Relationship between ESG and corporate financial performance in the energy sector: empirical evidence from European companies

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Abstract

Purpose – Considering environmental, social and governance (ESG) factors is vital in climate change mitigation. Energy companies must incorporate ESG into their business plans, although it unquestionably affects their corporate financial performance (CFP). This paper aims to investigate the effect of ESG on energy companies' profitability through return on assets by analysing the combined score and individual dimensions of ESG.

Design/methodology/approach – The study examined a panel data sample of 911 firm-year observations for 85 European energy-sector companies during 1995–2020. Two distinct modelling specifications were applied to explore the impact of ESG components on the CFP of EU energy companies. The financial data and ESG scores were obtained from the Thomson Reuters Eikon database in July 2021.

Findings – The empirical findings revealed that energy companies' profitability is marginally and negatively affected by their ESG performance. Whereas independent evaluation of the ESG subcomponents indicated that environmental responsibility has a significant negative effect. In contrast, corporate social and governance responsibilities are positively but not significantly associated with the company's CFP.

Originality/value – This study fills a research gap in the ESG–CFP literature in the European energy sector, a pioneer in sustainable development. To the best of the authors' knowledge, this study's originality lies in its analysis of ESG factors' role in profitability by considering different EU countries and energy sectors.

Keywords ESG, Corporate financial performance, Energy sector, Panel regression model, Correlation analysis, Environmental responsibility, Social responsibility, Governance responsibility

Paper type Research paper

1. Introduction

Climate change, biodiversity loss and pollution are becoming more of a concern in the face of global warming, shifting the world to sustainable practise and green technology investments (Giannopoulos *et al.*, 2022; Ozparlak, 2022). Recently, sustainability has been encouraged by

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the European Green Agreement via green finance, making environmental, social and governance (ESG) practices attracting and increasing interest among businesses. Some businesses use ESG to gain a competitive edge, whereas others view it as a standard practice; however, adopting sustainability is an evolving process. Sustainability is anticipated to have an enormous impact on the global scene and will be essential for businesses, as it is expected to increase their credibility by ensuring reliable resource allocation and management.

As the human future will likely rely on sustainability, companies are urged to include ESG in their corporate strategy. In addition, they must answer whether ESG performance can translate into positive corporate financial performance (CFP). Does ESG necessitate sacrificing profits or putting success on hold? The association between sustainability and the financial performance (FP) of corporations is of increasing interest to practitioners and stakeholders. Recently, numerous publications have been produced without any clear consensus (Cerciello *et al.*, 2022).

Since energy accounts for two-thirds of total greenhouse gases, it is central to climate change mitigation. As a result, energy companies are urged to combat climate change, as its effects on the environment and society are significant. European Union (EU)-based energy companies set the standard for sustainability (Johansson *et al.*, 2021), as the energy sector is a key player in the economy's functionality. By adopting an appropriate ESG model, energy companies can minimise environmental harm while maximising their productivity.

Due to the innovative sustainability-driven practices and the increasing interest of stakeholders and researchers, the energy sector is examined in this study (Constantinescu, 2021). Furthermore, the existing gap in the literature, primarily attributable to the contradictory results and limited research on the energy sector, necessitates additional research in that sector. In particular, the EU energy sector is a suitable setting for examining the impact of ESG on CFP because of its prominent position in the global energy market and the numerous policies implemented to promote sustainability. The EU has been a global leader in addressing challenges such as climate change and energy security, developing innovative legislative measures to reduce emissions, promote renewable energy and enhance energy efficiency. The EU has been an early adopter of global climate policy and has ratified the Paris Agreement with its Nationally Determined Contributions of reducing greenhouse gas (GHG) emissions by at least 40% by 2030 compared to 1990. Compared to other regions, the EU's energy mix comprises a diverse portfolio of fossil fuels, nuclear power and renewables. Even though fossil fuels still account for most of the EU's energy mix, the EU is steadily transitioning towards more renewable energy. Indeed, EU has made significant progress over the past years in completing the internal market for electricity and gas, promoting energy efficiency action, deploying renewable energy, reducing GHG emissions and establishing a more robust carbon price signal. These European policies indirectly push European energy companies to improve their ESG performance, particularly in the environmental dimension.

