

Corporate ESG, Investment Efficiency and Financial Performance

Kunkun Lu^{1*}, Minxue Gong²

{lu_kun_kun@163.com ^{1*}, gentlegmx@163.com ²}

Shenzhen University WeBank Institute of Fintech, Shenzhen University, Shenzhen, China

Abstract. Environmental, social, and corporate governance (ESG) has become an important source of the corporate risk and can impact a firm's financial performance and profitability. Drawing on ESG and stakeholder theory, our study suggests that ESG enhances corporate financial performance. And investment efficiency has a mediating role in the relationships between ESG and corporate financial performance. Moreover, higher levels of environmental disclosure strengthen the impact of ESG on performance, whereas lower levels of environmental disclosure weaken this relationship. Our predications receive strong support from the results we derive using a longitudinal dataset on Chinese listed firms for the period running from 2009 through 2021. These findings contribute to a more nuanced understanding of the role of ESG in firm performance and provide relevant suggestions for regulators, firms, and investors.

Keywords: ESG performance; Financial performance; Investment efficiency; Environmental governance disclosure quality

1 Introduction

ESG, covering environmental, social, and corporate governance, is crucial for firms in production and operations. ESG disclosure involves issuers releasing comprehensive, timely, and accurate environmental, social, governance, and financial data within a legal framework. This information aids in determining investment value and protects shareholders' and creditors' rights. How to realize the common development of economic and social benefits has become a problem that must be faced.

Research indicates that as a firm's environmental, social, and governance (ESG) performance improves, its firm value tends to increase ^[1]. Enhancing ESG can contribute to improved financial performance by alleviating financing constraints on the firm ^[2]. This aids in rational fund allocation, guiding their flow and reducing inefficient investments, thereby enhancing investment efficiency. Good ESG performance benefits multiple stakeholders by alleviating business finance restrictions and protecting small to medium-sized investors from management opportunism or shareholder abuse. This helps with sensible money allocation by directing their flow and decreasing unproductive investments, hence improving investment efficiency. Notably, the improvement of investment efficiency will also significantly enhance the firm performance ^[3]. However, the specific impact of ESG on financial performance remains inadequately explored in China.

Therefore, this study conducts an empirical study on the relationship between firm ESG performance and financial performance using a sample of Chinese A-share listed firms from 2009 to 2021. It explores how investment efficiency acts as a key pathway from ESG to financial performance, and analyzes how the quality of environmental governance disclosure moderates this relationship within a firm's internal information environment. The evidence supports the need for firms to enhance their ESG practices, aiding regulators in refining disclosure systems and guiding firms toward proactive and improved disclosures.

2 Theoretical foundation and hypotheses

First, the firm's social responsibility weighs stakeholders' benefits alongside economic gains. Stakeholder theory holds that the behavior of firms contributing to society while considering their own development not only builds a good social reputation for the firm, but also maintains a friendly relationship with stakeholders. Strong ESG performance helps businesses earn support and trust from stakeholders like the government and the public, and thus improves firm performance. Conversely, negative events can lead to social condemnation and erode firm value.

Second, firms' active fulfillment of ESG not only helps mitigate the agency problem between management and shareholders and enhance governance efficiency, but also improves productivity^[4], thus improving firm performance. With effective external governance mechanisms, the pressure of external monitors helps to motivate firms to standardize their behavior. Furthermore, organizations that share ESG information are more transparent, decrease investment risks, and meet the risk aversion preferences of investors^[5]. Studies have shown that institutional investors will pay attention to the ESG performance of firms and form certain shareholding preferences when looking for investment opportunities^[6], which also suggests that ESG performance may enhance firms' financial performance. Therefore, we hypothesize:

Hypothesis 1: Corporate ESG performance positively affects financial performance.

The impact of ESG scores on firms can be reflected in the internal governance of firms, and ESG may ultimately affect firms' financial performance through the transmission of the internal information environment pathway. A firm's investment decision is a key aspect of management and has a significant impact on the firm's performance and long-term development. We propose that ESG performance can improve the investment efficiency and thus improve the financial performance of firms. Strong ESG performance aids investment efficiency by addressing agency problems that lead to inefficient investment behaviors like under or overinvestment^[7]. This is achieved through effective governance mechanisms that supervise executives and by reducing free cash flow, prompting more prudent investment decisions^[8]. Overall, robust ESG performance mitigates agency problems and promotes better investment decisions, boosting investment efficiency in firms.

