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| RESEARCH ARTICLE

ESG in Promoting Sustainable Development of Manufacturing Companies in China's Selected a-share Listed Companies: A Proposed Financial Mathematical Model

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| ABSTRACT
In this study, the researcher proposes seven SOPs for the research objects, and establishes four basic assumptions on this basis, always focusing on the main line of how much ESG affects the sustainable development of manufacturing enterprises in China's A-share market. The four basic hypotheses correspond to the four dimensions of enterprise value, operation efficiency, business risk and investor reaction, and carry out empirical analysis, and draw their own research conclusions. It is verified that ESG promotes the construction of sustainable development ability of manufacturing enterprises in China's A-share market, and empirical evidence is also provided. In addition, these test results are through models' regression demonstrated financial model, the basis of the four basic models provide the foundation data analysis of mathematical logic. The final conclusion supports the thesis that ESG promotes the sustainable development of manufacturing enterprises. The research conclusions of this paper are as follows: a. ESG performance has a significant positive relationship with the value of manufacturing enterprises; b. ESG performance has a significant positive relationship with the operational efficiency of manufacturing enterprises; c. There is a significant negative relationship between ESG performance and business risk of manufacturing enterprises; d. ESG performance has a significant positive relationship with investor reaction (investor preference) of manufacturing enterprises.

| KEYWORDS

ESG, enterprise value, operational efficiency, business risk, investor reaction

| ARTICLE INFORMATION

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1 Introduction

1.1 Background of the Study

Traditional Chinese ethics offer a comprehensive framework for interpersonal and environmental relationships. In the last twenty years, environmental, social, and governance (ESG) has emerged as an essential ethical framework in modern economy. The ESG concept is congruent with ancient Chinese ethics, since both promote the pursuit of a healthy relationship between corporations, nature, and society (Shen, H., 2023).

Currently, China has implemented the "14th Five-Year Plan for High-quality Development of the Manufacturing Industry," which delineates the strategic direction and explicit needs for the advancement of the manufacturing sector (Zhang, C., 2022). Amid the dual context of expediting the establishment of a new development paradigm and achieving the "double carbon" objective, hastening the transformation and enhancement of the manufacturing sector is both a prevailing trend and aligned with the demands of sustainable economic advancement.

Consequently, fostering the sustainable development of enterprises remains a perpetual subject of discourse. The current literature has little empirical studies on sustainable development, primarily because most works concentrate on certain facets of

the subject，such as financial performance, enterprise value, business risk, etc. Does strong financial performance correspond to sustainability? The response is negative; thus, there is an urgent necessity for a comprehensive, validated framework for sustainable development. Consequently, this document presents the subsequent thorough Standard Operating Procedures for sustainable growth.

1.2 Relevant Literature

Among the four criteria through which ESG performance enhances corporate sustainability development, namely enterprise value, operational efficiency, operational risk, and investor response, The literature regarding enterprise value is the most comprehensive. Research on the manufacturing sector is rather limited within the domain of industrial characteristics.

Bai X. Et al. (2022) investigated the potential of ESG practices to generate value for organizations. The researchers employed the panel regression model and panel Logit model to analyze the shareholding ratio of institutional investors, utilizing data from 3,400 A-share listed businesses in Shanghai and Shenzhen from 2013 to 2020. Examine the influence of ESG performance on corporate value. ESG is identified as having a value-creation role. Regarding variable selection, they incorporated the "institutional investor shareholding ratio" and included the dummy variables for "individual fixed effect" and "year fixed effect," representing their innovative methodology.

Chen, J. (2023) has looked at the impact that enterprise ESG performance has on process outcomes. Sustainability and the economic process that integrates it. Based on China's A-share listed companies from 2011-2020, the DEA-BCC-modelled comprehensive benefit value is the dependent variable, while the overall Bloomberg ESG score and component responsibility score are the independent variables, with enterprise cash flow acting as the moderator. The fixed effects panel model was used after subjecting the data to the Hausmann test. This paper aims to analyze the effect of ESG performance on corporate efficiency.

The ESG performance of companies is crucial for expediting green transformation and collaboratively advancing the objectives of high-quality economic development and superior ecological conservation. Tu, S., et al. (2023) conducted an empirical investigation on the influence mechanism of ESG performance on business risk, utilizing a sample of Shanghai-Shenzhen A-share listed companies from 2010 to 2021. ESG performance mitigates business risks by diminishing knowledge asymmetry and relieving agency conflicts, with a more pronounced benefit shown in small firms and those with high pollution levels.

