UNVEILING THE NEXUS BETWEEN ENVIRONMENTAL, SOCIAL, GOVERNANCE VARIABLES AND FIRM PERFORMANCE: AN EMPIRICAL INVESTIGATION

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Abstract

The present study is based on the investigation of the effect of environmental, social, and governance (*ESG*) performance combined and its sub-elements E — environmental, S — social, and G — governance separately as independent variables along with *LEVERAGE*, *SIZE,* logarithm of total assets (*LOG_TA*), *BETA,* and *INFLATION* as control variables and the corporate's operational and financial performance measured by return on assets (*ROA*) and return on equity (*ROE*). In this research, the sample of NIFTY50 firms for the period of 2015–2022 was studied. The research is based on panel data regression analysis applied with a fixed effect model, as it was found suitable as compared to pooled ordinary least squares (OLS) and random effect models with the help of the Hausman test. We observed that ESG was found insignificant with *ROA* in Model 1, environmental pillar score (*EPS*) in Model 2, and social pillar score (*SPS*) in Model 3 along with governance pillar score (*GPS*) in Model 4 while in the case of *ROE* as a dependent variable, Model 1 *ESG* was found negatively significant with *ROE, EPS* in Model 2 and *SPS* in Model 3 failed to be statistically significant with dependent variable *ROE* but lastly in Model 4 *GPS* found negatively significant with *ROE*. The finding of this study is specific in relation to the data set used and further research outcomes may be traceable through different industries, the outcome of the study will be useful for corporations, policymakers and other stakeholders having financial and non-financial interests.

Keywords: ESG, Governance Pillar Score (GPS), Environmental Pillar Score (EPS), ROA, ROE

Authors' individual contribution: Conceptualization — M.A.I.; Methodology — M.A.I. and E.H.; Software — M.A.I. and N.C.; Validation — F.S. and N.T.; Formal Analysis — M.A.I. and M.S.; Data Curation — E.H. and F.S.; Writing — Review & Editing — A.F.

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1. INTRODUCTION

In recent years, the global business landscape has witnessed a paradigm shift as corporations are increasingly recognizing the profound impact of environmental, social, and governance (ESG) factors on their overall performance (Clark et al., 2015; Eccles & Serafeim, 2013). ESG considerations extend beyond traditional financial metrics, encompassing a broader spectrum of sustainable and responsible business practices. This evolving awareness has sparked a growing academic and research interest in understanding the intricate relationship between ESG performance and financial performance (Flammer, 2015; Grewatsch & Kleindienst, 2017). The integration of ESG criteria into corporate decision-making processes reflects a departure from the conventional notion that financial success alone is a sufficient measure of a company's health (Hockerts & Moir, 2004). Investors, stakeholders, and regulatory bodies are now placing a premium on organizations that demonstrate a commitment to sustainability, ethical conduct, and effective governance (Ioannou & Serafeim, 2015). This shift in perspective prompts critical questions:

RQ1: How do environmental, social, and governance practices influence financial outcomes?

RQ2: To what extent can responsible business conduct contribute to long-term financial success?

This academic inquiry seeks to delve into the multifaceted dynamics between ESG performance and financial performance, aiming to contribute valuable insights to both academia and industry. The rationale behind this investigation lies in the acknowledgement that sustainable business practices not only serve societal and environmental interests but also hold the potential to enhance corporate resilience, innovation, and competitive advantage (Margolis & Walsh, 2003; Porter & Kramer, 2006).

As scholars embark on this journey, it becomes imperative to evaluate the existing literature, identify gaps in knowledge, and establish a theoretical framework that can guide rigorous empirical investigations (Friede et al., 2015; Oikonomou et al., 2014). By systematically examining the nexus between ESG metrics and financial indicators, researchers aspire to unearth patterns, correlations, and causal relationships that illuminate the impact of responsible business practices on organizational success.

