

The Moderating Role of Company Age in the Relationship between ESG Performance and Firm Value in Chinese Transportation Equipment Manufacturing Firms

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Abstract—This paper investigates the moderating effects of company age on the relationship between ESG performance and firm value, focusing on Chinese transportation equipment manufacturing firms. It comprehensively analyzes the impact of ESG on corporate value by considering both integrated ESG scores and individual ESG factor scores. The research findings reveal a positive influence of ESG on firm value. Specifically, the environmental and social dimensions of ESG demonstrate a positive impact on firm value, whereas the governance dimension exhibits a negative effect. Notably, the moderating role of company age is evident in the relationship between overall ESG performance and firm value, as well as the relationship between environmental performance and firm value, both showing a negative moderating effect. However, in the case of the relationships between social performance and governance performance with firm value, company age does not appear to play a significant moderating role. Furthermore, the study highlights the negative moderating effect of company age on the relationship between overall ESG performance and firm value, suggesting that younger firms positively influence corporate performance through more proactive engagement in ESG activities compared to their older counterparts.

Index Terms—Company age, ESG, firm value, moderating role

I. INTRODUCTION

ENVIRONMENTAL, Social, and Governance (ESG) performance is increasingly recognized as a critical factor influencing corporate value. Companies with strong ESG performance can be perceived as more sustainable and ethical, potentially positively impacting corporate value. The impact of ESG performance on corporate value is multifaceted. Effective ESG management often leads to a more stable and supportive environment through maintaining positive relationships with various stakeholders such as employees, customers, investors, and local communities, thereby enhancing corporate value. ESG high-performing companies can secure a competitive advantage, which may translate into increased market share. Strong ESG performance helps companies identify and manage risks associated with environmental, social, and governance

issues, which in turn contributes to financial stability. ESG-sensitive companies often have a stronger reputation and brand value, as well as potential cost savings and operational efficiencies. Companies with a robust ESG profile often find it easier to secure capital on favorable terms. Companies that actively comply with regulations are in a more advantageous position to avoid legal and compliance-related costs, and the adoption of ESG principles often fosters innovation within the firm.

However, there are arguments suggesting that a company's ESG activities may have a negative impact on corporate value. Companies often need to allocate substantial resources to effectively execute ESG initiatives, and in the short term, these expenditures can reduce profitability and potentially diminish corporate value. This can be particularly relevant when investors prioritize short-term returns. Allocating a significant portion of the budget to ESG initiatives may lead to missed investment opportunities that could generate high returns, potentially negatively affecting long-term corporate value.

Numerous prior studies have provided evidence supporting the positive impact of ESG performance on corporate value [1]-[4], whereas there are also studies that have demonstrated its negative impact on corporate value [5]-[6]. Furthermore, there are studies that fail to establish a significant association between ESG activities and corporate value [7]. These varied research outcomes have left the relationship between ESG performance and corporate value inconclusive, with findings oscillating between positive, negative, or mixed results. Consequently, numerous scholars have undertaken investigations to explore the role of various moderating factors in clarifying this relationship. However, research on the moderating role of company age in the relationship between these two variables is notably scarce. As companies undergo changes in their strategic approaches over time, ESG activity transformations may ensue, thereby potentially altering their impact on corporate value. This study assessing the impact of company age on the relationship between ESG performance and corporate value, considering the points mentioned earlier.

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This study contributes to the existing literature on the relationship between ESG performance and corporate value in several ways. Firstly, it strengthens and verifies previous research findings by analyzing the impact of ESG performance on corporate value, both on an integrated ESG dimension and on individual dimensions. Secondly, Inconsistent results regarding the relationship between ESG performance and corporate value raise the need for further analysis. This study expands research on the relationship between ESG performance and corporate value by incorporating an important moderating variable, company age.

II. LITERATURE REVIEW AND HYPOTHESIS

The positive impact of ESG performance on corporate value is expounded upon by various theories and substantiated by empirical evidence. According to stakeholder theory, companies are motivated to efficiently manage the interests of a diverse set of stakeholders, including not only shareholders but also employees, customers, investors, and local communities. Strong ESG initiatives by companies tend to foster positive relationships with stakeholders. Satisfied employees often exhibit higher productivity, loyal customers contribute to increased revenue, and a favorable reputation within the local community can enhance a company's brand. Consequently, this can lead to long-term profitability and an increase in corporate value.

