THE ROLE OF ESG FACTORS IN SHAPING FIRM PERFORMANCE: INSIGHTS FROM US HEALTHCARE COMPANIES

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Abstract: *Corporate finance is continuously evolving, placing increased emphasis on various performance indicators. This research evaluates the financial performance of 60 healthcare companies listed on the S&P 500 index, using data from 2000 to 2024. By employing advanced analytical methods, including linear regression, nonlinear regression, and interaction-effect models, the study investigates the influence of key environmental, social, and governance components on corporate profitability. The findings indicate that total water consumption consistently exhibits a positive correlation with the financial performance of healthcare companies. Furthermore, the analysis identifies a specific threshold where this positive relationship changes in magnitude, indicating a turning point. Additionally, the proportion of female employees within companies also positively influences financial performance, with a similar threshold effect observed. During the global health crisis, the beneficial impact of women's representation in the workforce persisted and became statistically significant, emphasizing the robustness of this relationship under crisis conditions. Contrary to the initial hypothesis, the highest remuneration package did not negatively impact performance; instead, it demonstrated a positive correlation accompanied by a turning point at which the strength of this relationship shifted. Overall, this research enhances understanding of how diverse environmental, social, and governance strategies affect financial outcomes, operational transparency, and shareholder protection. The results emphasize the importance for companies to dynamically adapt their environmental, social, and governance policies to changing market conditions to maintain long-term financial health and effective corporate governance.*

Key words: *ESG strategies, financial performance, healthcare companies, turning point*

JEL: G30, G34, G39

1. Introduction

Profitability continues to be a fundamental concern in the field of corporate finance, with ongoing scholarly debate surrounding the factors that shape it. This study investigates the influence of key environmental, social, and governance (ESG) indicators on firm performance, focusing specifically on healthcare companies included in the S&P 500 index over the 2000–2024 period. The healthcare sector was selected for its critical economic significance and the considerable shifts in performance it has experienced in recent years, driven by rapid innovation and heightened service demand. The S&P 500 index offers a reliable benchmark for this analysis, as it encompasses a broad spectrum of leading United States firms and provides a stable context for evaluating corporate governance dynamics.

The central research objective is to explore how governance-related ESG factors influence the profitability of firms operating in the healthcare industry. Gaining insight into these connections is vital for stakeholders who seek to optimize firm performance and manage evolving market challenges effectively. This paper contributes to the literature through several novel aspects. The extended study period enables the use of a rich and longitudinal dataset, while the application of nonlinear regression models allows for the identification of nuanced patterns that linear models may overlook. Moreover, the inclusion of a pandemic-related dummy variable offers the opportunity to assess the crisis's specific effects on corporate behavior and performance.

The study's global significance lies in its analysis of governance mechanisms and their impact on profitability, offering valuable implications for corporate transparency and responsible business conduct. The paper proceeds with an introduction, literature review, methodological framework, empirical findings, and a concluding discussion.

2. Basic content

2.1 Literature Review

The relationship between various corporate indicators and firm performance has attracted growing scholarly interest, particularly in emerging and developing markets. Empirical research has employed a range of methodologies and datasets to identify both financial and non-financial determinants of corporate performance. The following synthesis presents the main findings from recent studies, focusing on the effects of each indicator on firm performance.

Water withdrawal total has been positively associated with firm performance in both quantitative and qualitative studies analyzed. (Hongming, et al., 2020), using panel data linear regression for 50 non-financial firms listed on the Pakistan Stock Exchange during 2013–2017, observed that higher water withdrawal was linked to improved firm performance, potentially due to higher operational intensity or environmental reporting practices. Similarly, (Talbot & Barbat, 2019), through qualitative analysis of 58 entities following the global reporting initiative between 2012–2013, found a positive relationship between water disclosure and firm success.

