The impact of ESG information disclosure quality on firm value

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Abstract. With green development advocated globally, China has firstly proposed a goal of carbon neutrality and carbon peak. Based on sustainable development theory, signal transmission theory, information asymmetry theory and stakeholder theory, this paper had used the data of 638 A-share listed companies in China from 2018 to 2020 to empirically analysed the relationship between *ESG* information disclosure quality and firm value. The study had concluded that the *ESG* quality is positively correlated with firm value. Although the impact of environment (*E*) and society (*S*) on firm value is greater than that of governance (*G*), the improvement of *ESG* split indicators will increase firm value. Finally, this paper had put forward suggestions for the firms and the government respectively.

1 Introduction

In September 2020, General Secretary Xi Jinping announced that China will strive to achieve carbon peak by 2030 and carbon neutrality by 2060 at the 75th UN General Assembly. However, global climate change is still intensifying, and the excessive carbon dioxide emissions have not been alleviated.

ESG covers three aspects: environmental governance (*E*), society responsibility (*S*) and corporate governance (*G*). In recent years, *ESG* has attracted considerable attention domestically and abroad (L. Wang, Y. Lian, J. Dong, 2022; Z. Lou, 2021; J. Tong, 2021) [1-3].

ESG supports firms to pursue financial reporting while coordinating the non-financial performance of the three aspects, so as to coordinate environmental and social responsibility in the process of realizing firm value, simultaneously promoting its long-term sustainable development (L. Wang, et al., 2022)[1].

Contemporary research on *ESG* is mainly focused on the impact of *ESG* overall indicators on firm value, there are few studies on *ESG* split indicators. Therefore, this paper is expected to explore the impact of both the *ESG* and its split indicators on firm value.

China proposed and implemented *ESG* information disclosure in 2018. Although explored for several years, the *ESG* information disclosure in capital market is still immature (e.g. Z. Lou, 2021; J. Tong, 2021; G. Xu, et al., 2022)[24]. There are many empirical research papers on corporate *ESG* quality and firm value, but some of the conclusions are different. (e.g. G. Xu, et al., 2022)[4].

The disclosure of *ESG* information can help firms promote positive interaction between firms, environment and society, therefore increase firm value and its sustainable development ability. This paper provides a reference for the government to formulate relevant policies and improve the enthusiasm of enterprises to carry out energy conservation and emission reduction.

2 Literature Review

Currently, many scholars have found that there is a correlation between company's *ESG* quality and firm value. *ESG* disclosure quality of firms can impact our society and performance of the public in turn affects company's profitability and value.

Studies have found that the three split indicators of corporate *ESG* will have different impacts on firm value (L. Zhang, H. Zhao, 2019)[5], several other studies have shown a positive correlation between *ESG* quality and firm value (J. Luo, B. Zhao, 2022)[11]. A number of scholars have analyzed the impact of *ESG* split index changes on firm value. It is indisputable that good corporation governance (*G*) can effectively enhance firm value (L. Wang, et al., 2022)[1]. However, there are numbers of differences in the impact of environmental governance (*E*) and social responsibility (*S*) on firm value. The points are positive correlation, negative correlation and not clear.

In terms of the environment (*E*) and firm value, some scholars take environmental performance as a variable in their research, such as energy conservation and emission reduction. Most views are positive correlation and irrelevance, but there are also some different standpoints.

A variety of studies have shown that there is a positive correlation between environmental performance and firm value (G. Xu, et al., 2022)[4]. No correlation between environmental performance and firm value (F. Verbeeten, R. Gamerschlag, and K. Möller, 2016)[6].

In the aspect of social responsibility (*S*), studies have shown that firms can reduce their cost of equity capital

by improving social responsibility performance, thereby increasing firm value (H. Wei, Y. Yao, X. Ma, 2020)[7]. Small and medium-sized firms assume social responsibility is positively correlated with firm value. (L. Wang, et al., 2022)[1]. But some studies have proposed that corporate governance affects the improvement of firm value most, exceeds the effect of environmental and social responsibility (G. Ge, et al.,2022)[8].

ESG impact on firm value was studied by analyzing the overall performance of *ESG*. There are also obvious differences in the issue, mainly including positive and negative correlations. A number of scholars have concluded through empirical analysis that *ESG* quality is positively correlated with firm value, and the positive impact of *ESG* quality on non-state-owned, small and non-polluting companies is greater than that of state-owned, large and polluting companies（L. Zhang, H. Zhao, 2019)[5]. The notion that *ESG* quality is negatively correlated with firm value is largely based on the agency theory (K. M. Eisenhardt, 1989)[9], which means the corresponding problems can be caused by the separation of ownership and management rights of the enterprise.