In the context of global resource scarcity and increasing environmental challenges, Liu, P. (2020) incorporated environmental, social, and governance factors into the investment decision-making process to promote the development of green economic initiatives, a consensus supported by enterprises and investors at all levels. This article empirically examines the impact of publicly traded companies' ESG ratings on stock excess returns from the perspective of investor sentiment. The study demonstrates a favorable correlation between ESG grade and excess stock return. Publicly traded companies possessing an ESG rating have superior excess returns relative to those lacking such a rating.

1.3 Research Methodology

This article mostly employs empirical analysis. The investigation into the internal mechanisms of ESG as they pertain to the sustainable development capabilities of enterprises is predominantly unidimensional, drawing from extensive literature that examines the influence of ESG on financial performance, its effect on enterprise value, and the enhancement of operational efficiency through ESG initiatives. These unidimensional studies are insufficient to demonstrate the enhancement of firms' sustainable development capacity. The capacity for sustainable growth includes enhancing corporate value, increasing operational efficiency (including innovation), attracting external investors (for publicly traded enterprises), and mitigating business risks. A thorough evaluation is more persuasive. This paper's theoretical approach incorporates enterprise value, operational efficiency, and business risk as internal dimensions, while investor reaction (investor preference) is considered an external dimension.

1.4 Source of Data

This study utilizes panel data from 1008 publicly listed manufacturing firms in China's A-share market, covering the period from 2010 to 2019. The primary data utilized consists of financial information released by publicly listed firms, sourced from China's Wind database and Guotai'an database, encompassing metrics such as Tobin's Q, return on assets (ROA), and equity concentration. This study performed the following data processing on all samples to assure the validity of the empirical analysis results:

a. Eliminate ST and *ST samples to mitigate the bias introduced by the substantial debt of unprofitable firms.
b. Samples containing a greater number of missing and outlier values were eliminated.
c. The extreme values are eliminated, and Winsorization is applied to continuous variables at the 1st and 99th percentiles.

1.5 Hypotheses

A plethora of literary works pertains to unidimensional impact analyses concerning ESG, enterprise value, financial performance, high-quality development, and information sharing. Empirical research on ESG's facilitation of sustainable development in publicly traded companies is scarce. Developing the framework for enterprise sustainable growth is a multi-faceted model, and it is erroneous to rely just on a single dimension of indicators to examine a unilateral influence. This paper endeavors to provide a multi-dimensional and multi-perspective research framework.

Based on this, this paper proposes four basic assumptions:

$H_0$1: ESG performance does not significantly affect the value of manufacturing enterprises.

$H_0$2: ESG performance does not significantly affect the operational efficiency of manufacturing enterprises.

$H_0$3: ESG performance does not significantly affect the business risk of manufacturing enterprises.

$H_0$4：ESG performance does not significantly affect the investor reaction of manufacturing enterprises.

2 Empirical analysis

2.1 Model Design

In total, there are four explained variables, which are enterprise value (Tobin Q, ROA), operational efficiency (OE), business risk (DOL), and investor reaction (Invest). One explanatory variable is enterprise ESG performance (ESG). Nine control variables, they are enterprise size (Size), enterprise age (Age), debt to asset (Debt), cash ratio (Cashflow), Growth (Growth), return on assets (ROA), ownership concentration (Top) and proportion of independent directors (Indep).

2.1.1. Relationship between ESG and enterprise value

$$\mathrm{TobinQ}_{it} = \alpha + \beta_1 \mathrm{Size}_{it} + \beta_2 \mathrm{Age}_{it} + \beta_3 \mathrm{Debt}_{it} + \beta_4 \mathrm{Cashflow}_{it} + \beta_5 \mathrm{Growth}_{it} + \varepsilon_{it} \text{(Model2.1）}$$

$$\mathrm{TobinQ}_{it} = \alpha + \beta_1 \mathrm{ESG}_{it} + \beta_2 \mathrm{Size}_{it} + \beta_3 \mathrm{Age}_{it} + \beta_4 \mathrm{Debt}_{it} + \beta_5 \mathrm{Cashflow}_{it} + \beta_6 \mathrm{Growth}_{it} + \varepsilon_{it} \text{(Model2.2)}$$

Model1.1 is a regression equation of explained variables and several control variables, and Model2.2 introduces explanatory variable enterprise ESG performance on the basis of Model2.1.

