ESG IMPACT ON CORPORATE PERFORMANCE AND FIRM VALUE ACROSS EUROPEAN INDUSTRIES

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Abstract: *This paper investigates the impact of Environmental, Social and Governance (ESG) scores on both firm value and corporate performance across ten sectors, focusing on European companies listed on stock exchanges from 2014 to 2023. The findings reveal significant industry-specific variations in how the environmental, social, and governance pillars affect both performance and market valuation. Positive correlations are found only in the Basic Materials sector, where higher ESG scores are linked to improved performance and increased firm valuation. In contrast, sectors such as Industrials, Consumer Cyclical, Consumer Non-Cyclical, Financials, Technology, Utilities, and Real Estate show declines in financial performance and reduced market valuation with higher ESG scores, with the Real Estate and Utilities sectors experiencing the most negative effects. Larger firms benefit marginally from ESG practices, particularly in Financial and Utility sectors, while leverage negatively impacts both performance and valuation. Liquidity and financial health, as measured by the current ratio and interest coverage ratio (ICR), correlate positively with firm performance and valuation, especially in capital-intensive sectors. This study emphasizes the importance of tailored ESG strategies to enhance firm value and competitiveness in a sustainability-focused market.*

Key words: ESG scores, firm performance, corporate value, sector analysis

JEL Classification Codes: G32, M14, L25

1. Introduction

The impact of Environmental, Social, and Governance (ESG) scores on firm value and performance has become a subject of increasing importance across various sectors of the stock market. ESG ratings serve as a benchmark for assessing how well companies manage environmental risks, social responsibilities, and governance practices, and their influence on corporate financial performance varies significantly depending on the industry.

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In the energy sector, ESG considerations are critical, with renewable energy companies being evaluated for their commitment to sustainable practices, while traditional oil and gas firms face mounting pressure to transition to lower-carbon alternatives. Likewise, the utilities sector, particularly those involved in electricity generation and water management, is closely monitored for how companies manage their energy sourcing, water usage, and environmental impact.

The basic materials sector, including mining and chemicals, faces intense scrutiny due to the environmental challenges associated with resource extraction, land use, and pollution. Companies in this sector must address biodiversity concerns and engage with local communities to maintain positive social and governance practices.

In the industrials sector, ESG factors center around operational efficiency, emissions reductions, and worker safety. Companies in manufacturing, construction, and transportation are evaluated based on how they manage environmental impact, including waste and emissions, as well as labor practices and innovation in sustainable technologies.

The consumer cyclical industry, including sectors such as automotive and retail, is increasingly judged on its ability to reduce carbon emissions, create sustainable supply chains, and embrace ethical labor practices. Companies that successfully transition to more environmentally and socially responsible practices can attract ESG-conscious investors and enhance their market value.

Similarly, in the consumer non-cyclical sector—comprising essential goods like food, beverages, and household products—firms are assessed on their labor standards, product safety, and efforts to minimize their environmental footprint. Sustainable sourcing and reduced packaging waste are key factors in driving ESG performance and long-term profitability.

The financial sector is evaluated based on responsible investment practices, governance structures, and risk management, with growing attention on ethical lending, green financing, and transparent reporting. ESG considerations are increasingly integrated into financial institutions' decision-making processes, affecting their reputation and firm value.

In the healthcare sector, companies are scrutinized for their social responsibility in areas such as patient care, access to medicines, and governance practices. Pharmaceutical firms are evaluated for their research ethics, pricing strategies, and supply chain transparency, all of which impact their ESG scores and corporate performance.

The technology sector focuses on social issues like data privacy, cybersecurity, diversity, and inclusion, while environmental factors such as energy consumption in data centers and e-waste management are becoming more significant. Tech companies that proactively address these issues can enhance their ESG profiles and strengthen their market position.

In the utilities sector, ESG evaluations focus on renewable energy adoption, carbon emissions, and governance. Companies leading in sustainability efforts and responsible governance tend to improve their ESG scores, enhancing market valuation and attracting investor interest.

The real estate industry is closely evaluated for its sustainable building practices, energy efficiency, and environmental impact, while social aspects such as tenant engagement and community development also contribute to ESG performance. Companies that excel in these areas are often rewarded with higher firm value and investor interest.

Given these sectoral variations, this paper aims to quantify the impact of ESG scores on firm value and corporate performance across these various industries. By analyzing the specific ESG scores within each sector, this study seeks to provide measurable insights into how firms can effectively leverage ESG strategies to enhance their financial performance and improve long-term market valuation.

2. Theoretical background

Prior empirical research provided mixed results regarding the impact of ESG on firm performance and market valuation.

Some studies point out that higher ESG scores can lead to improved financial performance, enhanced reputation, and greater investor interest, and that they may lead to increased firm value (Eccles et al., 2014; Flammer, 2015; Friede et al., 2015; Yoon et al., 2018; Zhao et al., 2018; Giese et al., 2019; Xie et al., 2019; Bhaskaran et al., 2020; De Lucia et al., 2020; Ahmad et al., 2021). According to these studies, ESG practices can drive increased firm performance and market valuation by enhancing long-term sustainability, reducing risks, improving stakeholder trust, and unlocking new opportunities for innovation and efficiency.

Other studies report either a negative or not significant impact of ESG practices on firm performance or market valuation due to several reasons (Lee et al., 2009; Fatemi et al., 2018; Capelle-Blancard and Petit, 2019; Garcia and Orsato, 2020; Duque-Grisales and Aguilera-Caracuel, 2021; Giannopoulos et al., 2022). First, ESG initiatives often require significant upfront investment, such as improving environmental efficiency or implementing social programs, which may lead to higher short-term costs. These expenses can reduce immediate profitability and cash flow, affecting market sentiment and stock prices. Additionally, ESG compliance can increase operational complexity, leading to inefficiencies or slower decision-making. In industries where ESG adoption is less aligned with core business models, firms may struggle to realize immediate financial benefits, reducing investor confidence. Furthermore, some investors may view ESG efforts as diverting focus from traditional financial objectives, which can result in undervaluation. Finally, inconsistent or unclear reporting standards may make it difficult for investors to accurately assess the financial value of ESG initiatives, adding uncertainty and driving down market valuations.