Women employees also appear to positively influence firm performance. (Allison, et al., 2023), analyzing data from 130,000 firms across roughly 130 developing countries between 2008–2017 using panel data regression, reported a positive effect of female workforce representation on firm outcomes. (Das & Smriti, 2022), in their study of 272 Indian firms listed on the National Stock Exchange between 2007–2019, confirmed these findings, showing that gender diversity contributes positively to performance metrics.

Regarding highest remuneration package, results are mixed. (Aslam, et al., 2019) applied GMM models to 100 non-financial firms listed in Pakistan between 2009–2016, and identified a negative effect, suggesting that excessive executive compensation may undermine performance, possibly due to agency conflicts. Conversely, (Harymawan, et al., 2020), using panel data from 847 Indonesian listed firms during 2014–2017, found a positive relationship, indicating that well-structured remuneration may incentivize better managerial outcomes.

Firm size, examined in the same study by (Harymawan, et al., 2020), showed a positive influence on firm performance, supporting the notion that larger firms benefit from economies of scale, market dominance, and improved governance structures. Similarly, sales growth, also studied by the same authors, was positively associated with firm performance, as revenue expansion often reflects strong market positioning and operational efficiency.

The indicator firm age has been shown to positively impact firm performance. (Almustafa, et al., 2023), in a study covering 739 non-financial firms across 12 Middle East and North Africa (MENA) countries during 2011–2020, used panel regression models and concluded that older firms tend to perform better, likely due to accumulated experience, brand recognition, and organizational stability.

Dividend payout ratio was investigated by (Sondakh, 2019) in a sample of 99 service-sector firms listed on the Indonesia Stock Exchange during 2015–2018. The results indicated a negative effect on firm performance, potentially reflecting the tension between shareholder returns and reinvestment needs.

Liquidity, measured by the current ratio, was positively linked to performance in a study by (Rompotis, 2024), who analyzed 80 publicly traded firms listed on the Athens Stock Exchange over the 2018–2022 period using panel data regression. This finding aligns with the argument that liquidity strengthens financial resilience and operational flexibility. In contrast, debt to capital, as examined by (Harymawan, et al., 2020), was found to negatively affect firm performance, highlighting the risks associated with high leverage. Finally, the pandemic crisis was associated with a negative impact on firm performance, according to (Almustafa, et al., 2023), underlining the vulnerabilities firms face during global shocks, regardless of maturity or size.

In summary, these studies contribute to a nuanced understanding of the multifactorial nature of firm performance, particularly in the context of emerging markets. Although existing studies provide valuable insights into the relationship between ESG variables and firm performance, many researchers have not explored potential turning points in these relationships, nor have they

systematically accounted for the impact of the pandemic crisis on key ESG indicators, leaving important dimensions of this field underexamined.

Table 1. Summary of the Literature Review

Indicators	Study	Companies	Years	Methodology	Effect
Water Withdrawal Total	(Hongming, et al., 2020)	50 non-financial firms listed on the Pakistan Stock Exchange	2013–2017	panel data linear regression	+
	(Talbot & Barbat, 2019)	58 Global Reporting Initiative	2012–2013	qualitative analysis	+
Women Employees	(Allison, et al., 2023)	130,000 firms across approximately 130 predominantly developing countries	2008–2017	panel data linear regression	+
	(Das & Smriti, 2022)	272 Indian firms listed on the National Stock Exchange	2007–2019	panel data linear regression	+
Highest Remuneration Package	(Aslam, et al., 2019)	100 non-financial firms listed in the Pakistan Stock Exchange	2009–2016	GMM models	-
	(Harymawan, et al., 2020)	847 entries involving companies publicly listed on Indonesia's stock market	2014–2017	panel data linear regression	+
Firm size	(Harymawan, et al., 2020)	847 entries involving companies publicly listed on Indonesia's stock market	2014–2017	panel data linear regression	+
Firm age	(Almustafa, et al., 2023)	739 publicly traded companies from 12 nations within the MENA region, excluding those in the financial sector	2011–2020	panel data linear regression	+
Sales Growth	(Harymawan, et al., 2020)	847 entries involving companies publicly listed on Indonesia's stock market	2014–2017	panel data linear regression	+
Dividend Payout Ratio	(Sondakh, 2019)	99 service-sector enterprises traded on the Indonesia Stock Exchange	2015–2018	panel data linear regression	-
Current Ratio	(Rompotis, 2024)	80 publicly traded firms operating on the Athens Stock Exchange	2018–2022	panel data linear regression	+
Debt to Capital	(Harymawan, et al., 2020)	847 entries involving companies publicly listed on Indonesia's stock market	2014–2017	panel data linear regression	-
Pandemic Crisis	(Almustafa, et al., 2023)	739 publicly traded companies from 12 nations within the MENA region, excluding those in the financial sector	2011–2020	panel data linear regression	-

