al., 2024). Motivated by the 2006 United Nations Principles for Responsible Investment (UNPRI), ESG—which aims to encourage the green transformation of corporations—has developed into a comprehensive and systematic set of disclosure and assessment standards that are widely accepted by global economies.

ESG is currently in varying phases of development in several nations worldwide. Historically, alongside China's rapid economic growth, there have been shortsighted actions like resource overuse and environmental pollution that have harmed the interests of business stakeholders. In light of this pressing issue, China is presently undergoing a significant phase of high-quality economic development transformation and has recently put out numerous economic policies that support sustainable development (Yang et al., 2019). Therefore, despite being a latecomer, ESG practices in Chinese businesses have accelerated recently. Over half of Chinese businesses will have released ESG reports by the end of 2021. As a result, Chinese businesses now place a high premium on fulfilling their ESG obligations (Li et al., 2023).

Meanwhile, there is still disagreement among academics regarding the connection between business value and ESG performance. Neoclassical theory supports the view of maximizing shareholder returns, which suggests that the implementation of ESG responsibilities by firms can have a negative impact on firms' value by increasing short-term costs, diverting resources, and decreasing short-term earnings (Gillan et al., 2021; Wieczorek-Kosmala et al., 2021). Nonetheless, the stakeholder hypothesis, which maintains that businesses can foster innovation and obtain competitive benefits by fulfilling their ESG responsibilities, tends to be supported by recent research findings (Porter & Kramer, 2006).

Specifically, a company's ESG practices can improve corporate information transparency (Friede et al., 2015), enhance corporate reputation (Islam et al., 2021), strengthen investor relations (Huang, 2021), and enhance shareholder and corporate value (Gillan et al., 2021), which further supports the view of the value-enhancing effect of ESG performance. In particular, a company's ESG practices can strengthen investor relations (Huang, 2021), increase corporate reputation (Islam et al., 2021), improve corporate information transparency (Friede et al., 2015), and increase shareholder and corporate value (Gillan et al., 2021). These findings further support the idea that ESG performance adds value.

In consideration of these conflicting findings, further investigation is required to identify the accurate impact path, particularly in light of China's concerted efforts to support enterprise technological innovation. However, there is still some room for expansion of existing research. First, China adopted ESG practices later than nations in Europe and America, and the majority of the early research concentrated on how ESG performance or disclosure affected business profitability. Second, current research has overlooked the significance of green innovation by not thoroughly examining its mediation function between corporate ESG performance and firm value.

Thus, the purpose of this paper is to investigate how corporate value and ESG performance are related and examine the mediating role of green innovation. The ESG research material will be enhanced, and businesses will have a practical means of increasing their value and competitiveness in sustainable development. In addition, the value-enhancing effect of ESG performance helps to motivate enterprises to implement energy conservation and emission reduction and industrial structure adjustment while improving economic benefits and successfully achieve green transformation.

Compared with the existing literature, this paper's marginal contributions are as follows. First, the value-enhancing impact of corporate ESG performance is thoroughly examined in this article utilizing data from A-share listed businesses on the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) in China. Second, this paper further reveals the mechanism by which the value-enhancing effect is transmitted and clarifies the mediating role played by green innovation. This verifies that effective ESG performance encourages green innovation and ultimately enhances corporate value. In addition, our research has important practical application value for governments to effectively guide corporate ESG practices, for companies to actively improve their ESG performance, and for the investors to produce long-term investment decisions.

Literature Review

Underpinning Theory

According to stakeholder theory, the business must maintain the contractual arrangement in order to receive the remaining capital investment and consistently generate value (Liu, 2022). In addition to being a means of assessing corporate securities firms' management skills, balancing stakeholder interests has also become a soft signal for other investors to assess non-financial risks (Gong et al., 2021). Additionally, an important theoretical foundation for the study of "ESG performance-green innovation-corporate value" is provided by the resource-based perspective theory. Green innovation is regarded as a crucial means of attaining exceptional business development, and the zeal of businesses to implement green innovation is readily influenced by their own resources. More innovation will be carried out by businesses with stronger resource bases. ESG practices can be considered a component of the enterprise's internal resources, particularly "soft resources" like environmental technology capabilities, reputation, and staff happiness, which exhibit VRIO properties, according to RBV (Beamish & Chakravarty, 2021).