Scholars have not reached a complete consensus on the relationship between *ESG* quality and firm value yet. The problems may be affected by relevant policies in local countries. Therefore, it is necessary to further study the mechanism of *ESG* quality affecting firm value.

In this paper, our study addresses the inconsistent findings surrounding the relationship between corporate *ESG* disclosure and firm value, and we have contribute in following aspects: Firstly, this paper used the overall indicator of *ESG* and split indicators *E, S* and *G*, which can help us to figure out the mechanism between *ESG* and firm value. Secondly, we used the OLS regression and the robustness test to reduce the bias, and provided new empirical evidence for this problem. We found that the improvement of *ESG* quality by firms can help increase firm value, and the impact of *E* and *S* on firm value is more significant than *G*. Thirdly, our paper extended the literature on the *ESG* quality and firm value, and provided helpful suggestions for companies and government.

3 Theoretical Analysis and Hypothesis

The sustainable development theory believes that the development of firms must take various aspects into account, rather than sacrificing the environment for more wealth (G. Zhou, et al., 2021)[14]. However, the cost of companies will also increase with the quality of environmental information disclosure improving, which may result in cost-benefit tradeoffs. Until the cost exceeds the expected benefit, it may cause the decline of firm value. Therefore, our first hypothesis is as follows:

H1: Environment Governance (E) information disclosure is positively related to firm value.

The asymmetric information theory starts from the aspect of enterprises and the public (G. Zhou, D. Ruan, C. Fan, 2021)[10], which means subjects with sufficient information tend to have an advantage and a better position. Disclosure of *ESG* information by companies can narrow the gap of information mastery between different entities. Currently, the public tends to evaluate a firm from different aspects comprehensively, not only its profitability. When a firm conducts great *ESG* quality, it can improve its goodwill and the sustainable competitiveness. Therefore, *ESG* quality of firms is an important indicator to measure its social responsibility. Based on this, this paper proposes the second hypothesis:

H2: Social responsibility (S) information disclosure is positively related to firm value.

According to the stakeholder theory, a firm is a community of interests consisting of internal, external and remote stakeholders (Z. Lou, 2021)[2]. The explanation given by Friedman (1970)[12]broke through the traditional concept of shareholder benefit maximization and weaken the status of material owners. Clarkson[13] expanded the definition of stakeholders, believing that stakeholders are groups and individuals who make certain investments, bearing certain risks in the production and operation activities of enterprises. Enterprises with excellent *ESG* quality should not only increase profits, but also optimize resource allocation and consider stakeholders. Therefore, we propose the third hypothesis:

H3: Corporate governance (G) is positively related to firm value.

Firms' property rights nature also has impact on the relationship between *ESG* quality and firm value. In China, differences in the ownership of firms will affect *ESG* quality on firm value. Relevant empirical studies have also found that *ESG* quality of non-state-owned enterprises is significantly positively correlated with firm value (G. Xu, et al., 2021)[4]. Therefore, different property rights of companies may have impact on their *ESG* quality, then affects firm value. Then come to our fourth hypothesis:

H4: State-owned and non-state-owned ESG ratings have different degrees of impact on firm value.

ESG information disclosure can reduce the financial risk of companies, thereby improving firm value (L. Wang, et al., 2022)[1]. *ESG* information disclosure will not have a negative impact on the short-term financial quality of firms (J. Luo, B. Zhao, 2022)[11]. Therefore, *ESG* quality indicates the robustness of the long-term operation of the company and its ability to create and grow in value, which has a positive impact on the improvement of the company's value. Therefore, we proposed fifth hypothesis:

H5: The overall quality of ESG contributes to enhancing firm value.

4 Research Design

4.1 Sample and Data

We selected China A-share listed companies from 2018 to 2020 as our sample, which contains 940 unique firms and 5797 observations. All data are collected from the CSMAR database. We selected year 2018 as the starting year as the *Green Investment Guidelines (Trial)* was

issued by the Securities Investment Fund Association of China in 2018, which first provided detailed guidelines for *ESG* information disclosure of China list companies. The data are filtered as follows: i. Deleted samples with missing data; ii. Deleted samples of listed companies in the financial industry; iii. Conducted 1% tail reduction with Stata 17.