Source: Authors' own research

The hypotheses guiding this research study are as follows:
H_1: Environmental ESG factors, particularly the volume of water consumption, positively influence corporate performance.
H_2: Social ESG aspects, especially the percentage of female staff members, positively affect business outcomes.
H_3: Governance ESG variables, specifically the level of the highest individual compensation, negatively influence company performance.

2.2 Methodology

2.2.1 Dataset Characteristics and Variable Explanation

This research focuses on healthcare firms included in the S&P 500 index over the 2000–2024 period. Drawing on data sourced from the Thomson Reuters Eikon database, the study examines long-term financial dynamics and sector-specific developments within the healthcare industry. In light of the sector's pivotal role in contemporary society, the analysis seeks to assess the impact of recent

transformations on both financial outcomes and ESG-related metrics. The performance of these companies serves as a proxy for broader shifts in healthcare innovation and sustainability, highlighting their significance as indicators of overall economic and social progress.
Figure 1 illustrates that the healthcare sector is one of the largest sectors within the S&P 500 index.

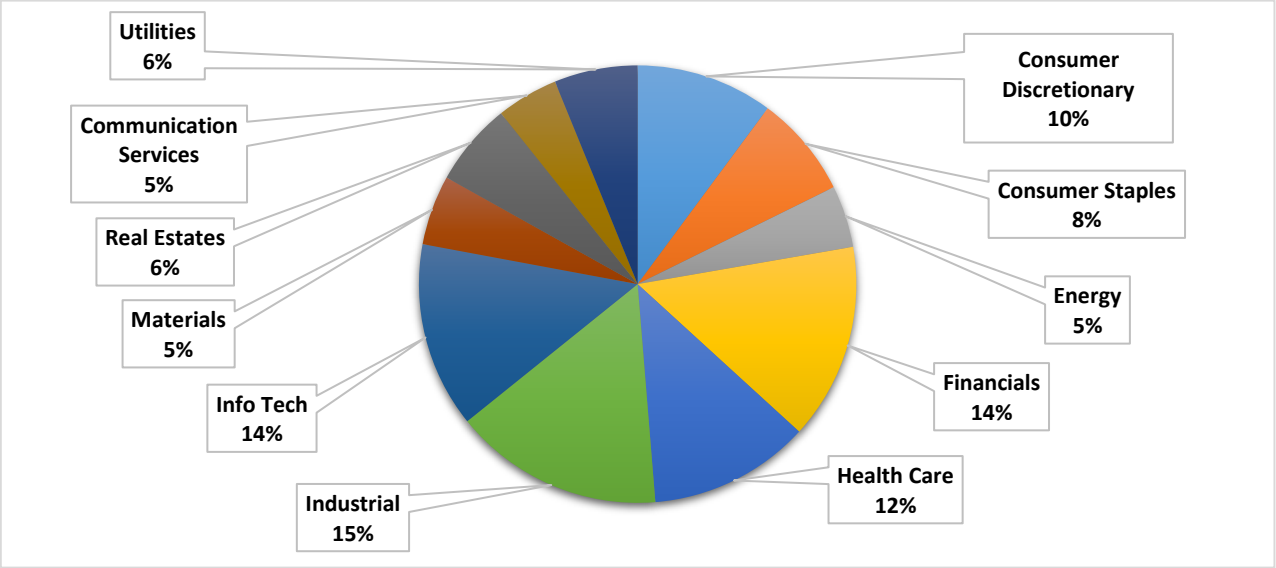

Figure 1. S&P 500 Sectors
Source: Authors' work

Thus, alongside the industrial, information and technology, and financial sectors, the healthcare sector plays a significant role in the United States economy. Table 2 outlines the core variables employed in the analysis, including their corresponding abbreviations, theoretical relevance, and detailed computational formulas.

Table 2. Presentation of Variables

Dependent variables	Symbol	Meaning	Measurement
Return on Assets	ROA	Measures how efficiently a company generates profit from its total assets.	$\text{ROA} = \frac{\text{Net profit}}{\text{Total Assets}}$
Earnings per Share	EPS	Indicates the portion of net profit allocated to each outstanding share.	$\text{EPS} = \frac{\text{Net Income}}{\text{Number of Shares}}$
Independent variables	**Symbol**	**Meaning**	**Measurement**
Water Withdrawal Total	WWT	Aggregate quantity of water drawn from all sources used by the company.	$\text{WWT} = \sum \text{Water withdrawn from each source}$