The EU energy market is distinguished by its organisational structure, market structure, regulatory framework and ownership structure (Capece *et al.*, 2013). Firstly, many independent companies have entered the EU energy market at various supply chain stages due to the sector's liberalisation. Secondly, EU directives have made it easier for new firms to enter all phases of energy production. Thirdly, the privatisation of numerous national and regional energy companies has begun in many member states. Fourthly, the EU established shared institutions and regulatory mechanisms for its member states. These four particularities of the EU energy market, with the EU's incentives for climate change action and the shift to a green economy, shape an energy market that combines a standard

structure with the diverse characteristics of EU member states. These factors affect the EU energy firms' adoption of ESG practices and their FP.

Moreover, the EU energy sector's physical resilience has been strong, contrary to its financial resilience, which has been under severe stress because of the Covid-19 crisis. The EU member states are keen on fostering ESG due to their political stability, physical and social infrastructure and the rich body of policies promoting sustainability. EU has passed the world's strictest mandatory ESG reporting regime. The Corporate Sustainability Reporting Directive will initially apply to a group of large EU companies beginning in 2024 and then gradually apply to smaller companies over the next four years. While ESG considerations affect companies across all sectors, energy companies have been at the forefront of many ESG developments. Indeed, it is a value-adding analysis to find the financial value and effects of the ESG practices of the companies that belong to environmentally sensitive industries, especially those in the energy and power generation industry. Hence, research in the EU, specifically in the energy sector that includes some of its largest emitters, is of utmost importance.

Therefore, this study examines how ESG affected the profitability of European energy companies between 2002 and 2020. This study's panel regression model uses the return on assets (ROA) as the dependent variable. ROA, an accounting measure of profitability, has been used extensively in the literature on the ESG–CFP nexus (Giannopoulos *et al.*, 2022). Multi-dimensional ESG scores (environment, social and corporate governance) and financial data were gathered from the Eikon database. The results of the regression analysis revealed that only environmental responsibility has a significant, albeit negative, impact on the profitability of energy companies.

Prior research on ESG–CFP association primarily focused on a single ESG dimension. However, because ESG issues are interrelated, considering a single subcomponent of ESG may be misleading (Alareeni and Hamdan, 2020; Ozparlak, 2022). Furthermore, even for studies that dissect ESG into its three components, the results are contradictory regarding whether ESG and its dimensions affect FP positively, negatively or neutrally (Giannopoulos *et al.*, 2022). This study makes five contributions to the ESG literature. Firstly, it looks at a composite score for ESG and sub-scores, including accounting-based financial measures for the EU energy industry. Studies like this one that explore the ESG subcomponents while examining the association between ESG and CFP can contribute to a better understanding of that relationship (Rahi *et al.*, 2022). Secondly, this study sheds light on the role of ESG factors on energy firms' profitability by considering different EU countries and economic sectors. Thirdly, it contributes to the literature by empirically examining the ESG–CFP nexus in the European energy sector, a pioneer in sustainable development. Furthermore, our study combines and incorporates into the analysis all those variables usually used in the ESG–CF nexus while also controlling for the different activities of energy firms (e.g. their involvement in renewable energy), thus, enabling the derivation of conclusions on the differences across various sub-sectors in energy. According to our knowledge, a limited number of studies in the energy field consider renewables as a control variable. Fourthly, the paper examines a period spanning more than two decades, during which numerous energy companies introduced social, ethical and environmental policy programmes and the stock market was volatile. Contrary to the study of Behl *et al.* (2022) and many others in the field, this research examines an extensive data set regarding the period, the number of energy firms and the variables. The extensive period plays a fundamental role in determining the relationship between ESG factors and FP. It takes time, especially for environmental regulations, to influence economic performance. Thus, the comprehensive data set used in this analysis provides robust results exploring improvements and developments in ESG

disclosure practices by the examined firms over time. Lastly, this study contributes to the literature by addressing a longstanding question on the impact of ESG on profitability in the energy industry, where results on that association are mixed and contradictory.