2.1.2 Relationship between ESG and Operational Efficiency

$$\mathrm{OE}_{it} = \alpha + \beta_1 \mathrm{Size}_{it} + \beta_2 \mathrm{Age}_{it} + \beta_3 \mathrm{Debt}_{it} + \beta_4 \mathrm{ROA}_{it} + \beta_5 \mathrm{Growth}_{it} + \varepsilon_{it} \text{(Model2.3)}$$

$$\mathrm{OE}_{it} = \alpha + \beta_1 \mathrm{ESG}_{it} + \beta_2 \mathrm{Size}_{it} + \beta_3 \mathrm{Age}_{it} + \beta_4 \mathrm{Debt}_{it} + \beta_5 \mathrm{ROA}_{it} + \beta_6 \mathrm{Growth}_{it} + \varepsilon_{it} \text{(Model2.4)}$$

Model2.1 is a regression equation of explained variables and several control variables. Model2.4 introduces explanatory variable enterprise ESG performance based on Model2.3.

2.1.3 Relationship between ESG and business risk

$$\mathrm{DOL}_{it} = \alpha + \beta_1 \mathrm{Size}_{it} + \beta_2 \mathrm{Debt}_{it} + \beta_3 \mathrm{Top}_{it} + \beta_4 \mathrm{Indep}_{it} + \varepsilon_{it} \text{(Model2.5)}$$

$$\mathrm{DOL}_{it} = \alpha + \beta_1 \mathrm{ESG}_{it} + \beta_2 \mathrm{Size}_{it} + \beta_3 \mathrm{Debt}_{it} + \beta_4 \mathrm{Top}_{it} + \beta_5 \mathrm{Indep}_{it} + \varepsilon_{it} \text{(Model2.6)}$$

Model3.1 is a regression equation of explained variables and several control variables. Model2.6 introduces enterprise ESG performance of explanatory variables on the basis of Model2.5.

2.1.4 Relationship between ESG and Investor Reaction

$$\mathrm{Invest}_{it} = \alpha + \beta_1 \mathrm{Size}_{it} + \beta_2 \mathrm{Age}_{it} + \beta_3 \mathrm{ROA}_{it} + \beta_4 \mathrm{Top}_{it} + \beta_5 \mathrm{Growth}_{it} + \varepsilon_{it} \text{(Model2.7)}$$

$$\mathrm{Invest}_{it} = \alpha + \beta_1 \mathrm{ESG}_{it} + \beta_2 \mathrm{Size}_{it} + \beta_3 \mathrm{Age}_{it} + \beta_4 \mathrm{ROA}_{it} + \beta_5 \mathrm{Top}_{it} + \beta_6 \mathrm{Growth}_{it} + \varepsilon_{it} \text{(Model2.8)}$$

To verify the impact of ESG performance of listed manufacturing enterprises in China on investor performance, Model2.7 is the basic regression equation of explained variables and several control variables. Model2.8 introduces ESG performance of explanatory variables on the basis of Model2.7.

2.2 Empirical analysis of the impact of ESG performance on enterprise value

2.2.1 Descriptive statistics of ESG and enterprise value

Table 2.1: Descriptive statistical table of ESG and enterprise value

Variable	Mean	Std. Dev.	Min	Max	Observations
TobinQ	2.1498	1.1191	1.0162	5.1962	10058
ROA	0.0363	0.0544	-0.0919	0.1410	10058
ESG	2.8363	1.5106	1.0000	9.0000	10058
Size	22.2560	1.0748	20.5365	24.4894	10058
Age	2.4400	0.5604	1.3863	3.2581	10058
Debt	0.4136	0.1846	0.1144	0.7479	10058
Cashflow	20.2900	1.2277	18.1638	22.7989	10058
Growth	0.1207	0.2333	-0.2737	0.6679	10058

The highest score of ESG performance of the sample enterprises is 9 points, the lowest score is 1 point, and the average score is 2.8363 points, the overall ESG score is low, and compared with the average of the subsector, it is also in line with the average level. In contrast to regression, the relationship between x and y is subtracted from the effects of all other variables entering the regression equation, that is, if the regression equation contains more than x and y variables, the relevant results will be different from regression. Therefore, the result of regression is more valuable for reference.