There are, however, some studies that provide mixed evidence of the connection between ESG and firm performance, respectively the market value. Some find a negative connection between ESG and firm performance, while they also find a positive connection between ESG and market value, possibly due to investors perceiving ESG initiatives as long-term value drivers despite their short-term costs or operational inefficiencies. Others find a positive connection between ESG and firm performance, while they found a negative or no connection at all between ESG and market valuation (Velte, 2015; Han et al., 2016; Lopez-de-Silanes et al., 2020; Gillan et al., 2021; Saygili et al., 2021; Aydoğmuş et al., 2022; Behl et al. (2022)).

Table 1 offers a comprehensive overview of the existing empirical literature, detailing key elements such as the sample size, the period of analysis, and the dependent and independent variables used in each study. Furthermore, the table will summarize the main findings of the studies, providing a clear comparison of results across different research efforts.

Table 1: Overview of main empirical background

Authors	Sample	Period of analysis	Dependent variables - measures for: a) firm performance b) market valuation	Control variables	Results
Lee et al. (2009)	Largest 2500 companies from Dow Jones Global	1998-2002	a) ROA, ROS and ROE b) -	Size, financial leverage, P/B ratio, liquidity ratio, total risk,	There is no evidence supporting a positive

	Index (DJGI), part of the Dow Jones Sustainability Index (DJSI)			market risk (beta), current ratio, marketable securities, free cash flow	association between social responsibility performance and corporate financial performance—this hypothesis is definitively rejected, regardless of the type of performance measure used.
Eccles et al. (2014)	180 companies (US)	1993-2010	a) ROA and ROE	Size, market value of equity over book value of equity (MTB), leverage	Companies with high sustainability practices consistently surpass their peers in the long run, demonstrating superior performance in both stock market returns and financial metrics. For firms with low sustainability practices, a positive impact is observed only on the Market-to-Book ratio (MTB), with no significant effect on Return on Assets (ROA).
Flammer (2015)	1500 companies (US, S&P 500)	1997-2012	a) abnormal returns, ROA, net profit margins, ROE	Institutional ownership. Inside ownership, labor productivity, capital expenditures, sales growth, leverage, cash	Value gains are greater for firms with lower pre-vote CSR levels, indicating diminishing returns to CSR. Additionally, companies in industries with stronger CSR norms see

					higher gains, as stakeholders in these sectors are more responsive to social initiatives.
Friede et al. (2015)	2200 empirical papers	1970-2015	-	-	There is a nonnegative ESG-corporate financial performance relationship.
Han et al. (2016)	94 companies (Korea)	2008-2014	a) ROE, MBR and stock return	Size, leverage, lagged dependent variables	No relationship for social score, positive relationship for governance score and negative for environment score
Velte (2017)	412 firms (Germany)	2010-2014	a) ROA b) Tobin's Q	R&D, beta, leverage, size, industry	ESG positively impacts firm profitability, but not firm value. Governance strongly impacts financial performance.
Fatemi (2018)	403 companies (US)	2006-2011	a) ROA b) Tobin's Q	Size, asset intensity, leverage, advertising intensity, advertising intensity, R&D intensity, R&D intensity missing, net to gross property, plant and equipment	ESG activities and reporting improve firm value. ESG concerns decrease firm value.
Yoon et al. (2018)	705 firms (Korea)	2010-2015	a) - b) market price	Book value per share, earning per share	CSR initiatives have a positive impact on market value.
Zhao et al. (2018)	20 large energy companies (China)	10 years	a) Return on capital employed (ROCE) b) -	Leverage, size	ESG and firm performance are positively related.

Capelle-Blancard and Petit (2019)	100 world-wide large listed companies	2002-2010	a) - b) Cumulative average abnormal returns	Size, P/E ratio, distance, characteristics of the targeted company (reputation, greenwashing, external pressures (sector's main concerns, trends), nature of the news	Standard ESG disclosures affect a firm's market value, typically in a negative way. The negative impact of ESG events is reduced when firms have disclosed more positive ESG information than peers or belong to sectors with strong ESG reputations. However, the loss worsens when the news is economically focused or emotionally connected to the firm.
Giese et al. (2019)	over 1600 stocks (MSCI World Index)	2007-2017	a) Gross profitability b) Earnings-to-price ratio	Dividend yield, systematic volatility, residual CAPM volatility, historical beta, book-to-price	ESG factors influence company valuation and performance, primarily by altering their systematic risk profile, leading to reduced capital costs and enhanced valuations.
Xie et al. (2019)	6631 world-wide companies (74 countries and 11 sectors)	2015	a) Tobin's Q, ROA, ROE b) -	R&D expenditure, firm size, leverage, industry type, country	The results reveal that a moderate level of ESG disclosure significantly boosts corporate efficiency, unlike high or low levels. The strongest positive relationship is seen with governance

					disclosure, followed by social and environmental disclosures. Conversely, low ESG disclosure levels are negatively associated with corporate efficiency, except for environmental disclosure, which shows a weak positive relationship.
Bhaskaran et al. (2020)	4887 global companies	2014-2018	a) Tobin's Q, ROA, ROE b) -	Price to earning, dividend yield, leverage, sales growth, R&D intensity, Capex intensity, advertisement intensity, firm size, systematic risk (five-year beta), management efficiency (% of independent board members)	Companies with a strong focus on environmental, governance, and social pillars are more likely to generate greater market value.
De Lucia et al. (2020)	1038 public companies (22 European countries)	2018-2019	a) ROA, ROE b) -	-	There is a positive association between various ESG measures and both ROA and ROE, except for environmental measures, which have a negative impact on both ROA and ROE.

