Empirical research on the relevance of enterprise performance based on ESG

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Abstract. ESG (short for Environmental, social and governance) is based on the concept of sustainable development as the guiding ideology, based on the macro emphasis on the performance of corporate social responsibility based on CSR theory in a broad sense, pays attention to and realizes this methodology, and at the same time promotes the application of the concept of sustainable development at the technical level to the theoretical construction at the academic level. Due to many global macroeconomic fluctuations and financial crises, the obstruction of economic globalization and the sluggish economic development caused by the COVID-19, economic entities pay more attention to the stability of enterprise operations. Based on the existing ESG evaluation methods, combined with key enterprise performance indicators, this paper examines the practicality of this methodology, and uses econometric methods to reveal the feasibility and foresight of ESG concept from an empirical perspective, so as to create a new direction for enterprise performance and value evaluation.

Keywords: ESG; Sustainable development; Enterprise performance; Green Finance.

1. Introduction

The ESG evaluation system is divided into two evaluation levels from the three major directions of environment, society and corporate governance [1-3]. In terms of environment, it is divided into three aspects: environmental management, enterprise disclosure of environment related information and environmental negative events. On this basis, the evaluation of the enterprise's environment can not only enable consumers to see more comprehensively the importance of the enterprise to the environment, but also help investors or institutions objectively understand the understanding and practice of the invested enterprise on the concept of sustainability [4]. In terms of society, secondary evaluation criteria such as employees, supply chain, customer management, public welfare and donations, and social adverse events are set. For an enterprise, employees, customers, services or products are an indispensable part, which is also an important embodiment of an enterprise's contribution to society [5,6]. As the market price of listed companies is closely related to their reputation, good ESG performance may make it easier for listed companies to obtain competitive advantages and from brand premiums [7-9]. In the long run, these resources may also become the core competitiveness of the company, making it in an advantageous position in the market, and ultimately improving the market performance of listed companies. For consumers and customers, the reputation or public praise of an enterprise in society largely determines whether it will choose this enterprise or its products. From various social events of an enterprise, such as whether it is required to work overtime or whether it makes donations in case of natural disasters, it can also reflect its corporate culture to a certain extent. Therefore, a satisfactory score in society is an important standard for an enterprise to leave a good impression on the public.

2. Hypothesis presentation

The ESG investment analysis and evaluation model score proposed in this paper (Hereinafter referred to as the ESG score in this paper) is demonstrable, and there are at least four main research indicators (Table 1) [10]:

Table 1 Hypothesis

Hypothesis 1	Corporate financial performance has a positive impact on ESG scores
Hypothesis 2	Systematic risks of enterprises have a negative impact on ESG scores
Hypothesis 3	There is a positive correlation between ESG score and corporate debt financing cost
Hypothesis 4	There is a negative correlation between ESG score and enterprise equity financing cost

3. Data source

As ESG is still in the relatively novel research stage, and its data is relatively limited, this paper takes China's CSI 300 and CSI 500 enterprises as the research objects, and takes the data from 2015 to 2021 as the time series sample interval to study the performance of enterprise ESG and its impact on the main indicators of enterprise performance. Among them, relevant financial data of listed companies are from CSMAR database, the enterprise ESG investment evaluation rating comes from the CSMAR database cooperative data SynTao Green Finance ESG rating. A total of 472 samples of 150 enterprises are obtained to build panel data.

4. Variable interpretation

See Table 2 for the explanation of variables used in this paper [10-14].