Alternatively, enhanced investment efficiency can elevate firms' financial performance. Overinvestment or underinvestment hampers firm progress^[9]. ESG implementation may boost firms' value and financial performance by rectifying these inefficient investment behaviors, thereby enhancing overall investment efficiency. Therefore, we propose the following:

Hypothesis 2: Investment efficiency mediates the relationship between firms' ESG performance and financial performance.

The effect of economic improvement due to the ESG performance of a firm is to some extent influenced by the internal information environment. Information disclosure is crucial for firms to communicate their internal operations to the market, minimizing information gaps between the firm and stakeholders ^[10]. The quality of environmental governance disclosure refers to the degree of environmental information disclosure caused by relevant decisions within a firm ^[11].

Disclosure of environmental governance can bring considerable benefits to firms themselves. Several studies have found that firms' disclosure of environmental information governance can reduce their cost of equity capital ^[12], increase expected cash flows, and enhance firm value. In addition, from a social reputation perspective, corporate disclosure of environmental governance information will trigger extensive attention from media organizations and improve firm social reputation ^[13]. Hence, we hypothesize:

Hypothesis 3: Environmental governance disclosure quality positively moderates the impact of firms' ESG performance on financial performance.

3 Data and methodology

3.1 Sample selection

We test our hypotheses using Chinese A-share listed companies' data from 2009 to 2021, utilizing ESG ratings from the WIND database and financial data from the CSMAR database. This study applies the following treatments to the data: (1) financial firms are eliminated; (2) samples such as ST or *ST are eliminated; (3) missing values of the regression variables are eliminated; (4) in order to reduce the impact of outliers, this paper performs the upper and lower 1% shrinkage of the main continuous variables and finally obtains 26,984 sample data.

3.2 Main variables

Corporate financial performance is measured by earnings per share (EPS) ^[14]. EPS is an important financial indicator of a company's operating results, and its size not only reflects the profitability of the firm but also affects the investment decisions of investors. In general, the higher the ratio, the more profit it generates and the better the stock market performance. Although stock prices can be affected by macro factors and institutional manipulation, EPS can reflect the profitability of a firm from the perspective of shareholders and other investors. To assess the impact of ESG on financial performance, we use a one-year lagged variable.

Corporate ESG Performance (ESG). We adopt the CSI ESG rating indicators to measure corporate ESG performance ^[15]. The CSI ESG rating system spans nine grades from AAA to C, representing scores from 9 to 1. This system measures a firm's ESG performance, where higher scores indicate superior ESG performance.

Investment efficiency. The residuals obtained from the regression of model (1) measure the level of firms' inefficient investment ^[16].

$$\begin{aligned}
 Invest_{i,t} = & \delta_0 + \delta_1 Growth_{i,t-1} + \delta_2 Size_{i,t-1} + \delta_3 Lev_{i,t-1} + \delta_4 Age_{i,t-1} + \delta_5 Return_{i,t-1} \\
 & + \delta_6 Cash_{i,t-1} + \delta_7 Invest_{i,t-1} + \sum Year + \sum Industry \\
 & + \varepsilon_{i,t}.
 \end{aligned} \tag{1}$$

Where Invest is calculated as (Expenditures for assets - Net cash from asset disposals - Asset depreciation) divided by Total assets at year-end. Other control variables include firm growth, size, leverage level, firm age, annual return on the firm's stock, cash as a percentage of total assets. The model (1) regression yields a residual indicating the variance between actual and expected investment spending. The absolute value of these residuals signifies the firm's inefficiency level. Thus, investment efficiency (INV) inversely correlates with the inefficient investment index—the higher INV, the greater the firm's investment efficiency.

Environmental governance disclosure quality (EDQ). It draws from six dimensions in the company's environmental and governance disclosure table: addressing waste gas, wastewater, dust, fume management, solid waste utilization, noise, light pollution, radiation, and cleaner production implementation^[17]. Data for each aspect is categorized as 0 for no description, 1 for qualitative description, or 2 for quantitative description. The scores across indicators sum up to derive the total EDQ score, where higher scores indicate better environmental governance disclosure quality.

Control variables and industry and year fixed effects are included in our research design to address endogeneity concerns. We select control variables from three aspects: firm's basic characteristics, financial status and internal governance status. Time-fixed and industry-fixed effects are also incorporated to account for unchanging factors across time and industry. The variables are described in Table 1.