The remaining sections of this paper are structured as follows. Section 1 introduces the research topic. Section 2 reviews the ESG–CFP literature, highlighting prior findings and gaps. Section 3 described the data set and methodology. Section 4 presents the analysis of the results. The last section, Section 5, provides conclusions and recommendations for future research.

2. Literature Review

ESG practices have received significant consideration from managers, investors and policymakers since they provide additional information regarding financial indicators, constituting a valuable asset in decision-making. Scholars have often questioned whether ESG practices are a competitive advantage or primarily a financial burden. Since the early 1970s, numerous studies have examined how sustainability influences FP (Giannopoulos *et al.*, 2022). The ESG–CFP association is more complex than a simple cause-and-effect relationship, as numerous factors must be considered to comprehend the effect of one variable on the other. This association has been investigated across several parameters, including the overall and sub-component ESG scores (Alareeni and Hamdan, 2020; Ademi and Klungseth, 2022).

The literature on the ESG–CFP nexus has produced contradictory and ambiguous findings (Garcia and Orsato, 2020; Alareeni and Hamdan, 2020; Bansal *et al.*, 2021; Ziqiong, 2022; Ozparlak, 2022). Using companies listed on the Chinese Stock Exchange from 2015 to 2019, Ruan and Liu (2021) discovered that ESG practises negatively impact the performance of companies that are particularly insensitive to environmental factors. Giannopoulos *et al.* (2022) investigated whether ESG and its dimensions affect a firm's FP positively, negatively or neutrally. The possible associations between sustainability and CFP are four:

(1) positive;
(2) negative;
(3) neutral; and
(4) U-forms (Adamkaite *et al.*, 2022).

The majority of studies concluded that sustainability could increase firm value, which translates into better FP (Wang and Sarkis, 2017). For example, Friede *et al.* (2015) reported that 90% of the 2,200 papers showed that sustainability positively impacted FP. Also, Saha *et al.* (2020) reviewed 114 papers published between 1958 and 2016 and reported a direct effect of ESG on CFP theories such as the resource-based view (RBV) and stakeholder theory have been used to explain the positive impact of ESG on a firm's performance. According to the RBV, sustainability practices give a competitive advantage to firms, boosting their reputation and improving their loyalty. In the literature, it is widely acknowledged that a company's reputation is a crucial factor in improving its FP (Nirino *et al.*, 2021). Based on the stakeholder theory, a firm tries to maximise its profit in the long term by creating value by meeting the demands of all stakeholders and, thus, converting sustainability into profits.

Other research works on ESG discovered that ESG harms a company's performance (Ruan and Liu, 2021). Some scholars found contradictory results on the ESG–CFP nexus (Ademi and Klungseth, 2022). For example, some concluded that ESG and CFP had a U-shaped association (Franco *et al.*, 2020). Others found no relationship between the two (La Torre *et al.*, 2021). Ozparlak (2022) examined the impact of ESG on the FP of 103 companies

in the S&P 500 index between 2015 and 2021 using accounting and market-based metrics. He found that ESG does not affect the FP of the companies. However, environmental responsibility affects the firms' market values but not ROA, return on equity (ROE) and market values of assets.

The energy sector has been asked to reduce its carbon footprint and contribute to a sustainable future due to its large environmental footprint. As a result, since 2015, there has been an increase in the amount of research on ESG in the energy industry (Ranjan and Das, 2015; Soni *et al.*, 2017). Between 2019 and 2020, sustainable investments in enterprises have more than doubled (Zumente and Lace, 2021). However, sustainability may incur financial costs and have a negative impact on a company's CFP in the short term (Bocken and Geradts, 2020). Atan *et al.* (2018) found that ESG had no significant impact on the FP of Malaysian firms. Contrarily, Dalal and Thaker (2019) and Buallay (2019) found that ESG performances affect CFP significantly and positively.