Hypothesis Development

ESG Performance and Corporate Value

Currently, the relationship between business value and ESG performance is still up for debate among academics. Most empirical studies support the value-enhancing view of ESG performance (Aboud & Diab, 2018; Sadiq, 2020), despite some academics' claims that there is a negative association (Duque-Grisales & Aguilera-Caracuel, 2021) or even an uncorrelation (Atan et al., 2018) between the two. Businesses that perform well in ESG enjoy less financing costs (Wong et al., 2021), higher price-to-book ratios (Galema et al., 2008) and excellent financial performance (Zhang et al., 2024). According to stakeholder theory, companies that manage ESG issues responsibly can increase stakeholder trust, boost corporate reputation (Odriozola & Baraibar-Diez, 2017), help them project a socially conscious image, strengthen their competitive edge, draw in more ethical investment, and eventually have a positive impact on financial performance and corporate value (Javed et al., 2020; Zheng et al., 2022). Based on the above analysis results, we propose hypothesis 1:

H1: Good ESG performance helps to enhance corporate value.

ESG Performance and Green Innovation

The creative framework referred to as "green innovation" promotes resource efficiency, environmentally friendly and sustainable practices, and harmonious coexistence of people and the natural order. Businesses may benefit from more business prospects and the ability

to sustain their competitive edge in the market (Fernando & Wah, 2017). Effective ESG performance can lower equity capital costs, ease corporate financing limitations, and encourage business investment in green innovation (Cornell, 2020; Wu et al., 2024). Strong ESG performance, in particular, may efficiently address issues like imperfect capital markets, environmental externalities, and path dependence, attract green-preferred capital to environmentally conscious companies, and promote the process of green innovation (Zhang & Lucey, 2022). China has currently put forward a dual-carbon development goal. Businesses are being encouraged by the government to implement green innovation. It has been demonstrated that government subsidies for new energy businesses (Wang et al., 2022) and regulatory measures like environmental laws (Luo et al., 2023) encourage corporate green innovation. Based on the external pressure theory, the pressure from stakeholders and external institutions will further encourage businesses to transform green and develop to a high standard (Berrone et al., 2013). Therefore, the following hypothesis 2 is proposed.

H2: Good ESG performance contributes to the enhancement of corporate green innovation.

The Mediating Role of Green Innovation

Sustainable development goals require modern businesses to balance economic advantages with social, environmental, and managerial benefits. The aforementioned scholars' research indicates that companies that place a high priority on ESG performance are able to actively assume social and environmental responsibilities and ensure the stability and lifespan of green innovation efforts. Conversely, innovation output is positively correlated with firm productivity and is essential to accomplishing social and economic goals. (Altomonte et al., 2016). As a result, a company's exceptional ESG performance will foster the expansion of its green innovation, and its innovation investment will, to some degree, yield favorable feedback, boosting its competitiveness and market value (Xue et al., 2024). The following hypothesis 3 is put out by this study in light of this analysis:

H3: Green innovation acts as a mediator in the interaction between business value and ESG performance.

Research Design

Data

This study selects all Chinese A-share listed enterprises on the SHSE and SZSE for the period of 2015-2022 as the initial research sample. Since China formally published the "Guidelines for Writing Social Responsibility Reports" in 2015, that year was selected as the beginning year. The sample is cleaned in the manner described below to guarantee the validity of the conclusions: 1) Eliminating the sample that contains missing or anomalous data. 2) Not including businesses that receive special treatment (ST and *ST businesses). 3) Not including banking firms. 4) The 1% and 99% levels of winsorization are applied to all continuous variables to eliminate the influence of extreme values. Ultimately, 7,451 unbalanced panel data are obtained. ESG performance data is obtained from the Huazheng ESG ratings in the wind database, green innovation data is collected from the CNRDS database, and other data are obtained from CSMAR.

Variable Definitions and Measurement

With reference to research by Wong et al. (2021) and Zheng et al. (2022), we employ TobinQ to assess company value in light of shifts in market value. As for ESG performance, we use the Huazheng ESG rating after consulting the pertinent research (Zhang et al., 2024). We take into

account the reliability of the ESG database, the coverage of Chinese businesses, and other factors. This grading system, which takes into consideration China's local circumstances and capital market characteristics, employs internationally recognized methodology and reference experiences to evaluate the ESG data of Chinese listed companies after 2009. Furthermore, due to the effects of reverse causality, we use ESG performance data that is one period behind time in our regressions.

Furthermore, since patent application data is more timely and dependable than license data, the logarithm of the number of firms' green patent applications is utilized as a proxy variable for green innovation (Jiang & Liu, 2024). This paper deals to the control variables utilized in relevant research to avoid the missing variables from producing variations in the model estimation findings (Qian, 2024; Rabaya & Saleh, 2022). Thus, the following control variables: ownership concentration (TOP10), enterprise size (Size), debt-to-asset ratio (Lev), company growth (Growth), intangible asset ratio (IAR), and independent director ratio (Dir) are selected. In addition, we have authority over the industry and the year. The definitions of the related variables are shown in Table 1.

