

What Are the Key Influencing Factors of ESG?

—Empirical Research Based on Chinese Listed Companies

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Abstract: This study explores the impact of company financial indicators on the environmental, social and governance (ESG) scores of listed companies in China using a fixed-effects panel regression model. I found that company's total assets and number of employees are significantly and positively related to ESG scores, and that there may be a nonlinear relationship between the number of employees and ESG scores. In addition, current ratio has no significant effect in terms of ESG score. Debt-to-asset ratio was significantly negatively related to ESG score, while ROE and operating profit margin were significantly positively related to ESG score. The results suggest that different financial indicators may have different roles in predicting CSR fulfillment. Future research could delve into industry and regional differences, as well as other factors that influence the relationship between financial indicators and ESG scores.

Keywords: ESG, Chinese listed companies, financial performance

1. Introduction

Sustainability is a win-win solution where we work hand in hand with the environment around us. As sustainability goals are always long-term, and so are their impacts, ESG (Environmental, Social, and Governance) scores as an important indicator of the degree of corporate sustainability and social responsibility performance have attracted extensive academic discussion in the past [1]. Not only that, addressing ESG as a risk management issue has become a focus point for investors, shareholders, and governments. For corporations, it has also become an emerging part of competitive strategy [2]. Specifically, investors, managers and other stakeholders can assess, and measure company performance based on ESG reports and ratings [3].

The purpose of ESG measurement is to capture additional dimensions of a company's performance which are not presented in their accounting data, such as reputation, workplace culture, brand equity, and the value of a series of other assets [4]. Although ESG scores are non-financial performance indicators [5], it has been identified by a significant number of studies in recent years that there exist some potential impacts on companies' financial performance [6-8]. Some other studies have tried to find a link between ESG scores and investment behavior [9,10]. But rarely do studies try to find out what financial indicators are likely to affect the performance of a company's ESG score. Meanwhile, Bloomberg, for example, did not explicitly state which company financial indicators were used in its ESG scoring methodology released in 2020 [11]. Therefore, by exploring whether there is a potential

relationship between ESG scores and some financial indicators of companies, this paper may be able to provide readers with some new perspectives.

Currently in China, ESG scores have not gained enough attention from the market, and as China is in an important period of economic transformation, the interest in social and environmental issues will rise gradually, ESG practices are expected to be more demanded in China, thus this study contributes to a better understanding of the ESG practices in the developing countries [10]. In this study, I select relevant financial indicators from the perspectives of company's basic information, debt-paying ability, and profitability, and explore whether there is a potential relationship between these financial indicators on ESG scores through panel regression. This study is based on a sample of A-share non-financial listed companies in China from 2011 to 2021, and ESG data is obtained from Bloomberg [7].

2. Literature Review and Hypothesis

2.1. ESG Scores and Company Basic Information

Company size, as one of the most important elements of company's basic information, has been the topic of quite a number of studies that try to find out whether there is a certain relationship between it and ESG scores [12,13,8]. Among them, Cohen did not find a significant relationship between company size and total ESG scores through his study of US listed companies [12]. But larger companies may be able to have more resources that can help improve their ESG scores [13]. Therefore, this research paper will continue to investigate whether company size has an impact on ESG scores. In this study, company size is categorized into the total assets of the company and the number of employees as indicators to demonstrate its size, and the perspective is placed on the Chinese market. The nature of the company is particularly important for Chinese companies as China has the largest state-owned asset system in the world [14]. This has resulted in many studies choosing to take the nature of the company into account when considering Chinese companies [14,15]. In addition, the board size is also an indicator that will be mentioned [16]. Therefore, in this study, total assets of the company, number of employees, board size, and ownership of the company (SOEs and non-SOEs) are selected as indicators of basic information.

2.2. ESG Scores and Company Profitability

So far, a number of researchers have pointed out that there is a positive relationship between ESG scores and companies' profitability [17]. Many of these studies have found a positive relationship not only between ESG scores and company value, but also between ESG scores and ROE, ROA of companies [18-20]. However, there are some opposing voices such as Landi and Sciarelli's study which stated that there was a significant negative correlation between ESG scores and companies' financial performance [21]. Although their study has found a relationship between companies' profitability and ESG scores, more studies have been conducted using indicators such as ROA as a dependent variable [18]. In contrast, studies using profitability indicators as independent variables are rare. Therefore, in this paper, companies' Return on Equity, Sales Expense Ratio, and Operating Margin are selected as indicators of companies' profitability to study their impact on ESG scores.

2.3. ESG Scores and Company Debt Paying Ability

Compared to profitability and company size, there are few studies that try to find the relationship between ESG scores and company's debt paying ability. For example, Khalid et al in their study in 2022 found that ESG scores and Current Ratio of the companies are correlated. There are also some researchers who found some relationship between companies' ESG scores and their debt costs [9,22].