ESG's impact on a company's FP is gaining global attention (Alsayegh *et al.*, 2020; Ozparlak, 2022). However, few studies (Lloyd, 2018; Constantinescu, 2021; Adamkaite *et al.*, 2022) have examined the ESG–CFP nexus in the energy sector. Furthermore, only a few of them examined more than one country or region. For instance, Zhao *et al.* (2018) discovered that the Chinese energy power market's FP might be enhanced by high ESG performance. Alhawaj *et al.* (2022) found that ESG has a substantial impact on operational performance but a negligible impact on FP when measured by metrics such as ROE and Tobin's Q. Furthermore, there has not been much research on sustainability in the energy industry in terms of time and geography (Agudelo *et al.*, 2020), with most of the studies concentrating on the fossil fuel industry and very few on renewables. Indeed, much research in the energy industry has discovered a neutral link between the two. For example, Adamkaite *et al.* (2022) studied nine Lithuanian energy companies from 2017 to 2020 and concluded that sustainability has no impact on the CFP. Constantinescu *et al.* (2021) used data from 67 energy companies operating in sectors such as oil and gas, oil- and gas-related equipment and services, multiline utilities, renewable energy and uranium sectors over 2015–2018 to explore the impact of ESG factors on firm value. They found that the ESG and its components are significantly connected with the firm's market value, which supports both a positive and a negative association between the combined and individual ESG factors disclosure and the firm's value measured by market value. Therefore, additional research is still required, especially in the renewable energy sector (Patari *et al.*, 2014). Thus, by examining the ESG–CFP nexus in the EU energy sector and considering the impact of renewables, this study seeks to advance knowledge in that specific field.

2.1 Environmental responsibility

Globally, businesses invest in environmentally friendly practices to reduce their environmental impact and increase profitability (Albuquerque *et al.*, 2019). Correspondingly, a substantial amount of research has been conducted on the association between environmental performance (EP) and CFP. Nonetheless, the results remain contradictory. Some researchers discovered a positive link between the two (Endrikat *et al.*, 2014; Ranjan and Das, 2015). Others, however, discovered that environmental practices have a negative impact on FP (Rahi *et al.*, 2022). Arslan-Ayaydin and Thewissen (2014) found that environmental responsibility neither improves a firm's FP on the stock market nor provides significantly positive returns in times of high uncertainty. They also concluded that reducing environmental concerns improves the corporate profitability of energy companies.

2.2 Social responsibility

Prior research on the relationship between corporate social responsibility (CSR) and CFP yielded contradictory findings (Rahi *et al.*, 2022). Numerous studies have concluded that CSR activities contribute to positive returns and better accounting performance (Blasi *et al.*, 2018). By investing in CSR, businesses can cultivate a good reputation and, thus, attract more investors (Okafor *et al.*, 2021; Shahzad *et al.*, 2022). For instance, Okpa *et al.* (2019) concluded that social responsibility is vital to the CFP of the examined companies. Magrizos *et al.* (2021) found that CSR positively influences the CFP of small and medium enterprises. CSR represents a sustained competitive advantage that generates resources for the business and has the potential to be profitable. Nonetheless, several studies have found a non-existent or negative relationship between social responsibility and FP (Peng and Yang, 2014; Akben Selcuk and Kiymaz, 2017; Alareeni and Hamdan, 2020).

2.3 Corporate governance

A vast amount of research has been conducted on CG, especially after the 2008–2009 economic crisis due to the important contribution of CG to the companies' FP (Alareeni and Hamdan, 2020). Examining the association between CG and various CFP indicators yielded varying results. Numerous researchers have reported a positive correlation between the two. For example, Rahi *et al.* (2022) concluded that governance practices affect positively the performance of the Nordic financial industry institutions. This can be explained by the fact that strong governance ensures higher profitability from firms' use of their assets. However, other studies reported a negative effect of CG on CFP (Conca *et al.*, 2020). Despite contradictory findings, good CG practices positively impact CFP.

3. Empirical setting

3.1 Data

This research aimed to explore whether ESG factors affect the FP of the EU energy companies and, if so, then how they affect it. The method deemed appropriate for the study was panel data analysis, which permits the examination of dynamic relationships in time and space. Annual data for EU energy companies from 2002 to 2020 listed in the Thomson Reuters Eikon database in July 2021 made up the study data set. A total of 12,168 observations made up the initial size of the study sample. The final size of the sample was decreased to 911 firm-year observations since only 85 of those firms provided a full set of ESG scores for the analysis period.

