

Analyzing the Influence of Corporate Environmental, Social, and Governance Ratings on Corporate Performance

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Abstract. This research examines the economic implications of corporate ESG (Environmental, Social, and Governance) ratings on the financial performance of S&P 500 companies, addressing a crucial gap: how do individual ESG components affect a firm's profitability, and what does this signify for stakeholders and investors who are concerned with this issue? Gaining a comprehensive grasp of the role of ESG elements in investment strategies and company success is facilitated by this study. Using a refined empirical platform Alpha and Beta (from the Index Model) as well as ESG scores from the Bloomberg database, the research assessed the relationship between ESG metrics and a company's financial performance. The diagnostic testing processes guaranteed correct reporting, whereas the model captured the general industry implications and firm-specific attributes to isolate the specific ESG impact. Environmental and Social scores have a positive relationship with corporate profits while Governance score presents a complicated pattern. This implies that complete ESG factors in isolation affect the objectives of a firm. Their impact must be considered in portfolio development and investing in the best possible ways. The study underscores a crucial consideration for investors: adding a slot for ESG measurement, primarily for environmental and social issues, could consequently boost the profit and longevity of any given investment. The findings form a basis for the succeeding research on ESG aspects across different niches of the industry investment styles whereby the merging of ethicality in business performance gets a hard push as a new trend in finance.

Keywords: ESG, Business performance, Socially responsible investing.

1. Introduction

1.1. Research Background and Significance

The objective of this study is to assess the financial impact of environmental, social, and governance (ESG) ratings on the S&P 500 companies' financial performance throughout the studied period. In an age when societal and environmental responsibilities as well as good governance yield are more likely to dictate the strategies of enterprises and the selection of investors, understanding the importance of ESG aspects for business performance is crucial. The survey research seeks to determine how each ESG dimension influence the enterprises' profitability.

The ever-evolving vistas of corporate responsibility and investing styles are captured in view of this research, propelling the recognition of a new era where morally responsible and sustainable investment frameworks take up a traditional approach. This study conducts a thorough examination of the correlation between ESG ratings and financial outcomes, providing insights into how this impacts investors, financial institutions, and the advancement of ethical and sustainable societal progress. Consequently, it is vital in the ongoing conversation on sustainability and has practical tenacity to enhance integration of ESG in investment decisions and the vitality of businesses.

1.2. Literature Review

Sharp streamlined Markowitz's model in 1963 and put out a single index model that connected the portfolio's risk and return to the market portfolio, offered a fresh viewpoint on portfolio diversification, and drastically decreased the model's computation burden [1]. According to Anelli, the ESG thinking perspective is supposed to update Sharpe Ratio, taking into account the ESG-related risk to investor performance, indicating that the evaluation of performance will be biased when is not done considering ESG features [2]. Aich et al focus on the intricate dimensions of ESG on investment,

utilizing a structure function to determine the transition of the ESG factors to the decisions by the investors [3].

Research stating the significance of governance quality in corporate operation is undeniable, as high-quality governance is seen as one of the foundational factors that bring corporate financial performance to a success [4]. However, by far the two aspects like environment and social require a more comprehensive understanding because of their complex effect on investment and sustainability in the future [5]. The mantra is that it is widely believed that ESG elements have been successfully incorporated into today's investment decisions and this has been led by the financial market whose standards of valuation have increasingly put emphasis on sustainability, more so among millennial investors [6-8].

The examination of corporate ESG standards builds on the assumption that in addition to corporate governance, environmental and social responsibilities provide a company with an inherent capability to create long-term value and risk offshore. These elements are currently to be a principal consideration for the investment evaluation process [9]. Studies carried on further suggest that ESG criteria-infused strategies are not just something the investors feel ethically driven to do but more and are equally becoming a vital part of financial analysis and portfolio management as investor demographics and inclinations keep on changing [10,11].

