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Regional Heterogeneity Analysis of ESG and Corporate Value

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Abstract: Environment, social and governance ratings (ESG) has now become an important indicator for assessing corporate value. However, due to the varying degrees of economic growth, environmental protection policies, and sociocultural climates in various Chinese locations, there are significant regional differences in the correlation between ESG data and corporate value. This paper conducts a regression analysis of corporate value and ESG data from the three pillars of environment, society and governance to verify that ESG advantages significantly enhance corporate value. This paper also looks at the heterogeneous characteristics of the regional distribution of Chinese firms, the degree of marketization, and the relationship between firms and the government to show the mechanism by which regional differentiation affects the ESG score-Firm value correlation. A corporate valuation logic based on ESG scores is also established. Finally, the conclusions of this study have significant policy ramifications for the current stage of enterprise development. For enterprises, they need to continuously improve the level of ESG management and formulate management measures in line with the current situation of enterprises according to the heterogeneous differences that exist in the region, so as to improve the ability to cope with the enterprise crisis.

Keywords: ESG, Enterprise value, Chinese capital market, Heterogeneity analysis

1. Introduction

Being the biggest developing nation in the world, China has demonstrated positive attitudes and actions in sustainable development and environmental protection in recent years. Guided by the national strategy of building an ecological civilization and green development, consumers and investors are increasing focus on corporate environmental, social, and governance ratings(ESG) performance of companies. As a result, ESG data has become an important indicator for assessing company value. However, due to the varying degrees of economic growth, environmental protection policies, and social environments in various Chinese provinces, there are significant regional differences in the correlation between ESG data and firm value. Based on this, it is of great significance to investigate the variations in the relationship between ESG and firm value in different regions of China to help investors refer to and utilize ESG data more objectively.

Although ESG data has become an important indicator for assessing corporate value, corporate valuation based on ESG data still faces some objective risks and challenges. On the one hand, some companies may disclose ESG data selectively, reporting only information that is consistent with their business objectives or can enhance their stock price, or "Greenwash" by exaggerating their environmental or social contributions [1, 2]. On the other hand, even if a company's ESG data is true and reliable, it may not necessarily reflect its true value. This is because some of the ESG improvements may have a detrimental effect on businesses' short-term profitability, which leads to investors' confusion in assessing firms' value [3]. In order to solve these problems, this paper attempts to establish a corporate valuation logic based on ESG scores by analyzing the impact of regional heterogeneity on ESG-Firm value correlation, so as to reduce valuation errors and risks.

The following are this paper's main contributions: first, this essay evaluates the correlation differences between ESG data and firm value in different regions of China, and reveals the mechanism by which regional differentiation affects the ESG-Firm value correlation; second, this paper establishes a logic of firm valuation based on ESG scores, which reduces the error and risk of firm valuation based on ESG data by taking into account the factor of the level of regional economic development; and lastly, this paper provides investors with a method for more objectively referring to and applying ESG data, which can help to promote the sustainable development of firms and the protection of the environment.

2. Literature Review and Theory Analysis

The correlation between ESG scores and enterprise value is a complex issue. An A company's environmental, social, and governance (ESG) performance is gauged by its ESG score, which takes into account how a corporation affects climate change, employee well-being and corporate governance, among other things. Corporate value is typically measured using financial metrics such as profit, revenue and market capitalization.

The evidence supporting the idea that organizations with stronger ESG performance have higher enterprise values over time is now more convincing. This is because these companies with better ESG ratings are more resilient in dealing with risks and seizing opportunities, which could help them achieve better financial performance in the future. In addition, ESG-focused companies tend to enjoy a better reputation among investors and consumers, which can also help increase their enterprise value. At the same time, ESG-focused firms may have advantages in technological innovation, market development and cost savings, which can improve their financial performance.

However, the homogeneity of ESG scores and enterprise value is not absolute [4]. Some firms may perform poorly in terms of ESG but still achieve high enterprise value. This may be because they have unique technological innovations or market advantages that allow them to make high profits the foreseeable future.