As indicated in Table 1, the sample comprises businesses from a variety of energy-related industries. Most companies (73 companies with 830 firm-year observations) are engaged in oil- and gas-related industries, while nine companies operate in the renewable energy sector (56 observations).

3.2 Variables

The data set used in the analysis consists of all EU energy firms for which ESG and financial data were available in the Eikon database without any sampling process being used. Considering the multidimensional nature of ESG and the effect of one component that may erase the adverse effects of another, we considered the three separate scores of ESG sub-components and the overall ESG score. This categorisation helps to identify the effect of each ESG component on CFP. The Eikon database was queried to obtain the scores of the overall ESG and its subcomponents.

Typically, the ESG score, a composite index comprising the three ESG components (environmental, social and governance), represents a company's sustainability performance.

Sector	No. of firms	No. of observations
Coal	3	25
Integrated oil and gas	12	145
Oil and gas drilling	5	25
Oil and gas exploration and production	12	123
Oil and gas refining and marketing	14	175
Oil and gas transportation services	10	108
Oil-related services and equipment	20	254
Renewable energy equipment and services	8	53
Renewable fuels	1	3

Source: Created by the authors

Table 1. Composition of the sample by sector

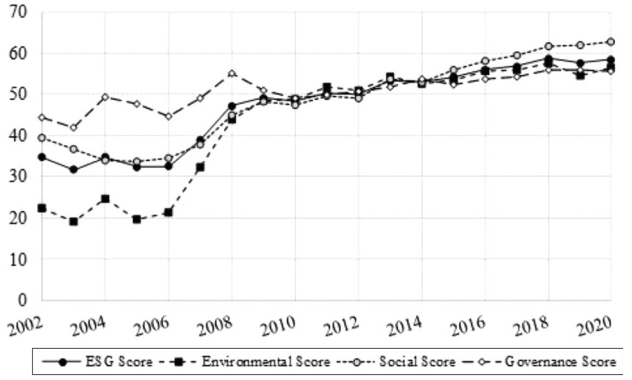
The environmental disclosure score evaluates a company's environmental footprint (e.g. CO_2 emissions, waste management, etc.). The social disclosure score includes topics such as equality, human rights and working conditions, whereas the governance disclosure score includes shareholder rights and corruption, among other topics.

The Refinitiv Eikon platform provides ESG scores ranging from 0% to 100%, which are computed based on data concerning various environmental, social and corporate governance factors. When examining the relationship between sustainability and a company's FP, ESG scores have been used extensively in the literature (Alareeni and Hamdan, 2020; Constantinescu, 2021).

Figure 1 depicts the evolution of the ESG score and its sub-components for the analysed companies during the period of the analysis. It is obvious that the ESG performance of firms improved after 2006, primarily due to enhancements in the environmental and social dimensions. In contrast, there has been a modest improvement in governance.

ROA was used to assess the company's FP. An accounting measure such as ROA is more reliable than market-based measures and it applies to all companies, even non-listed ones. ROA was, therefore, used as the dependent variable for the analysis.

Additional financial data were treated as control variables in accordance with the pertinent literature to proxy the company's FP (Alareeni and Hamdan, 2020). These include leverage (LEV), current ratio (CR), market value-to-book value ratio (MBV) and



Source: Created by the authors

Figure 1. Trend of the ESG scores during the analysis period

the size of the company (SIZE). A rich body of academic research in the field has pointed out the fundamental role of those variables in investigating the relationship between sustainability disclosure and a firm's FP (Nirino *et al.*, 2021; Constantinescu, 2021; Zahid *et al.*, 2022). Calculated as the ratio of total debt to total assets, LEV indicates a company's reliance on debt to finance its assets. In addition, the size of a company as determined by the natural logarithm of total assets has a significant impact on its performance. On the one hand, large companies are more resilient to external shocks (e.g. an economic crisis) and have more means to implement the large-scale investments that are often needed in the energy sector. On the other hand, however, smaller companies are more flexible, and they can adjust faster through innovation. Therefore, the existing literature provides mixed evidence on the role of a company's size on its FP. The CR was used to gauge the company's liquidity, which impacts its ability to maintain sustainable practices. The MBV, calculated as market value to total equity, is used to evaluate the growth of a company on the market.