Table 1. Variable definitions.

Variable	Definition
EPS	Net profit / total shares
ESG	According to the CSI ESG rating from low to high, the assigned value is 1~9.
INV	According to the absolute value of the residuals obtained from the regression of model (1), the Taking the opposite number
EDQ	Sum of environmental governance disclosure scores
Age	Firm age
Lev	Total debt / total assets
Tobin Q	Market capitalization plus liabilities divided by total assets
Cash	cash divided / total assets
Growth	(current year's business revenue / previous year's business revenue) - 1
Dual	1 if the chairman and general manager are held by the same person, otherwise 0
Board	ln(Number of Directors)

3.3 Regression model

3.3.1 Benchmark model

Our primary regression model examines the impact of ESG on financial performance (EPS). After the Hausman test, we use a fixed effects regression model that controls for both time (Year) and industry (Industry) fixed effects. The following regression model applies for our hypotheses:

$$EPS_{i,t} = \alpha_0 + \alpha_1 ESG_{i,t} + \sum Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (2)$$

3.3.2 Mediating effect model

This study empirically examines how ESG factors influence financial performance through an impact mechanism test. To examine the mediating effect of investment efficiency, we set up the following model to test it using the Bootstrap method.

$$EPS_{i,t} = \varphi_0 + \varphi_1 ESG_{i,t} + \sum Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (3)$$

$$INV_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \sum Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (4)$$

$$EPS_{i,t} = \varphi'_0 + \varphi'_1 ESG_{i,t} + \varphi'_2 Mediator_{i,t} + \sum Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (5)$$

3.3.3 Moderating effect model

In order to explore the moderating effect of firms' environmental disclosure on firms' ESG performance and financial performance, we introduce the degree of environmental disclosure as a moderating variable and construct a model (6):

$$EPS_{i,t} = \gamma_0 + \gamma_1 ESG_{i,t} + \gamma_2 EDQ_{i,t} + \gamma_3 ESG_{i,t} \times EDQ_{i,t} + \sum Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (6)$$

Where the coefficient γ_2 indicates the quality of environmental governance disclosure of the sample firms, and the cross multiplier coefficient γ_3 represents the degree and direction of the impact of the quality of firms' environmental governance disclosure on ESG in order to test Hypothesis 3.

4 Empirical results

4.1 Descriptive statistics

Table 2 displays the correlation matrices and descriptive statistics for the variables. The EPS variance of 0.56, surpassing the mean of 0.37, highlights significant differences among firms. ESG ratings average 4.08 with a variance of 1.02, placing the sample firms within the B~BB range. The mean EDQ for environmental governance disclosure is 1.61, indicating generally low disclosure levels.

Table 2. Descriptive Statistics and Correlations.

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1.EPS	0.37	0.56	1.00										
2.ESG	4.08	1.02	0.26***	1.00									
3.INV	-0.03	0.03	0.02***	0.06***	1.00								
4.EDQ	1.61	2.46	0.10***	0.21***	0.01	1.00							
5.Age	17.36	5.63	-0.02***	-0.04***	0.11***	0.06***	1.00						
6.Lev	0.44	0.21	-0.12***	-0.07***	0.07***	0.08***	0.14***	1.00					
7.Tobin Q	2.09	1.38	0.02***	-0.15***	-0.10***	-0.13***	-0.03***	-0.24***	1.00				
8.Cash	0.05	0.07	0.31***	0.09***	-0.06***	0.12***	-0.01	-0.18***	0.09***	1.00			
9.Growth	0.18	0.45	0.19***	-0.02***	-0.01	-0.04***	-0.05***	0.04***	0.02***	0.02***	0.02**	1.00	

10.Dual	0.26	0.44	0.02**	-0.03***	-0.04***	-0.07***	-0.08***	-0.14***	0.07***	-0.01	0.02** *	1.00
11.Board	2.14	0.20	0.06***	0.04***	0.02***	0.14***	0.01	0.15***	-0.13***	0.04** *	-0.01**	-0.18***

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

4.2 Regression results

We report the results in Table 3. Model 1 does not contain control variables. Model 2 adds adjustment. Model 3 adds industry and year fixed effects. Models 3-5 examine the mediating effect of investment efficiency. Model 6 examines the adjustment effect.

