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The Impact of ESG Policies of Enterprises on Internal Rate of Return

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Abstract: Environmental, Social, and Governance (ESG) is an investment strategy and corporate assessment framework that emphasizes the impact of enterprises on the environment, society, and governance. Its objective is to assess companies' performance and non-financial risks in relation to sustainable development. The internal rate of return (IRR) is the rate at which the project's cash flow is equal to zero. The objective of this study was to examine the correlation between an enterprise's ESG score and its IRR. This work utilizes quantitative analysis and multiple linear regression approaches, building upon earlier research that has examined the relationship between ESG factors and financial indicators. This research used Excel 2018 to do regression analysis on ESG and IRR, building upon the findings of prior studies. The research findings indicate a strong negative linear link between a company's IRR and its ESG rating, as well as its overall revenue growth rate. However, the total profit growth rate shows no significant correlation. Moreover, this study discovered that the overall rate of revenue growth has a more significant influence on the firm's IRR compared to the rate of ESG factors. This report presents a divergent finding from the bulk of other studies, offering a novel research avenue for examining the influence of ESG on financial performance.

Keywords: ESG, IRR, Lizhu Pharmaceutical Inc, Total Revenue Growth, Total Profit Growth.

1. Introduction

In 2020, the epidemic has swept across the globe, and the severity of the outbreak has peaked, severely affecting various industries. In 2021, the pandemic remained a major public health crisis on a global scale. Despite improvements to the global vaccine supply chain, the virus has mutated frequently, with Delta and Omicron mutated strains hitting the scene. Due to the new crown's impact in China, the government's demand for medicines and vaccines has increased significantly. The reform of China's medical and health systems has also deepened, and the pharmaceutical industry continues to transform and upgrade. In this market environment, pharmaceutical companies are seeing higher research costs, higher production volumes, and lower prices to cope with patients at all consumption levels. The pandemic significantly reduced offline outpatient and hospital visits, leading to a significant shift in pharmaceutical companies' offline transactions to online, potentially impacting their ESG policies and IRR. LiZhu Pharma Group's S&P ESG score of 65 in November 2023 ranked among the top 5% of global pharmaceutical companies evaluated. From 2020 to 2024, Lizhu Pharmaceutical gradually upgraded its ESG rating from B to AAA, and its Wind score also increased

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to AA. The company's high-quality and sustainable development can show its uniqueness and representativeness in the industry, which is worthy of study.

Research on ESG has a long tradition. For instance, Gabriela Camacho elaborated and further analyzed different ESG scoring standards and ESG scoring systems in different countries by means of classification discussion and predicted the possible corruption and degree of corruption in ESG scoring to a certain extent according to the scoring standards at the time [1]. Gabriela Camacho proposed methods and policies to reduce and prevent corruption, utilizing a scenario-based approach to speculate on potential causes of corruption and connecting them to the ESG assessment methodology and criteria [1]. Florencio and others conducted a comparative study using a special database consisting of a combination of several sets of different types of data, and used the controlled variable method to study the linkage relationship between ESG disclosure and quality [2]. They found a strong relationship between the extent of ESG disclosure and the quality of a firm's disclosure [2]. Todd Cort and Daniel Esty focused on ESG's future direction and explored the need for ESG standards in a variety of ways [3]. They reviewed the process of changing standards from the inception of the ESG policy to the recent past and objectively evaluated the ESG assessment system and the ESG policy at that time in the context of the global social environment, the natural environment, and the level of transparency of listed companies [3]. Afterwards, they propose potential improvements in the areas that are not yet perfect [3].

Despite the abundance of research on ESG, the majority of it concentrates on enhancing the policy itself rather than examining its influence on specific social or business indicators. Due to recent optimization of ESG evaluation methods and multipolar changes in the global environment (such as the previous epidemic), focusing solely on the characteristics and development prospects of ESG is no longer sufficient. According to the changes in the current market environment, companies will also make corresponding adjustments and change their ESG strategies. Focusing only on static ESG policies and scoring systems will lead to one-sidedness and even large errors in the final research results. Therefore, it is necessary to comprehensively analyze ESG and other indicators based on annual dynamic ESG data and corporate data.

The research object for this paper will be Lizhu Pharmaceutical Group's financial statements and MSCI scores from 2020 to 2023. It will synthesize the conclusions from the previous ESG research, construct a regression model of ESG and IRR along with other independent variables through empirical analysis, and explore the correlation between ESG and IRR. After drawing conclusions, scrutinize the erroneously significant correlation between ESG and IRR, assess if the model aligns with the hypothesis, and gauge the degree to which the model explains the variables.

