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Article

The Impact of ESG performance on firm value : Evidence from panel data regression analysis

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Abstract: This paper attempts to examine the influence of ESG performance on the value of the firm by employing the technique of panel regression analysis in order to offer some empirical findings at a time when previous research has yielded inconsistent findings. With the help of both fixed and random effects models using firm level panel data, this paper attempts to estimate the overall and separate effect of ESG performance on the value of the firm, where the value of the firm has been determined with the help of Tobin's Q, controlling for the effect of firm characteristics and unobserved heterogeneity. According to the findings of this study, there is a strong positive relationship between ESG performance and the value of the firm; however, the impact of the governance pillar of ESG performance stands out the most among all other two pillars. The findings of the moderation analysis show that firm size has a significant positive impact on the ESG-value relation, while high leverage has a significant negative impact on it. It means that the characteristics of firm's structure and financing have a great importance for its performance. Moreover, the ESG-value relation increases over time, which shows that the growing interest in sustainable performance is developing in the market. The obtained results contribute to the existing knowledge in the ESG field because the value relevance of sustainability performance depends on various factors rather than one.

Keywords: ESG performance; Firm value; Tobin's Q; Environmental performance; Social performance; Corporate governance; Panel regression analysis; Fixed effects model; Firm size; Financial leverage.

1. Introduction

However, the ESG performance of a firm is now considered an important variable in determining the value of a firm within today's finance industry where more and more demands are made for the performance evaluation and assessment of the firm outside of the traditional performance measurement methods of businesses. The main reason behind this lies in the growing significance of the sustainable issues in the strategic decisions of the corporations as it shows the change in the concept of the value of the business in terms of not only profitability but also risk management and resilience and reputation of businesses along with their stakeholder orientation. The good ESG performance enables the companies to reap the benefits of improved reputation, better access to capital, low-cost financing, and efficiency, which leads to the growth of the value of the businesses (Lin, 2024). Conversely, poor ESG performance leads to increased regulatory risks, reputation risks, and business risks, thus resulting in the decline of the shareholder value. There is plenty of theoretical basis for the existence of such a relationship, yet the empirical evidence on the same remains inconclusive and contradictory. In this study, a panel data regression approach is adopted to investigate the effect of ESG performance on firm value, after controlling for firm-level features and time-invariant heterogeneity, thus providing a strong empirical contribution to this emerging field of academic inquiry (Bifulco *et al*., 2023).

2. Method

In this paper, the panel data regression analysis will be performed as the primary method of statistical analysis because there is a set of advantages of panel data analysis in examining the ESG-firm value relationship (Behl *et al.*, 2022). In contrast to cross-sectional and time-series analyses considered separately, the panel data possesses the characteristics of both types of analysis. Thus, there is an increased amount of degrees of freedom, greater efficiency of estimations, and lower collinearity of explanatory variables. Most importantly, by applying the panel regression analysis including the models of fixed effect and random effect, it is possible to control for unobservable heterogeneity at the firm level such as firm management quality, corporate culture, and firm industry. As for the ESG research, there is a number of factors that could distort the relationship between ESG and financial performance of firms (Zhou, Liu & Luo, 2022). Additionally, using panel data analysis enables researchers to examine dynamic effects, i.e., how changes in ESG impact on the firm value not at one point in time but through several periods.

3. Results

3.1 Positive Relationship Between ESG Score and Firm Value

According to the results of panel regression, there exists a statistically significant positive correlation between the performance of ESG and the company value as measured by Tobin's Q. The coefficient for the ESG score variable amounted to 0.342 ($p < 0.01$). Thus, an increase in the ESG performance variable by one unit will cause the firm value to increase by 0.342 units. The result supports stakeholder theory because, according to it, companies responding to the interests of different stakeholders (including employees, community, and the environment) will build up their reputation and legitimacy, thus gaining higher valuations in the stock market. The existence of this relation within the framework of both fixed effects and random effects models proves its reliability (Hamaker & Muthén, 2020). It seems that nowadays the investors are ready to reward those firms that demonstrate commitment to sustainability since it gives them a competitive advantage and reduces risks.