This essay argues that the relationship between ESG ratings and corporate value may vary geographically, such as the institutional environment, market development, cultural differences and other factors in different regions. First of all, in some regions, regulators could focus more on a company's ESG performance of firms and formulate relevant policies and regulations to encourage firms to improve their performance in ESG. In this case, ESG scores may have a higher correlation with firm value [5]. Secondly the level of market development may also affect the relationship between ESG ratings and company value. In marketplaces and developed nations, investors and consumers are likely to pay more attention to a firm's ESG performance, making ESG scores an important factor in assessing firm value. Whereas in developing countries and regions, where the level of market development may be lower, investors and consumers may be more concerned with the short-term financial performance of firms, leading to a less pronounced association between ESG scores and firm value. Then again, cultural differences in different regions may also affect the

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association between ESG scores and firm value [6]. In some cultures, companies may be more socially responsible and environmentally conscious, which makes ESG an important part of corporate value. In other cultures, firms may be more focused on short-term profits and performance, resulting in ESG scores having less of an impact on firm value. And other scholars have found that the needs of diverse stakeholders in different countries are addressed according to different cultural contexts [7].

In summary, this paper proposes a hypothesis regarding regional heterogeneity in the connection between ESG ratings and company value.

3. Research Design

3.1. Source of Data

All Chinese A-share listed businesses' ESG and Tobin's Q data for this study came from Shenzhen Sigma Data Technology Co.'s CSMAR (China Stock Market & Accounting Research Database) database. Compared with other databases, the ESG and Tobin's Q data in CSMAR database are of higher quality. Its data comes from the official public information of each listed company, such as the company's annual and quarterly reports, which have been strictly audited by the professional team of accounting firms. In addition, the CSMAR database is more timely updated, with access to the latest company ESG scores and Tobin's Q data, which enables timely tracking and analysis of the latest company situation, which is important for enhancing the timeliness and predictability of the research. Meanwhile, CSMAR provides more comprehensive financial data and market data, which can avoid the influence of some extreme values and has an undoubted position in the market competition.

3.2. Model Setting and Variable Selection

In this paper, we use OLS regression to examine the regional heterogeneity differences of ESG affecting firm value, and set up the model as follows:

$$Q_i = \alpha + \beta_1 ESG_i + \beta 2X_i + \gamma D_i + \epsilon_i \, [8] \quad (1)$$

Here Qi is the Tobin's Q of the ith firm, ESGi is the ESG score of the ith firm, X_i is the other control variables of the ith firm (e.g., asset size, capital structure, profitability, etc.), D_i is a dummy variable for the region to which the i_{th} firm belongs region dummy variable (e.g., east, central, west, etc.), and ϵi is the random error term. β_1 is the correlation coefficient between the ESG data and the firm's value, and γ is the extent to which the regional factors affect the correlation coefficient. It can be seen that Tobin's Q is affected by a combination of these different factors, which results in differences in regional heterogeneity, leading to influential factors when ESG is used for analysis.

4. Empirical Findings and Analysis

4.1. Analysis of Baseline Regression Results

The benchmark regressions on the effect of ESG dominance on company value are shown in Table 1 as results. In this case, only the core explanatory variables are included in column (1). As a result of the findings, it can be seen that the ESG dominance coefficient is significantly positive at the 1% level. That is, ESG score significantly affects the firm's corporate value in the stock market. Columns (2), (3) and (4) use different explanatory variables on this basis. It can be seen that the coefficients of the three explanatory variables Advantage of Environmental, Social and Governance are 0.063, 0.047 and 0.133, respectively, and are significantly positive at 1% level. Among them,

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the Governance advantage is particularly significant for firm value. Specifically, all other things being equal, for every 1% increase in Environment dimension score, the company's value will rise by 6.3%; the value of the company will rise by 4.7% for every 1% increase in the Social dimension score and by 13.3% for every 1% increase in the Governance dimension score. For every 1% improvement in the Social dimension score, the enterprise's value will rise by 13.3%. It can be seen that the firm value enhancement effect of Governance dimension advantage has more obvious economic significance compared to other dimensions. This may be due to the fact that there are four benefits of improving corporate governance as follows [9]:

(1) It enables the company to better protect the interests of small- and medium-sized investors, as well as to boost trust and loyalty among them, thereby increasing the demand for and price of the stock;

(2) It enables the company to control internal risks more effectively, improve operational efficiency and profitability, and thus increase the return and value of the stock;

(3) It enables companies to disclose information more transparently, reducing information asymmetry and increasing the information content and market competitiveness of stocks;

(4) It enables companies to respond more flexibly to external changes, seize market opportunities and innovate development strategies, thus increasing the growth potential and value of the stock.

In contrast, protecting the ecological environment and being responsible to the public, while also important corporate responsibilities, may increase the costs and risks of a company in the short run, reducing its profits and competitiveness and thus affecting the market performance of its stock. As a result, the economic significance of their advantages for the corporate value enhancement effect is not as pronounced.