In conclusion, this research initiative endeavours to deepen our understanding of how ESG considerations intertwine with financial performance. As businesses worldwide navigate an increasingly complex and interconnected global landscape, this investigation aims to provide nuanced perspectives that can inform strategic decision-making, foster sustainable corporate practices, and contribute to the ongoing dialogue on the role of businesses in creating a more resilient and responsible future.

The rest of this paper is structured as follows. Section 2 reviews the relevant literature. Section 3 presents the methodology. Section 4 shows the empirical results. Section 5 summarizes discussions. Section 6 provides conclusions of the findings.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

There are numerous studies on ESG along with their association with corporate financial performance that have already the streamlined and followed by the trending in nature due to the prodigious issues pertaining to ESG. Setiani (2023) has studied the impact of ESG scores on financial performance with the help of moderating the role of gender diversity by using eighty companies listed on the Indonesian stock exchange. The result of the study indicated a positive association between ESG score and corporate financial performance and gender diversity works as a catalyst between these associations. The impact of ESG score and financial performance of NIFTY 50 companies in India between 2015–2022 was analyzed by using fixed effect panel quantile regression and revealed that ESG practices and financial profitability vary across return on equity (ROE) whereas environmental parameter score along with governance parameter's score showed highly negative significance (Rao et al., 2023).

The study related to the impact of ESG performance and stock return of listed firms in the Eurostock50 index during the period between 2000 and 2018 by Torre et al. (2020). In the investigation of Zengfu and Jin (2022) ESG performance was found significant in relation to abnormal returns of Chinese firms during a pandemic and was more prone to firms with low human capital and bad goodwill. The association between ESG performance and public limited companies was analyzed in the study of Dalal and Thaker (2019) with the help of a random effect panel regression model over 65 Indian firms listed on the National Stock Exchange (NSE 100 ESG) index database for the period of 2015–2017, the performance of Indian firm was denoted by return on assets (ROA) and Tobin's Q, the result found that there is strong and positive association between ESG performance and firm performance which is required to enhance practical implications for corporates, investors, regulators as well as policymakers. Aydoğmuş et al. (2022) identified a positive and significant relationship between ESG score with firm value when considered combined while individual environmental factors found no significant relationship but social along governance factors were found significant.

The association between ESG performance and economic performance in Malaysia and Singapore was examined for the period of 2010–2014 by Tarmuji et.al (2016) and concluded the positive influence of ESG on economic performance. Out of the three parameters of ESG environment-friendly activities impacted most over the value of selected 251 banks from 44 emerging economies while ESG activity was found positively significant with the cash flow and their efficiency revealed in the study of Azmi et al. (2021). This study elucidates the existing literature on ESG and its relationship with the performance of firms, therefore, this paper proposes the following hypotheses:

H1: ESG scores are positively related to corporate financial performance (ROE).

H1a: Environmental scores are positively related to corporate financial performance (ROE).

H1b: Social scores are positively related to corporate financial performance (ROE).

H1c: Governance scores are positively related to corporate financial performance. (ROE).

H2: ESG scores are positively related to corporate financial performance (ROA).

H2a: Environmental scores are positively related to corporate financial performance (ROA).

H2b: Social scores are positively related to corporate financial performance (ROA).

H2c: Governance scores are positively related to corporate financial performance (ROA).

3. RESEARCH METHODOLOGY

The study is based on two base models for ESG followed by other six sub-models for the segregated study of ESG as E — environmental score, S — social score, and G — governance score, through the first based model the relationship between dependent variable *ROA* and independent variables and through the second based model the relationship between *ROE* and independent variables were estimated. The previous studies of Velte (2017) and Alamanos and Koundouri (2022), etc., used *ROA* as a dependent variable to know corporate performance, the studies of Nguyen et al. (2022), Junius et al. (2020) and Aydoğmuş et al. (2022), etc., used *ROE* as a dependent variable to investigate the corporate performance with the inclusion of *ESG* as independent variables along with other control variables. Its role is between dependent and independent variables particularly *ESG* as one of the independent variables. The following models were used in the study.

