Empirical Analysis of the ESG and Financial Performance: Evidence from Chinese Technology Enterprises

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Abstract: To date, the concept of sustainable development has gained global attention from companies and investors. One important reason for this is the increasing interest of investors in incorporating environmental, social, and governance (ESG) elements into their investments. The purpose of this dissertation is to analyze the correlation between ESG factor performance and corporate financial performance in Chinese technology enterprises. Additionally, the study focuses on Internet and medical technology companies to ensure relevance. The findings of the study provide guidance on ESG investment and sustainability for both companies and individual investors.

Keywords: Empirical; Financial; Chinese technology

1. Investigation and discussion

This article utilizes enterprise data by eliminating sample enterprises with missing information and those with clear financial irregularities, resulting in 1,541 observations from 236 enterprises between 2013 and 2021 [1]. The first step involves organizing the collected data and addressing abnormal values in advance. Descriptive statistics were conducted to understand the basic characteristics of the data. Correlation analysis was performed to assess the direction and significance of the correlation coefficients between the two variables, followed by a multicollinearity test to determine whether there was a high degree of multicollinearity between the variables [2]. Subsequently, regression analysis and heterogeneity analysis were carried out to examine the impact of internet and medical technology enterprises on return on assets (ROA). Finally, with the help of Stata, the research conclusions were obtained [3].

1.1. Descriptive statistics

Table 1 presents the descriptive statistics for the data in this paper. The minimum value of ROA is -134.6940,

the maximum value is 87.9906, and the average is 7.6909, with the mean skewed towards the maximum value. The minimum value of environmental, social, and governance (ESG) is 11.3570, the maximum is 67.2065, and the average is 34.4617. The mean values of the three ESG subsets are 16.5261, 16.0074, and 70.7594, respectively, with the average value of G being the highest [4].

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	1541	7.6909	10.6031	-134.6940	87.9906
ESG	1541	34.4617	11.1727	11.3570	67.2065
E	1541	16.5261	18.1037	0.0000	73.8146
S	1541	16.0074	9.6117	0.0000	51.3906
G	1541	70.7594	11.4897	27.2727	91.2402
lnASSET	1541	9.5519	1.3395	4.8321	14.3461
Lev	1541	16.1462	14.0133	0.0000	73.0220
lnRE	1541	6.8767	4.4188	-12.1158	13.4222

Winsorization, a method used to minimize the influence of outliers, was applied before the statistical analysis, as shown in Appendix A. Winsorization involved adjusting the upper and lower 1% of the data for each variable to the 1st and 99th percentiles. This approach preserved the integrity of the variable information while addressing the potential impact of abnormal values. It can be seen that, after winsorization, the minimum values of most variables increased, and the maximum values decreased, reducing the possible adverse effects of extreme values [5].

1.2. Correlation analysis and variance inflation factor

Since correlation analysis only assesses the relationship between two variables, the variance inflation factor (VIF) test is a more accurate method for detecting multicollinearity. The VIF test involves regressing each explanatory or control variable against the others. Multicollinearity occurs when strong linear relationships exist between independent variables, leading to analytical errors and making it difficult to accurately assess their effects. If the goodness of fit is greater than 0.90, the VIF value will exceed 10. To mitigate multicollinearity, some independent variables may need to be screened, retaining the more important ones and eliminating less relevant or substitutable variables. According to Appendix B, the VIF values for all variables are below 10, indicating that the model does not suffer from high multicollinearity, which is consistent with the results of the correlation analysis [6].

1.3. Regression analysis and hypothesis testing
1.3.1. Regression analysis
Table 2 presents the results of the regression analysis of ESG scores and ROA for technology enterprises. Regression analysis is a reliable method for determining which variables influence the topic of interest. Model 1 shows the regression analysis of LESG and ROA. As shown in **Table 2**, the R-square equals 0.3862, the adjusted R-square equals 0.3844, the goodness of fit equals 38.44%, and the F-test equals 204.117. The model

is significant at the 1% level, indicating that the overall model passes the significance test. The impact of the independent variable LESG on ROA is significant at the 1% level. The results indicate that as LESG increases, ROA decreases [7]. At the 1% significance level, the control variables lnAsset, debt, and lnRE show significant effects: lnAsset and leverage have significant negative impacts, while lnRE has a significant positive impact. This suggests that ROA growth initially increases with LESG but then declines, leading to the rejection of the original hypothesis H_1 [8].

Table 2. Regression analysis results of technology enterprises: ESG score and ROA

	(1)	(2)	(3)	(4)
Variables	**ROA**	**ROA**	**ROA**	**ROA**
LESG	-0.0998***	-0.0634***	-0.0809***	-0.0542***
	(-4.7047)	(-2.7630)	(-3.7129)	(-2.9592)
lnASSET		-0.7811***	0.1634	-1.1825***
		(-4.0214)	(0.8172)	(-6.6660)
DEBT			-0.2066***	-0.1708***
			(-12.1157)	(-11.8742)
lnRE				1.0485***
				(23.3963)
Constant	11.2334***	17.5902***	12.4275***	16.5122***
	(15.1769)	(10.0882)	(7.2785)	(11.4420)
Observations	1,303	1,303	1,303	1,303
R-square	0.0167	0.0288	0.1274	0.3862
r2_a	0.0160	0.0273	0.1254	0.3844
F	22.1343***	19.2819***	63.2263***	204.2117***

Significance: * 10% level, ** 5% level, *** 1% level. Parentheses are *t* values.