Numerous prior studies have consistently demonstrated a positive correlation between ESG performance and corporate value. Research findings have indicated a positive relationship between high ESG scores and corporate value, suggesting that ESG strengths contribute to an increase in corporate value. ESG performance has been found to have a positive impact on corporate value [1], and ESG composite scores are reported to be positively associated with corporate value [8]. It is suggested that ESG performance significantly influences corporate value enhancement [9]. Previous studies have pointed out that companies with high ESG ratings tend to outperform their competitors in terms of profitability, corporate value, and other relevant metrics. Consequently, persuasive theories and empirical evidence, in conjunction with stakeholder theory and resource-based theory, substantiate the positive influence of ESG performance on corporate value. Companies with high ESG performance often establish stronger stakeholder relationships, leverage valuable resources, and maintain a long-term perspective, all of which contribute to enhancing corporate value. Therefore, the following hypothesis is posited regarding the relationship between ESG performance and corporate value:

Hypothesis 1: ESG performance is positively associated with firm value.

Inconsistent empirical findings regarding the relationship between ESG performance and corporate value, encompassing positive, negative, or non-significant associations, have been reported. Some attribute these inconsistent results to the aggregation and lack of discrimination among various ESG activities [9]. Corporate environmental initiatives are viewed as opportunities for performance enhancement and can lead to cost reduction and risk mitigation [10]-[12]. Moreover, improvements in performance through environmentally friendly business opportunities are expected to enhance overall corporate performance [13]-[14]. Therefore, the following hypotheses are posited concerning the relationship between environmental activities and corporate value:

Hypothesis 1a: Environmental performance (E) is positively associated with firm value.

It is well-established that companies achieving positive relationships with various stakeholders through social activities tend to attain higher financial performance. Numerous international organizations have adopted various international standards to promote Corporate Social Responsibility (CSR) activities [15]. A company's social activities are considered a crucial foundation of competitive advantage and a key element of corporate strategy [11], [16]. Furthermore, compliance with laws and regulations related to a company's social activities can have a positive impact and enhance corporate value [17]. Therefore, the following hypotheses are proposed regarding the relationship between social activities and corporate value:

Hypothesis 1b: Social performance (S) is positively associated with firm value.

A transparent and fair corporate governance structure is known to lead to stable profit generation and performance improvement, whereas weak corporate governance results in deteriorating profitability and decreased corporate value [18]-[19]. Corporate governance activities have the potential to enhance transparency, foster investor trust, strengthen resource utilization, and attract more favorable investment capital [20]. Therefore, the following hypothesis is posited regarding the relationship between corporate governance and corporate value:

Hypothesis 1c: Governance performance (G) is positively associated with firm value.

Some scholars argue that without considering certain intervening factors, the analysis of the relationship between CSR and corporate value may yield questionable results [21]-[23]. Corporate age is considered as a moderating variable in

this relationship [24]. Younger companies tend to focus more on financial performance than their social image, which may lead to their engagement in fewer ESG activities [25]-[26]. In contrast, older companies, due to their better understanding of information disclosure, are believed to have a positive impact on corporate social responsibility disclosure [27]. Research on European firms has also revealed that corporate age plays a significant moderating role in the relationship between CSR and corporate value [28]. Therefore, the following hypothesis is formulated:

Hypothesis 2: Firm age acts as a positive moderator in the relationship between ESG performance and firm value.

Hypothesis 2a: Firm age acts as a positive moderator in the relationship between E performance and firm value.

Hypothesis 2b: Firm age acts as a positive moderator in the relationship between S performance and firm value.

Hypothesis 2c: Firm age acts as a positive moderator in the relationship between G performance and firm value.