Garcia and Orsato (2020)	2165 companies (emerging and developed countries)	2007-2014	a) ROA and DCF (free cash flow) b) -	Size, leverage, market capitalization, industry, dummy (company part of the sustainability index)	There is a positive correlation between ESG performance and corporate financial performance in developed countries, whereas in emerging countries, a negative relationship exists between ESG scores and financial performance.
Lopez-de-Silanes et al. (2020)	large market capitalization companies (6 countries: United States, United Kingdom, France, Switzerland, Japan, Australia)	2015-2018	a) Total annual returns b) -	Size, leverage, intangible asset level, riskiness, industry	ESG scores have limited to no effect on risk-adjusted financial performance.
Ahmad et al. (2021)	351 companies (UK)	2002-2018	a) EPS b) Market value	Size, Financial leverage	ESG has a positive impact on both firm value and financial performance. The impact of ESG on firm performance is influenced by company size. Moreover, firms in the top 20% of ESG scores outperform those in the bottom 20%.
Duque-Grisales and Aguilera Caracuel (2021)	104 multinational firms (Latin America)	2011-2015	a) ROA b) -	Liquidity, geographic international diversification, firm size, leverage	Negative relationship between ESG scores (general and individual) and

					financial performance.
Saygili et al. (2021)	Turkish companies from Borsa Istanbul Corporate Governance Index	2007-2017	a) ROA b) Tobin's Q	Free float percentage, size, foreign ownership, leverage, net profit margin, asset turnover, dividend yield	Negative relationship of environmental score on financial performance, positive relationship of governance with financial performance.
Aydoğmuş et al. (2022)	1720 large market capitalization companies from Bloomberg	2013-2021	a) ROA b) Tobin's Q	Size, leverage	The combined ESG score, along with the individual Environment, Social, and Governance scores, all show positive and significant correlations with firm profitability. However, only the Social and Governance scores have a positive impact on firm value.
Behl et al. (2022)	62 companies from the energy sector (India)	2016-2019	a) - b) Tobin's Q	-	ESG and its components negatively impact firm value in the short run, but have a positive long-term effect on the firm value.
Giannopoulos et al. (2022)	20 companies (Norway)	2010-2019	a) ROA b) Tobin's Q	Size, leverage	There is a negative relationship between ESG and firm performance, while ESG is positively related to Tobin's Q.

Source: Authors' own computation

Building on prior empirical studies that explore the relationship between ESG scores and various dimensions of corporate performance, our research aims to investigate the impact

of ESG scores on both firm financial performance and market valuation. In this regard, we propose and will empirically test the following hypotheses:
H1: There is a positive and significant relationship between a firm's ESG scores and its financial performance, suggesting that firms with higher ESG ratings are more likely to demonstrate superior financial outcomes, as proxied by return on assets.
H2: There is a positive and significant relationship between a firm's ESG scores and its market valuation, suggesting that firms with higher ESG ratings are perceived as lower-risk and more resilient by investors, leading to increased market capitalization relative to total assets, as proxied by Tobin's Q.

3. Data and methodology

3.1 Data
The data used in this study is sourced from Refinitiv. Our analysis focuses on European companies across various sectors, including energy, basic materials, industrials, consumer cyclical, consumer non-cyclical, financials, healthcare, technology, utilities, and real estate. By examining firms from these diverse sectors, we aim to capture a comprehensive view of how Environmental, Social, and Governance (ESG) scores influence both firm performance and valuation in different industry contexts. This broad sectoral representation allows for a more nuanced understanding of the ESG impact, accounting for the unique characteristics and challenges faced by companies in each industry.
This analysis includes a total of 1959 companies across various sectors, selected based on the availability of four continuous years of ESG score data from 2014 to 2023. The table below (Table 2) outlines the number of companies available and those ultimately chosen for each sector.

Table 2: Number of companies by sector

Sector	Available companies	Selected companies
Energy	410	78
Basic materials	792	145
Industrials	1934	381
Consumer cyclical	1548	286
Consumer non-cyclical	769	123
Financials	1741	328
Healthcare	732	169
Technology	1288	264
Utilities	373	65
Real estate	798	120
TOTAL	**10385**	**1959**

Source: Authors' own computation

3.2 Methodology
In this paper, we focus on two dependent variables—firm performance, proxied by return on assets (ROA), and firm value, proxied by Tobin's Q (QTOB)—to examine the impact of ESG scores on these metrics (Table 3). These two measures have been widely used in empirical research as standard proxies for firm performance and market valuation, as we could see in Table 1.
In our study, we choose to use pre-tax ROA, calculated as the ratio of pre-tax net income to total assets, providing insight into how effectively a company utilizes its assets to generate profit before the impact of taxes. Using pre-tax ROA as a performance metric allows for a

clear evaluation of operational efficiency, as it indicates the firm's ability to convert investments in assets into earnings without the distortion of tax effects. A higher pre-tax ROA signifies more efficient management and a greater ability to generate profit from the asset base, making it a relevant indicator for analyzing the impact of Environmental, Social, and Governance (ESG) scores on firm performance. Furthermore, pre-tax ROA is widely recognized in financial analysis for its ability to standardize performance across companies of different sizes, thus facilitating meaningful comparisons within the context of this study. By employing pre-tax ROA as the dependent variable, we can effectively gauge the relationship between ESG practices and operational effectiveness, contributing to a deeper understanding of how these factors influence overall firm value.

To evaluate firm value, this study employs Tobin's Q as a key proxy. Tobin's Q is calculated as the ratio of market capitalization to total assets, which provides a simplified yet effective measure of the market's valuation of a firm's assets relative to their recorded value. This metric serves as a useful proxy for firm value, as it reflects both investor perceptions and the intrinsic worth of the company’s asset base.

The use of Tobin's Q is particularly suitable in assessing how effectively a firm's management utilizes its assets to create value. Specifically, Tobin’s Q compares the market value (as represented by market capitalization) to the book value of total assets. A Q ratio greater than 1 indicates that the market values the firm’s assets higher than their book value, suggesting strong growth potential and effective asset utilization, whereas a Q ratio less than 1 implies that the market believes the firm's assets are undervalued or not being utilized efficiently.