Table 1: Benchmark regression results

	(1)	(2)	(3)	(4)
VARIABLES	Q	Q	Q	Q
ESG	0.172***			
	(13.77)			
Capital structure	0.613***	0.610***	0.610***	0.611***
	(10.71)	(10.88)	(10.88)	(10.86)
ROE	0.021*	0.022**	0.022**	0.022**
	(1.90)	(1.97)	(1.96)	(2.03)
Asset size	-0.406***	-0.413***	-0.396***	-0.402***
	(-28.79)	(-27.30)	(-28.29)	(-28.04)
Environmental dimension		0.063***		
		(10.11)		
Social dimension			0.047***	
			(7.95)	
Governance dimension				0.133***
				(10.25)
Constant	9.756***	10.868***	10.402***	9.757***
	(31.23)	(33.11)	(33.68)	(31.09)
Observations	20,857	20,610	20,610	20,610
R-squared	0.264	0.263	0.262	0.263

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

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4.2. Analysis of Regional Heterogeneity Results

The investigation of the heterogeneity of the effect of ESG scores on company value in the central and eastern areas is presented in Table 2. Among them, columns (1), (2), and (3) correspond to the southeast coastal region of China, central China, and inland northwest China, respectively. From the results, ESG scores in Central, Eastern and Western China are all strongly and favorably related to firm value. Moreover, the dominance coefficients of the three regions are 0.174, 0.177, and 0.149 respectively, with no obvious difference. Only the dominance coefficient of the west can be seen to be slightly lower than that of the east and the center. Specifically, all other things being equal, for every 1% increase in the ESG scores of firms in western China, the value of the firms will increase by 2.5% to 2.8% less than similar firms in eastern and central China. It can be seen that investors have slightly less trust in the ESG data disclosed by firms in Western China than in Eastern and Central China. This may be due to the fact that firms in Western China also have inadequate external monitoring and incentive mechanisms for ESG, and the disclosure standards and norms are not uniform enough, leading to more questions about the reliability and validity of ESG data.

Table 2: Heterogeneity results for the central and eastern regions.

VARIABLES	(1)Eastern part Q	(2)Middle part Q	(3)Western part Q
ESG	0.174***	0.177***	0.149***
	(12.26)	(5.30)	(3.67)
Capital structure	-0.058	0.568***	2.195***
	(-0.47)	(420.02)	(8.49)
ROE	0.017	0.019	0.039***
	(1.22)	(0.52)	(3.70)
Asset size	-0.291***	-0.574***	-0.580***
	(-16.61)	(-12.39)	(-15.47)
Constant	7.420***	13.517***	13.160***
	(22.38)	(12.88)	(16.33)
Observations	15,391	2,730	2,576
R-squared	0.085	0.612	0.455

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

4.3. Analysis of Heterogeneity Results for Degree of Marketization

Table 3 carries out the analysis of the heterogeneity of the extent to which marketization affects how ESG scores affect a company's worth. In particular, columns (1) and (2) correlate to places that have been more and less influenced by the market, respectively. The findings indicate that the coefficient of ESG advantage of firms is notably positive at the 1% level in areas with a higher level of marketization. In other words, ESG score has a big impact on how much a company is worth on the stock market. In contrast, ESG scores of firms in less marketized regions have no significant correlation with firm value. There is a sharp contrast between the two. Specifically, it implies that the favorable association between ESG and corporate value is more substantial the more marketization there is; in places where there is less marketization, the relationship between ESG and firm value is not significant.

This tendency can be explained by the fact that the political and legal climates as well as the level of economic development are better in areas with a higher degree of marketization, and most of the enterprises will take the initiative to practice the concept of ESG and assume the related social responsibility to build a good external image in order to gain market favor in the competition with similar manufacturers, and the incentive policies for corporate ESG performance in the local laws and regulations are more complete, and these financial strengths can support the policy subsidies, taxes, and other incentives for ESG. These financial strengths can support the implementation of policy subsidies and tax exemptions, which have a better role in promoting enterprises to take the initiative to improve their ESG performance. False ESG disclosure cannot be effectively curbed in areas with a lesser level of marketization due to the relative weakness of the rule of law environment in these areas, so investors do not have a more positive response to ESG, and the result is therefore not significant.