The maximum value of TobinQ of the sample enterprises is 5.1962, the minimum value is 1.0162, and the average value is 2.1498. This indicates that the market value of the sample enterprises is higher than their net asset value, and some enterprises' market value is much higher than their net asset value.

The maximum ROA of the sample enterprises is 0.1410, the minimum is -0.0919, and the average is 0.0363. It shows that there is a large difference in profitability among the sample enterprises, and some enterprises' profit performance is lower than their total assets level.

2.2.2 Correlation analysis between ESG and enterprise value

Table 2.2: Correlation analysis table between ESG and enterprise value

Items	TobinQ	ROA	ESG	Size	Age	Lev	Cash	Growth
TobinQ	1							
ROA	0.237***	1						
ESG	0.013**	0.240***	1					
Size	0.397***	0.110***	0.256***	1				
Age	-0.110***	-0.114***	0.007	0.386***	1			
Debt	-0.286***	-0.360***	-0.075***	0.430***	0.323***	1		
Cashflow	0.278***	0.226***	0.271***	0.860***	0.319***	0.251***	1	
Growth	0.086***	0.364***	-0.002	0.066***	-0.144***	-0.018*	0.077***	1

The correlation coefficient between TobinQ and ESG was 0.013, which was significant at 5% level. The correlation coefficient between TobinQ and Size was 0.397, and was significant at 1% level. The correlation coefficient between TobinQ and Age was

0.110, and it was significant at 1% level. The correlation coefficient between TobinQ and Debt was -0.286, which was significant at 1% level. The correlation coefficient between TobinQ and Cashflow was 0.278, and it was significant at 1% level. The correlation coefficient between TobinQ and Growth was 0.086, which was significant at 1% level.

2.2.3 Multicollinearity test between ESG and enterprise value

Table 2.3: Multicollinearity test table between ESG and enterprise value

Variable	VIF	1/VIF
Size	4.92	0.2032
Cashflow	4.14	0.2417
Debt	1.41	0.7101
Age	1.27	0.7896
ESG	1.13	0.8841
Growth	1.04	0.9585
Mean VIF	2.32	

The aforementioned table demonstrates that the inflation factors for the explanatory variable ESG and various control variables are all below 5, signifying an absence of significant correlation among the variables, thereby indicating no severe collinearity issue. Consequently, the data utilized in this study is valid and suitable for further empirical analysis.

2.2.4 Model examination of the relationship between ESG and enterprise value

Table 2.4: LM test and Hausman test list

Model	Test	Chi2	P
Model1.1	LM	8087.86	0.000
Model1.1	Hausman	126.12	0.000
Model1.2	LM	8259.02	0.000
Model1.2	Hausman	132.55	0.000

LM test result of Model2.1 is, Chi2 value is 8087.86, P value is 0.000, indicating that random effect is better than mixed regression. The result of Hausman test is that the Chi2 value is 126.12 and the P value is 0.000, indicating that the fixed effect is superior to the random effect. Model2.1should adopt fixed effects model.

LM test results of Model2.2 are as follows: Chi2 value is 8259.02 and P value is 0.000, indicating that random effect is superior to mixed regression. The result of Hausman test is that the Chi2 value is 132.55 and the P value is 0.000, indicating that the fixed effect is superior to the random effect. Model2.2 should adopt fixed effects model. To sum up, all models in this section will adopt the fixed-effect model for regression.

2.2.5 Fundamental regression results between ESG and enterprise value

Table 2.5: Table of basic regression results between ESG and enterprise value

Items	Model2.1	Model2.2
	TobinQ	TobinQ
ESG		0.0319***
		(4.58)
Size	0.5848***	0.5981***
	(19.91)	(20.29)
Age	0.0549***	0.0926***
	(2.61)	(2.64)
Debt	-0.0614***	-0.0581***
	(-2.67)	(-2.63)
Cashflow	0.0851***	0.0894***
	(4.89)	(5.13)
Growth	0.3185***	0.3284***
	(9.11)	(9.39)
_cons	13.2907***	13.3167***
	(29.13)	(29.22)
Industry	Yes	Yes
Year	Yes	Yes
R^2	0.487	0.489
adj. R^2	0.305	0.313
F	172.9553	147.9387
N	10058	10058

t statistics in parentheses

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

The regression coefficient for Size is 0.5848, with a T-value of 19.91, significant at the 1% level. The regression coefficient for Age is 0.0549, with a T-value of 2.61, significant at the 1% level. The regression coefficient for Debt is -0.0614, with a T-value of 2.61, significant at the 1% level. The regression coefficient for Cashflow is 0.0851, with a T-value of 4.89, significant at the 1% level. The regression coefficient for Growth is 0.3185, with a T-value of 9.11, significant at the 1% level.