As a proxy for firm value, Tobin's Q offers several advantages. First, it captures market perception, which is a critical component of firm valuation, as it reflects investor expectations of future profitability and growth potential. A higher Tobin’s Q suggests that investors anticipate greater returns from the company and view its assets as having a higher replacement cost. Second, it provides insight into management efficiency in deploying the company’s assets for value creation. Firms with high Tobin's Q ratios are often seen as being well-managed, leveraging their resources effectively to generate substantial market value.

In this study, we focus on the impact of Environmental, Social, and Governance (ESG) scores on firm performance and valuation. We examine both the overall ESG score and the individual pillar scores: Environmental Pillar Score (EPS), Social Pillar Score (SPS), and Governance Pillar Score (GPS). The general ESG score reflects a firm's comprehensive sustainability practices, while the individual pillar scores provide nuanced insights into specific areas of performance. By analyzing these scores, we aim to determine how ESG practices influence operational efficiency, financial stability, and ultimately, firm value.

Table 3: Variable description and measurement

Type of variable	Variables	Description	Measurement
Dependent variables	Firm performance	Pre-tax return on assets **(ROA)**	Pre-tax income/Average total assets
	Firm value	Tobin’s Q **(QTOB)**	Market capitalization/Total assets
Interest independent variables	ESG score	Environment, social and governance score **(ESG)**	The scores range from 0 to 100, a score of less than 50 is considered

			relatively poor and more than 70 is considered relatively good
	EPS score	Environmental pillar score **(EPS)**	
	SPS score	Social pillar score **(SPS)**	
	GPS score	Governance pillar score **(GPS)**	
Control variables	Size of company	Total assets **(SIZE)**	Log (Total assets)
	Risk	Debt to equity ratio **(LEV)**	$\text{Lev} = \frac{\text{Total debt}}{\text{Total equity}}$
	Liquidity	Current ratio **(CR)**	$\text{CR} = \frac{\text{Current assets}}{\text{Current liabilities}}$
	Financial health and solvency	EBITDA net interest coverage ratio **(ICR)**	$\text{ICR} = \frac{\text{EBITDA}}{\text{Net interest expense}}$

Source: Authors' own computation

In this study, we have considered the following control variables: size of the company (proxied by natural logarithm of total assets), risk (proxied by financial leverage), liquidity (proxied by the current ratio), and solvency (proxied by the EBITDA net interest coverage ratio). Size and leverage are two key control variables consistently considered in empirical studies examining the relationship between ESG scores and financial performance or market valuation. Additionally, liquidity is considered as an appropriate control variable in some of the empirical studies (Lee et al., 2009; Flammer, 2015; Duque-Grisales and Aguilera Caracuel, 2021). While other studies often rely on net profit margin and asset turnover as additional control variables (Saygili et al., 2021), we choose to use the EBITDA net interest coverage ratio because it provides a more comprehensive measure of a company's ability to cover its interest expenses with operational earnings, offering a clearer picture of financial stability and operational efficiency, especially in capital-intensive industries.

To investigate the impact of Environmental, Social, and Governance (ESG) scores on firm performance and valuation, we employ four regression analyses using panel data. The first regression examines the relationship between the overall ESG score and firm performance, specifically measured by pre-tax return on assets (ROA). The second regression analyzes the effect of the individual pillar scores on ROA. The third regression assesses the impact of the overall ESG score on firm valuation, measured by Tobin's Q (QTOB). Finally, the fourth regression focuses on how the individual pillar scores influence Tobin's Q. We apply fixed effects or random effects models, guided by the results of the Hausman test, to account for unobserved heterogeneity across firms, ensuring robust estimates of the relationships between ESG scores and the dependent variables.

$$ROA_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 CR_{i,t} + \beta_5 ICR_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$ROA_{i,t} = \beta_0 + \beta_1 EPS_{i,t} + \beta_1 SPS_{i,t} + \beta_1 GPS_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 CR_{i,t} + \beta_5 ICR_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$QTOB_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 CR_{i,t} + \beta_5 ICR_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$QTOB_{i,t} = \beta_0 + \beta_1 EPS_{i,t} + \beta_1 SPS_{i,t} + \beta_1 GPS_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 CR_{i,t} + \beta_5 ICR_{i,t} + \varepsilon_{i,t} \quad (4)$$

4. Results and interpretations

Furthermore, we will examine the results from the four regressions conducted. The R^2 values, which indicate the proportion of variance explained by the models, vary across industries. However, relative higher R^2 obtained for most models suggest that they explain a substantial portion of the variance in firm performance and market valuation for these sectors. The Durbin-Watson statistical values are close to 2 in most sectors, indicating that there is little to no evidence of autocorrelation in the residuals, meaning that the models are well-specified.

Table 4 illustrates the impact of ESG general score on firm performance. ESG scores show a negative effect in Consumer Non-Cyclical, Financials, Technology, and Real Estate sectors, with varying degrees of significance. The negative impact is strongest in Real Estate and Financials. This suggests that in these sectors, higher ESG scores might be associated with a decline in financial performance. This conclusion is in line with the results obtained by Capelle-Blancard and Petit (2019), Garcia and Orsato (2020), Duque-Grisales and Aguilera-Caracuel (2021) and Giannopoulos et al., (2022), among others, and might be explained by the increased costs of compliance with sustainability initiatives, a long-term focus that prioritizes future value over immediate profits, and the risk of higher investor expectations that could pressure the company to maintain high ESG standards at the expense of short-term returns.

The size of a firm has varied impacts on performance across different industries. In sectors such as Financials, Utilities, and Real Estate, firm size shows a positive and significant effect on performance, indicating that larger firms tend to perform better. This outcome is expected, as larger firms often benefit from economies of scale and have more resources to manage operations efficiently. However, in industries like Consumer Cyclical and Technology, size has a negative impact on performance. This negative relationship may reflect the challenges large firms face in fast-evolving industries, where agility and innovation are crucial for success.

Leverage generally has a negative effect on firm performance across most industries. This negative impact is especially significant in sectors such as Energy (-0.0007, significant at 5%), Basic Materials (-0.0007, significant at 1%), Consumer Non-cyclical (-0.0005, significant at 1*), Healthcare (-0.0301, significant at 1%), and Real Estate (-0.0014, significant at 1%). These results align with the expectation that higher debt levels increase financial risk, thereby negatively affecting performance. In contrast, leverage shows an insignificant or mixed effect in other sectors.