4.2 Key Variables

4.2.1 Explained Variable

We used *EPS* as a proxy to measure the firm value. *EPS* (earnings per share) is the ratio of after-tax profit to total equity, reflecting the net profit per share. We also used *Roe* (the return on net assets) as the proxy for firm value in robustness test. As shown in Table 1.

Table 1 The Definitions and Measurements of Variables

	Symbol	Measurements
Dependent Variable	*EPS*	Value Per Share, which can be calculated as: (Net Income - Preferred Stock Dividend) / Number of outstanding shares
Independent Variable	*ESG*	*ESG* rating data, which is a proxy of a company's *ESG* performance
	E	Environmental Governance: Enterprise 's *E* scores in *ESG* evaluation system
	S	Social Responsibility: Enterprise '*S* scores in *ESG* evaluation system
	G	Corporate Governance: Enterprise '*G* scores in *ESG* evaluation system,
	Lev	Asset-liability Ratio, which can be calculated as: Total End-of-Period Liabilities / Total End-of-Period Assets
Control Variable	*Roe*	Return On Net Assets, which can be calculated as: Net Profit / Net Assets Balance
	Growth	Growth Ability, which means net profit growth rate or operating income growth rate
	Top10	Ownership Concentration, which means Shareholding ratio of top ten shareholders
	Property	Nature Of Ownership, State-owned enterprises is 1, non-state-owned enterprises is 0

4.2.2 Explanatory Variables

The key explanatory variable of this paper is *ESG*, which establishes an *ESG* evaluation system to classify the *ESG* quality of firms to three indicators of *E* (environmental governance), *S* (social responsibility) and *G* (corporate governance). *ESG* score equals to the average value of the three-split indicator. The *ESG* rating has 9 levels, namely C, CC, CCC, B, BB, BBB, A, AA, AAA from low to high.

4.2.3 Control Variables

This paper also selected the following variables as control variables: *Lev*, *Growth*, *Top10* and *Property*.

4.3 Models

In order to study the impact of *ESG* quality on firm value, this paper constructed the following OLS regression model:

$$EPS_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Control_{it} + \varepsilon \quad (1)$$

Model (1) examines the impact of the overall *ESG* score on firm value. The dependent variable is EPS_{it}, representing the firm value. The independent variable is ESG_{it}, measuring the *ESG* quality of the company *i* in year *t*. The key coefficient in this model is β_1, namely the regression coefficient of the dependent variable ESG_{it}, its size represents *ESG*'s degree of influence on *EPS*.

In further studies, we want to find the impact of the split indicators of the *ESG* on the firm value, and then constructed the following model (2-4):

$$EPS_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 Control_{it} + \varepsilon \quad (2)$$
$$EPS_{it} = \beta_0 + \beta_1 S_{it} + \beta_2 Control_{it} + \varepsilon \quad (3)$$
$$EPS_{it} = \beta_0 + \beta_1 G_{it} + \beta_2 Control_{it} + \varepsilon \quad (4)$$

Model (2) studies the impact of *E* (environmental governance) on firm value for firm *i* in year *t*. The dependent variable is E_{it}, which represents the *E*-score in the firm *ESG* evaluation system. The key coefficient is β_1, namely the regression coefficient of E_{it}, its values and the amount of size represents *E*'s degree of influence on *EPS*. Model (3) studies the impact of *S* (social responsibility) on firm value. The dependent variable is S_{it}, which represents the *S*-score. The key coefficient is β_1, namely the regression coefficient of S_{it}, its values and the amount of size represents *S*'s degree of influence on *EPS*. Model (4) studies the impact of *G* (corporate governance) on firm value. The dependent variable is G_{it}, which represents the *G*-score. The key coefficient is β_1, namely the regression coefficient of G_{it}, its values and the amount of size represents *G*'s degree of influence on *EPS*.

In those above models, β_0 represents the intercept term, β_2 represents the regression coefficient of the control variable, *i* represents the enterprise and *t* represents the year. The control variable set is $Control_{it}$.