Model 2.2 builds on Model 2.1 by adding ESG performance as an explanatory variable. The regression coefficient for ESG is 0.0319, with a T-value of 4.58, significant at the 1% level. This demonstrates a strong positive relationship between ESG performance and enterprise value in listed manufacturing firms in China.

2.2.6 Robustness test between ESG and enterprise value

To test the robustness of the baseline regression results, TobinQ was replaced by ROA based on Model2.2.

$$ROA_{it} = \alpha + \beta_1 ESG_{it} + \beta_2 Size_{it} + \beta_3 Age_{it} + \beta_4 Debt_{it} + \beta_5 Cashflow_{it} + \beta_6 Growth_{it} + \varepsilon_{it}$$

In this section, the robustness test is carried out by replacing control variables, and the ROA index is used to replace TobinQ index for regression. The specific regression results are shown in Table 2.6.

Table 2.6: Robustness test table between ESG and enterprise value

Items	Model1.3
	ROA
ESG	0.0006*
	(1.75)
Size	0.0003**
	(2.23)
Age	0.0155***
	(9.46)
Debt	-0.1270***
	(-29.66)
Cashflow	0.0102***
	(12.58)
Growth	0.0673***
	(41.18)
_cons	-0.0946***
	(-4.44)
Industry	Yes
Year	Yes
R^2	0.278
adj. R^2	0.197
F	581.3875
N	10058

t statistics in parentheses

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

As can be seen from the regression results of Model, the regression coefficient of ESG is 0.0006, and the T-value is 1.75, which is significant at the level of 10%, basically consistent with the regression results of basic regression Model2.2, so this paper believes that the baseline regression results pass the robustness test. To sum up, the better the ESG performance of Chinese listed enterprises, the higher their enterprise value, rejecting the hypothesis of $H_0$1.

2.3 Empirical analysis of the impact of ESG performance on operational efficiency

This paper is part of the content selected based on the author's doctoral thesis. Due to space limitations, the analysis other than basic regression analysis will not be presented in the following three dimensions.

Table 2.7: Table of basic regression results between ESG and operational efficiency

Items	Model2.3	Model2.4
	OE	OE
ESG		0.0047**
		(2.25)
Size	0.0067	0.0053
	(0.11)	(0.09)
Age	-0.0453	-0.0398
	(-0.48)	(-0.41)
Debt	-0.5555**	-0.5557**
	(-2.15)	(-2.15)
ROA	4.5831***	4.5869***
	(7.52)	(7.52)
Growth	0.2496**	0.2483**
	(2.40)	(2.38)
_cons	-0.3436	-0.3411
	(-0.28)	(-0.27)
Industry	Yes	Yes
Year	Yes	Yes
R^2	0.047	0.049
adj. R^2	0.035	0.038
F	91.8470	97.8816
N	10058	10058

t statistics in parentheses

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

Model2.3 presents the regression results of the operational efficiency of OE, incorporating the control variable and the dependent variable. The results indicate that the regression coefficient for Size is 0.0067, with a T-value of 0.11, which lacks significance.

The value of the regression coefficient for Age was estimated as -0.0453 and the T value of Age was also -0.48 showing that this variable is insignificant.

The regression coefficient for Debt was -0.5555, and the T-value was 2.15, significant at the 5% level. The data indicates that a lower asset-liability ratio in listed manufacturing businesses in China correlates with diminished operational efficiency.

The regression coefficient for ROA is 4.5831, with a T-value of 7.52, indicating significance at the 1% level.

The regression coefficient for Growth is 0.2496, with a T-value of 2.40, indicating significance at the 5% level. Model2.3 is a regression model derived from Model2.1, incorporating the explanatory factors related to corporate ESG performance presented in this paper. The regression coefficient of ESG in Model 2.2 is 0.0047, with a T-value of 2.25, indicating a significant positive connection at the 5% level.