Table 4. Impact of ESG on firm performance

	Energy	Basic materials	Industrials	Consumer cyclical	Consumer non-cyclical	Financials	Healthcare	Technology	Utilities	Real estate
ESG	0.0012 (0.0008)	0.0010*** (0.0003)	-0.0002 (0.0001)	-0.0003 (0.0002)	-0.0004** (0.0002)	-0.0013** (0.0006)	-0.0009 (0.0006)	-0.0006** (0.0003)	-0.0005 (0.0003)	-0.0022*** (0.0003)
SIZE	0.0090 (0.0413)	0.0108 (0.0105)	0.0025 (0.0055)	-0.0450*** (0.008)	-0.0109 (0.0127)	0.0515*** (0.0132)	0.0480 (0.0320)	-0.0256*** (0.0080)	0.0689*** (0.0235)	0.0236** (0.0113)
LEV	-0.0007** (0.0004)	-0.0007*** (0.0002)	-0.0010 (0.0008)	-0.0003 (0.0005)	-0.0005*** (0.0002)	-0.0078 (0.0091)	-0.0301*** (0.0041)	-0.0003 (0.0002)	-0.0112* (0.0068)	-0.0014*** (0.0003)
CR	0.0250*** (0.0092)	0.0080* (0.0044)	0.0032* (0.0019)	0.0005 (0.0022)	-0.0016 (0.0012)	0.0009 (0.0006)	0.0066*** (0.0009)	-0.0186*** (0.0037)	0.0006 (0.0054)	-1.35$*10^{-5}$ (0.0021)
ICR	0.0001*** (0.0000)	9.03$*10^{-6}$* (4.64$*10^{-6}$)	1.95$*10^{-5}$*** (5.88$*10^{-6}$)	4.15$*10^{-5}$*** (1.23$*10^{-5}$)	1.40$*10^{-6}$ (9.33$*10^{-7}$)	2.22$*10^{-6}$*** (8.33$*10^{-7}$)	2.01$*10^{-5}$** (9.73$*10^{-6}$)	8.53$*10^{-7}$* (5.28$*10^{-7}$))	1.55$*10^{-5}$** (7.58$*10^{-6}$)	8.28$*10^{-5}$ (0.000122)
R^2	0.3373	0.4975	0.5917	0.7127	0.6312	0.3720	0.8768	0.8609	0.5955	0.2951

*p < 0.1; **p < 0.05; ***p < 0.01.
Source: Authors' own computation

The current ratio has a significant positive impact on firm performance in most industries such as Energy, Basic Materials, Industrials, and Healthcare, indicating that firms with higher liquidity tend to perform better in these sectors. This is expected, as better liquidity allows companies to meet short-term obligations more effectively, contributing to greater operational stability. However, in the Technology sector, the current ratio has a negative impact on performance, with a coefficient of -0.0186, significant at 1%. This negative relationship may suggest that excessive liquidity in this industry could imply inefficient asset use, where capital might be better invested in innovation and growth rather than being held in current assets.

The EBITDA net interest coverage ratio, which measures a firm's ability to cover its interest expenses with earnings, has a positive and significant impact on performance across all sectors. This indicates that firms with a higher capacity to meet their interest obligations tend to perform better, likely due to reduced financial distress and improved overall financial health.

Table 5 presents the impact of individual ESG pillars (Environmental, Social, Governance) on firm performance across various industries, using multiple financial performance metrics.

When looking at EPS (Environmental pillar score), we observe a negative or statistically insignificant effect across most industries. Notably, in the financial sector, EPS is positively affecting firm performance, suggesting that ESG factors in this industry may improve earnings. In contrast, in the real estate sector, EPS has a significant negative effect on firm performance, implying that higher focus on this pillar may reduce earnings in this industry. This result seems in line with the one obtained by Han et al. (2016) or De Lucia et al. (2020), which find a negative connection between environment score and firm performance.

For SPS (Social pillar score), this shows a positive effect in the basic materials sector, while it has a negative impact in the utilities and real estate sectors. In real estate, this negative relationship is significant, which may suggest that SPS-related actions adversely affect firm performance in this industry.

When analyzing GPS (Governance pillar score), the effects of governance-related factors are negatively impacting the firm's performance across industries. In the financial sector especially, there is a significant negative effect, indicating that governance practices may restrict growth in this industry. Similarly, the real estate sector shows a negative impact, though to a lesser degree, highlighting the potential challenges posed by governance measures in this area.

The size of the company has a significant positive impact on industries such as financials, utilities and real estate. However, in the consumer cyclical sector, there is a significant negative effect, indicating that larger firms in this sector may experience diminishing returns from size when considering ESG factors. A similar connection is found in the case of companies from the technology sector.

Leverage generally shows a negative effect on firm performance across most industries. The healthcare sector exhibits the strongest negative impact, suggesting that higher debt levels reduce firm performance, possibly due to increased risk or financial constraints. Similar trends are seen in utilities and real estate sectors, where leverage negatively affects performance.

The current ratio, which measures liquidity, generally has a positive impact on firm performance. In the energy sector, a strong positive relationship is observed, indicating that firms with better liquidity perform better under ESG-related practices. This positive effect is also seen in the basic materials sector, where stronger liquidity appears to support better financial health in light of ESG considerations. The technology sector is the only one where a negative relationship has been observed between the current ratio and firm performance. This suggests that, in this industry, higher liquidity may not necessarily lead to better financial outcomes. Unlike other sectors, where a strong liquidity position is typically linked to better performance, technology companies may prioritize rapid innovation, investment, and growth over maintaining high levels of current assets.

The interest coverage ratio (ICR), which measures a firm's ability to cover interest expenses from operating earnings, shows a highly significant positive effect across all industries. The financial sector, in particular, demonstrates a very strong influence of ICR in improving firm performance. The energy and technology sectors show especially a significant positive relationship between this variable and financial performance.