Women Employees	WE	Share of female employees within the company's total workforce.	$\text{WE} = \frac{\text{Number of women employees}}{\text{Total employees}} x100$
Highest Remuneration Package	HRP	Maximum compensation package provided to an individual employee.	$\text{HRP} = \max(\text{Total Compensation})$
Firm size	FS	The company's size measured by applying a logarithmic scale to total revenues.	$\text{FS} = \ln(\text{Total Revenue})$
Firm age	FA	The duration in years since the company's establishment or registration date.	$\text{FA} = \text{Year}_{\text{t}} - \text{Year}_{\text{foundation}}$
Revenue Growth Rate	GW	Rate at which the company's revenues have increased over a given period.	$\text{GW} = \left(\frac{\text{Sales revenue}_{\text{t}}}{\text{Sales revenue}_{\text{t-1}}}\right) - 1$

Dividend Payout Ratio	DPR	Ratio indicating the portion of net earnings distributed as dividends to shareholders.	$\text{DPR} = \frac{\text{Dividend paid}}{\text{Net income}}$
Current Ratio	CR	Evaluates the company's ability to fulfill short-term obligations using its short-term assets.	$\text{CR} = \frac{\text{Current assets}}{\text{Short term liabilities}}$
Debt to Capital	DC	Proportion of debt financing in the company's overall capital structure.	$\text{DC} = \frac{\text{Long term liabilities}}{\text{Equity} + \text{Long term liabilities}}$
Pandemic Crisis	COVID	Specifies whether the data corresponds to a year affected by a pandemic crisis.	Dummy variable: 1 if the year is 2020, 2021, or 2022; 0 otherwise.

Source: Authors' work

The computational formulas presented in Table 2 are consistent with methodologies commonly cited in established scholarly and professional literature.

2.2.2 Model Specification and Estimation Methods

This research employs Stata software to conduct the econometric analysis, which encompasses descriptive statistics and Pearson correlation coefficients. For data preprocessing of variables such as ROA, EPS, GW, DPR, CR and DC, 90% winsorization was applied to mitigate the influence of extreme outliers and ensure the robustness of the regression results. The analytical approach integrates baseline, linear, and nonlinear regression models, incorporating both fixed effects and random effects specifications. Model selection is guided by the Hausman test, applying a 5% significance level to determine the appropriate estimation technique.