Likewise, the source also notes the sign of attraction towards ESG implementation into investment goals. It will involve an investigation of how ESG scoreboards serve to provide investors with key information on a company's base and in what ways these data impact on the investment process [12,13]. Besides, there is the prominence of non-financial factors in investment analysis, which are increasingly listed like profitability and growth determinants used to make profits on an investment [14].

In summary, ESG factors are closely linked to risk-return analysis and offer an alternative approach that challenges traditional financial metrics in a challenging economy. This presents a sustainable, ethical, and profitable approach to corporate governance and investment strategy.

1.3. Research Contents

After comparing common investment strategies that consider ESG factors, in the following ways, this study contributed to the research of ESG factors' impact on corporate performance and offered a more scientific approach to ESG-oriented investors. Firstly, the research collects a range of data illustrating the enterprises' profitability and ESG performance, also the range highlights the data's diversity. The range includes various industries ensuring an outcome with high applicability and accuracy. Second, in order to get a more certain answer, the research individualizes the three ESG components in order to ascertain how the environmental, social, and governance factors affect the financial performance of the company. Thirdly, the study conducted a threshold model and summarized the empirical findings of the data. Finally, the study investigated and analyzed the potential factors contributing to the result.

2. Methodology

2.1. Sample Description

This paper employs a sample of 40 S&P 500 firms from 2016 to 2022. When selecting the firms, three criteria are met: (1) the financial data must be available in Yahoo Finance during the 7 years, (2) the ESG performance is rated by Bloomberg and (3) the ESG performance between 2016 and 2022 must be accessible in Bloomberg.

The sample consists of various company types, with 30.0% falling into the Technology category, 27.5% categorized as Finance Services, 17.5% in Industrials, and the remaining 25% split between Consumer Cyclical, Consumer Defensive, and Healthcare.

2.2. Variable Measures

To measure firm performance, the study employs Alpha and Beta from the Index Model [1]. Despite the Index Model's limitation, Michele Anelli reexamined the model and variables' feasibility under modern economic conditions [2]. The paper leverages ESG scores obtained from the Bloomberg ESG database to assess a company's ESG performance.

Bloomberg ESG platform provides access to ESG information covering over three million businesses across more than 130 nations, including stock identifiers for most of these enterprises. In the Bloomberg ESG, there are three categories Environment, Social, and Governance, encompassing a range of factors that influence a company's ESG performance. These issues are categorized as either risks or opportunities, and the company's exposure and management of these are evaluated to determine its performance on such matters. The scale for scoring ranges from 0, indicating poor performance, to 100, indicating excellent performance. The overall ESG score is derived by combining the individual scores from each sector based on their relevance to the respective industry.

2.3. Model Construction

The baseline regressions of firm performance on ESG are as follows:

$$r_{i,t} = \alpha_i + \beta_i r_{m,t} + \gamma_i E_{i,t-1} + \delta_i S_{i,t-1} + \zeta_i G_{i,t-1} + \varepsilon_i \quad (1)$$

Where r is the return; i is firm; t is the year; ε is the error term; γ , δ , ζ are the correlation index representing E, S, G Score's effect on the Company's Monthly Return.

Several diagnostic tests are employed to ensure a proper estimation approach is used. First, the study examines the data showcasing normal distribution, which promises an accurate outcome. Second, the research addresses the potential issue of multicollinearity by assessing the relationships between the independent and control variables to ensure accuracy in the data analysis. As Table 1 illustrates, the correlations between the Company's Monthly Return, E Score, S Score, and Beta are positive, which provides initial evidence of the impact of ESG on firm performance.

Table 1. Correlation matrix

	Company's Monthly Return	Alpha	Beta	E Score	S Score	G Score
Company's Monthly Return	1					
Alpha	-0.02392	1				
Beta	0.121789	-0.172	1			
E Score	0.518857	-0.0331	0.185215	1		
S Score	0.476365	-0.053950	0.2012380	0.706075	1	
G Score	0.431123	-0.015930	0.1339690	0.8548480	0.68869	1

In addition, the environmental, social, and governance (ESG) performance of a company is frequently shaped by the actions of other companies operating in the same industry. Therefore, this research will group error terms by industry to handle potential serial correlation. Additionally, the analysis will incorporate both firm and year-specific fixed effects to eliminate the impact of constant, unobserved differences related to firms and periods on the error terms.