Overall, the table indicates that while the influence of individual ESG pillars on firm performance varies significantly across industries and financial metrics, the overall conclusion points to a negative correlation between them.

Table 5. Impact of each individual ESG Pillars (Environmental, Social, Governance) on firm performance

	Energy	Basic materials	Industrials	Consumer cyclical	Consumer non-cyclical	Financials	Healthcare	Technology	Utilities	Real estate
EPS	-0.0009 (0.0010)	0.0003 (0.0003)	-2.24*$* 10^{-5}$ (0.0001)	0.0002 (0.0002)	-9.53*10^{-5} (0.000186)	0.0013** (0.0006)	-0.0003 (0.0003)	-0.0002 (0.0002)	5.31$* 10^{-5}$ (0.0003)	-0.0007*** (0.0002)
SPS	0.0007 (0.0007)	0.0010*** (0.0003)	-2.08$* 10^{-5}$ (0.0001)	-0.0003 (0.0002)	-0.0002 (0.0002)	-0.0010 (0.0006)	0.0002 (0.0004)	-0.0001 (0.0003)	-0.0006* (0.0003)	-0.0008*** (0.0003)
GPS	0.0010 (0.0007)	-0.0002 (0.0003)	-0.0002* (0.0001)	-0.0002* (0.0001)	-0.0002 (0.0001)	-0.0012** (0.0005)	-0.0005* (0.0003)	-0.0004* (0.0002)	-3.17$* 10^{-5}$ (0.000184)	-0.0008*** (0.0002)
SIZE	0.0102 (0.0400)	0.0122 (0.0109)	0.0025 (0.0055)	-0.0463*** (0.0080)	-0.0112 (0.0125)	0.0515*** (0.0131)	0.0409 (0.0333)	-0.0239*** (0.008)	0.0707*** (0.0244)	0.0243** (0.0114)
LEV	-0.0007** (0.0004)	-0.0006** (0.0003)	-0.0010 (0.0008)	-0.0004 (0.0005)	-0.0005*** (0.0002)	-0.0087 (0.0092)	-0.0298*** (0.0041)	-0.0003 (0.0002)	-0.0116* (0.0069)	-0.0014*** (0.0003)
CR	0.0249*** (0.0090)	0.0086* (0.0046)	0.0032* (0.0019)	0.0007 (0.0023)	-0.0016 (0.0013)	0.0010* (0.0006)	0.0066*** (0.0009)	-0.0186*** (0.0037)	0.0007 (0.0054)	-8.22*$* 10^{-5}$ (0.0021)
ICR	8.85*10^{-5} $***$ (2.57*10^{-5})	7.94$* 10^{-6}$* (4.75$* 10^{-6}$)	1.95$* 10^{-5}$*** (5.86$* 10^{-6}$)	4.21$* 10^{-5}$*** (1.22$* 10^{-5}$)	1.39$* 10^{-6}$ (9.447)	2.21$* 10^{-6}$*** (8.31$* 10^{-7}$)	1.98$* 10^{-5}$** (9.51$* 10^{-6}$)	8.42$* 10^{-7}$* (5.28$* 10^{-7}$)	1.72$* 10^{-5}$** (7.63$* 10^{-6}$)	8.13*$* 10^{-5}$ (0.0001)
R^2	0.3432	0.4955	0.5919	0.6681	0.6311	0.3784	0.8787	0.8613	0.5973	0.2947

*p < 0.1; **p < 0.05; ***p < 0.01.

Source: Authors' own computation

Table 6 presents the results of the analysis examining the impact of ESG (Environmental, Social, and Governance) general score on firm valuation, as measured by Tobin's Q, across several industries. The regression analysis includes control variables such as firm size (log of total assets), financial risk (total debt/total equity), liquidity (current ratio), and solvency (EBITDA net interest coverage ratio).
Starting with the impact of ESG scores on firm valuation, the energy sector shows a small but significant positive impact of ESG performance (0.0040*), indicating that better ESG performance tends to increase firm valuation. Similarly, in the basic materials and healthcare sectors, ESG performance has a positive and significant effect. However, in the consumer cyclical sector, as well as in the real estate sector the impact is significantly negative, suggesting that in these sectors, firms with better ESG performance may experience lower valuations. The positive relationship of the ESG score with the market valuation obtained in the case of some sectors is consistent with the results obtained by Bhaskaran et al. (2020), Ahmad et al. (2021) or Giannopoulos et al. (2022).
Firm size shows a consistently negative and significant impact on firm valuation across most industries. In basic materials (-0.5786***), industrials (-0.3294***), consumer cyclical (-0.5858***), consumer non-cyclical (-0.5612***), financials (-0.7990***), healthcare (-1.2569***), and technology (-0.7032***), larger firms are associated with lower firm valuations. This might suggest that as firms grow, they may face diminishing market valuations. The negative impact is particularly strong in healthcare, technology, and financials. In contrast, sectors like energy and utilities show insignificant impact, indicating that firm size may have a weaker relationship with valuation in these sectors.
The leverage ratio (LEV) has a negative impact on firm valuation. In basic materials (-0.0027*), consumer non-cyclical (-0.0046***), and real estate (-0.0029*), higher leverage is associated with lower valuations, implying that in these sectors, firms with higher debt levels tend to be valued less. However, the leverage effect is insignificant in other sectors like energy and financials, where the relationship between debt levels and valuation appears to be weaker.
The current ratio (CR), a measure of liquidity, shows a positive and significant effect on firm valuation in the energy and consumer cyclical sector, indicating that better liquidity leads to higher valuations in these industries. The technology sector also shows a significant positive relationship (0.1045*), suggesting that higher liquidity is beneficial for firm valuation in this sector as well. Conversely, in the basic materials sector (-0.0987***), better liquidity is associated with lower valuations, perhaps indicating inefficiencies in liquidity management or industry-specific factors that affect valuation.
Lastly, the interest coverage ratio (ICR), reflecting a firm's ability to meet its interest obligations, generally shows positive and significant impacts on firm valuation in the consumer cyclical and utilities sectors. This suggests that financial health, as measured by interest coverage, plays a significant role in firm valuation.