Table 2 Variable interpretation

Variable name			Symbol	Definition
Dependent variable	ESG investment analysis and evaluation score		ESGrate	ESG score calculated by comprehensive evaluation system
Independent variable	Financial condition	Current Liability Rate	CuLia	Total current liabilities / liabilities × 100%
		Debt rate	DebtAsset	Total liabilities / total assets × 100%
		Return on equity	ROE	Net profit / average shareholders' equity × 100%
		Tobin's Q Ratio	TobinQ	Market value of the company / replacement cost of assets
	Systematic Risk	Risk factors	Risk	β Coefficient, calculated based on the 12-month yield of the company
	Finance costs	The cost of debt financing	DebtCost	Financial expenses / average interest bearing liabilities × 100%
		Equity financing cost	EquityCost	Calculated according to peg model

4.1 Empirical test

4.2 Descriptive statistics and correlation analysis

First, make descriptive statistics on the data, as shown in Table 3. This paper selects the data of 150 representative enterprises.

The variance of ESG indicators is relatively large, which shows that there are obvious differences in the importance of enterprises to the concept of sustainable development under the environment of not establishing a perfect information disclosure and ESG investment evaluation and analysis system. The minimum value of the risk factor coefficient is 0.182 and the maximum value is 1.903, indicating that the market volatility of various enterprises is relatively understandable. The average value of the risk factor is stable at 0.962, indicating that the data source enterprises selected in this paper are generally durable [15].

The average value of current liability ratio and asset liability ratio lies between the macroeconomic average values, and both are between 40% and 60%. The data source for this paper is representative for most enterprises. The standard deviation and variance of these two items are large, which shows that there is a huge gap between enterprises in traditional financial performance [16].

Table 3 Descriptive statistics

	N	Min	Max	Mean	StdDeviation	Variance	Skewness
ESGrate	150	26.120	47.250	32.213(0.243)	6.427	63.341	-1.188(0.267)
CuLia	150	17.255	83.441	46.983(2.744)	16.498	247.877	0.809(0.271)
DebtAsset	150	37.226	91.544	56.373(1.499)	20.094	289.741	0.759(0.273)
ROE	150	8.491	37.116	14.092(1.387)	3.932	41.072	0.532(0.274)
TobinQ	142	0.891	12.403	2.038(0.628)	1.592	17.650	-0.443(0.267)
Risk	148	0.182	1.903	0.962(0.028)	0.307	0.106	0.132(0.268)
DebtCost	140	-5.972	0.631	-0.0463(0.827)	0.458	0.733	-0.109(0.267)
EquityCost	132	0.033	0.271	0.105(0.506)	0.038	0.071	0.092(0.288)

4.3 Correlation analysis [17,18]

Before constructing the sample regression analysis model, this paper conducts Pearson correlation analysis on the data of the main explanatory variables to test the correlation between various variables and the significance of the contribution of variables. The results are presented in table 3. There is no significant positive correlation between the cost of corporate debt financing and the scope of corporate ESG investment analysis and evaluation. Score of ESG investment analysis and evaluation is negatively correlated with the cost of equity financing, and is significant at the significance level of 1%. It can be observed that the better the ESG evaluation and analysis score, the lower the equity financing cost of the enterprise.

For the control variables, the debt asset ratio (DebtAsset), return on net assets (ROE) and Tobin Q ratio (TobinQ) are significantly positively correlated, while the current liability ratio (CuLia) is significantly negatively correlated, and the risk factor (Risk) is not significantly negatively correlated.

Limited by the limitations of correlation test itself, the results of correlation analysis are only for reference, and the true correlation between variables needs to be verified by subsequent sample regression analysis (Table 4).

Table 4 Pearson correlation test of variables

	ESGrate	CuLia	DebtAsset	ROE	TobinQ	Risk	DebtCost	EquityCost
ESGrate	1.000	-	-	-	-	-	-	-
CuLia	-0.188*	1.000	-	-	-	-	-	-
DebtAsset	0.678***	0.321*	1.000	-	-	-	-	-
ROE	0.327***	0.033***	0.032	1.000	-	-	-	-
TobinQ	0.442**	-0.388**	-0.229**	0.317*	1.000	-	-	-
Risk	-0.710	-0.312**	-0.021***	-0.033***	0.067*	1.000	-	-
DebtCost	0.172	0.126**	0.174**	-0.231**	0.026**	0.098*	1.000	-
EquityCost	-0.026**	0.127**	-0.091	-0.002***	-0.778*	0.261	-0.032**	1.000