3. Data analysis

3.1. Statistical Description

Table 2 provides details on the sample statistics, showing that the Company's Monthly Return has an average of 0.0119% and a standard deviation of 0.08233%. The minimum value of the Company's Monthly Return is -0.5%, while the maximum value is 0.51026%. The average value of Alpha is 0.02403. Alpha experiences its lowest value of -0.28491, while the highest value is 0.50823.

Table 2. Statistical description

Variable	Obs.	Mean	Std. Dev.	Min	Max
Company's Monthly Return	3440	0.0119%	0.0823%	-0.5000%	0.5103%
Alpha	3440	0.0240	0.0863	-0.2849	0.5082
Beta	3440	0.3382	0.2172	0	1.2200
E Score	3440	22.028	16.9945	9.3023	66.6600
S Score	3440	32.5972	11.1889	17.5439	56.1404
G Score	3440	53.9059	18.0353	37.5000	100

3.2. Empirical Analysis

3.2.1 Threshold effect test and threshold identification

Table 3 displays the outcomes of a thorough ordinary least squares (OLS) linear regression investigation, showing the influence of variables Alpha to G Score on the Company's Monthly Return, which serves as the dependent variable. The regression analysis results indicate that the E Score and S Score variables have a statistically significant and positive influence on the Company's Monthly Return, however, at the 5% level, the G Score, Alpha, and Beta variables do not exhibit statistical significance.

Table 3. OLS linear regression analysis

Company's Monthly Return	Coefficient	Robust Std. err.	t	P> t	[95% conf. interval]	
Alpha	4.2333	41.2071	0.1000	0.9180	-76.7279	85.1946
Beta	3.5183	19.5169	0.1800	0.8570	-34.8275	41.8640
E Score	3.0692	0.7729	3.9700	0.0000	1.5506	4.5877
S Score	2.4645	0.5348	4.6100	0.0000	1.4136	3.5155
G Score	-0.7752	0.5572	-1.3900	0.1650	-1.8701	0.3196
_cons	42.7676	22.2340	1.9200	0.0550	-0.9163	86.4516

In order to determine how many thresholds there are and the structure of the model, it is important to perform a test to see whether a threshold effect exists among the variables prior to putting the panel threshold regression model into practice. In this regard, this research repeated the sample 500 times to obtain the Bootstrap-P value to determine the existence of the threshold effect, the test results are shown in Table 4.

Table 4. Threshold effect test

Threshold	Bootstrap	Fstat	Prob	Crit10	Crit5	Crit1
Single	300	1.1200	0.0167	3.7525	4.5307	5.5837
Double	300	10.7200	0.0067	7.3399	8.4589	9.7363
Triple	300	2.1900	0.8600	12.1546	14.2892	23.0438

A significant threshold influence of variables on the performance of the Company is shown in Table 4. The single-threshold F-value passes the 10%significance test(i.e., P-value<0.1), the double-threshold F-value passes the 1%significance test(i.e., P-value<0.01), but the triple-threshold F-value does not meet the criteria. These findings indicate that when the variable changes, the impact on the company's performance is double-threshold. This study first determines the number of thresholds and then continues to investigate and evaluate them. The effectiveness of the thresholds is demonstrated by Table 5, which displays the estimation results of the thresholds and mainly provides the single-threshold's parameters and double-threshold models with the Company's Monthly Return serving as the cutoff point and the associated 95% confidence intervals.

Table 5. Threshold estimator

Model	Threshold	Lower	Upper
Th-1	0.0341	-0.0040	0.0324
Th-2	0.0686	0.0622	0.0703

Note: Th-1 and Th-2 stand for two different thresholds, which are used to differentiate the various stages or levels of the impact of the company's monthly return rate on company performance.