2. Literature Review

2.1. Definition

ESG is a type of evaluation that evaluates a company's environmental, social, and governance dimensions rather than its financial reporting [4]. It is a comprehensive evaluation of a company across the three dimensions of environment, society, and governance. Goldman Sachs first provided a clear definition of ESG in 2006, linked the three concepts of environment, society, and governance together, and gradually established a more complete ESG investment ideology with the joint efforts of several countries and financial institutions [4].

The three levels of information—environmental performance, corporate governance, and social responsibility—focus on various dimensions of the enterprise [4]. Among these, "E" stands for "environmental protection," encompassing various business practices such as emissions, energy consumption, and water conservation that impact the environment and resources; "S" signifies the enterprise's social value, encompassing employee welfare and medical care, the operation of the

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industrial chain and supply chain, and the company's contribution to society; and "G" represents the company's management, emphasizing the composition of directors and managers, corporate governance, investor relations, and corporate risk management [4]. Based on these three specific definitions, it can be seen that ESG is an assessment of corporate sustainability performance as a measure, which has a very broad scope and is more specific and precise than the previous CSR.

In today's rapid development of the new economy, it helps to promote the high-quality and sustainable development of enterprises.

For investors, the ESG score represents how risky an investment is. Investors' need for ESG stems from a concern that the current climate crisis has reached a point where it has the potential to cause significant losses in their assets, i.e., they have invested a lot of assets in the past during a period of fossil-fuel-dominated economic growth, which are at risk of suffering declines. This sense of crisis has prompted these investors to look into ESG.

2.2. Important Results

Research generally indicates that enhancing a company's environmental performance and social responsibility can significantly boost its value. For example, Xing Qiangdu conducted a study on companies' environmental behavior indicators and operating costs, concluding that these measures can effectively reduce their liabilities [5]. Clelland and colleagues conducted an analysis of companies' ESG scores and investment costs [6]. By correlating these data with the turnover and profitability of these companies in subsequent years, they concluded that "green" behaviors significantly contribute to their financial performance [6]. This is because these behaviors can establish a "green and safe" brand image with minimal investment costs, thereby promoting sustainable development [6].

However, a summary of this paper reveals that the majority of researchers hold the belief that satisfying the potential needs of stakeholders can influence the value of businesses. Cornell and Shapiro examined the performance of various stock markets over an extended period, concluding that unfulfilled demands from stakeholders other than shareholders trigger market panic. This, in turn, escalates the firm's risk premium, escalates its operational and administrative expenses, and ultimately results in losses [7]. Petrovits and others empirically discovered that meeting the potential needs of certain important stakeholders enhances the firm's reputation and subsequently boosts its performance [8]. Firms with proactive social responsibility behaviors tend not to disclose unfavorable elements to reduce the impact on the company's accounting information [8].

2.3. Summary

In summary, a review of relevant studies at home and abroad reveals that a company's environmental performance comes first when implementing sustainable social responsibility. The disclosure of a company's environmental information can stimulate the participation of investors who have a strong understanding of environmental protection, lower their expected risk for the company's earnings, and reduce their required risk reward. This, in turn, lowers the enterprise's capital costs and expands the company's cash flow. Secondly, by fulfilling corporate social responsibility, a company can enhance its credibility and project a positive image in the eyes of investors. This, in turn, can lead to the effective use of investors' interests, rational allocation of corporate assets, and an improvement in the quality of its assets. Low corporate environmental and corporate social responsibility evaluation performance will not only have a negative impact on the company's financial status, but it will also have a negative effect on the company's valuation.

Thus, the level of a firm's ESG score represents the magnitude of an investor's propensity to invest in the firm. The higher the ESG score, the more attractive it is to investors. Based on the above

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findings, this paper proposes the hypothesis that an increase in the performance of a firm's ESG rating has a facilitating effect on the firm's IRR.

3. Research Design

In previous ESG studies, quantitative case studies were a well-established approach. Liu Mingyang used a quantitative method to analyze the impact of ESG rating performance on financial performance [9]. Yu Wenli used a quantitative method to analyze the impact of corporate ESG performance on audit fees [10]. This paper will use a case study and a quantitative approach to analyzing the situation. This method can measure large samples systematically; there is a standardized measurement process, and the results are reliable. This study will encapsulate the annual financial data and ESG scores of Lizhu Pharmaceutical Group Inc. for the years 2020–2023. The sample of this study was chosen as it provides the most direct representation of a company's operating conditions and allows us to calculate a company's IRR based on them and correlate it with the ESG.