Their studies found that companies with higher ESG scores have higher credit ratings and lower cost of debt. This can provide a sideways view of the potential relationship between ESG scores and companies' debt paying ability. Therefore, it is still a meaningful topic to investigate whether companies' debt paying ability has a potential impact on their ESG scores. In this paper, Working Capital, Current Ratio, Interest Coverage Ratio and Debt Asset Ratio are selected as the indicators of companies' debt paying ability.

2.4. Hypothesis

Based on the literature review above, the following hypotheses are proposed.

H1: The more total assets a company has, the higher its ESG score is; The more the number of employees, the lower their ESG scores will be.

H2: The more solvent a company is, the higher its ESG score will be.

H3: The more profitable a company is, the higher its ESG score will be.

3. Data and Methods

3.1. Data and Descriptive Statistics

In this article, the financial data and ESG scores of all Chinese A-share listed companies for a total of 11 years from 2011 to 2021 were selected as the samples for the research to ensure that the relationship between the two can be fully demonstrated. Chinese listed companies started to disclose ESG-related information since 2009 only [14]. Therefore, this article chooses 2011 as the starting year of the data to ensure the accuracy of ESG scores. On this basis, companies in the financial and insurance industries and companies subject to special treatment are excluded, and the relevant variables are winsorized, and extreme values are removed to minimize the bias caused by outliers or extreme values. In the end, 1,215 companies and 11,179 company-year observations were obtained.

The ESG score data in this article is from Bloomberg, and the financial and accounting data is from China Stock Market & Accounting Research Database (CSMAR).

Table 1: Descriptive statistics.

VARIABLES	N	Mean	SD	Min	Max
ROE	11,150	0.0721	1.522	-158.2	8.715
Current Ratio	11,179	2.097	3.008	0.0568	80.66
Operating Margin	11,179	0.102	0.366	-15.98	14.04
Working Capital	11,179	2.734e+09	2.084e+10	-2.784e+11	4.394e+11
Total Asset	11,179	3.890e+10	1.350e+11	9.010e+07	2.730e+12
Debt-Asset Ratio	11,179	0.474	0.204	0.00836	2.471
Sales Expense Ratio	11,179	0.0686	0.0917	0	0.982
Interest Coverage Ratio	8,395	18.61	49.31	-20.15	373.0
Number of Employee	11,179	12,366	31,520	10	552,810
Board Size	11,179	9.000	1.868	3	18
Company Nature	11,179	0.514	0.500	0	1
ESG	11,179	28.25	9.025	6.198	68.92

3.1.1. Dependent Variable

Since the purpose of this article is to explore whether there exists a certain effect of a company's financial performance on its ESG score. Therefore, all models in this article have ESG scores as dependent variables.

3.1.2. Independent Variables

This article will analyze the relationship between company's financial performance and ESG scores from three perspectives: company's basic information, debt paying ability and profitability, and using three different models. The total assets, debt asset ratio and ROE of the company are chosen as the independent variables of the company's basic information, debt paying ability and profitability, respectively. Among them, ROE is chosen as the independent variable of company's profitability because the samples in this article are not differentiated by industry, and ROE is more capable of demonstrating the profitability differences between companies in different industries compared to ROA.

3.1.3. Control Variables

Basic information: The number of employees is chosen as one of the control variables as a perspective of company size. In addition, the board size, and the nature of the company, as factors that are often considered, are also chosen as control variables.

Debt paying ability: In order to better analyze the relationship between company's debt paying ability and ESG score, this article will consider both short-term debts paying ability and long-term debt paying ability, and select relevant indicators (working capital, current ratio, and interest coverage ratio) as the control variables.

Profitability: In addition to ROE, this article also chooses sales expense ratio and operating margin to show the company's ability in cost control.

3.2. Data and Descriptive Statistics

$$ESG_{i,t} = \beta_0 + \beta_1 * TA_{i,t} + \beta_2 * NoE_{i,t} + \beta_3 * BS_{i,t} + \beta_4 * CN_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$ESG_{i,t} = \beta_0 + \beta_1 * TA_{i,t} + \beta_2 * NoE_{i,t} + \beta_3 * BS_{i,t} + \beta_4 * CN_{i,t} + \beta_5 * NoE^2_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where $ESG_{i,t}$ are ESG scores of stocks i in year t . $TA_{i,t}$ is the logarithm of total asset of the company at time t ; $NoE_{i,t}$ is the total number of employees of company i at time t ; $BS_{i,t}$ is the number of board size of company i at time t ; $CN_{i,t}$ is the company nature of company i at time t ; $NoE^2_{i,t}$ is the square of total number of employees of company i at time t ;

$$ESG_{i,t} = \beta_0 + \beta_1 * WC_{i,t} + \beta_2 * CR_{i,t} + \beta_3 * ICR_{i,t} + \beta_4 * DAR_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$ESG_{i,t} = \beta_0 + \beta_1 * WC_{i,t} + \beta_2 * CR_{i,t} + \beta_3 * DAR_{i,t} + \varepsilon_{i,t} \quad (4)$$