To evaluate the effects of the health crisis on firm-level indicators, the study introduces interaction terms between pandemic-related variables and ESG indicators. These models are estimated under both fixed and random effects frameworks. Additionally, nonlinear regression models are employed to capture potential turning points in the relationship between the independent variables and firm profitability, using the same methodological structure. The following regression equations are estimated:

-Linear Regression Model: $Firm\ profitability_{it} = a_0 + a_1 ESG\ variables_{it} + a_2 Financial\ variables_{it} + a_3 COVID_{it} + \varepsilon_{it}$ (1)

-Nonlinear Regression Model: $Firm\ profitability_{it} = a_0 + a_1 ESG\ variables_{it} + a_2 ESG\ variables_{it}^2 + a_3 Financial\ variables_{it} + a_4 COVID_{it} + \varepsilon_{it}$ (2)

-Interaction Variable Regression Model: $Firm\ profitability_{it} = a_0 + a_1 ESG\ variables_{it} + a_2 ESG\ variables_{it} * COVID_{it} + a_3 Financial\ variables_{it} + a_4 COVID_{it} + \varepsilon_{it}$ (3)

Where a_0 is the intercept, $a_1 \ldots a_{10}$ denote the estimated coefficients, ε represents the error term, and firm profitability metrics include ROA and EPS. Financial variables are FS, FA, GW, DPR, CR, DC, COVID and ESG variables are WWT, WE, HRP. Also, i = [1; 60] and t = [2000; 2024].

2.3 Empirical Findings and Analysis

2.3.1 Statistical Description and Correlation Analysis

Table 3 presents the descriptive statistics for the dataset, summarizing the key characteristics of the variables under investigation. A standard deviation exceeding the mean indicates high variability, suggesting substantial fluctuations over time. In contrast, variables with a lower standard deviation relative to the mean are considered more stable. Notably, earnings per share, revenue growth rate, dividend payout ratio, and the pandemic crisis exhibit significant volatility, reflecting pronounced shifts during the study period. The table also provides the minimum and maximum observed values for each variable, offering insights into the distribution and range within the sample.

Table 3. Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
ROA w	1147	.093	.056	-.026	.209	.174	2.838
EPS w	1363	4.354	4.467	-.302	17.01	1.477	4.528
WWT	524	14.4	2.014	7.336	19.627	-.353	3.096
WE	495	52.896	12.128	28.3	80	.447	2.543
HRP	1005	16.241	.753	12.493	18.723	-1.056	5.31
FS	1410	22.561	1.942	10.82	26.715	-.683	4.403
FA	1259	34.604	31.572	0	137	1.408	4.078
GW w	1350	.121	.148	-.075	.531	1.398	4.59
DPR w	1251	.201	.268	0	.883	1.271	3.478
CR w	1328	2.29	1.354	.912	6.009	1.419	4.175
DC w	1403	.36	.222	.003	.868	.484	2.907
COVID	1500	.12	.325	0	1	2.339	6.47

Source: Authors' work

Skewness reflects the asymmetry of a variable's distribution. Within the dataset, variables such as earnings per share, firm age, revenue growth rate, and the pandemic crisis exhibit pronounced skewness, indicating highly asymmetric distributions. In contrast, total water withdrawal, highest remuneration package, and firm size display negative skewness, suggesting left-skewed distributions. The remaining variables are positively skewed, indicating distributions with longer right tails.
Kurtosis, by contrast, measures the extent to which a distribution is either sharply peaked or relatively flat compared to a normal distribution. Variables such as return on assets, women employees, and debt to capital show kurtosis values below 3, characteristic of platykurtic distributions, which are flatter than the normal distribution. In contrast, the rest of the variables exhibit leptokurtic tendencies, with kurtosis values exceeding 3, indicating sharper peaks and heavier tails.
Table 4 presents the correlation coefficient matrix, illustrating the strength and direction of linear relationships among the variables included in the analysis.