Although the variable selection was based on the grounds of the existing literature and data availability, we refrained from using the same set of variables that were frequently used in relevant studies. By taking into account a diverse set of variables that have been claimed to be important in the analysis of the ESG–CFP nexus, we hoped to add to the body of current work.

Table 2 presents the descriptive statistics for the chosen variables (mean, median and standard deviation).

Table 3 shows the correlations among all variables. A preliminary analysis indicates that the ESG disclosure score positively correlates with the individual ESG dimensions (E, S and G) and the firm's size (SIZE). Furthermore, the results do not establish a strong correlation among all the explanatory variables, which shows that the variables do not suffer from multicollinearity concerns in our regression models. In particular, results indicate no significant correlation between ROA and the examined variables, suggesting that ROA is an appropriate financial measure for examining the ESG–CFP nexus.

Table 4 also indicates that there is no multicollinearity problem as the values for variance inflation factor for all independent variables are less than 10.

Table 5 reports the average values of ESG, individual scores and ROA for firms operating in renewables and other fields in the energy sector. Though the scores may be diverse across the firms operating in renewables or the other examined sectors, the governance component is the most important compared to ESG and its environmental and

Variable	Mean	Median	SD
Environmental score	48.49	52.67	27.80
Social score	51.93	52.17	25.99
Governance score	52.17	51.95	24.22
ESG score	50.74	52.15	21.90
ROA	5.26	4.80	7.27
CR	1.70	1.35	1.27
MBV	5.51	1.53	12.18
LEV	0.27	0.24	0.18
Size (assets in million US$)	40,959.17	5,539.67	98,120.13
Size (in assets)	22.45	22.44	2.09

Source: Created by the authors

Table 2.
Descriptive statistics of the variables

Variable	ESG	E	S	G	ROA	CR	MBV	LEV	SIZE
E	0.903								
S	0.910	0.775							
G	0.635	0.380	0.380						
ROA	−0.129	−0.131	−0.122	−0.055					
CR	−0.242	−0.240	−0.213	−0.129	0.039				
MBV	−0.241	−0.258	−0.226	−0.091	−0.038	0.029			
LEV	−0.004	0.025	0.054	−0.130	−0.289	−0.229	0.012		
SIZE	0.570	0.562	0.455	0.381	0.082	−0.161	−0.441	−0.145	
RENEW	−0.013	0.052	0.040	−0.134	−0.070	0.058	0.088	−0.018	−0.219

Source: Created by the authors

Table 3. Correlations among variables

Variable	Variance inflation factor
E	3.09
S	2.65
G	1.24
RENEW	1.10
LEV	1.14
CR	1.15
MBV	1.14
SIZE	1.39

Source: Created by the authors

Table 4. The values for variance inflation factor

Variable	E	S	G	ESG	ROA
Renewables	51.56	53.39	40.41	48.25	3.33
Others	46.76	49.94	51.40	49.21	5.48
p-value*	0.08	0.19	0.00	0.67	0.04

Note: * *t*-test *p*-value
Source: Created by the authors

Table 5. Averages by the business field of the companies (renewables production vs others)

social components. This shows that EU firms mainly focused on governance, followed by sustainability's environmental and social dimensions across all sectors. For firms involved in renewables, the S-scores are higher compared to the other companies. However, the differences are not statistically significant. Firms involved with renewables also have higher performance in the environment pillar of ESG, with the difference from other companies being significant at the 10% level. On the other hand, the governance performance of firms involved with renewables is significantly lower compared to other companies. Overall, the difference in the global ESG score between the two groups of companies is marginal, whereas in terms of profitability, firms in renewables production are less profitable with the difference being significant at the 5% level.

In Table 6, the averages of ESG, E, S and G scores and the ROA are given for three periods:

(1) before the global financial crisis;
(2) during the crisis period; and
(3) after the crisis.

The recession includes the European debt crisis characterised by high government structural deficits and accelerating debt levels. As observed, the environmental and governance scores were higher during the economic crisis, with the social scores being the highest in the after-crisis period. However, the mean of ESG scores was almost the same between the crisis and after the crisis period. The importance of sustainability in the EU energy firms is evident even during the economic crisis. After the crisis, and while the FP of energy firms was even worst, the EU energy firms kept investing in sustainability and mostly in CSR, followed by the governance and environmental dimensions of sustainability across all sectors.