*: p≤0.1，**: p≤0.05，***: p≤0.01

4.4 Correlation analysis

Because of its limitations, the correlation test can not completely reflect the correlation between variables. This article uses Stata 14. Further test the impact of ESG investment analysis and evaluation scores on financing costs, systemic risks and financial conditions of enterprises, and build a multiple linear regression model as follows:

$$ESGrate = \alpha_0 + \alpha_1 CuLia + \alpha_2 DebtAsset + \alpha_3 ROE + \alpha_4 TobinQ + \alpha_5 Risk + \alpha_6 DebtCost + \alpha_7 EquityCost \quad (1)$$

The empirical test of the sample data is shown in Table 5:

Table 5 Results of multiple regression analysis

CuLia	DebtAsset	ROE	TobinQ	Risk	EquityCost	DebtCost
-0.053*	0.032	-0.015**	0.006*	-2.319*	-0.003**	0.001*
(-0.925)	(1.15)	（-0.231）	(6.61)	(-1.092)	(-2.401)	(1.66)

*: p≤0.1，**: p≤0.05, ***: p≤0.01

The regression results show that there is a negative correlation between the ESG investment analysis and evaluation score and the equity financing cost, and the correlation coefficient is -0.003, which is significant at the significance level of 5%. It shows that the better the ESG investment analysis and evaluation score of the enterprise, the lower the equity financing cost. Hypothesis 4 is proved. The net asset liability ratio and current liability ratio are significantly negative, indicating that with the growth of these indicators, the risk of enterprises may be higher. Tobin Q ratio is also significantly positive at the significance level of 5%, indicating that to a certain extent, the better the enterprise performs in environment, society and corporate governance, the more investors recognize the growth ability of the enterprise, and hypothesis 1 is proved. There is a negative correlation between the risk coefficient and the ESG investment analysis and evaluation score of enterprises at the significance level of 10%, and the correlation coefficient is -2.319. Comparatively speaking, the risk coefficient has little impact on the ESG investment analysis and evaluation of enterprises, which may be due to the change of social investment psychology towards risk preference caused by the slower economic growth in society. Hypothesis 2 is proved. The enterprise debt financing cost and the enterprise ESG investment analysis and evaluation score are significantly positive at the significance level of 10%. Hypothesis 3 is proved.

In order to ensure the robustness of the empirical results, this paper introduces the annual average of corporate social responsibility performance as a tool variable, and uses the two-stage least square method to test the endogenous of the regression model to study whether the hypothesis is tenable. In the test of weak instrument variables and two-stage least square method, in the model with equity financing cost as the explained variable, the statistical value of F is 16.827, which is greater than all critical values, and the original assumption of weak instrument variables is rejected.

4.5 Empirical test stability test and results

In the second stage of regression, the CuLia, ROE, Risk, EquityCost is still negatively correlated, DebtCost, DebtAsset, TobinQ is still positively correlated, indicating that the results of this study are reliable with the hypothesis test, and the selection of instrument variables is effective, And the instrumental variable test is consistent with the previous regression results. Therefore, the ESG investment evaluation system proposed in this paper not only innovatively adds sustainable development and long-term macro considerations on the basis of ESG concept and sustainable development concept, but also has very good compatibility with traditional performance evaluation methods. At the same time, in view of the fact that the financial situation of most small and micro enterprises cannot be systematically and professionally evaluated, a trade-off has been made between scientificity and economic practicality. This new investment evaluation and guidance concept has great potential and development space in solving the above-mentioned problems and further deepening the reform of the financial investment structure.