Table 4. Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) ROA_w	1.000										
(2) EPS_w	0.266	1.000									
(3) WWT	-0.142	-0.133	1.000								
(4) WE	-0.287	0.104	0.041	1.000							
(5) HRP	-0.061	0.160	0.349	0.182	1.000						
(6) FS	-0.387	0.224	0.550	0.370	0.596	1.000					
(7) FA	0.058	-0.128	0.486	-0.232	0.211	0.140	1.000				
(8) GW_w	0.105	0.039	-0.096	0.046	0.061	0.027	-0.092	1.000			
(9) DPR_w	-0.192	-0.207	0.620	0.031	0.329	0.420	0.399	-0.132	1.000		
(10) CR_w	0.246	-0.110	-0.373	-0.270	-0.243	-0.528	-0.169	0.050	-0.314	1.000	
(11) DC_w	-0.130	0.285	0.085	0.057	0.082	0.239	-0.103	0.007	0.238	-0.371	1.000
(12) COVID	0.130	0.234	-0.152	-0.049	0.057	-0.004	-0.032	0.143	-0.105	-0.011	0.082

Variables	(12)
(12) COVID	1.000

Source: Authors' work

In this study, a correlation coefficient greater than 0.65 is interpreted as indicating a strong positive relationship, whereas values below -0.60 suggest a strong negative association. However, no such strong correlations were identified within the dataset.

2.3.2 Results

The core findings of this research are presented in Table 5. Based on the results of the Hausman test, the models incorporating fixed effects are identified as the most appropriate specifications for the data. The linear regression models without effects are presented in Models 1 and 2. Models 3 and 4

correspond to linear regression models with fixed effects. Furthermore, Models 5 and 6 represent nonlinear regression models without effects, while Model 7 is a nonlinear regression model incorporating fixed effects. Finally, Model 8 is a fixed-effects regression model that includes an interaction variable.

Table 5. Regression Models

	(1) ROA_w	(2) EPS_w	(3) ROA_w *fe*	(4) EPS_w *fe*	(5) ROA_w	(6) EPS_w	(7) ROA_w *fe*	(8) EPS_w *fe*
WWT	0.00433*	-0.428*	-0.0114**	0.547*	0.00443*	6.378**	-0.00965*	0.470
	(2.07)	(-2.16)	(-2.63)	(2.04)	(2.16)	(3.28)	(-2.23)	(1.76)
WE	-0.000697*	0.00499	0.000260	0.0238	0.00698**	0.00425	0.000546	0.00548
	(-2.28)	(0.17)	(0.36)	(0.54)	(3.11)	(0.15)	(0.76)	(0.12)
HRP	0.0253***	0.922	0.0135**	-0.117	0.0207**	1.086	0.268**	-0.111
	(3.82)	(1.46)	(3.12)	(-0.44)	(3.12)	(1.75)	(2.89)	(-0.42)
FS	-0.0197***	1.371***	0.0335***	5.003***	-0.0201***	1.158***	0.0327***	4.956***
	(-6.30)	(4.60)	(3.62)	(8.79)	(-6.54)	(3.87)	(3.57)	(8.76)
FA	0.0000554	0.00913	-0.00162**	0.133***	0.0000134	0.0112	-0.00183**	0.130***
	(0.68)	(1.19)	(-2.93)	(3.90)	(0.17)	(1.48)	(-3.32)	(3.83)
GW_w	0.0450	-2.850	0.0321*	0.620	0.0403	-1.328	0.0354*	0.858
	(1.89)	(-1.26)	(2.17)	(0.68)	(1.72)	(-0.59)	(2.41)	(0.94)
DPR_w	-0.0223*	-5.597***	-0.0410***	-0.584	-0.0311**	-5.196***	-0.0424***	-0.666
	(-2.07)	(-5.47)	(-4.04)	(-0.94)	(-2.86)	(-5.14)	(-4.22)	(-1.08)
CR_w	0.000944	0.344	-0.00287	-0.0834	-0.00200	0.408	-0.00344	-0.0965
	(0.32)	(1.23)	(-1.27)	(-0.60)	(-0.66)	(1.48)	(-1.53)	(-0.69)
DC_w	0.000223	7.203***	0.00135	3.971***	0.00291	7.783***	0.000463	4.191***
	(0.02)	(5.69)	(0.09)	(4.31)	(0.22)	(6.20)	(0.03)	(4.55)
COVID	0.0119*	1.792**	0.00964**	0.658**	0.0123*	1.861***	0.0102**	-1.714
	(2.08)	(3.29)	(2.91)	(3.22)	(2.19)	(3.48)	(3.12)	(-1.57)
WWTxWWT						-0.236***		
						(-3.52)		
WExWE					-0.00007***			
					(-3.45)			
WExCOVID								0.0470*
								(2.22)
HRPxHRP							-0.00777**	
							(-2.75)	
_cons	0.132	-36.93***	-0.655***	-126.0***	0.0307	-83.51***	-2.749***	-122.9***
	(1.41)	(-4.14)	(-3.34)	(-10.47)	(0.32)	(-5.26)	(-3.49)	(-10.21)
Obs	323	326	323	326	323	326	323	326
R-sq	0.254	0.294	0.0378	0.0122	0.282	0.321	0.275	0.673
F-stat	10.65***	13.11***	9.299***	55.03***	11.10***	13.48***	9.343***	51.19***
Mean VIF	1.67	1.66						
Hausman Test			37.60***	141.40***			141.40***	141.40***
Turning point					47.75146	13.487031	17.316742	