3.3 Estimation model

The base model is expressed as follows:

$$ROA_{it} = \alpha + \beta_1 ESG_{i,t-1} + \beta_2 LEV_{i,t-1} + \beta_3 CR_{i,t-1} + \beta_4 MBV_{i,t-1} + \beta_5 SIZE_{i,t-1} + \beta_6 RENEW + Years + Countries + \varepsilon_{it}$$

In addition to the ESG score and the financial variables described earlier, the model incorporates country and year-fixed effects, as well as a dummy variable indicating whether a company engages in renewable energy-related activities (RENEW). Given the nature of the operation of such companies, they are expected to have a better environment footprint and performance. This is indeed verified for the companies in the sample, as companies in RENEW = 1 have an average environmental score of 51.6 versus 46.8 for the other companies (p-value 0.077 according to the Mann-Whitney non-parametric test). Moreover, it was observed that the mean social score for the RENEW = 1 group was also higher (53.4 versus 49.9 for the other companies), although the difference is not significant at the 10% level. On the other hand, companies involved in RENEW, have a lower governance score (40.4 vs 51.4 for the other companies), with the difference being significant at the 1% level. In terms of the overall ESG score no significant differences were observed (48.3 mean ESG score for RENEW = 1 vs 49.2 for the other companies). Given the different characteristics of companies in the renewables sector, the incorporation of the corresponding dummy variable in the regression model enables the analysis of the effect that this specific sector has on the FP of the companies, beyond the ESG score. It should further be noted that for the average ROA of the firms in the sample that operate in renewables is significantly lower than companies in other energy sub-sectors (mean ROA 3.3% versus 5.5%; significant difference at the 5% level).

Period	E	S	G	ESG	ROA
Pre-crisis (up to 2007)	32.24	39.72	50.51	39.90	9.59
Crisis (2008–2012)	52.00	50.01	50.78	50.81	6.36
After the crisis (2013–2020)	49.14	53.33	50.07	50.87	3.57
p-value*	0.00	0.00	0.91	0.00	0.00

Note: *ANOVA p-value
Source: Created by the authors

Table 6. Averages of ESG, E, S, G and ROA by time (pre-crisis, crisis and after the crisis)

All independent financial variables and the ESG score are lagged by one year compared to the ROA-dependent variable. In that way, we ensure that the potential impact-by-time lags between ESG and financial metrics were captured.

The above base model is further extended by incorporating the individual ESG dimensions (E, S and G), first introducing each one separately in the analysis to examine their individual effects on CFP, and then introducing all three ESG pillars (E, S and G) in the regression model to examine their combined impact. These additional specifications provide further insights into the role of ESG factors on the FP of the companies.

The estimation of the regression models is conducted within a framework of random effects with robust standard errors. The choice of this estimation procedure was based on appropriate statistical tests (e.g. the Hausman test) to examine the suitability of different estimation techniques (i.e. O.L.S., fixed effects and random effects).

4. Results and discussion

The results of the regression analysis are summarised in Table 7, where Model (1) is the base model presented in sub-section 3.3. Models (2–4) incorporate the E/S/G dimensions separately to explore the effect of each pillar of ESG (environment, social and corporate governance) on firms' value measured by ROA, whereas Model (5) considers all dimensions.

As expected, LEV has a persistent negative effect, whereas the MBV has a strong positive effect. The negative relationship between financial LEV and FP was also observed by Naseem *et al.* (2020) while examining the impact of ESG on firm performance of 1,021 Asian firms over the period 2006–2016. The company's size positively affects profitability, although this finding is not consistently significant. This observation is consistent with the theory of economies of scale, meaning that larger companies are more competitive than smaller ones; the size enables them to strengthen their market position via economies of scale position in market through economies of scale (Chakroun and Amar, 2021). This is particularly true for the energy sector, which is capital intensive requiring large capital expenditures. The positive association between firm size and ROA may be also explained by the extensive experience and a high number of professionals dealing with sustainability in large firms (Derbali, 2021).