III. METHODOLOGY

A. Sample and Data Collection

The research sample was comprised of Chinese equipment manufacturing firms listed on the A-share market from 2011 to 2020. Data were obtained from Bloomberg database, Guotaian database, and Hutchison Investment Consulting Platform and were selected based on the following criteria. Firstly, data for companies lacking ESG scores in the Bloomberg database were excluded. Secondly, data for ST, *ST, and PT companies were removed. Thirdly, data for companies that had undergone an initial public offering (IPO) in the given year were eliminated. Consequently, a total of 161 sample firms and 1,610 sample data were collected. To mitigate the influence of outliers, upper limits of 99% and lower limits of 1% were applied to continuous variables in the sample data.

B. Variables

The dependent variable, corporate value, was measured using Tobin's Q based on prior research [29]-[30]. Tobin's Q (TQ) is defined as the ratio of a firm's market value to book value, calculated by dividing market capitalization by total assets. This metric allows for an evaluation of how efficiently a firm utilizes its current assets in the market. An advantage of Tobin's Q is that it remains unaffected even when a company undergoes changes in its accounting policies [31].

The independent variable, ESG, is constructed using Bloomberg's ESG scores and the environmental responsibility (E), social responsibility (S), and corporate governance (G)

scores. ESG is determined using the corporate ESG composite scores as disclosed by Bloomberg, where E, S, and G correspond to the Environmental, Social, and Governance scores disclosed by Bloomberg, respectively.

The moderating variable is company age (AGE), which is measured based on the year of the company's establishment. The importance and impact of ESG factors may vary between newly established firms and well-established ones. Newly founded companies often initially focus on survival and growth, which may require more time to establish long-term ESG strategies. On the other hand, older firms may already have developed and executed ESG-related strategies with greater experience. Furthermore, newly founded firms may demonstrate agility in responding to industry changes and new regulations, potentially indicating their ability to adapt quickly to new ESG requirements. Considering company age enables an examination of how a company's adaptability and changes can impact the connection between ESG performance and its value.

Control variables, as per previous research, include firm size, leverage ratio, fixed assets ratio, and ownership concentration [31]-[33]. Firm size (SIZE) is measured as the natural logarithm of total assets. Leverage ratio (LEV) is defined as total debt divided by total assets, serving as an indicator explaining the extent of financial risk. Fixed assets ratio (FAR) is calculated as fixed assets divided by total assets, providing insights into a company's financial health and asset structure. Ownership concentration (CON) represents the ownership stake of the largest shareholder and is considered a key indicator of internal governance factors.

IV. EMPIRICAL RESULTS AND DISCUSSION

This study utilized panel data from Chinese equipment manufacturing companies spanning from 2011 to 2020. The panel regression analysis was conducted using the Hausman test to select the fixed effects model. Table 1 presents descriptive statistics for all variables. The average value of ESG is 21.3286, with a standard deviation of 6.6125. The maximum value is 52.4793, whereas the minimum value is 1.2397, indicating significant variation in ESG scores among companies. The average values of the three dimensions of ESG, namely, E, S and G, are 10.3181, 23.3911, and 44.9173, respectively, demonstrating that environmental scores are the lowest, whereas governance scores are the highest. The average age of companies is approximately 19.80 years, ranging from newly established companies with 2 years of operation to those with a history of 41 years. The minimum and maximum values of the debt ratio are 4.1467 and 110.1940, respectively, with a standard deviation of 18.3348,

TABLE III
ESG PERFORMANCE AND FIRM VALUE

Quantity	Model 1	Model 2	Model 3	Model 4
Constant	7.9211***	8.4549***	9.4176***	9.0854***
ESG		0.0085*	0.0051*	0.0237*
AGE			0.0194**	0.0394**
ESG*AGE				-0.0009**
SIZE	-0.2696***	-0.3013***	-0.3604***	-0.3629***
LEV	0.0050**	0.0053**	0.0053**	0.0048*
FAR	0.0055	0.0051	0.0055	0.0053
CON	-0.0055	-0.0053	-0.0030	-0.0025
No. of Obs.	1640	1640	1640	1640
R-squared	0.5596	0.5605	0.5617	0.5623

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

indicating significant variability in this ratio.

