The Impact of ESG Performance of Energy Enterprises on Stock Value

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Abstract: ESG, as an increasingly important evaluation indicator for today's enterprises, is being widely used. This article aims to study the relationship between ESG performance in the energy industry and stock value. This article takes the data of energy companies listed in the Shanghai and Shenzhen A-share markets from 2015 to 2022 as samples, controls for two variables: energy type and industry profitability, and uses the P/E ratio estimation method for analysis. Research has found that energy companies with environmental friendliness, high social reputation, and good management practices have higher stock prices, making them more likely to be favored by investors. The relevant research in this article can effectively help investors optimize their decision-making by analyzing the ESG situation when choosing the energy industry. At the same time, this study can provide some development insights for new and traditional energy enterprises.

Keywords: ESG rating, stock pricing, sustainability, energy industry

1. Introduction

Currently, with the growth of the world population and continuous economic development, environmental, ecological, and energy issues are becoming increasingly serious, and sustainable development has become a development concept advocated by many countries. Therefore, China has also proposed the goal of achieving a carbon peak by 2030 and carbon neutrality by 2060 [1]. For energy enterprises, the pollution and energy supply and demand issues of traditional energy enterprises are still serious. To achieve sustainable development goals, they are seeking a transformation of renewable energy development; For new energy enterprises, how to achieve energy conservation, environmental protection, and efficient development is also an urgent problem to be solved. To achieve the goals of carbon peaking and carbon neutrality, under the guidance of the Chinese government, accelerating the structural upgrading of energy enterprises and promoting their development towards greenery through policy-driven measures is of utmost importance. Wong's study has shown that ESG ratings can enhance firm value through ESG disclosure of corporate social responsibility [2]. In this context, ESG rating can serve as an effective supervisory measure to promote enterprise development.

Looking back at the development process of ESG, its concept originated in the 1970s and has gradually been accepted by mainstream investment institutions worldwide after decades of popularization, becoming an important evaluation indicator for promoting high-quality development in various countries around the world [3]. In the financial field, ESG ratings help investors assess the

environmental, social, and corporate governance risks of their investment goals and make informed decisions. In the non-financial sector, companies strive for sustainable development by evaluating and improving their performance through ESG ratings.

In recent years, research has mostly focused on the relationship between ESG and corporate stock returns, with little research on ESG and corporate stock pricing. The rare research on ESG and stock price has a relatively broad coverage for different enterprises and has not conducted in-depth research on a certain category of enterprises. This article will focus on the impact of ESG ratings in the energy industry on its stock pricing. This article analyzes the impact of ESG ratings of energy companies on stock pricing by controlling for two variables: energy type and industry profitability, combined with the P/E ratio estimation method. Studying the impact of ESG performance in the energy industry on stock pricing is beneficial for investors to comprehensively evaluate the risk and value of energy companies, as well as providing advice to new and old energy companies to promote their development towards sustainable development.

2. Theoretical Basis and Literature Review

2.1. Related theories of ESG

ESG represents the initials of environmental, social, and corporate governance, respectively. ESG will evaluate the sustainability of business operations and their impact on social values from three dimensions: environmental, social, and corporate governance. At present, ESG has become a non-financial indicator for many investors to evaluate the investment value of enterprises.

Nowadays, ESG rating is a popular quantitative indicator for measuring ESG levels. The ESG rating results of enterprises can quickly provide a reference for various market entities through information dissemination, and rating agencies can even endow companies with special status through high ratings, demonstrating the importance of ESG rating [2].

At present, Wind Rating, Shangdao Ronglv Rating, and FTSE Russell Rating are all popular rating agencies related to ESG rating. This article selects the rating system of Shangdao Ronglv as the standard to measure ESG performance.

2.2. Related theories of stock value

Stock value refers to the valuation of a company in the market, which refers to the degree of market recognition of the company's stock and the price investors are willing to pay for it. Studying the value of stocks not only helps investors optimize their decisions but also helps them effectively manage risks or make long-term investments.

There are currently approximately three calculation models for stock pricing:

Discounted cash flow model:

$$P = \sum_{t=1}^{\infty} \frac{FCFE_i}{(1+K)^t} \tag{1}$$

This model estimates the value of stocks by predicting free cash flows for several years to come. Ni's research used a discounted cash flow model to evaluate the value of Company X and ultimately improved the company's value through multiple adjustments [4].

Dividend discount model:

$$P = \sum_{t=1}^{\infty} \frac{D_i}{(1+K)^t} \tag{2}$$

This model was proposed by Gordon. It believes that the value of a stock is equal to the sum of the present value of all future dividends. This model has greater limitations compared to model (1).

(3)P/E ratio valuation method

$$\text{Stock value} = \text{P/E ratio} * \text{earnings per share} \tag{3}$$

Unlike the previous two methods of calculating stock value from the perspective of expected returns, the P/E ratio valuation method considers the value of stocks from a market perspective. Based on trading cases and information in the Chinese capital market, this article decides to use the P/E ratio valuation method to calculate the value of stocks.