t statistics in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Source: Authors' work

With regard to the ESG indicator pertaining to the environmental dimension, in this case total water withdrawal, empirical results based on the baseline regression models indicate a positive and statistically significant effect on accounting performance. Conversely, market performance is negatively and significantly impacted. When employing fixed effects regression models, as determined by the Hausman test, the direction of influence shifts: accounting performance is negatively affected, while market performance exhibits a positive and statistically significant relationship with the environmental ESG indicator. Moreover, nonlinear regression analysis reveals the existence of a turning point. Specifically, the impact of total water withdrawal on EPS is positive

up to a threshold value of 13.48, beyond which the effect becomes negative. These findings are consistent with previous studies such as (Hongming, et al., 2020) and (Talbot & Barbat, 2019), which also reported a positive relationship between environmental ESG factors and firm performance. Furthermore, the empirical evidence supports the study's initial hypothesis. The contrasting effects of total water withdrawal on ROA and EPS can be explained by the distinct financial dynamics they represent. ROA, as a measure of asset efficiency, may decline with higher water usage due to increased operational and compliance costs, especially as facilities expand. In the healthcare sector, however, water-intensive processes, such as sterilization, and facility hygiene can drive revenue growth and support profitability. As a result, EPS may increase if net income improves or if share buybacks occur, even as asset efficiency declines.

Considering the number of women employed at the company level, this ESG indicator related to the social dimension shows a negative and statistically significant impact on ROA, while its effect on EPS is positive but not statistically significant, according to the baseline linear regression models. Based on fixed effects linear regression models, the influence of this indicator is positive for both accounting and market performance; however, the results are not statistically significant. From the perspective of nonlinear regression models, a turning point was identified: up to a threshold of 47.75, the proportion of female employees exerts a positive influence on ROA, after which the impact becomes negative. Additionally, regression models incorporating interaction terms reveal that during the pandemic crisis, the influence of this indicator on market performance intensified and became statistically significant. These findings are consistent with prior research by (Allison, et al., 2023) and (Das & Smriti 2022), who also reported a complex and context-dependent relationship between gender diversity and firm performance. Moreover, the results are aligned with the main hypothesis of this study. In the healthcare sector, a higher proportion of female employees can positively influence both ROA and EPS due to the alignment between gender representation and sector-specific competencies. Women are often overrepresented in essential healthcare roles such as nursing, patient care, and support services, positions that directly contribute to operational effectiveness and service delivery. This alignment enhances productivity and can improve financial efficiency as well as profitability per share. During the pandemic crisis, the demand for healthcare services surged, and the contribution of female workers became even more critical.