ROA as dependent variable:

$$ROA_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 BETA_{it} + \beta_5 INF_{it} + \varepsilon_{it} \quad (1)$$

$$ROA_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 BETA_{it} + \beta_5 INF_{it} + \varepsilon_{it} \quad (2)$$

$$ROA_{it} = \beta_0 + \beta_1 SPS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 BETA_{it} + \beta_5 INF_{it} + \varepsilon_{it} \quad (3)$$

$$ROA_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 BETA_{it} + \beta_5 INF_{it} + \varepsilon_{it} \quad (4)$$

ROE as dependent variable:

$$ROE_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 BETA_{it} + \beta_5 INF_{it} + \varepsilon_{it} \quad (5)$$

$$ROE_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 BETA_{it} + \beta_5 INF_{it} + \varepsilon_{it} \quad (6)$$

$$ROE_{it} = \beta_0 + \beta_1 SPS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 BETA_{it} + \beta_5 INF_{it} + \varepsilon_{it} \quad (7)$$

$$ROE_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 BETA_{it} + \beta_5 INF_{it} + \varepsilon_{it} \quad (8)$$

where, *ROE* and *ROA* are dependent variables, environmental, social, and governance (*ESG*), environmental pillar score (*EPS*), social pillar score (*SPS*) and governance pillar score (*GPS*) are independent variables, *LEVERAGE*, *SIZE* (*LOG_TA*), *BETA,* and *INFLATION* are control variables and ε_{it} refer as error terms for firm *i* in period *t*.

Table 1. Summary of variable

Variables	*Description*
Dependent variables	
ROE	Net income / shareholder's equity
ROA	Net income / total assets
Independent variables	
ESG	Total combined score (Refinitiv database)
EPS	Environment score (Refinitiv database)
SPS	Social score (Refinitiv database)
GPS	Governance score (Refinitiv database)
Control variables	
BETA	Systematic risk of companies stock
LEVERAGE	Total debt / total assets
SIZE	Logarithm of total assets
INFLATION	Inflation rate % (2015–2022)

4. RESULTS

Different statistical techniques used in the study comprise descriptive analysis, correlation analysis and regression analysis with the help of GNU Regression, Econometrics and Time-series Library (GRETL) software. Table 1 refers to the descriptive analysis that defines the characteristics and mean, standard deviation, minimum value, maximum value and median of the variables chosen in the study.

Table 2 shows the *ESG* scores exhibit a mean and median value of 59.5 along with a standard deviation of 17.5, the range of *ESG* scores spans from a min of 13.1 to a max of 93.2, *SPS* has a mean value of 65.4 and median of 68.3. The standard deviation of *SPS* is 19.6 reflecting some dispersion, *SPS* range from min 8.81 to max 96.8, while *GPS* shows a mean of 54.6 and median 53.9 followed by a standard deviation of 23. Which indicate that *GPS* has a wider variation. The lowest *GPS* is 11.9 and the highest is 97.3.

EPS carries a mean of 54.5 and a median of 55.6 along with 23.5 as standard deviation and min and max ranging from 0.00 min to max 97.2. *ROA* indicates 9.92 as mean and 6.23% as median along with 11.3 as deviation. The variation has been shown on the basis of min and max values which ranging from min -12% to a max value of 77.6. The *ROE* indicates 19.8 as the mean and 15.9% median with a standard deviation recorded as 16.9 and a min value of -21.0 and a max of 115.

BETA is stable with a mean of 0.99 and median of 0.94 with a low standard deviation of 0.48 and ranging from min -0.02 to max 2.35. The *LEVERAGE* ratio has a high mean of 83.5 and median of 59.7 with a standard deviation of 89.7 followed by

min 0.00 and max 555 values. The *INFLATION* rate comprises of mean 0.04, a median of 0.04, a standard deviation of 0.01, a min of 0.03 and 0.06 max values, lastly, the *SIZE* is denoted with a log of total assets (*LOG_TA*) shows a consistent mean and median as 27.4 with a small standard deviation of 1.47, min and max ranging from 24.1 min to 31.6 max.