5 Empirical Results

5.1 Descriptive Statistics

Before correlation analysis, this paper firstly conducts descriptive statistics, as shown in Table 2, which shows that the maximum *EPS* of the sample companies is 37.17 in column 5, and the minimum value is -7.999 in column 4, means a significant difference in the corporate earnings per share in the capital market assessment. The maximum and minimum *Roe* of the sample companies are 0.543 and -21.5 respectively in column 4 and 5, which shows that firms have large difference in income

level and firm value. The maximum value of *ESG* of all samples is 7 in column 5 and the minimum value is 0 in column 4, the mean value is 2.075 in column 2, which shows that the *ESG* quality of the companies is lower than the median. The maximum values of *E, S* and *G* are 8.4, 7.73 and 6.83 in column 5 respectively. The standard deviations of the three-split indicators are 1.783, 1.539 and 1.228 in column 3, shows that the quality of *E, S,* and *G* varies greatly among different companies. The average value of *Lev* of the sample companies is 0.518 in column 2 and the standard deviation is 0.209 in column 3, which indicates that the financial leverage ratio is high. The average annual growth of enterprises is 40.2% in column 2, and the standard deviation is 9.899 in column 3, means growth ability varies greatly from enterprise to enterprise. The equity concentration has an average value of about 63.93 in column 2, means the top ten shareholders hold 63.93% of the equity of listed companies. The average value of property rights of sample enterprises is 0.533 in column 2, indicating that about 53.3% of the enterprises are state-owned enterprises, and 46.7% of the enterprises are non-state-owned enterprises.

Table 2 Descriptive Statistics

Variables	N	Mean	Std	Min
EPS	1,914	0.811	1.691	-7.999
ESG	1,914	2.075	1.334	0
E	1,914	1.474	1.783	0
S	1,914	2.082	1.539	0
G	1,914	2.673	1.228	0
Roe	1,914	0.0778	0.539	-21.50
Lev	1,914	0.518	0.209	0.0143
Growth	1,914	0.402	9.899	-0.847
Top10	1,914	63.93	15.70	15.13
Property	1,914	0.533	0.499	0

5.2 Correlation Analysis

In order to ensure the validity and rationality of the empirical evidence, this paper analyzed the correlation among explanatory variables, explained variables and control variables, as shown in the unreported table. The key explanatory variables *ESG, E, S* in the unreported table show significant correlation at 1% level, which is consistent with our hypothesis of the article. However, there is no significant relationship between the *G*

variable and the explained variable *EPS*, which indicates *G* has no significant correlation with the firm value. Variable *Lev* is negatively related to *EPS* at the 1% level, which means the firm value will decrease when the asset-liability ratio increases. The firm value is significantly affected by the company's net asset indicators such as *Roe*, and the company's top ten equity capital concentration *Top 10*.

5.3 Benchmark Regression Results

This paper uses stata17 to conduct regression by OLS (Ordinary Least Squared) regression model, the regression results are shown in Table 3. *EPS* and the four independent variables all show a significant positive correlation with the dependent variable *EPS* at the 1% level, indicates that firm value will increase with the rise of *E, S, G* and *ESG* quality. The results of column (1)-(4) in table 3 can support our main expectations.

In order to figure out the impact of different property rights nature, we also classified our sample into state-owned enterprises and non-state-owned enterprises, and conducted OLS regression respectively. It can be seen from the classification regression results in Table 4. The column (1)-(4) is the results of state-owned enterprises and the column (5)-(8) that of non-state-owned enterprises. The results show that *ESG, E, S and G* quality on the value of non-state-owned enterprises is significantly greater than that of state-owned enterprises. For non-state-owned enterprises, *S* is significantly positively correlated with *EPS* at the level of 10%, the remaining independent variables are significantly positively correlated with *EPS* at the level of 1%. As for state-owned enterprises, although *E* and *ESG* are significant with *EPS* at the 1% level, *G* is only significant at the 10% level, and *S* is not even significantly correlated with *EPS*.

From the column (4) and column (5) in the table 4, the *ESG* quality of non-state-owned enterprises has a significant positive correlation with *Growth* at the level of 1%, which indicates that the improvement of *ESG* quality of non-state-owned enterprises has a significant positive impact on their growth ability, but there is no significant impact on the improvement of related performance of state-owned enterprises. The reasons may be due to state-owned enterprises having more completed information disclosure regulation, and state-owned enterprises themselves strictly abide by state regulations in environmental and social governance.