Table 2 presents the correlation matrix among the variables. The absolute values of the correlation coefficients between variables are mostly below 0.4, with the highest value being 0.554, which represents the correlation coefficient between firm size and the debt ratio. The correlation coefficients between ESG and the control variables are generally low. The variance inflation factors (VIF) are weak, indicating that the model specification in this study is not likely to be affected by multicollinearity problems. The positive correlation coefficient between TQ and ESG suggests that companies with better ESG performance are more likely to have higher corporate values.

Table 3 presents the results of testing the relationship between ESG performance and firm value. Model 1 demonstrates the impact of control variables on firm value, whereas Model 2 reveals the influence of ESG on firm value while controlling for these variables. Model 3 is an extension of Model 2 with the addition of the company age variable, and Model 4 analyzes whether company age moderates the relationship between ESG and firm value. The R-squared statistics indicate an improvement in model fit with the addition of each variable.

Hypothesis H1 predicts a positive relationship between ESG performance and firm value. Model 2 shows that ESG has a

TABLE IV
ENVIRONMENTAL PERFORMANCE AND FIRM VALUE

Quantity	Model 1	Model 2	Model 3	Model 4
Constant	7.9211***	8.4939***	9.4572***	9.3173***
E		0.0066*	0.0041*	0.0264**
AGE			0.0194**	0.0300***
E*AGE				-0.0010**
SIZE	-0.2696***	-0.2976***	-0.3590***	-0.3619***
LEV	0.0050**	0.0052**	0.0052**	0.0046*
FAR	0.0055	0.0052	0.0056	0.0054
CON	-0.0055	-0.0055	-0.0031	-0.0024
No. of Obs.	1640	1640	1640	1640
R-squared	0.5596	0.5604	0.5617	0.5630

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

significant positive impact on firm value (0.0085, p<0.10), supporting H1. Hypothesis H2 anticipates a positive moderating role of firm age in the relationship between ESG and firm value. Both Model 3 and Model 4 demonstrate a positive association between firm age and firm value. However, the interaction term between ESG and AGE has a significant negative coefficient of -0.0009 at the 5% level, leading to the rejection of H2. This suggests that despite the positive relationship between ESG and firm value, this relationship weakens with older firms. Therefore, younger firms are expected to have a stronger relationship between ESG performance and firm value. Younger firms are also more likely to engage in more aggressive ESG activities, which positively impact firm value. In conclusion, the relationship between ESG and firm value is negatively moderated by firm age.

Table 4 examines the impact of environmental performance within the three dimensions of ESG on firm value and tests the

TABLE I
DESCRIPTIVE STATISTICS

Variable	Mean	Min	Max	Std. Dev.
TQ	1.8561	0.7429	9.6141	1.0437
ESG	21.3286	1.2397	52.4793	6.6125
E	10.3181	0.0000	51.9380	8.0034
S	23.3911	0.0000	61.4035	9.4583
G	44.9173	3.5714	62.5000	5.0333
AGE	19.7957	2.0000	41.0000	5.7311
SIZE	23.0477	19.5411	27.5470	1.3432
LEV	48.2249	4.1467	110.1940	18.3348
FAR	18.4486	0.5537	62.5873	10.3095
CON	35.0990	3.0000	86.4900	15.1628

moderating effect of firm age in this relationship. Hypothesis

TABLE II
CORRELATION MATRIX

	TQ	ESG	AGE	SIZE	LEV	FAR	CON
TQ	1.000						
ESG	0.177	1.000					
AGE	-0.15	0.327	1.000				
SIZE	0.153	0.449	0.254	1.000			
LEV	0.381	0.212	0.156	0.554	1.000		
FAR	0.012	0.030	0.025	-0.12	-0.02	1.000	
CON	-0.01	0.045	-0.22	0.095	0.067	-0.06	1.000

H1a predicts that environmental performance (E) is positively related to firm value. In Model 2, it is observed that the E score has a significant positive impact on firm value (0.0066, p<0.10), supporting Hypothesis H1a. Hypothesis H2a predicts a positive moderating role of firm age in the relationship between E score and firm value. However, the interaction term between E and AGE exhibits a significant negative coefficient of -0.0010 at the 5% level, failing to support Hypothesis H2a. Overall, the relationship between E and firm value mirrors the relationship

between ESG and firm value. It is also evident that the relationship between E performance and firm value is negatively moderated by company age.