2.4 Empirical analysis of the impact of ESG performance on business risk

Table 2.8: Table of basic regression results between ESG and business risk

Items	Model2.5	Model2.6
	DOL	DOL
ESG		-0.0735***
		(-4.52)
Size	-0.1801***	-0.1660***
	(-4.09)	(-3.76)
Debt	4.5908***	4.6206***
	(21.54)	(21.69)
Top	-0.4127**	-0.3800**
	(-2.41)	(-2.22)
Indep	0.3996	0.4695
	(0.66)	(0.78)
_cons	4.4757***	3.9272***
	(4.54)	(3.95)
Industry	Yes	Yes
Year	Yes	Yes
R^2	0.551	0.583
adj. R^2	0.531	0.546
F	122.4684	142.2698
N	10058	10058

t statistics in parentheses

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

Model 2.5 presents the regression results of the Degree of Operating Leverage (DOL) for company risk, using both control and explanatory variables. The results indicate that the regression coefficient for Size is -0.1801, with a T-value of -4.09, which is significant at the 1% level. The regression coefficient for Debt was 4.5908, and the T-value was 21.54, indicating significance at the 1% level. The regression coefficient for Top is 0.4127, with a T-value of 2.41, significant at the 5% level. The regression coefficient for Indep is 0.3996, with a t value of 0.66, indicating insignificance.

Model2.6 is a regression model derived from Model3.1, incorporating the explanatory variables of enterprise ESG performance presented in this paper. The regression coefficient of ESG in Model 3.2 is -0.0735, and the T-value is -4.52, indicating a strong positive connection at the 1% level.

2.5 Empirical analysis of the impact of ESG performance on investor reaction

Table 2.9: Basic regression results analysis table

Items	Model2.7	Model2.8
	Invest	Invest
ESG		0.0191***
		(6.64)
Size	0.7418***	0.7362***
	(80.28)	(79.53)
Age	0.0626***	0.0867***
	(4.36)	(5.87)
ROA	1.1596***	1.1736***
	(13.31)	(13.49)
Top	0.6174***	0.5999***
	(20.56)	(19.95)
Growth	0.0725***	0.0674***
	(4.66)	(4.33)
_cons	5.9235***	5.9407***
	(31.81)	(31.98)
Industry	Yes	Yes
Year	Yes	Yes
R^2	0.577	0.579
adj. R^2	0.530	0.532
F	168.7536	174.4439
N	10058	10058

t statistics in parentheses

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

Model 2.7 presents the regression results of the control variable and the dependent variable, investor performance (Invest). The results indicate that the regression coefficient for Size is 0.7418, with a t value of 80.28, significant at the 1% level. The regression coefficient for Age is 0.0626, with a T-value of 4.36, indicating significance at the 1% level. The regression coefficient for ROA is 1.1596, with a T-value of 13.31, indicating significance at the 1% level.

The regression coefficient for Top is 0.6174, and the T-value is 20.56, indicating significance at the 1% level. The regression coefficient for Growth is 0.0725, and the T-value is 4.66, indicating significance at the 1% level.

Model 2.8 is derived from Model 4.1, which is a regression model with an added explanatory variable: the enterprise's ESG performance level. In Model 4.2, the regression coefficient of ESG is 0.0191 while the T- statistic is 6.64 revealing a positive relationship of ESG at 1% level of significance.

3. Conclusions

This paper proposes seven standard operating procedures (SOPs) for the research subjects and establishes four main assumptions. These assumptions focus on how ESG performance impacts the sustainable development of manufacturing companies in China's A-share market. The four assumptions cover enterprise value, operational efficiency, business risk, and investor response. By conducting empirical analysis, this study confirms that ESG performance enhances the sustainable development of manufacturing firms in China's A-share market. The results also provide evidence to support this conclusion.

To sum up, this paper draws four conclusions:

a. ESG performance has a significant positive relationship with the value of manufacturing enterprises.
b. ESG performance has a significant positive relationship with the operational efficiency of manufacturing enterprises.
c. There is a significant negative relationship between ESG performance and business risk of manufacturing enterprises.
d. ESG performance has a significant positive relationship with investor reaction (investor preference) of manufacturing enterprises.

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