3.2.2 Threshold regression results

Based on the previous work, this research uses Stata 14.0 software to conduct model regression and Table 6 reports the results of the impact on corporate environmental, social, and managerial scores on corporate performance.

Table 6 demonstrates that the company's performance has a negative regression coefficient when the Alpha is in the low range ($\alpha_i \leq 0.0341$), failing the significance test; at the 1% level, the regression coefficient is 604.6 when the Alpha is in the middle range ($0.0341 \leq \alpha_i \leq 0.0686$); and at the 83.86 level when the Alpha is in the high range ($\alpha_i \geq 0.0686$). This phenomenon indicates with the increase of Alpha, the effect on the company's performance turns into a promotional effect, but after crossing the threshold, the significant impact decreases. The reason for this is that an enterprise's ability to make more profits is limited and is affected by the ESG factor [10].

Meanwhile, the three scales of the company's ESG score have different impacts on the Company's Monthly Return. The regression coefficients for the E Score and S Score shown in Table 6 are 6.149 and 3.360, respectively, implying a positive influence on the Company's Monthly Return. However, E Score's influence is more significant. The G Score's regression coefficient is -4.461, hurting the Company's Monthly Return. The explanation for this phenomenon is that with the same budget, the Environment, and Social Scale can fuel the company more, for their strong relation with innovation and public relations. The managerial scale requires more allowance to refine the original system, which is mature already, and therefore the incentives are fewer.

Table 6. Threshold regression model parameter estimation results

Variables	Company's Monthly Return
$\alpha_i \cdot I (\alpha_i \leq 0.0341)$	-15.1400 (48.1500)
$\alpha_i \cdot I (0.0341 \leq \alpha_i \leq 0.0686)$	604.6000** (102.8000)
$\alpha_i \cdot I (\alpha_i \geq 0.0686)$	83.8600 (41.6200)
β_i	-0.6210 (8.1940)
E Score	6.1490** (2.0500)
S Score	3.3600* (1.3020)
G Score	-4.4610* (1.8150)
Constant	139.8000*** (23.6900)
Observations	3440
Number of id	40
R-squared	0.3640

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4. Conclusion

The influence of ESG practices on company performance is dependent on the context and how the potential endogeneity of ESG is addressed. This study examines a cohort of, from 2016 to 2022, 40 firms from the S&P 500 index, all of which have ESG ratings, by utilizing the firm's Alpha as an instrumental variable. This study reveals that, in contrast to popular belief, a negative impact occurred when the G Score increased and that the company's E and S scores have a favorable impact on the company's monthly return. This finding suggests that it is inaccurate to calculate a company's overall ESG score by adding its E, S, and G scores when evaluating ESG limitations in investment portfolios.

This study suggests a new approach for investors to improve their portfolio construction. Improving both the E Score and S Score will enhance the company's profit-making capabilities. Therefore, when composing an ESG responsible portfolio, investors should prioritize E and S factors for enhanced returns. One possible explanation for this outcome is that regardless of the industry a company operates in, all aspects of its operations, including manufacturing, marketing, and profitability, are influenced by the environment. A higher E Score can lead to greater sustainability for the company, which in turn can result in a higher return on investment. Secondly, the S Score is a direct indication of the firm's public relations and investor relations, as a result, a higher S Score means better user adhesiveness more efficient communication, and information dissemination, which are direct influence factors. Lastly, G Score represents the company's management ability, which faces a homogenization phenomenon in the same domain, therefore causing a negative impact.

Analysis of the S&P500 has established a solid foundation for researchers to conduct further investigations into how the E, S, and G scores influence company performance in the future. The author asks that the study's scope be expanded to include sectors and indices. Meanwhile, the influence may be different according to the company's domain, therefore a more detailed classification standard should be implied in future studies.

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