Hypothesis 1 predicts that firms with higher ESG performance will perform better. In Model 3, ESG information significantly and positively impacts business information (b=0.124, p<0.01), confirming Hypothesis 1. This underscores that greater transparency in a firm's ESG information contributes to enhancing financial performance.

Hypothesis 2 suggests investment efficiency mediates between ESG and financial performance. Models 3-5 report the test results of the mediating variables. Model 3 mirrors the benchmark result. Model 4 shows a significant ESG link to investment efficiency (b=0.001, p<0.01). Model 5 incorporates both variables, revealing a positive and significant effect of investment efficiency on EPS (b=0.361, p<0.01). This implies higher EPS with better investment efficiency. Notably, ESG maintains a significant positive impact (b=0.124, p<0.01) in Model 5, affirming the mediating role of investment efficiency.

Hypothesis 3 suggests that environmental governance disclosure quality strengthens the positive effects of ESG on performance. In Model 6, the interaction between EDQ and ESG has a positive effect (b=0.003, p<0.01), which supports hypothesis 3.

Table 3. Regression analysis.

	EPS Model1	EPS Model2	EPS Model3	INV Model4	EPS Model5	EPS Model6
ESG	0.142*** (43.81)	0.129*** (41.82)	0.124*** (39.39)	0.001*** (7.24)	0.124*** (39.19)	0.118*** (36.19)
INV					0.361*** (3.85)	
EDQ						0.009*** (6.44)
ESG×EDQ						0.003*** (2.74)
Age		0.001*** (2.58)	-0.001 (-1.06)	0.000*** (9.75)	-0.001 (-1.29)	-0.001 (-1.33)
Lev		-0.186*** (-11.84)	-0.252*** (-14.98)	0.003*** (2.74)	-0.253*** (-15.04)	-0.268*** (-15.83)
Tobin Q		0.005** (2.12)	0.012*** (4.93)	-0.002*** (-11.74)	0.013*** (5.19)	0.013*** (5.05)
Cash		2.168*** (48.24)	2.162*** (47.10)	-0.014*** (-4.58)	2.167*** (47.20)	2.136*** (46.41)
Growth		0.245*** (35.78)	0.237*** (34.89)	-0.000 (-0.19)	0.237*** (34.90)	0.238*** (35.10)

Dual		0.026***	0.024***	-0.002***	0.025***	0.025***
		(3.58)	(3.33)	(-4.21)	(3.43)	(3.55)
Board		0.150***	0.156***	0.003**	0.155***	0.146***
		(9.51)	(9.75)	(2.56)	(9.69)	(9.09)
Constant	-0.210***	-0.584***	-0.525***	-0.047***	-0.508***	-0.484***
	(-15.36)	(-15.02)	(-13.33)	(-18.49)	(-12.82)	(-12.22)
Year and Industry dummies	No	No	Yes	Yes	Yes	Yes
R2 (adj.)	0.066	0.193	0.231	0.058	0.231	0.233
Observations	26984	26984	26983	26983	26983	26983

Standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1 (two-tailed)

4.3 Robustness Tests

High-performing firms tend to allocate more resources to enhance ESG performance, causing potential endogeneity issues in this study. We use the mean ESG performance within regions and industries as an instrumental variable. Using the two-stage least squares method, our first-stage analysis confirms the instrumental variable's significance (b=0.11, p<0.01), validating its effectiveness. In the second stage, the coefficient for firms' ESG performance (derived from the first stage) is 0.167 (p<0.01), significantly impacting financial performance.

5 Conclusions

This study examines data from 2009 to 2021 from China's A-share listed firms to explore how ESG performance influences corporate financial performance. Our findings reveal a strong positive relationship between ESG performance and a firm's earnings per share. In today's market landscape, effective ESG performance can enhance a firm's financial standing with enduring, long-term effects. ESG can enhance a firm's financial performance by making it more efficient to invest. In addition, the impact of ESG performance on corporate financial performance is more obvious in firms with higher quality environmental governance disclosure, but this effect is weaker in firms with lower quality environmental governance disclosure.

Our findings offer several important implications for managers and policymakers. Firms must proactively enhance ESG performance for sustained financial benefits, prioritizing long-term goals over short-term gains. Second, policymakers should enforce standardized ESG disclosure rules, guiding firms towards uniform environmental standards. Moreover, it is also necessary to strongly support and develop ESG rating agencies, optimize the third-party certification mechanism, and strengthen the supervision of corporate environmental governance disclosure.

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