Where $WC_{i,t}$ is the logarithm of Working Capital of company i at time t ; $CR_{i,t}$ is the Current Ratio of company i at time t ; $ICR_{i,t}$ is the Interest Coverage Ratio of company i at time t ; $DAR_{i,t}$ is the Debt Asset Ratio of the company at time t .

$$ESG_{i,t} = \beta_0 + \beta_1 * ROE_{i,t} + \beta_2 * SER_{i,t} + \beta_3 * OM_{i,t} + \varepsilon_{i,t} \quad (5)$$

Where $ROE_{i,t}$ is the Return on Equity of company i at time t ; $SER_{i,t}$ is the Sales Expense Ratio of company i at time t ; $OM_{i,t}$ is the Operating Margin of company i at time t .

$$ESG_{i,t} = \beta_0 + \beta_1 * \log(TA_{i,t}) + \beta_2 * NoE_{i,t} + \beta_3 * DAR_{i,t} + \beta_4 * ROE_{i,t} + \beta_5 * OM_{i,t} + \varepsilon_{i,t} \quad (6)$$

4. Result

4.1. Company's Basic Information

In this article, the relationship between the basic information of a company and its ESG score is first investigated. The indicators such as total assets, number of employees, number of board of directors, and nature of the company were selected as the basic information of the company.

First, as shown in Table 2, I observed that total assets have a positive and statistically significant correlation with ESG score. This implies that there is a positive relationship between total assets and ESG scores, same as Hypothesis1. One possible explanation is that larger assets may provide companies with more capital and flexibility to strategically invest and innovate in ESG.

It is important to note that total assets, as a measure of a company's size and financial strength, may be correlated with other factors not considered, which can affect ESG scores. For example, larger companies tend to have more resources and capacity to implement and monitor ESG measures and therefore may be more likely to receive a higher ESG score. In addition, larger companies are typically subject to higher public attention and stakeholder monitoring, which may motivate them to focus more on ESG performance.

Second, the results show a positive relationship between the number of employees and ESG scores (Table2), which is contrary to the expected results (H1). I believe that there should be a negative relationship between the number of employees and ESG scores because the larger the number of employees, the more difficult it may be to manage and thus challenging to ESG performance.

To further explore the relationship between employee size and ESG scores, the squared term of employee size is introduced in this paper to explore whether there is a non-linear relationship (Table2). Encouragingly, further analysis showed a negative and statistically significant relationship between the squared term of the number of employees and ESG scores. This result suggests that there may be a critical value for the impact of the number of employees on ESG scores. When the number of employees is low, it is easier for companies to manage and implement ESG measures, thus improving ESG scores. However, when the number of employees exceeds a certain critical value, increased management difficulty may have a negative impact on ESG performance.

Table 2: Regression Results between ESG Scores and Basic Information.

VARIABLES	Formula 1	Formula 2
TA	1.098*** (5.15)	1.014*** (4.71)
BS	-0.015 (-0.24)	-0.015 (-0.25)
NoE	0.028** (2.14)	0.047*** (2.70)
CN	0.099 (0.20)	0.099 (0.20)
NoE^2		-0.008** (-2.09)
Observations	11,183	11,183
Adjust R-square	0.691	0.691

Robust t-statistics in parentheses

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

4.2. Company's Debt-paying Ability

The paper then explores the relationship between company debt-paying ability and ESG scores. I first selected the company's working capital, current ratio, interest coverage ratio, and debt asset ratio as the indicators of company's solvency.

From the results, only the debt asset ratio among the four selected indicators is significant and negatively correlated with the ESG score (Table3). This implies that a lower debt asset ratio may lead to a better ESG score. However, the study sample is relatively small due to the small amount of publicly available information on interest coverage ratio. Therefore, this paper excludes this indicator and re-performs the regression.

The new results show that still only the relationship between a company's debt asset ratio and ESG is significant and remains negative. The insignificant relationship between current ratio and ESG scores is more surprising than that of working capital. Because working capital is the difference between current assets and current liabilities, while current ratio is current assets/current liabilities, the current ratio is more sensitive to the difference in company's debt-paying ability when companies differ in size. Possible explanations for this result are:

The current ratio itself may have a weak relevance in explaining ESG scores. While the current ratio is often considered a measure of a company's solvency, ESG scores involve broader environmental, social, and corporate governance factors. Therefore, other factors that are more directly related to ESG scores may play a more important role in explaining ESG scores, resulting in a less significant impact of current ratio.