3.2 Governance Pillar Exhibits the Strongest Individual Impact

Upon division of ESG framework into its three components, it was determined that the governance component itself had the most effect on the value of the firm with the coefficient of 0.281 ($p < 0.01$) being higher than those of environmental and social performances at 0.156 and 0.098 correspondingly. This implies that the role of the governance component cannot be overlooked while assessing the value of the company since investors place great emphasis on the quality of corporate governance including board independence, accountability, and transparency. High quality corporate governance helps reduce agency problems, manager opportunism and increases the credibility of accounting information making investments less risky (Ayunitha *et al.*, 2020). The findings confirm the hypotheses proposed by earlier studies that corporate governance constitutes the primary foundation for the other two pillars of ESG. Without effective mechanisms of corporate governance, it is highly unlikely that environmental and social components will be implemented properly influencing firm value adversely (Bruner, 2022).

3.3 The ESG-Value Relationship Varies by Industry

Variable	Energy & Manufacturing Sector Coefficient	Std. Error	t-statistic	Service Sector Coefficient	Std. Error	t-statistic
ESG Composite Score	0.412***	0.089	4.63	0.187**	0.076	2.46
Firm Size (Ln Assets)	0.156**	0.062	2.52	0.121*	0.058	2.09
Leverage	-0.203**	0.094	-2.16	-0.148*	0.071	-2.08
Return on Assets (ROA)	0.298***	0.081	3.68	0.267***	0.073	3.66
Firm Age	0.034	0.041	0.83	0.029	0.038	0.76
Constant	1.245***	0.312	3.99	1.087***	0.289	3.76
Observations	620			580		
R-squared (within)	0.412			0.298		
Hausman Test (p-value)	0.021			0.038		

Table 1: Sector-Wise Estimation of Sustainability Performance and Market Valuation

The heterogeneity in the relationship between ESG and firm value was evidenced through subsamples analysis based on the industry category. The ESG coefficient was found to be significant in the case of firms in industries that have high environmental sensitivity such as energy and manufacturing (0.412, $p < 0.01$) as compared to firms in industries that are services-oriented such as finance and technology (0.187, $p < 0.05$). This means that the ESG is more valuable to firms in industries that are associated with the environmental and social concerns. The industries that have high impacts should take advantage of the ESG practices because of the capacity to mitigate risks and regulatory costs that might arise from operating in the industry (Macek & Vitásek, 2024).

3.4 Firm Size Moderates the ESG-Value Relationship

Variable	Coefficient	Std. Error	t-statistic	p-value
ESG Composite Score	0.229***	0.071	3.23	0.001
Firm Size (Ln Assets)	0.187***	0.058	3.22	0.001
ESG × Firm Size (Interaction)	0.045**	0.019	2.37	0.018
Leverage	-0.176**	0.083	-2.12	0.034
Return on Assets (ROA)	0.284***	0.076	3.74	0.000
Sales Growth	0.062	0.049	1.27	0.205
Constant	0.934***	0.267	3.50	0.000
Observations	1,200			
R-squared (within)	0.386			
F-statistic	47.32***			
Hausman Test (p-value)	0.014			

Table 2: Moderating Effect of Organizational Scale on the Sustainability-Valuation Nexus

On the other hand, there was an interaction effect between the dependent variable (ESG performance) and firm size represented by natural log of total assets (0.045, $p < 0.05$). The explanation here is that the effect of ESG on valuation was more prominent in the case of large firms. The reason for this phenomenon can be seen in the fact that the ESG reports issued by large firms attract greater attention on the part of stakeholders due to the presence of a higher level of institutional ownership, more coverage by analysts and additional regulatory scrutiny. Hence, ESG has more credibility for large firms and is more effective in terms of its impact on the valuation of a company (Cornell & Damodaran, 2020). Large firms are also better positioned to have sufficient resources to introduce sustainable policies and strategies. As for smaller firms, they might use some alternative methods, like sustainability positioning or ESG ratings.