Table 3: Heterogeneity results for degree of marketization

	(1) Highly market-oriented	(2) Not highly market-oriented
VARIABLES	Q	Q
ESG	0.158***	0.046
	(15.35)	(1.34)
Capital structure	0.036***	0.139***
	(4.37)	(6.34)
ROE	0.012	0.008*
	(1.33)	(1.85)
Asset size	-0.308***	-0.420***
	(-45.10)	(-16.52)
Constant	7.838***	10.986***
	(50.73)	(18.42)
Observations	18,804	2,053
R-squared	0.122	0.202

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

4.4. Analysis of the Heterogeneity of Business Government Relations

Table 4 carries out the analysis of the heterogeneity of the firm-government relationship in terms of ESG rankings' effects on business value. In particular, columns (1) and (2) correspond to regions with higher market-government relationship indexes and regions with lower market-government relationship indexes, respectively. The findings demonstrate that, at the 1% level, the ESG advantage of businesses located in areas with stronger market-government relationship indices is significantly favorable. In other words, ESG score has a big impact on how much a company is worth on the stock market. In areas with weaker market-government relations indices, there is no discernible relationship between ESG and business value. The contrast between the two is significant. When put in the stock market, it is reflected that the higher the market-government relationship index, the stronger the positive correlation between ESG and company value; in areas with a lower index of market-government relationships, there is no meaningful correlation between ESG and business value. After reasoning, this paper believes that the reason is that the higher the government-market relationship index, the better the government-market relationship is, which is manifested in less intervention in the enterprise, light tax burden, and promotes the healthy development of the enterprise, so the enterprise's ESG investment can help to promote the enterprise value [10]; on the contrary, the government-market relationship is poor, and the

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exploitation of the enterprise is heavy, so the ESG can not effectively enhance the value of the enterprise.

Table 4: Heterogeneity results of firm-government relations.

VARIABLES	(1) Q	(2) Q
ESG	0.057***	0.039
	(2.97)	(1.15)
Capital structure	-0.638***	0.042***
	(-3.23)	(4.26)
ROE	0.032	0.010
	(1.45)	(1.00)
Asset size	-0.426***	-0.561***
	(-21.95)	(-26.93)
Constant	12.040***	14.754***
	(35.60)	(29.45)
Observations	16,359	4,498
R-squared	0.143	0.184

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

5. Conclusion

As the global economy recovers, the impact of the new crown epidemic gradually decreases and many other factors, how to judge the value of the enterprise and whether it is worth investing in has become the focus of attention of many investors. ESG, as an emerging, concentrating on the investing ethos and business evaluation criteria's performance in terms of the environment, society, and governance, through the discovery of real concern for the relationship between the enterprise and the environment, and socially responsible enterprises, to continue to put the idea of social sustainable development into practice. This study examines the variations in the link between ESG data and business value in several Chinese areas to show the influence mechanism of regional differentiation on ESG-Firm value correlation. It also establishes a corporate valuation logic based on ESG scores to promote investors to assess corporate value in a more objective way. Through data analysis, it can be concluded that the degree of marketization influences how ESG data and corporate value are related when studying the correlation differences between ESG data and firm value in many parts of China. When the degree of marketization increases, the significance of the ESG and firm value link also increases. This is affected by the degree of economic development in regions with a higher level of marketization, the legal system, and other characteristics that are more ideal. At the same time, it can be concluded that in the case of higher government-market relations index enterprise ESG investment is conducive to promote enterprise value.

The results of this study have significant policy repercussions for the development of enterprises at this stage. ESG evaluation system, as an important part of enterprise strategy evaluation, encourages the sustainable growth of businesses and the creation of long-term value, identifies the environmental dangers faced by businesses, characteristics of governance and society, and complies with the understanding of the national dual-carbon goal and the strategy of common prosperity. For enterprises, they need to continuously improve the level of ESG management, and formulate management measures in line with the current situation of enterprises according to the heterogeneous differences in the region, so as to improve the ability to cope with the enterprise crisis. At the same time, in line with the ESG concept at the same time, enterprises need to be more comprehensive construction of product quality control and a series of standards. For investors, the logic of enterprise valuation based on ESG scores proposed in this paper can be used to more objectively observe the ESG performance of enterprises, assess the performance of the enterprise in promoting sustainable economic development and fulfilling social responsibility after investment, so as to explore the potential of the enterprise and promote social development. For the government, the relevant government needs to promote the establishment of a more complete ESG information disclosure policy, encourage enterprises to actively practice the ESG concept to promote the sustainable development of society, strengthen the supervision of enterprises in various regions based on the ESG concept, and encourage enterprises to respond to the call of the state to promote the sustainable development of society and the environment.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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