2.3. Literature review

The current research on ESG and stocks, as well as corporate value both domestically and internationally, mainly includes ESG and stock liquidity, ESG, and stock pricing efficiency performance, ESG's impact on stock returns, and ESG's impact on corporate value. The first is the study of ESG and stock liquidity and returns. Wang's research on the impact of ESG on stock liquidity shows that ESG performance has a positive impact on stock liquidity, and ESG performance improves stock liquidity by reducing corporate risk [5]. Secondly, progress has been made in the study of ESG and stock pricing efficiency performance. Wu found through his investigation of Chinese listed companies that stocks included in the ESG list have relatively good pricing efficiency performance [6]. Mario's research found that the impact of the "ESG overall" index on stock returns varies among companies, with some companies showing a positive correlation between ESG performance and stock returns [7]. However, Guo's research indicates a positive correlation between corporate ESG performance and stock returns, and may even lead to excess returns [8]. As for the impact of ESG on corporate value, Mahmut's study found that investing in companies with high ESG performance is beneficial for bringing more returns in terms of value and profitability, based on the ESG composite score [9].

However, studying the value of stocks as a key component in helping investors better understand and evaluate the potential value of stocks and make more informed decisions has been less considered in research on ESG and corporate stocks both domestically and internationally. Domestic Wu's research found that the ESG rating of Chinese-listed companies is positively correlated with stock value [10]. Wan's research using parallel mediation models and other methods found that companies with better ESG performance have lower levels of stock mispricing [11]. This article will study the impact of ESG rating on the value of energy stocks from the perspective of ESG rating and stock pricing. Unlike current research on ESG and stock pricing, this study focuses on energy enterprises and refines the categories of new and old energy enterprises to achieve accurate research.

Based on the research background and literature review, this article proposes the following two hypotheses:

H1: The ESG performance of energy companies is positively correlated with their stock value

H2: The ESG performance of energy companies is negatively correlated with their stock value

3. Research design

3.1. Sample selection and data sources

This article takes energy companies listed in the Shanghai and Shenzhen A-share markets from 2015 to 2022 as the research object, excluding listed companies treated by ST and ST *, as well as energy companies lacking ESG ratings and other financial data. After screening, a total of 494 samples were

obtained. Among them, the ESG rating data of these energy companies mainly comes from the ESG rating of Shangdao Ronglv.

3.2. Variable construction

3.2.1. Explained variable

The explanatory variable for this article is stock value. This variable will be calculated by formula (3). Due to the large numerical value, it will be logarithmized during subsequent data processing.

3.2.2. Explanatory variables

The explanatory variable of this article is the ESG performance of energy companies. The ESG rating will reflect this variable. Shangdao Ronglv is an official rating that decreases from A+ to D, and the corresponding assigned values for each rating are shown in Table 1 below. The higher the ESG rating assigned, the better its ESG performance.

Table 1: ESG rating assignment rules

ESG grade	A+	A	A-	B+	B
ESG score	10	9	8	7	6
ESG grade	B-	C+	C	C-	D
ESG score	5	4	3	2	1

3.2.3. Control variables

Due to various factors such as the size of new and old energy enterprises, profits also vary. This article will choose the earnings per share of a company as an indicator to measure its profitability.

Energy enterprises can be divided into new energy and traditional energy enterprises today. This article sets the enterprise category as a dummy variable and assigns a value of 1 to new energy enterprises and 2 to traditional energy enterprises.

All variables are shown in Table 2.

Table 2: All variables

Variable type	Name	Meaning
Explained variable	Value	Log formula(3)
Explanatory variables	ESG	ESG rating
Control variable	Variety	dummy variable
Control variable	EPS	Earning per share

As a result, this article constructs the following regression model:

$$Value = \beta_1 ESG + \beta_2 Variety + \beta_3 EPS + \alpha \tag{4}$$

3.3. Data processing

3.3.1. Descriptive statistical analysis

In this paper, 494 samples were descriptively statistically analyzed using STATA, and the observations were mean, standard deviation, minimum, and maximum. The dumb variable of energy categorical variables is not analyzed below.

3.3.2. Regression result analysis

To determine that there is no correlation between the set variables, this article uses the variance inflation factor to measure the multicollinearity problem between the variables. After the above tests, this article will conduct regression analysis according to formula (4).

4. Experimental result

4.1. Descriptive statistical analysis

The resulting descriptive statistical analysis of each variable is shown in the table below.

Table 3: Descriptive statistics

VarName	Mean	SD	Min	Max
ESG	5.415	1.143	3.000	8.000
EPS	0.932	1.672	-1.144	23.368
value	24.086	57.216	1.340	900.000
Ln value	2.461	1.021	0.293	6.802

According to Table 3, the average value before the logarithmization of stocks is 24.086, the minimum value is 1.34, the maximum value is 900, and the standard deviation is 57.216, which reflects the large value gap between different stocks and the high volatility of the data. The standard deviation of the stock value after logarithmic treatment is 1.021, which is more stable; the average value of earnings per share is 0.932, the minimum value is -1.144, the maximum value is 23.368, and the standard deviation is 1.672, which shows that the profitability gap of different energy companies is also huge, and some energy companies are in a loss-making state; the average value of ESG rating is 5.415, the minimum value is 3, the maximum value is 8, and the standard deviation is 1.143.