Table 6. Impact of ESG on firm valuation

	Energy	Basic materials	Industrials	Consumer cyclical	Consumer non-cyclical	Financials	Healthcare	Technology	Utilities	Real estate
ESG	0.0040* (0.0022)	0.0042** (0.0021)	-0.0012 (0.0018)	-0.0069*** (0.0022)	-0.0017 (0.0021)	0.0006 (0.0039)	0.0095** (0.0049)	-0.0063 (0.0045)	-0.0003 (0.0025)	-0.0038*** (0.0006)
SIZE	-0.0484 (0.0791)	-0.5786*** (0.0684)	-0.3294*** (0.0791)	-0.5858*** (0.0836)	-0.5612*** (0.1345)	-0.7990*** (0.0785)	-1.2569*** (0.2941)	-0.7032*** (0.1283)	-0.0663 (0.1159)	-0.0465* (0.0261)
LEV	0.0003 (0.0005)	-0.0027* (0.0016)	0.0009 (0.0052)	-0.0063 (0.0046)	-0.0046*** (0.0011)	-0.0544 (0.0544)	-0.0445 (0.0307)	-0.0017 (0.0032)	-0.0122 (0.0179)	-0.0029* (0.0017)
CR	0.1869* (0.1039)	-0.0987*** (0.0285)	0.0268 (0.0236)	0.0602* (0.0326)	0.0120 (0.0162)	9.8410^{-7} (0.003599)	0.0025 (0.0124)	0.1045* (0.0598)	0.0752 (0.0720)	0.0044 (0.0034)
ICR	7.25*10^{-5} (0.0001)	4.31*10^{-5} (3.02* 10^{-5})	4.84*10^{-5} (4.25*10^{-5})	0.0005*** (0.0001)	3.13**10^{-5} (3.24**10^{-5})	4.0410^{-6} (4.96* 10^{-6})	0.0002 (0.0001)	-4.32* 10^{-6} (8.64* 10^{-6})	4.07* 10^{-5}** (1.75* 10^{-5})	0.0005 (0.0004)
R^2	0.6703	0.7906	0.8035	0.8692	0.8028	0.7494	0.8368	0.9198	0.8035	0.7102

*p < 0.1; **p < 0.05; ***p < 0.01.
Source: Authors' own computation

Table 7 presents the impact of the individual ESG pillars — Environmental, Social, and Governance — on firm valuation, measured by Tobin's Q, across various industries.
Starting with the Environmental Pillar Score (EPS), we see a negative significant effect among industrials and real estate sectors. In the industrial sector, a significant negative relationship (-0.0046**) indicates that higher environmental performance tends to reduce firm valuation in this sector. Similarly, in real estate, the environmental pillar has a significant negative effect (-0.0013***), suggesting that greater focus on environmental issues could lower firm valuation. The results are in line with the ones obtained by Han et al. (2016) or the ones depicted by Aydoğmuş et al. (2022).
For the Social Pillar Score (SPS), the basic materials sector displays a significant positive impact (0.0052***), indicating that higher social performance is associated with higher firm valuation. This suggests that companies in this sector benefit from improved social practices. On the other hand, the real estate sector demonstrates a significant negative effect (-0.0011**), indicating that higher social scores in real estate reduce valuation.
The Governance Pillar Score (GPS) has a negative impact on firm valuation. In the consumer cyclical sector, a significant negative effect (-0.0043***) suggests that better governance practices might be perceived as a cost rather than a value driver. Similarly, real estate exhibits a significant negative relationship (-0.0014***), implying that strong governance measures might detract from firm value. Other industries show no significant relationship between governance scores and firm valuation. Our results contradict at least part of the previous empirical papers (Bhaskaran et al., 2020; Saygili et al. (2021); Aydoğmuş et al. (2022)).
Looking at the control variables, firm size has a largely negative and significant effect on firm valuation across most industries. This is especially evident in healthcare (-1.2818***), financials (-0.7948***), and technology (-0.6986***), suggesting that larger firms in these sectors may experience lower valuations, possibly due to diminishing returns or increased scrutiny under ESG criteria. The basic materials sector and consumer cyclical sector also show strong negative impacts of size on firm valuation.
Leverage (LEV) has a negative effect on firm valuation in several industries (consumer non-cyclical sector, and real estate sector). However, in the other sectors leverage appears to have a negligible impact on firm valuation, with insignificant coefficients.
The current ratio (CR), which measures a company's liquidity, has a positive and significant effect on firm valuation in certain industries. In the energy sector, liquidity is strongly positively associated with firm valuation (0.1873***), suggesting that firms with better liquidity are valued more highly when ESG factors are considered. In technology (0.1041*), a similar positive effect is observed. On the contrary, basic materials display a significant negative relationship (-0.1017***), indicating that greater liquidity may reduce firm valuation in this industry.
Lastly, the interest coverage ratio (ICR), reflecting a firm's ability to meet its interest obligations, generally has a positive and significant effect on firm valuation. The consumer cyclical sector shows a strong positive relationship, suggesting that firms with better interest coverage tend to have higher valuations. Other sectors like utilities also demonstrate significant positive effects, implying that better financial health, as measured by the interest coverage ratio, enhances firm valuation under ESG scrutiny.