Table 2. Descriptive statistics

Variables	*Mean*	*Median*	*Std. dev.*	*Min*	*Max*
ESG	59.5	59.5	17.5	13.1	93.2
SPS	65.4	68.3	19.6	8.81	96.8
GPS	54.6	53.9	23.0	11.9	97.3
EPS	54.5	55.6	23.5	0.00	97.2
ROA	9.92	6.23	11.3	-12.0	77.6
ROE	19.8	15.9	16.9	-21.0	115
BETA	0.99	0.94	0.48	-0.02	2.35
LEVERAGE	83.5	59.7	89.7	0.00	555
INFLATION	0.04	0.04	0.01	0.03	0.06
LOG_TA	27.4	27.4	1.47	24.1	31.6

Table 3 indicates the correlation matrix for selected variables and also shows no correlation between *ESG* score combined with *ROA* and *ROE*, *DEBT-EQUITY* ratio was also found no correlation with *ROA*, *ESG*, *EPS*, and *GPS* but indicates moderate correlation with *BETA*, *EPS* has a moderate and positive correlation with *ESG* and *SPS* furthermore, *BETA* has positively correlated with *EPS*, *SPS*, *ROE,* and *DEBT-EQUITY*. *INFLATION* is positively correlated with *EPS, GPS*, *SPS,* and *LOG_TA* and lastly, *ROA* is negatively correlated with *LOG_TA,* and *ROE* is found positively correlated with *SPS*, *BETA,* and *DEBT-EQUITY* and negatively correlated with *EPS*, *GPS,* and *LOG_TA*.

Table 3. Correlation matrix

	ROA	*ROE*	*ESG*	*EPS*	*SPS*	*GPS*	*BETA*	*DEBT-EQUITY*	*INFLATION*	*LOG_TA*
ROA	1									
ROE	0.6	1								
ESG	0.0	-0.0	1							
EPS	-0.0	-0.1	0.8	1						
SPS	0.2	0.1	0.9	0.7	1					
GPS	-0.0	-0.1	0.6	0.3	0.3	1				
BETA	-0.1	0.2	-0.0	-0.0	0.0	-0.0	1			
DEBT-EQUITY	-0.0	0.1	0.0	0.0	-0.0	0.0	0.4	1		
INFLATION	-0.0	-0.0	0.1	0.1	0.1	0.1	-0.1	-0.0	1	
LOG_TA	-0.3	-0.3	0.2	0.2	0.2	-0.1	0.0	-0.0	0.1	1

Before running panel data regression, we find out the best panel data model suitable for our panel data among pooled, fixed and random effects models. Firstly, we compared pooled and fixed effects models with the help of the F-test and found the fixed effect model suitable for our panel data.

Secondly, we ran the Hausman test to compare fixed effect and random effect and found fixed effect model is more suitable for our regression panel data to know the effect on *ROA* and *ROE* (see Table 4).

Table 4. Hausman test

Dependent variables	*Test result*	*Chi-square*	*p-value*
ROA	Fixed effects	62.227	5.466e-15
ROE	Fixed effects	38.116	2.314e-05

As our panel data has short time series and large cross sections, that is why the problem of cross-sectional dependency (CD) in the error terms would not affect the result which was checked by applying the Breusch-Pagan Lagrange multiplier (LM) along with the Pesaram CD test and found CD in the error terms but would not bring complication in selected research design. The present panel data is micro in nature due to its short time period of *t* (eight years) as compared to 50 cross sections due to which no problem of serial correlation was found by applying the Breusch-Godfrey test for serial correlation.