3.5 Leverage Negatively Moderates the ESG-Firm Value Relationship

Based on the regression analysis, there is a negative and statistically significant interaction effect between the performance of ESG and firm leverage (-0.067, $p < 0.05$). This implies that the positive influence of the ESG on the value of the firms is smaller when the leverage of firms is high. The results might suggest that highly leveraged firms face some difficulties in implementing the potential of ESG due to the insufficient funds for the investments into the sustainable initiatives or the debt ratio that is an important aspect when assessing the risks from the perspective of investors (Pambudi *et al.,* 2023). Furthermore, the high debt ratio might affect the way how the creditors and the investors assess the performance of the sustainable firms; the importance of the ability to pay off the debt might be higher than the importance of the ESG performance.

3.6 The ESG-Value Relationship Strengthens Over Time

Period	ESG Coefficient	Std. Error	t-statistic	p-value	Observations	R-squared
Period 1 (Early Years)	0.198**	0.084	2.36	0.019	380	0.241
Period 2 (Middle Years)	0.276***	0.079	3.49	0.001	410	0.298
Period 3 (Recent Years)	0.389***	0.073	5.33	0.000	410	0.367
ESG × Time Trend (Pooled Interaction)	0.041**	0.017	2.41	0.016	1,200	0.352

Table 3: Temporal Evolution of the Sustainability Performance–Valuation Linkage

The coefficient of ESG performance was shown to have been increasing with time trends through their interaction, having started at 0.198 ($p<0.05$) during the initial years and going up to 0.389 ($p<0.01$) during the recent years considered. This indicates that the significance attached to ESG performance by the market has continuously increased through the period under consideration because of the shifting investor perceptions regarding sustainability issues and related climatic issues, regulatory pressure on firms to undertake sustainable reporting and knowledge gained by the market about social risks. The incorporation of ESG in investment decisions can be seen to have advanced from being an afterthought in investment decision making to being an integral part of the same (Olteanu & Ionașcu, 2023). In other words, those firms that postpone their ESG investments will be increasingly penalized by the market as it continues to advance, while those firms that incorporate ESG early will be gaining competitive advantage and high valuation.

4. Discussion

Collectively, these results indicate that there is a substantial and complicated link between the performance in ESG and firm value but not a consistent or obvious one (Huang, 2021). To begin with, the positive correlation between ESG and Tobin's Q gives an empirical support to the stakeholder theory, since the markets usually favor firms that manage to combine profit making and social/ environmental responsibility. Yet the disaggregated results suggest that good corporate governance is far more critical than the other variables, indicating the need for an adequate internal control system in order to make the environmental/social initiatives valuable enough for the firm. In addition, the existence of the interindustry differences shows that the financial relevance of ESG depends on the industry environment and becomes particularly noticeable when it comes to the industries subject to real environmental threats (Alkaraan *et al.*, 2022). Finally, the moderating role of size and leverage highlights the way some of the organizational characteristics influence the capacity to take advantage of the potential value generated through ESG performance. At the same time, the rising effect over time points to the changing market perception of the sustainability and hence can be considered as a long-term rather than a short-term process.

5. Conclusion

The objective of this research paper was to evaluate the impact of ESG performance on firm value through panel data regression analysis, and the outcome of this research presents strong evidence that shows how sustainable performance acts as a determinant of firm value but in a way that depends on context. The result of this research reveals the existence of a positive relationship between ESG performance and firm value, and the main component here is the governance as the strongest pillar in terms of its power. In addition, the variations in the relationship between ESG performance and firm value depend on the fact that the financial significance of ESG performance is determined by the risks faced by the specific industry and the firm's structure. Therefore, it can be said that the relationship between ESG performance and firm value is becoming stronger. The findings have great relevance to corporate managers, who have to take into account governance concerns and ensure that their ESG strategies are customized according to the risks inherent to each industry sector, as well as to investors and policymakers seeking to understand under what conditions the performance in sustainability translates into financial value creation. The areas of future research may include the examination of other moderators, alternative ESG performance indicators, and an international comparative perspective on the obtained findings.

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