5. Development prospect of ESG methodology and theory

At present, the development of ESG investment in China is relatively slow, which is mainly reflected in four aspects. The first is ESG information disclosure. China has no perfect information disclosure system. Enterprise ESG information disclosure is not comprehensive or active, and there are problems in the transition from voluntary disclosure to mandatory disclosure. Then there is insufficient data support related to ESG, such as rating, index, etc. The disclosure lacks basic data, quantitative information is insufficient (extracted from ESG performance literature), there is no systematic methodology, and the evaluation is not completely transparent, with low accuracy and feasibility. Secondly, the ESG standard has not reached a basic consensus, and each enterprise will have different views on the ESG standard from the perspective of its own interests and development, which leads to the diversification of ESG rating and increases the difficulty of implementing ESG investment. Finally, there is the absence of long-term investors. Green preference investors and industry preference investors will play a useful guiding role in ESG investment. However, the progress of ESG investment in China is relatively slow due to the lack of relevant investors or less investment guidance available to relevant investors.

In order to further promote the development of ESG investment in China, we put forward the following six suggestions:

(1) It is suggested to further improve China's ESG basic data services, such as rating system and index system. Taking the index system as an example, the world's mainstream index companies have launched ESG series indexes, such as Dow Jones index (DJSI), FTSE4Good index (FTSE4Good), Mingsheng (MSci) ESG index, etc. more than $125 billion of assets in the world have been tracking the MSCI ESG series index 11. Due to its wide adoption by institutional investors, ETF products, etc., MSCI index companies are also constantly improving ESG information disclosure and management practices, To improve its ESG rating. It is suggested to learn from the experience of relevant MSCI ESG index system to improve ESG basic data services.

(2) It is suggested to design evaluation indicators and weights in combination with China's national conditions and policy orientation. At present, China has a large proportion of research on the environment, even too much, but there are many deficiencies in the research on social and

corporate governance. This suggests that China should balance the development of E, s and G in the next ESG investment.

(3) It is suggested to encourage the establishment of local ESG third-party service institutions. In 2001, Moody's in Manhattan, the United States, set up a representative office in Beijing to develop China's bond rating business. At present, it is also exploring the path of ESG investment. SynTao Green Finance is a leading professional service institution for green finance and responsible investment in China, focusing on providing customers with professional services such as responsible investment, ESG evaluation and information services, green bond evaluation and certification, green finance consulting and research. However, compared with the scale of Chinese enterprises, the number of professional ESG third-party service institutions is far from enough, so it is suggested to encourage the development and construction of local ESG third-party service institutions.

(4) It is suggested to improve the information disclosure system by drawing on the existing experience and process of information disclosure, and improve it from two aspects: information disclosure requirements and information disclosure standards. Among them, the information disclosure requirements can be converted from the non mandatory principle to the semi mandatory or mandatory principle. For the information disclosure standards, it is suggested to draw on international experience, from the typical European market, American market, Japanese market and Hong Kong market, Chinese Mainland market, etc. combined with research to find standards and policies suitable for ESG investment information disclosure in China.

(5) It is suggested to improve the ability of multi-party restriction. Not only the enterprise side should pay attention to the importance of ESG investment, but also the investment service side, such as ESG rating service agencies, should also recognize the importance of ESG investment and improve the ESG rating system. Investors should cooperate with the enterprise side and investment service side, and multi-party restriction can further promote the development of ESG investment.

(6) It is suggested to use the way of public opinion guidance to transition voluntary disclosure to mandatory disclosure. Mandatory information disclosure is a major factor affecting the development of ESG investment. It can further supervise the enterprise side and provide more relevant investment guidance to investors. However, in the past, the process of information disclosure in China was often "no measures, policy first", and forced policy change without preconditions, From voluntary disclosure to compulsory disclosure, it may lead to a certain rebound effect. Therefore, it is suggested that the concept of ESG should be popularized to the public by means of public opinion guidance before the release of the policy, so as to improve the ability of multiple constraints and promote the development of ESG investment.

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