Table 5 investigates the impact of social performance within the ESG framework on firm value and examines the moderating effect of firm age in this relationship. Hypothesis H1b predicts that social performance (S) is positively related to firm value. Social performance consistently demonstrates a positive relationship with firm value at a significance level above 5%. Therefore, Hypothesis H1b is supported. Hypothesis H2a predicts a positive moderating role of firm age in the relationship between S score and firm value. However, the interaction term between S and AGE exhibits a non-significant negative coefficient of -0.0006, failing to support Hypothesis H2b. Thus, unlike the integrated ESG score and E score, firm age does not appear to play a moderating role in the relationship between S score and firm value.

Table 6 examines the impact of governance performance within the ESG framework on firm value and investigates the moderating effect of firm age in this relationship. Hypothesis H1c predicts that governance performance (G) is positively related to firm value. Governance performance consistently exhibits a negative relationship with firm value at a significance level above 5%. Therefore, Hypothesis H1c is rejected. Hypothesis H2c predicts a positive moderating role of firm age in the relationship between G score and firm value. However, the interaction term between G and AGE shows a non-significant negative coefficient of -0.0013, similar to Hypothesis H2b, failing to support Hypothesis H2c. Thus, firm age does not seem to play a moderating role in the relationship between G score and firm value.

V. CONCLUSION

This paper comprehensively analyzes the impact of ESG performance, including both integrated ESG scores and individual ESG factor scores, on corporate performance. While the relationship between ESG performance and firm value has been widely studied across industries, this study specifically examines the moderating role of firm age in this relationship, focusing on equipment manufacturing firms, which have received relatively less attention. The research findings reveal that ESG has a positive impact on firm value from both an overall perspective and in the individual dimensions of E and S. However, the governance dimension exhibits a negative impact on firm value. The moderating effects of firm age in the relationship between ESG performance and firm value vary. It is observed that firm age negatively moderates the relationship between overall ESG performance and firm value, as well as the relationship between environmental performance and firm value. However, in the case of the

relationship between social performance and firm value, as well as the relationship between governance performance and firm value, firm age does not appear to play a moderating role. Ultimately, for Chinese equipment manufacturing firms, the negative moderating effect of firm age in the relationship between overall ESG performance and firm value suggests that younger firms positively influence corporate performance through more proactive engagement in ESG activities compared to older firms. Therefore, it is important for both government authorities and organizations to take measures to prevent organizational inertia among older firms and facilitate their adaptation to new challenges. This study has certain limitations, including its focus on Chinese equipment manufacturing firms and the absence of comparisons across countries and industries. Future research should aim to

TABLE V
 SOCIAL PERFORMANCE AND FIRM VALUE

Quantity	Model 1	Model 2	Model 3	Model 4
Constant	7.9211***	8.7893***	9.7392***	9.5272***
S		0.0101***	0.0088***	0.0195**
AGE			0.0175*	0.0316**
S*AGE				-0.0006
SIZE	-0.2696***	-0.3191***	-0.3775***	-0.3785***
LEV	0.0050**	0.0053**	0.0054**	0.0050**
FAR	0.0055	0.0049	0.0052	0.0048
CON	-0.0055	-0.0046	-0.0026	-0.0024
No. of Obs.	1640	1640	1640	1640
R-squared	0.5596	0.5624	0.5634	0.5639

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

address these limitations and further advance the field by

TABLE VI
 GOVERNANCE PERFORMANCE AND FIRM VALUE

Quantity	Model 1	Model 2	Model 3	Model 4
Constant	7.9211***	8.1938***	9.9984***	11.0174***
G		-0.0150**	-0.0191***	-0.0428**
AGE			0.0284***	-0.0323
G*AGE				0.0013
SIZE	-0.2696***	-0.2499***	-0.3497***	-0.3459***
LEV	0.0050**	0.0042*	0.0042*	0.0045*
FAR	0.0055	0.0057	0.0061	0.0060
CON	-0.0055	-0.0062	-0.0029	-0.0033
No. of Obs.	1640	1640	1640	1640
R-squared	0.5596	0.5614	0.5642	0.5647

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

conducting comparative analyses across different nations and industries.

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