Since the selected sample covers companies of various industries and sizes, there may be differences in their business models and operating environments. These differences may lead to an inconsistent degree of impact of current ratio across industries or company types. As a result, the average impact in the overall sample may be masked by industry differences or heterogeneity, such that no significant results can be observed in the overall sample.

However, despite the insignificant results for current ratio and working capital, the negative relationship between debt asset ratio and ESG scores may indicate that a company's proper arrangement and management of its debt structure can positively influence ESG performance, supporting the Hypothesis2 that a company's solvency may have an impact on ESG scores.

Table 3: Regression Results between ESG Scores and Debt-paying Ability.

VARIABLES	Formula 3	Formula 4
WC	-0.001 (-0.19)	0.001 (0.11)
CR	-0.087 (-1.46)	-0.034 (-1.38)
ICR	-0.000 (-0.03)	
DAR	-1.502** (-1.98)	-1.462** (-2.15)
Observations	8,395	11,179
Adjust R-square	0.689	0.686

Robust t-statistics in parentheses

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

4.3. Company's Profitability

This paper also analyzed the relationship between company's profitability and ESG scores. The variables such as ROE, Sales Expense Ratio and Operating Margin of the company were considered as indicators of profitability.

The results of the regression analysis show that there is a significant positive relationship between ROE and operating margin and ESG score. This indicates that among Chinese listed companies, those with higher ROE and operating margin tend to exhibit higher ESG scores.

Higher ROE and operating margin may reflect a company's strengths in operational management, market competition and profit generation. These companies may have achieved better performance in sustainable business practices, social responsibility fulfillment, and good governance structure, resulting in higher ESG scores.

However, the result did not find a significant relationship between sales expense ratio and ESG scores. This may indicate that the sales expense ratio has a weak contribution in explaining ESG scores, or that other factors interfere with the relationship. Also, the diversity of the sample may still be one of the reasons for the insignificant relationship between sales expense ratio and ESG score.

The result that ROE and operating margin both showed a significant positive relationship with ESG score, however, still supports the Hypothesis3 that company's profitability has an impact on ESG score.

Table 4: Regression Results between ESG Scores and Profitability.

VARIABLES	Formula 5
ROE	0.026** (2.56)
SER	2.215 (1.15)
OM	0.385** (2.34)
Observations	11,150
Adjust R-square	0.685

Robust t-statistics in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

4.4. Total

To test the completeness and authenticity of the results, the paper concludes by putting together all the indicators with significant results obtained from the previous analysis and examining the correlation between these indicators and ESG scores in a comprehensive way.

The results show that only the results for operating margin differ from those obtained previously, and the new results show that the results between operating margin and ESG score are not significant. One possible explanation is that when other indicators are introduced as control variables, these indicators may have a stronger explanatory power, causing the effect of operating margin to become insignificant.

Table 5: Regression Results between ESG Scores and All Indicators.

VARIABLES	Formula 6
TA	1.296*** (5.75)
NoE	0.027** (2.11)
DAR	-3.352*** (-4.98)
ROE	0.017*** (2.96)
OM	0.073 (0.64)
Observations	11,150
Adjust R-square	0.692

Robust t-statistics in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

The purpose of this study is to examine the potential impact of company financial indicators on ESG scores. I selected some important financial indicators from three aspects: company's basic information, debt-paying ability, and profitability, and analyzed the data of the listed companies in China from 2011 to 2021 using a fixed-effects panel regression model.

For the inspection of the basic information of the company, the results show that there is a potential relationship between total company assets as well as the number of employees and ESG scores. In this case, total assets of the company showed a positive correlation with ESG scores. However, after a more in-depth study, it was found that there may be a non-linear relationship between the number of employees and ESG scores, which means that there is a critical value between the number of employees and ESG scores, and below the critical value, they are positively correlated. Instead, it is negatively correlated.

For the inspection of the company's debt-paying ability, the results show that the company's debt asset ratio is significantly negatively related to the ESG score. This suggests that a company's debt level may have some impact on its sustainable development and social responsibility fulfillment.

For the inspection of the company's profitability, the results show that ROE and operating margin are significantly positively correlated with ESG scores. This suggests that firms with higher profitability may pay more attention to social responsibility fulfillment and perform more positively on ESG scores. However, in the final summary it shows that there is no significant relationship between operating margins and ESG scores, which may imply a weaker relationship between them.

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