Table 5 concludes the result of the fixed effect regression model in which *ROA* is taken as dependent variables and *ESG, EPS, SPS,* and *GPS* as independent variables along with *DEBT-EQUITY, INFLATION, BETA,* and *LOG_TA* as control variables to analyse the impact of independent variables on the dependent variable. The Bloomberg and definitive databases are the source of data taken in the study. *ESG* with coefficient and p-value of 0.015 and 0.611 was found insignificant with *ROA* (Qureshi et al., 2021) in Model 1, *EPS* in Model 1.1 has 0.027 as coefficient and 0.205 as p-value also found insignificant with *ROA* (Goel & Misra, 2017, Sroufe & Gopalakrishna-Remani, 2019), similarly *SPS* (Bătae et al., 2021) in Model 1.2 along with *GPS* in Model 1.3 found no significant association with *ROA* (Ahmed et al., 2015) with values (coefficient = -0.002, p-value = 0.928), (coefficient = -0.018, p-value = 0.412). *BETA* as the control value with the coefficient value ranging from 0.356 to 0.478 across all models along with p-values above 0.736 across all models found insignificant with *ROA*. Moreover, out of the remaining independent and control variables *DEBT-EQUITY* and

LOG_TA are found significant associations with the *ROA* across all models, *LOG_TA* with coefficient value = 3.851 to 4.398 and (p-value < 0.0001 has been found negative significant relationship which depicts that as *LOG_TA* increases *ROA* decreases. Similarly, *DEBT-EQUITY* with (p-value < 0.001) was observed negatively significant with *ROA* which indicates a higher *DEBT-EQUITY* ratio leads to lower *ROA*. Lastly, with the conclusion only *DEBT-EQUITY* ratio and *LOG_TA* have been found significant with *ROA* which provides important insights regarding the factors that may impact *ROA* and leads to be fruitful for stakeholders in decision making.

Table A.4. Fixed effects regression result for return on assets (Model 1: *ROA* as dependent variable)

Variables	*Model 1.1*	*Model 1.2*	*Model 1.3*	*Model 1.4*
ESG	0.015 (0.611)			
EPS		0.027 (0.205)		
SPS			-0.002 (0.928)	
GPS				-0.018 (0.412)
BETA	0.478 (0.648)	0.374 (0.721)	0.465 (0.657)	0.356 (0.736)
DEBT-EQUITY	-0.028 (0.0001)***	-0.028 (0.0003)***	-0.028 (0.0003)***	-0.028 (0.0003)***
INFLATION	27.015 (0.171)	25.862 (0.186)	28.984 (0.143)	29.98 (0.124)
LOG_TA	-4.200 (0.000)***	-4.398 (0.0001)***	-3.994 (0.0001)***	3.851 (0.0001)***

Note: Table indicates the result for ESG, EPS, SPS, and GPS as independent variables, DEBT-EQUITY, INFLATION, BETA, and LOG_TA as control variables, and ROA as dependent variable.
Source: Authors' elaboration using Bloomberg and Refinitive databases ESG variables.

Table 6 concludes the result of fixed effect regression applied to analyse the relationship between different independent variables and *ROE* as the dependent variable. In Model 2 *ESG* was found negatively significant with *ROE*, however, this result falls in the category of less percentage of a negative relationship between corporate financial performance and *ESG* in previous research and found near about 10% of a negatively significant relationship between corporate financial performance and *ESG* (Friede et al., 2015), this result may be caused due to technological advancement and disruptive technology which may lead to reduce short term profitability and consequent *ROA* or may be operational disruptions by integrating *ESG* practices which leads to affecting productivity and profitability (Andersen et al., 2024) with -0.136 coefficient and 0.085 p-value at 10% level of significance while *EPS* (Kumar et al., 2022; Matuszewska-Pierzynka, 2021; Rao et al., 2023) in Model 2.1 and *SPS* (Karmani & Boussaada, 2021; Bătae et al., 2021) in Model 2.2 failed to be statistically significant with dependent variable *ROE* indicated (p-value = 0.758 and 0.603, respectively). In Model 2.3, *GPS* was found negatively significant (Al-Jalahma et al., 2020; Rouf et al., 2011) at 0.1% level with *ROE* with -0.201 coefficient and 0.0005 p-value, it may be due to the impact of economic downturns and external shocks like natural disasters or pandemics which forced companies to focus on short term survival or may be due to high transparency costs associated with governance and reporting lead to more administrative cost affecting *ROE*. Moreover, *BETA*, *DEBT-EQUITY*, *INFLATION*, and *LOG_TA* as control variables were found highly significant with *ROE* across all models in the study.