Table 7. Impact of each individual ESG Pillars (Environmental, Social, Governance) on firm valuation

	Energy	Basic materials	Industrials	Consumer cyclical	Consumer non-cyclical	Financials	Healthcare	Technology	Utilities	Real estate
EPS	0.0034 (0.0030)	0.0001 (0.0019)	-0.0046** (0.0021)	-0.0012 (0.0019)	-3.92$*\ 10^{-5}$ (0.002367)	0.0041 (0.0035)	0.0011 (0.0048)	-0.0009 (0.0040)	-0.0022 (0.0018)	-0.0013** (0.0005)
SPS	0.0004 (0.0028)	0.0052*** (0.0018)	0.0027 (0.0021)	-0.0005 (0.0023)	-0.0028 (0.0025)	0.0006 (0.0038)	0.0047 (0.0057)	-0.0011 (0.0045)	0.0021 (0.0019)	-0.0011** (0.0005)
GPS	0.0005 (0.0019)	-0.0010 (0.0016)	0.0002 (0.0011)	-0.0043*** (0.0015)	0.0014 (0.0014)	-0.0033 (0.0032)	0.0041 (0.0036)	-0.0042 (0.0032)	0.0001 (0.0010)	-0.0014*** (0.0005)
SIZE	-0.0521 (0.0753)	-0.6139*** (0.0709)	-0.3200*** (0.0797)	-0.5962*** (0.0860)	-0.5573*** (0.1326)	-0.7948*** (0.0783)	-1.2818*** (0.2987)	-0.6986*** (0.1292)	-0.0769 (0.1140)	-0.0465* (0.0261)
LEV	0.0003 (0.0009)	-0.0025 (0.0017)	0.0009 (0.0051)	-0.0065 (0.0046)	-0.0039*** (0.0011)	-0.0611 (0.0550)	-0.0439 (0.0305)	-0.0018 (0.0032)	-0.0092 (0.0184)	-0.0029* (0.0017)
CR	0.1873*** (0.0232)	-0.1017*** (0.0298)	0.0292 (0.0236)	0.0640* (0.0337)	0.0093 (0.0158)	0.0004 (0.0036)	0.0023 (0.0122)	0.1041* (0.0598)	0.0756 (0.0721)	0.0043 (0.0034)
ICR	7.27$*\ 10^{-5}$ (0.000178)	3.84$*\ 10^{-5}$ (3.10$*\ 10^{-5}$)	5.00$*\ 10^{-5}$ (4.37E-05)	0.0005*** (0.0001)	3.18$*\ 10^{-5}$ (3.30$*\ 10^{-5}$)	4.07$*\ 10^{-6}$ (4.96$*\ 10^{-6}$)	0.0002 (0.0001)	-4.46$*\ 10^{-6}$) (8.65$*\ 10^{-6}$)	3.38$*\ 10^{-5}$* (1.74$*\ 10^{-5}$)	0.0005 (0.0004)
R^2	0.6706	0.7935	0.8040	0.8695	0.8035	0.7505	0.8370	0.9199	0.8040	0.7102

*p < 0.1; **p < 0.05; ***p < 0.01.
Source: Authors' own computation

5. Conclusions

Prior empirical research found mixed results regarding the impact of ESG on firm performance and market valuation. This study seeks to contribute to the understanding of how both the general ESG score and its constituent pillars affect firm performance and firm valuation metrics, thereby providing valuable insights for investors, corporate executives and strategic planners, and policymakers interested in the relationship between sustainability and corporate success.

Our study indicates that, in general, the impact of ESG scores on firm performance is negative across most industries. While the Basic Materials sector shows a positive correlation between higher ESG scores and improved performance—likely driven by reputational benefits and operational efficiencies—other sectors tell a different story. In Consumer Non-cyclical, Financials, Technology, and Real Estate, higher ESG scores are associated with declines in financial performance. This suggests that, in these sectors, the costs of implementing ESG initiatives or industry-specific constraints may outweigh any potential benefits. The negative impact is particularly pronounced in Real Estate, reflecting how certain industries may face greater challenges in aligning ESG strategies with financial success. Overall, the findings point to a generally unfavorable effect of ESG practices on firm performance, with variations depending on the sector.

The impact of individual ESG pillars on firm performance shows considerable variation across industries and financial metrics, with the majority of the effects being negative. Larger firms, particularly in the financial and utility sectors, show some benefit from ESG practices, but these are exceptions. Notably, the Governance pillar has the most negative impact, with negative coefficients observed in most sectors, suggesting that governance-related ESG practices may not align with improved financial performance. Additionally, higher leverage tends to adversely affect performance across most industries. While liquidity, as measured by the current ratio, and the ability to cover interest expenses (ICR), are positively correlated with better performance, this is especially true in capital-intensive sectors like energy, healthcare, and technology. However, the overall trend indicates that the benefits of ESG practices, particularly from the governance aspect, are limited or even detrimental to firm performance in many cases.

The impact of ESG performance on firm valuation varies significantly across industries. ESG performance tends to increase valuation in sectors like energy, basic materials, and healthcare, but may reduce valuation in consumer cyclical and real estate sectors. Firm size has a negative impact on valuation across almost all industries. Leverage is negatively correlated with market valuation, while liquidity and financial health generally contribute positively to firm valuation in most industries.

The impact of ESG pillars on firm valuation is highly industry-specific. The environmental and governance pillars tend to have negative effects on firm valuation in industries such as real estate, industrials and consumer cyclical sectors, while the social pillar has a positive impact in the basic materials sector. Larger firms generally face lower valuations in almost all industries, while liquidity and financial health are positively correlated with firm valuation across several sectors.

For the investment community, the paper underscores the financial materiality of ESG metrics, showing a positive correlation between ESG performance and market valuation in some sectors. This empowers investors to prioritize ESG factors in portfolio allocation, optimizing long-term growth. For corporate executives and strategic planners, the findings reveal a general negative impact of ESG initiatives on firm performance, highlighting the need for a balanced and selective approach. For corporate leaders, this emphasizes the importance of aligning ESG investments with core business objectives, focusing on

initiatives that drive measurable value and avoid overcommitting resources to areas with limited financial returns. This insight encourages a more strategic integration of ESG, ensuring efforts are both sustainable and supportive of long-term profitability. For policy makers to reassess how ESG frameworks are designed and implemented. Regulators can use this insight to refine policies, ensuring they provide clear guidance and incentives that support firms in achieving ESG goals without compromising financial viability.
Future research could explore the impact of ESG on firm performance by incorporating a broader range of regions, particularly outside of Europe, to capture diverse economic and regulatory environments. Additionally, applying advanced panel data modeling techniques, such as the Generalized Method of Moments (GMM), could improve the robustness of findings by addressing potential endogeneity issues.

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