4.2. Regression result analysis

The VIF inspection is shown in the following table.

Table 4: VIF inspection

Variable	VIF	1/VIF
EPS	1.08	0.928
Variety	1.07	0.934
ESG	1.01	0.992
Mean VIF	1.05	

The VIF test (Table 4) results for each variable are greater than 1 and less than 10, so serious multicollinearity problems can be ruled out in this model. Therefore, this article can be analyzed according to the above (formula) regression model, as shown in the following table.

Table 5: Linear regression analysis

	(1)	(2)	(3)
	Ln value	Ln value	Ln value
ESG	0.104***	0.0520*	0.172***
	(4.20)	(2.47)	(3.37)

Table 5: (continued).

EPS	0.303***	0.515***	0.283***
	(17.22)	(12.26)	(12.30)
variety	0.977***		
	(16.65)		
_cons	0.180	1.327***	1.796***
	(1.13)	(11.49)	(6.38)
N	494	264	230
R-sq	0.623	0.391	0.43
adj. R-sq	0.621	0.386	0.425
F	269.8	83.65	85.67
t statistics in parentheses			
* p<0.1, ** p<0.05, *** p<0.01			

From the regression result (1) (Table 5), it is found that the p-value of each variable is less than 0.01, the significance test is passed in the test of the partial regression coefficient, and there is 99% certainty that the partial regression coefficient of each variable is not 0, and R2 = 0.623. The coefficients were $\beta 1=0.104$, $\beta 2=0.977$, $\beta 3=0.303$, $\alpha=0.180$, and the regression equation was as follows:

$$Value=0.104ESG+0.977Variety+0.303EPS+0.180 \qquad (5)$$

The biased regression coefficient of ESG is 0.104, indicating that the ESG performance of energy companies is positively correlated with stock value. The regression coefficient of ESG is 0.104, and when the energy enterprise category is the same as profitability, the stock value increases by 1.11 for each additional level of ESG rating; the regression coefficient of the enterprise category is 0.977, indicating that when the ESG rating and profitability are the same, the stock value of new energy companies is 2.66 higher than that of traditional energy companies. The regression coefficient of earnings per share is 0.303, indicating that when other things are equal, the stock value increases by 1.35 for each unit increase in the company's earnings per share. Therefore, we accept hypothesis 1 and reject hypothesis 2, believing that ESG performance is positively correlated with the stock value of energy companies.

In addition, according to the analysis of the relationship between ESG and stock value by new energy enterprises and traditional energy enterprises, it is found from the regression results (2) and (3) that the ESG regression coefficient of new energy enterprises is 0.172, which is greater than the overall regression coefficient of 0.104, and the ESG regression coefficient of traditional energy enterprises is 0.052, which is less than the overall regression coefficient. Therefore, the improvement of ESG by new energy enterprises is more conducive to enhancing the value of stocks. Part of the reason may be that today's new energy industry is closely related to people's daily lives, and ESG performance will affect people's choices and judgments of these companies, so ESG has a stronger correlation with stock prices. In contrast, in the traditional energy industry, the correlation between ESG and stock price is weak, which may be due to the relatively long business cycle of traditional energy companies and the short ESG update cycle, resulting in consumers being unable to match the two in time, so the impact on the stock price is not large.

5. Conclusion

To investigate the relationship between ESG performance and stock pricing of new energy and traditional energy companies, this paper uses STATA to model and complete descriptive statistics and regression analysis based on financial data such as SynTao's green finance ESG ratings and related earnings of energy companies listed in the Shanghai and Shenzhen A-share markets from 2015 to 2022. The findings indicate a favorable correlation between the ESG performance of energy companies and stock pricing, with higher industry ESG ratings translating into higher stock values. In addition, by dividing the different types of new energy and traditional energy companies into energy companies, it can be found that although the ESG ratings of these two types of companies are positively correlated with stock prices, the correlation of new energy companies is stronger.

This article can effectively help investors to analyze and evaluate the environmental status, social, and governance of the industry when choosing an energy industry, to give a more accurate judgment on the profitability of the enterprise and whether the stock pricing is reasonable. For enterprises, the significance of this paper is to promote their environmental, social, and governance improvement and enhancement, which also means that the traditional energy industry needs to adhere to the green energy-saving development model, improve energy efficiency, and achieve green transformation. The emerging energy industry should be committed to green innovation and sustainable development.

However, the study cannot reasonably classify some new and existing energy companies in transition, and the data may not be accurate in terms of industry category. In addition, the research sample is limited to China's Shanghai and Shenzhen A-share markets, and the data from international stock markets can be added to the sample for a more comprehensive study.

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