Table 6. Fixed effects regression result for return on equity (Model 2: *ROE* as dependent variable)

Variables	*Model 2.1*	*Model 2.2*	*Model 2.3*	*Model 2.4*
ESG	-0.136 (0.085)*			
EPS		-0.016 (0.758)		
SPS			-0.033 (0.603)	
GPS				-0.201 (0.0005)***
BETA	-7.420 (0.004)***	-7.133 (0.006)***	-7.123 (0.006)***	8.691 (0.0009)***
DEBT-EQUITY	-0.072 (0.0003)***	-0.069 (0.0005)***	-0.070 (0.0004)***	-0.068 (0.0004)***
INFLATION	155.539 (0.001)***	145.063 (0.003)***	148.162 (0.003)***	152.889 (0.001)***
LOG_TA	-9.948 (0.0001)***	-11.319 (0.0001)***	-11.235 (0.0001)***	-9.784 (0.0001)***

Note: Table indicates the result for ESG, EPS, SPS, and GPS as independent variables, DEBT-EQUITY, INFLATION, BETA, and LOG_TA as control variables, and ROE as dependent variable.
Source: Authors' elaboration using Bloomberg and Refinitive databases ESG variables.

5. DISCUSSION

The association of components of *ESG* with the financial performance of the companies are analyzed combined as well as separately based on separate scores of *EPS, SPS,* and *GPS*. The results of the study are based on the proposed hypothesis and are very well-defended with the previous findings as well. The finding of the study indicates an insignificant relationship between *ROA* and *ESG* and its components which aligned with the previous studies while conversely in other studies *ESG* has a significant relationship with financial performance (Ferrell et al., 2016, Otman, 2014).

Furthermore, the findings of the study have also revealed that there is a negatively significant relationship between *ROE* as a financial indicator and *ESG* combined along with the subcomponent of *GPS* which is aligned with the previous study (Krüger, 2015), however, this result falls in the category of less percentage of the negative relationship between corporate financial performance and *ESG* in previous researches and found near about 10% as negatively significant relationship between corporate financial performance and *ESG* (Friede et al., 2015), this result may be caused due to stakeholders pressure which can dilute immediate financial return or may reduce operational flexibility.

6. CONCLUSION

We use regression analysis and applied panel data fixed effects model by using GRETL software to analyse the relationship between *ESG* score along with their sub-components *EPS, SPS*, and *GPS* and corporate financial health through *ROA* and *ROE*, control variables like *BETA*, *DEBT-EQUITY*, *INFLATION* rate, and logarithm of total assets (*LOG_TA*). Sample data covers NIFTY50 firms from 2015 to 2022. In reference to *ROA* analyses *ESG* scores along with *EPS, SPS,* and *GPS* were found statistically insignificant but the control variables including *BETA, DEBT-EQUITY* ratio, and *LOG_TA* were found significant with *ROA*. The study concluded that *ESG* combined score and their sub-components are not found direct contributory factors to impact *ROA* in the present study. The result has indicated that while assessing corporate financial performance the governance parameter of *ESG* along with control variables plays an emphatic role as compared to environmental and social parameters. Moreover, the depicted negative relationship between *ESG* scores and *ROE* suggested that companies having higher *ESG* scores must be concerned more about sustainability and social responsibility rather than maximizing shareholders' return. The policymaker must understand that believing a direct relationship between *ESG* scores and combined financial performance is not fair enough but *ESG* sub-components along with other factors are also crucial for consideration.

The present study is limited and specific in relation to the data set used and further research outcomes may be traceable through different industries, regions or any other additional combination of data to assess the impact on corporate financial performances in addition to consideration of factors like lack of ESG professionals due to unawareness or proper trainings, high penalties over the companies due to not meeting the compliance issues related to ESG reporting and also compromise of board of directors with long term ESG benefits whether monetary or non-monetary.

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