Table1

Description of Variables

Variable Type	Variable	Variable Definition
Dependent variable	TobinQ	Market Value /Total Assets;
Independent	ESG	Huazheng ESG ratings
Intermediary	GI	The whole green patent application plus one, expressed as
Control variables	Size	The year-end natural logarithm of total assets
	Growth	Enterprise sales revenue growth rate
	Dir	The ratio of independent directors to directors' sizes
	Lev	Total liabilities/total assets
	TOP10	The shareholding ratio of the top 10 shareholders*100
	IAR	Net intangible assets/total assets

Model

To examine how ESG performance affects enterprise value, the following model is employed:

$$\text{TobinQ}_{i,t} = \alpha_0 + \alpha_1 \text{ESG}_{i,t-1} + \alpha_2 \text{Controls}_{i,t-1} + \lambda_t + \gamma_j + \varepsilon_{i,t} \quad (1)$$

$$\text{GI}_{i,t} = \beta_0 + \beta_1 \text{ESG}_{i,t-1} + \beta_2 \text{Controls}_{i,t-1} + \lambda_t + \gamma_j + \varepsilon_{i,t} \quad (2)$$

$$\text{TobinQ}_{i,t} = \theta_0 + \theta_1 \text{ESG}_{i,t-1} + \theta_2 \text{GI}_{i,t} + \theta_3 \text{Controls}_{i,t-1} + \lambda_t + \gamma_j + \varepsilon_{i,t} \quad (3)$$

The corporate value of enterprise i in year t is the variable $\text{TobinQ}_{i,t}$ that is being explained. The Huazheng ESG score in year $t-1$ is the primary explanatory variable $\text{ESG}_{i,t-1}$, and $\text{GI}_{i,t}$ is the mediating mechanism variable that will be examined. $\text{Controls}_{i,t-1}$ denotes other control variables. In addition, this study employs independent and control variables that are one period behind, taking into account the impact of timeliness and endogeneity concerns. Furthermore, the model accounts for year-fixed λ_t and industry-fixed effects γ_j to account for the possible impact of time and industry characteristics on corporate value. The random disturbance term is indicated by $\varepsilon_{i,t}$.

Empirical Results

Descriptive Statistics and Correlation Analysis

The descriptive statistics of the main and control variables used in this paper are shown in Table 2. There are notable variations in the Tobin Q values of various companies, as evidenced by the explanatory variable TobinQ's mean of 2.459, minimum of 0.826, maximum of 12.18, and standard deviation of 2.157. Furthermore, its kurtosis (9.717) and skewness (2.485) show that a small number of the sample's enterprises have extremely high valuations. The ESG is quite evenly distributed among the sample, as seen by the main explanatory variable's mean of 74.17, standard deviation of 4.41, concentrated distribution of values, skewness of -0.187 , and kurtosis of 3.046, all of which are near to a normal distribution. The standard deviation of green innovation (GI) is 9.499, the mean is 3.53, the minimum is 0, and the highest is 48. This indicates that the overall level of green innovation in businesses is not high and varies greatly. Moreover, GI has a large number of really high-innovation samples and is significantly right-skewed and thick-tailed. Thus, the variable was logarithmically modified because of its non-normal distribution and outliers, which could affect the empirical findings.

Additionally, by taking the natural logarithm of the total assets of the company at the end of the year, the enterprise size (Size) is calculated, with an average of 23.27 and a standard deviation of 1.263. The relatively concentrated variable distribution suggests that the variations in enterprise size within the sample are relatively stable after logarithmic transformation. The very right-skewed Growth, Dir, and IAR statistics show that there are apparently very high growth rates, a limited number of enterprises with exceptionally high shares of intangible assets, or large disparities in independent directors in the sample data. However, the Lev and TOP10 distributions are comparatively symmetrical, suggesting that the sample's financial structure and equity concentration fluctuate very slightly.

Table 3 shows the Pearson correlation coefficients between the variables. ESG is significantly positively correlated with GI, which strongly supports our second hypothesis that excellent ESG performance may help improve corporate green innovation capabilities. Meanwhile, GI and TobinQ have a strong correlation but in a negative relationship, which could be caused by of some extreme values in the two variables' initial data.