This paper chooses Lizhu Pharmaceutical Group Inc. as its research subject. The primary research data for this paper is the company's financial data and ESG score from 2020 to 2023. The financial information consists mainly of the company's total revenue and total profit. Total revenue is all the income that a company earns from the sale of its products or the provision of its services during a given period of time. It includes the company's income from its main business, as well as other business income. Total profit, on the other hand, is the remainder of total revenue minus total costs. Total revenues reflect a company's sales performance and market share, while total profit reflects a company's profitability and operating efficiency. The sample-related data were obtained from the official website of Lizhu Pharmaceutical Group and the MSCI score database. Calculate the firm's IRR for each year using the firm's return on equity investment from 2020 to 2023 with net cash flow. Use the following Formula 1 in Excel to calculate the IRR for each year.

$$IRR = NPV(r) = \sum [Ct / (1 + r)^t] = 0 \quad (1)$$

4. Results

The investing website provides the company's stock history data, while the official website of LiZhu Pharmaceuticals Inc. collects the company's net cash flow from its quarterly and annual reports. Excel consolidates and analyzes the collected and calculated data.

According to Table 1, the sample data's standard error is small, indicating that the sample mean is very close to the overall mean. The median of total return is 12,246,950.80 thousand, the median of total profit is 2,356,608.58 thousand, and the median of IRR is 0.04635. The extreme value does not affect the median, thereby reflecting the concentration trend of the data. The large standard deviation suggests that the data distribution is more dispersed. Total revenue and total profit have low kurtosis values, indicating that their distribution is relatively flat. Total returns and total profits exhibit negative skewness values, suggesting a leftward skewed distribution.

Table 1: The descriptive statistics for the total annual revenue, total annual profit, and IRR for LiZhu Pharmaceutical Inc from year 2020 to 2023

	Total Revenue (in thousands)	Total Profit (in thousands)	IRR
Mean	11,910,972.62	2,362,085.42	0.06355
Standard Error	478,092.11	50,977.35	0.028422424
Median	12,246,950.80	2,356,608.58	0.04635

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Table 1: (continued).

Standard Deviation	956,184.22	101,954.70	0.056844847
Variance	9.14E+11	10,394,761,529	0.003231337
Kurtosis	2.764903511	0.312840048	1.226241321
Skewness	-1.658127365	0.292997696	1.327676169
Range	2,109,169.21	243,746.86	0.1249
Minimum	10,520,409.84	2,245,688.83	0.0183
Maximum	12,629,579.05	2,489,435.69	0.1432

(Data Source:www.investing.com;www.livzon.com.cn)

In Table 2, the correlation coefficient between total revenue and total profit is 0.999999663, which is a value very close to 1, indicating a very strong positive correlation between total revenue and total profit. This means that when total revenue increases, total profit also increases, and vice versa, proving that the business is operating in line with the general situation. The correlation coefficient between total revenue and IRR is -0.200827472, which is a negative value indicating that there is a weak negative correlation between total revenue and IRR. This means that when the total return increases, the IRR may decrease slightly, and vice versa. IRR measures the profitability of an investment project, and this negative correlation may indicate that while total return increases, IRR does not necessarily increase due to costs or other factors. The correlation coefficient between total profit and IRR is -0.201027277, which is a value very close to -0.200827472, indicating that there is also a weak negative correlation between total profit and IRR. This is similar to the correlation between total profit and IRR, indicating that IRR does not necessarily increase with an increase in total profit.

The weak negative correlation between total revenue, total profit, and IRR could suggest that other factors like cost structure, investment size, or project risk influence IRR.

These correlation analyses' results can help investors or decision-makers understand the relationship between different financial indicators and make investment decisions or business plans accordingly. However, further quantitative and qualitative analyses are necessary to determine the relationship between these variables, as correlation analyses do not provide evidence of causality.

Table 2: Correlation Analysis

	Total Revenue (in thousands)	**Total Profit (in thousands)**	IRR
Total Revenue (in thousands)	1		
Total Profit (in thousands)	0.999999663	1	
IRR	-0.200827472	-0.201027277	1

A regression model is to be established with the IRR as the dependent variable. The independent variables will include the ESG rating, operating revenue growth rate, and total profit. Here's how to formulate the regression model (Formula 2):

$$IRR_t=\alpha+\beta_1*ESG_t+\beta_2*\text{Revenue Growth }_t+\beta_3*\text{Profit Growth }_t+\epsilon_t \quad (2)$$

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In this regression equation, IRR_t represents the internal rate of return at time t. The model's intercept or constant term is denoted by α. B_1, β_2, and β_3 are the coefficients for the respective independent variables. ESG_t is the ESG rating at time t. Revenue growth is the growth rate of operating revenue at time t. Profit growth is the growth rate of profit at time t. ϵ_t is the error term at time t, representing the random disturbances in the model.

Assigning different values to the four different ESG scores of the firm: 1 for BB, 2 for BBB, 4 for AA, and 5 for AAA, where the initial value is 1 and increases by 1 for each step up the rank.

The regression results are shown below (Table 3). The R-square value is 0.634382656. This value is closer to the standard value, suggesting that the model has adequate explanatory power. To conclude, the model shows a strong linear relationship between the independent and dependent variables.