Table 3 Benchmark Regression Results

Variables	(1) E	(2) S	(3) G	(4) ESG
EPS	0.0596***	0.0637***	0.0374**	0.0913***
	(0.0141)	(0.0162)	(0.0158)	(0.0199)
Property	0.0635	0.0723	0.0902	0.0595
	(0.1280)	(0.1280)	(0.1280)	(0.1280)
Top10	0.0010	0.0008	0.0002	0.0005
	(0.0027)	(0.0027)	(0.0027)	(0.0027)
Growth	0.0026*	0.0025*	0.0021	0.0026*
	(0.0014)	(0.0014)	(0.0014)	(0.0014)

	(1)	(2)	(3)	(4)
Constant	0.2620	0.2250	0.2890	0.1920
	(0.1980)	(0.2000)	(0.1990)	(0.2000)
N	1,914	1,914	1,914	1,914
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4 Classification Regression Results of Enterprise Property Rights

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	State-owned enterprises				Non-state-owned enterprises			
Variables	*E*	*S*	*G*	*ESG*	*E*	*S*	*G*	*ESG*
EPS	0.0345**	0.0273	0.0322*	0.0585***	0.0956***	0.0987***	0.0453*	0.1260***
	(0.0144)	(0.0171)	(0.0169)	(0.0217)	(0.0215)	(0.0241)	(0.0240)	(0.0287)
Top10	0.3360	0.0009	0.3090	0.2700	0.0034	0.0031	0.0021	0.0029
	(0.2760)	(0.0038)	(0.2790)	(0.2790)	(0.0031)	(0.0031)	(0.0031)	(0.0031)
Growth	0.0009	0.0003	0.0009	0.0008	0.1100***	0.1140***	0.1040***	0.1120***
	(0.0037)	(0.0010)	(0.0038)	(0.0038)	(0.0374)	(0.0375)	(0.0376)	(0.0374)
Constant	0.0004	0.3360	0.0001	0.0004	0.2090	0.1470	0.2770	0.1130
	(0.0010)	(0.2780)	(0.0010)	(0.0010)	(0.2020)	(0.2070)	(0.2080)	(0.2080)
Observations	1,020	1,020	1,020	1,020	894	894	894	894
Enterprises	340	340	340	340	298	298	298	298
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5.4 Robustness Test

In order to verify the robustness of our results, this paper used *Roe* as the alternative proxy for firm value. It can be seen from Table 5. Independent variables *E, S, G,* *ESG* and the dependent variable *Roe* show a significant positive correlation at the level of 1%, which is basically consistent with the above analysis results. Therefore, great *ESG* quality has a positive impact on firm value.

Table 5 Robustness Recommendation Results

	(1)	(2)	(3)	(4)
Variables	*E*	*S*	*G*	*ESG*
Roe	0.0075***	0.0111***	0.0128***	0.0133***
	(0.0023)	(0.0026)	(0.0033)	(0.0191)
Property	0.0135	0.0130	0.0135*	0.0121
	(0.0083)	(0.0082)	(0.0082)	(0.0082)
Top10	0.0007***	0.0007***	0.0007***	0.0007***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Growth	7.1128	9.9457	5.5223	8.8888
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Constant	-0.0470***	-0.0615***	-0.0761***	-0.0633***
	(0.0175)	(0.0178)	(0.0191)	(0.0179)
N	1,913	1,913	1,913	1,913
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

6 Conclusions

We investigated the impact of *ESG* quality on firm value based on the data of Chinese companies from 2018 to 2020. We also divided the companies into state-owned enterprises and non-state-owned enterprises and made OLS regression respectively to find the difference. In the robustness test, we used *Roe* instead of *EPS* for regression analysis to improve reliability of results.

We draw the conclusions as follows: First, the improvement of *ESG* quality by firms can help increase firm value. Second, for the three split aspects of *ESG*, the impact of *E* and *S* on firm value is more significant than *G*. Third, the impact is more obvious in non-state-owned enterprises than state-owned enterprises, which may due to state-owned enterprises had more completed regulation.

The suggestions are as follows: As the information provider of *ESG* disclosure, firms should pay more attention to improve *ESG* quality. Specifically, the state-owned enterprises should put more emphasis on the improvement of *E* and *G* performance, while non-state-owned enterprises should focus more on the improvement of *E* and *S* performance. As for the government, it should explore new appraisal methods and evaluation systems for various types of firms as the policymakers in our capital market, and also conduct specific regulations guidelines in *ESG* information disclosure for companies.

There are some limitations for our studies. First, we cannot test the long-term effect of *ESG* quality on firm value due to the short-period data, so it deserves to explore the long-term effect. Second, our sample only consists of China's firms, which may exist deviation, so we may extend our research on international firms in the future.

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