Table 2

Descriptive Statistics

Variables	Obs	Mean	Std.Dev.	Min	Max	p1	p99	Skew.	Kurt.
TobinQ	8100	2.459	2.157	0.826	12.18	0.826	12.18	2.485	9.717
ESG	7451	74.169	4.413	60.47	83.22	62.36	83.22	-0.187	3.046
GI	8100	3.53	9.499	0	48	0	48	3.625	15.904
Size	7717	23.273	1.263	19.907	26.305	20.597	26.305	0.385	2.913
Growth	7717	0.171	0.376	-0.545	2.311	-0.481	2.311	2.839	15.544
Dir	7717	37.633	5.854	20	80	33.333	57.143	1.825	7.963
Lev	7717	0.467	0.196	0.06	0.904	0.069	0.865	-0.05	2.209
TOP10	7717	60.709	15.823	24.11	94.96	24.79	92.56	-0.066	2.407
IAR	7451	0.049	0.057	0	0.322	0	0.322	2.894	12.964

Table 3

Correlation Analysis Results

	TobinQ	ESG	GI	Size	Growth	Dir	Lev	TOP10	IA
Tobin	1								
ESG	-0.00900	1							
GI	-	0.148**	1						
Size	-	0.199**	0.278***	1					
Growth	0.139***	0.041**	-0.0110	-	1				
Dir	0.033***	0.105**	0.0150	0.083**	-0.0110	1			
Lev	-	-	0.121***	0.530**	-	0.024**	1		
TOP10	0.047***	0.097**	0.044***	0.278**	0.090**	0.070**	0.033**	1	
IA	-	-0.027**	-	0.0190	-0.0160	-	-0.0130	0.049**	1

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Benchmark Regression Results

The findings of the regression of ESG performance on corporate value are presented in column 1 of Table 4, which is based on model (1). Year and industry fixed effects are controlled for in every column. At the 5% level, the ESG coefficient in column (1) is 0.0544, indicating a substantial positive result. This suggests that firm value can be considerably increased through ESG performance. The findings of the regression support Hypothesis 1.

Mediating Effect Analysis

Table 4 shows the impact of ESG performance on businesses' green innovation (GI) in column (2). The findings demonstrate that at the 1% level, the ESG coefficient is 0.14 and considerably positive, suggesting that ESG performance can significantly contribute to the level of firms' green innovation. Consequently, hypothesis H2 is confirmed. Column (3) reports the effect of ESG and GI on firm value. According to the findings, the GI and ESG coefficients are 0.0707 and 0.0445, respectively, and both are significantly positive at the 10% and 5% levels. This indicates that green innovation mediates the effect of ESG performance on firm value. The results suggest that, therefore, high-quality ESG performance contributes to the enhancement of firm value by promoting firms' green innovation investment. Hypothesis H3 is validated.

Table 4

Multiple Regression Results

	(1) TobinQ	(2) GI	(3) TobinQ
ESG	0.0544** (0.0254)	0.140*** (0.0175)	0.0445* (0.0254)
GI			0.0707** (0.0293)
Size	-0.548*** (0.0397)	0.225*** (0.0282)	-0.564*** (0.0413)
Growth	0.659*** (0.0632)	-0.0289 (0.0303)	0.661*** (0.0629)
Dir	0.0119**	-0.00305	0.0121**

	(0.0057)	(0.0033)	(0.0057)
Lev	-1.739***	0.0902	-1.745***
	(0.2291)	(0.1315)	(0.2287)
TOP10	0.0227***	-0.00231	0.0229***
	(0.0023)	(0.0015)	(0.0023)
IAR	-0.672	-0.590	-0.630
	(0.5343)	(0.3819)	(0.5344)
Year-Fixed	Yes	Yes	Yes
Industry-Fixed	Yes	Yes	Yes
_cons	13.99***	-4.399***	14.30***
	(0.8764)	(0.6210)	(0.9067)
<i>N</i>	7451	7451	7451
<i>R</i> ²	0.4083	0.3073	0.4094
<i>adj. R</i> ²	0.4038	0.3019	0.4047
Notes: Coefficient and t-values are reported. The latter are in parentheses.			

Robustness Tests

The benchmark regression's findings indicate that superior ESG performance considerably raises firm value. However, the estimation results may still be impacted by prospective measurement error and other endogeneity problems. In order to assess how reliable the earlier findings were, we refer to the study by Zheng et al (2022) and conduct robustness tests using the measure with replacement of explanatory variables. We replace the percentile measure of ESG ratings with a nine-point rescaling system, corresponding to values 1-9. Table 6 displays the regression results.

The ESG_Score coefficient, as indicated in Column 1 of Table 5, is 0.0778, which is considerably positive at the 1% level. It indicates that ESG performance still significantly enhances firm value even when different ESG assessment methods are used. The resulting coefficients in columns 2 and 3 also remain significant, further validating the mediating effect of green innovation and indicating that the benchmark regression conclusions are robust.