Table 3: Regression Results

Regression statistics	
Multiple R	0.796481
R Square	0.634383
Adjusted R Square	0.542978
standard error	0.074547
Number of objects	16

Table 4's significance F value of less than 0.05 suggests that the regression model is statistically significant. This suggests that the independent variables have a notable influence on the dependent variable.

Table 4: Variance Analysis

Variance Analysis					
	df	**SS**	**MS**	**F**	**Significance F**
Regression analysis	3	0.115707	0.038569	6.9404	0.005801567
Error	12	0.066686	0.005557		
Total	15	0.182394			

As can be seen in Table 5, the coefficient for revenue growth is -0.500897698. The t-statistic is -2.37124152, and the p-value is 0.035321537, which is less than 0.05, indicating that revenue growth has a significant effect on the dependent variable. The coefficient for profit growth is 0.110722251. The t-statistic is 0.964265607, and the p-value is 0.353943305, suggesting that the effect of profit growth on the dependent variable is not significant. The coefficient for ESG is -0.044748401. The t-statistic is -2.364860082, and the p-value is 0.035734052, indicating that ESG has a significant effect on the dependent variable. The results suggest that the impact of revenue growth and ESG on the dependent variable is relatively strong. Revenue growth and ESG have a significant negative effect on the dependent variable, while profit growth is not significant.

Table 5: Coefficients Results

	Coefficients	**standard error**	**t Stat**	**P-value**
Intercept	0.29886308	0.042132918	7.093339	1.25929E-05
Revenue growth	-0.500897698	0.211238583	-2.37124	0.035321537

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Table 5: (continued).

Profit growth	0.110722251	0.11482547	0.964266	0.353943305
ESG	-0.044748401	0.018922219	-2.36486	0.035734052

5. Discussion

The experimental conclusion indicates that there is a negative correlation between Lizhu Pharmaceutical's IRR and the ESG score. The conclusion also reveals a relatively significant negative correlation between LiZhu Pharmaceutical Company's IRR and its revenue growth rate, with the IRR showing no correlation with the total profit growth rate. This finding contradicts the paper's research hypothesis.

Firstly, there is indeed a significant correlation between IRR and ESG, indicating that a company's total revenue growth rate and its ESG rating can have a significant impact on its IRR. However, IRR is primarily an internal evaluation metric for a project or a company, mainly influenced by the company's internal costs and internal benefits. In contrast, ESG ratings are based more on external factors, including the company's environmental policies and management practices. These factors are highly relevant to those affecting IRR, but they cannot directly intervene. Using previous research results as a guide, the study may have overlooked the distinction between internal and external factors. This led to the conclusion that the relationship between IRR, ESG, and the total revenue growth rate is inverse, contradicting the research hypothesis.

Secondly, from 2020 to 2022, the pandemic had a significant impact on the global landscape. The pandemic had a significant impact on the research subject's pharmaceutical company. The government's demand for vaccine medications surged rapidly, leading to increased research costs for Livzon Pharmaceutical Company, higher sales volume and capacity, but a 50% reduction in the selling price. These policies, while improving the ESG score, resulted in sales not growing at the same rate.

The unique characteristics of the era may also play a significant role in shaping the research conclusions. The IRR and the total profit growth rate do not have a linear relationship. This might be due to the fact that the IRR and the total profit growth rate focus on and calculate aspects of financial performance in fundamentally different ways. When calculating IRR, time value considerations are essential, whereas the total profit growth rate does not involve such considerations, simply comparing profit growth across different periods. The two metrics evaluate a company's financial health from distinct perspectives; thus, they do not exhibit a linear relationship but rather a more intricate one.

6. Conclusion

The pandemic significantly affected the world from 2020 to 2023, leading to a significant increase in the demand for vaccine drugs and a significant impact on the pharmaceutical industry. This paper takes Lizhu Pharmaceutical Inc. as the research object and investigates the impact of its ESG ratings on its IRR during the period of 2020–2023, as well as the relationship between ESG and IRR.

After reviewing the research methods and conclusions of previous studies, the paper establishes the theoretical relationship between ESG ratings and a positive correlation with enterprises. Therefore, a quantitative analysis research method is adopted, and the hypothesis that the ESG of the research object is significantly positively correlated with the IRR is proposed. During the empirical analysis stage, this paper considers the IRR as the dependent variable, and the ESG rating, total revenue growth rate, and total profit growth rate as the independent variables. A multiple regression model is constructed, and a multiple linear regression analysis is conducted. The final conclusion is that there is a significant negative linear relationship between the ESG and IRR of Lizhu Pharmaceutical Inc.

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Although the paper has drawn conclusions, there are some limitations, such as a small number of sample data points and a limited number of independent variables in the study. In future research, researchers should select more independent variables when constructing regression models and collect more sample data for the study.

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