From the perspective of the governance indicator, specifically, higher remuneration packages, a positive and statistically significant impact on the analyzed performance indicators is observed based on the baseline regression models. According to the fixed effects regression models, the influence on ROA is positive and statistically significant, while the effect on EPS is negative but not statistically significant. Furthermore, the presence of a nonlinear relationship was identified: up to a threshold of 17.31, the influence of this indicator on ROA is positive, but beyond this point, the effect turns negative. These findings are consistent with those reported by (Harymawan et al., 2020); however, they do not support the hypothesis of the present study. Economically, a higher remuneration package may initially enhance firm performance by attracting and retaining qualified executives and specialists, especially in sectors where managerial expertise is crucial to operational success, such as healthcare. This can lead to improved decision-making, innovation, and overall organizational efficiency, positively affecting ROA. However, beyond a certain threshold, excessive remuneration may indicate inefficiencies, agency problems, or misaligned incentives, which can reduce the return on assets.

Finally, the control variables, such as firm size, sales revenue growth rate, debt-to-capital ratio, and the pandemic crisis, exert a positive influence on both accounting and market performance. In contrast, the dividend payout ratio and current ratio show a negative impact on firm performance. Regarding firm age, the results indicate a negative influence on ROA, while the effect on EPS is positive.

3. Conclusions

This empirical study investigates the impact of key ESG-related factors on the financial performance of healthcare firms in the United States between 2000 and 2024. The analysis is based on a panel of 60 companies, all constituents of the S&P 500 index. The research focuses on exploring how selected environmental, social, and governance indicators relate to firm profitability, employing a comprehensive econometric framework that includes linear and nonlinear regression models, along with interaction effects to account for the influence of the pandemic crisis.

The findings reveal distinct patterns: total water withdrawal initially supports accounting performance, but beyond a certain threshold, its effect turns negative, indicating diminishing returns on excessive resource use. In contrast, its relationship with EPS is overall positive, reflecting scale-related profitability in water-intensive operations. The proportion of women employed shows a nuanced effect, negatively associated with ROA but mildly positive, though not statistically significant, for EPS. Notably, this indicator's influence shifts direction at higher representation levels, and during the pandemic, its impact on market performance became significantly more positive. Higher executive remuneration consistently improves performance metrics up to a point, especially ROA, but shows signs of negative returns when compensation exceeds certain levels. Interestingly, the effect on EPS is less robust and statistically insignificant. These insights suggest that while ESG investments can enhance performance, their outcomes are contingent on scale, timing, and context. Control variables such as firm size, revenue growth, leverage, and pandemic-related dynamics further strengthened the explanatory power of the models.

From a policy perspective, healthcare companies should closely monitor how resource usage, workforce composition, and executive compensation influence their financial performance. Efficient water management is essential, as moderate levels of resource use can enhance operational outcomes, whereas excessive withdrawal may reduce asset efficiency. Human capital strategies should prioritize balanced gender representation, as a diverse workforce, particularly female employment, has shown varying effects on profitability, which may become more favorable in times of crisis. Compensation policies must be carefully structured to attract talent and drive performance, while avoiding excessive packages that may lead to diminishing returns. In sum, ESG-related policies must be calibrated to sector-specific dynamics and periodically reassessed, especially under disruptive conditions such as global health emergencies.

This study is limited by its focus on S&P 500 healthcare companies within a specific timeframe. Future research could expand by including other sectors and regions, a broader range of ESG indicators, and macroeconomic variables, using more refined econometric approaches to capture complex relationships between sustainability practices and firm performance.

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