Table 5

Additional Robustness Checking

	(1) TobinQ	(2) GI	(3) TobinQ
ESG_Score	0.0778***	0.168***	0.0650**
	(0.0289)	(0.0201)	(0.0287)
GI			0.0765**
			(0.0308)
Size	-0.510***	0.225***	-0.528***
	(0.0420)	(0.0286)	(0.0437)
Growth	0.655***	-0.0451	0.659***
	(0.0648)	(0.0301)	(0.0645)
Dir	0.0100*	-0.00365	0.0103*
	(0.0059)	(0.0034)	(0.0059)

Lev	-1.732*** (0.2408)	0.103 (0.1365)	-1.740*** (0.2405)
TOP10	0.0238*** (0.0024)	-0.00235 (0.0015)	0.0240*** (0.0024)
IAR	-0.684 (0.5690)	-0.589 (0.3962)	-0.639 (0.5691)
Year-Fixed	Yes	Yes	Yes
Industry-Fixed	Yes	Yes	Yes
_cons	12.72*** (0.9049)	-5.060*** (0.6302)	13.11*** (0.9415)
<i>N</i>	6638	6638	6638
<i>R</i> ²	0.3924	0.3085	0.3937
adj. <i>R</i> ²	0.3872	0.3026	0.3884

Notes: ESG_Score is an alternative to ESG performance.

Coefficient and t-values are reported. The latter are in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Bootstrap Test for Mediation Effect

This research uses a three-step regression method to assess the mediation impact in the previous benchmark regression. The findings indicate that green innovation partially mediates the relationship between firm value and ESG performance. To improve the robustness of the results, we combine Bootstrap (bias-corrected bootstrap method) with a fixed effects model to assess the mediation effect. The significance of the indirect effect is tested by Bootstrap method (repeated sampling 3000 times) in case the explanatory variables are ESG and ESG_Scores, respectively. The results in Table 5 illustrate that hypotheses H1, H2 and H3 were tested.

Specifically, the indirect effect of ESG on firm value through GI is 0.0099 and significant at the 95% confidence level (percentile P method: [0.0051, 0.0154]; bias-corrected BC method: [0.0052, 0.0154]), suggesting that green innovations play a positive intermediary role in the pathway through which ESG affects firm value. Similarly, the indirect effect of ESG_Scores on firm value through GI is 0.0129 and significant at 95% confidence level (percentile method P method: [0.0065, 0.0196]; bias-corrected method BC method: [0.0065, 0.0197]), and the results similarly support the mediating role of green innovations, which further verifies the reliability of the paper's findings.

Table 6

Test Results for Intermediary Mechanisms

IV		Observed coefficient	Bias	Bootstrap std. err.	Normal-based [95% conf. interval]	
ESG	Indirect effects	0.00987844***	0.0001151	0.00261188	0.0051197	0.0153949 (P)
					0.0051524	0.0154232(BC)
ESG_Score	Direct effects	0.04452151***	0.0000386	0.01767968	0.0101103	0.0798252 (P)
					0.00986	0.0794164(BC)
ESG_Score	Indirect effects	0.01288856***	0.0000686	0.00340218	0.0065027	0.0196119 (P)
					0.0065063	0.0196689(BC)
ESG_Score	Direct effects	0.06495369***	-	0.02159849	0.0208883	0.1070847 (P)
			0.0011546		0.0249744	0.1095693(BC)

Notes: P: Percentile method; BC: Bias-corrected method

Conclusion

This study confirms the importance of improving ESG performance for modern enterprises to achieve sustainable development and effective economic management. It provides particular evidence from emerging economies. This value-enhancing effect of ESG performance persists even after robustness tests with proxy variable substitution. Furthermore, further mechanism testing indicates that green innovation mediates the relationship between firm value and ESG performance to some extent, with consistent results obtained through both bootstrap tests and robustness tests with explanatory variable substitution. Therefore, our findings confirm that the implementation of corporate ESG strategies not only directly promotes firm value creation but also, by promoting green innovation, accelerates green transformation, enhances market competitiveness, and contributes to long-term value growth and the achievement of sustainable development goals.

This research is crucial for advancing ESG initiatives and green transformation within emerging economies, optimizing ESG and green innovation policies, and promoting ESG-related investment. Promoting corporate green transformation, attracting socially responsible investment, and achieving sustainable economic growth all rely on enhancing corporate ESG awareness. Governments can simultaneously improve ESG information disclosure systems and optimize relevant ESG policies to better encourage companies to make ESG strategic choices and achieve high-quality economic development.

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