2. Result and discussion

To date, there has been limited research on the correlation between ESG factor performance and corporate financial performance (FP) in the Chinese market. By focusing on companies in the Chinese market, this study addresses this research gap by examining the relationship between ESG performance and FP, considering the advantages of the ESG dimension. According to the regression analysis, the findings indicate that ESG scores are inversely correlated with the FP of technology firms. This negative correlation suggests that a higher ESG score may lead to lower profitability. This outcome may be attributed to the fact that a company's FP reflects the implementation costs associated with ESG initiatives [9]. When ESG initiatives are implemented without sufficient experience or are not executed properly, stakeholders may fail to recognize their value, and the costs incurred may not be justified.

Additionally, when substantial funds are allocated to ESG initiatives, cash flow may be diverted from essential operational resources, potentially harming profitability by constraining regular business activities. For example, companies are facing significant financial pressure due to official mandates on energy conservation,

carbon reduction, and the transition from outdated to cleaner technologies [10]. Addressing environmental issues in high-pollution industries has drawn national attention, especially with the issuance of China's 2010 guidelines on environmental information disclosure for listed companies, which have increasingly strict oversight of corporate environmental disclosures.

Furthermore, establishing trust with investors is critical, particularly in developing markets where institutional frameworks are often weak and investor protection is limited. As a result, businesses must invest more in corporate governance systems. Short-term costs that impact performance may include hiring professional brokers, increasing the number of independent directors, and improving information disclosure. This analysis aligns with the empirical findings of this study [11].

ESG is a comprehensive indicator that encompasses various aspects of corporate data. ESG rankings are based on specific elements, each of which may have unique effects on performance. This study separated the effects of E, S, and G on financial performance and evaluated them individually [12]. Although the results indicate a negative relationship between the three components and FP, the social element is not statistically significant. The E and G scores, however, serve as practical indicators of an enterprise's operational capacity, reflecting good governance and efficient production processes [13]. Additionally, a significant portion of technology enterprises in China consists of Internet technology companies, contributing to the overall negative correlation with technology firms.

Following the COVID-19 outbreak, the medical sector also garnered considerable attention. However, medical technology companies performed poorly in both ESG and financial performance evaluations. The medical science and technology industry in China is still in its early stages. Due to the small sample size, the results are not particularly significant, as many medical companies have not yet fully transitioned to science and technology [14].

This negative correlation between ESG and FP is expected to persist for some time, given the current state of China's environmental legislation and financial markets. Moreover, investing in ESG entails higher costs, which inevitably leads to lower short-term profits. However, it is anticipated that the positive effects of ESG initiatives will increase over time, while their negative impact on costs will gradually diminish [15].

3. Conclusion

The empirical results indicate that, according to the regression analysis, ESG scores are negatively correlated with the financial performance (FP) of technology enterprises. This negative correlation suggests that higher ESG scores are likely to result in reduced profitability. This outcome may be due to the financial performance reflecting the costs associated with implementing ESG measures. These projects may not be well-executed, or there may be limited institutional support, making the benefits less apparent. As a result, the implementation of ESG may not secure the approval of all stakeholders.

Additionally, when ESG investments are substantial, they may reduce cash flow and divert resources essential for operations, potentially harming profitability by imposing restrictions on daily activities. For instance, enterprises are facing a heavy financial burden due to requirements for energy conservation, carbon reduction, and transitioning from outdated technologies to cleaner alternatives. China's regulatory authorities have also become increasingly strict in overseeing the environmental information disclosures of enterprises. The release of China's 2010 guidelines on environmental information disclosure for listed companies has drawn

significant national attention to the treatment of environmental issues, particularly in high-pollution industries.

Furthermore, in developing market economies, where institutional environments are often weak and investor protection is limited, building trust with investors is crucial. This requires enterprises to increase investment in corporate governance mechanisms. Hiring professional brokers, increasing the number of independent directors, and enhancing information disclosure in the short term will raise costs and impact short-term performance. This analysis aligns with the empirical research findings of this study.

Given the requirements of relevant Chinese regulatory authorities and the current state of the capital market, it is expected that this negative correlation will persist in the near future, as the substantial initial costs of ESG investments will inevitably lead to a decline in profits. However, it is also anticipated that the positive effects of ESG initiatives will continue to grow, while the cost impact will gradually diminish. Research findings based on financial markets in developed countries have validated this hypothesis. Therefore, under the current circumstances, it is important to actively promote the growth and adoption of ESG, as well as the ongoing improvement of ESG standards and data disclosure among Chinese listed companies.

Disclosure statement

The author declares no conflict of interest.

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