Variable	(1)	(2)	(3)	(4)	(5)
ESG_{t-1}	−0.035 (0.149)				
E_{t-1}		−0.044** (0.026)			−0.053** (0.025)
S_{t-1}			−0.015 (0.386)		0.012 (0.544)
G_{t-1}				0.001 (0.991)	0.009 (0.658)
RENEW	−2.295** (0.035)	−2.389** (0.044)	−2.182** (0.046)	−2.099* (0.054)	−2.426* (0.052)
LEV_{t-1}	−8.727*** (0.006)	−8.704*** (0.006)	−8.683*** (0.006)	−8.733*** (0.005)	−8.612*** (0.006)
CR_{t-1}	0.078 (0.813)	0.064 (0.845)	0.098 (0.768)	0.104 (0.756)	0.057 (0.865)
MBV_{t-1}	0.097** (0.043)	0.099** (0.038)	0.096** (0.042)	0.094** (0.042)	0.097** (0.040)
$SIZE_{t-1}$	0.858* (0.090)	0.968** (0.045)	0.721 (0.130)	0.617 (0.169)	0.883* (0.080)
Constant	−17.987 (0.162)	−20.865 (0.104)	−15.687 (0.229)	−14.076 (0.230)	−19.892 (0.117)
N	795	795	795	795	795
Within R^2	0.231	0.238	0.231	0.232	0.241
Between R^2	0.256	0.256	0.243	0.231	0.247
Overall R^2	0.245	0.247	0.242	0.241	0.248

Notes: *p*-values in parentheses, *$p < 0.1$; **$p < 0.05$ and ***$p < 0.01$
Source: Created by the authors

Table 7.
Regression analysis results

Regarding the overall ESG score, its contribution to Model (1) is negative but insignificant. ESG's negative impact might be explained by the increased expenses associated with ESG investments. According to Gillan *et al.* (2021), corporations prefer to splurge on ESG to enhance their reputation at the expense of their shareholders. Nevertheless, ESG investments have a negative impact on the company's value. Diverse research on the ESG–CFP nexus involving a variety of industries and countries have yielded similar results (Garcia and Orsato, 2020; Barauskaite and Streimikiene, 2021; Lo and Liao, 2021; DasGupta, 2021; Cerciello *et al.*, 2022). McWilliams and Siegel (2000), for instance, indicated that ESG hinders CFP, but Buallay *et al.* (2020) observed that sustainability damaged the performance of 882 firms from developed and developing countries over an 11-year period. Similarly, DasGupta (2021) concluded that the ESG practices implemented in 27 countries during 2010–2019 decreased their profitability. In addition, Rahi *et al.* (2022) found that sustainability harms the FP of the Turkish and Nordic listed companies measured by return on invested capital and equity. The negative effect may be attributed to the requirement for long-term investment in sustainability measures, which has a negative effect on FP (Bodhanwala and Bodhanwala, 2018). Giannopoulos *et al.* (2022) found that ESG practices affect the FP through the ROA of the Norwegian listed companies negatively. Zahid *et al.* (2022) also concluded that ESG has a negative but insignificant impact on FP measured by ROA explained by the fact that ESG practices increase costs to shareholders, limiting investment opportunities and, thus, adversely affecting the firm's FP. This finding is consistent with our results and supports the trade-off view and the traditional neoclassical approach.

Looking at the further results on the components of the ESG score, it is clear that only the environmental dimension (E) is relevant for the profitability of the EU energy companies. In particular, E has a statistically significant negative effect at the 5% level. Several studies have reported comparable findings for energy firms. For example, Constantinescu (2021) found a similar relationship between the environmental component and the market value of energy firms while exploring the impact of ESG components on the performance of 61 energy companies within the EU. The observation in regard to the impact of environmental practices on profitability is also found in the studies by Li *et al.* (2019) and Alareeni and Hamdan (2020). Liu (2020), using sensitive industries such as utilities, explained that negative relationships result from a general lack of trust shown by the customers in these industries.

The investment in environmental practices of heavy-pollution industries, such as energy and power generation industries, not only involves the surrounding environmental protection but also includes the improvement of the emission reduction performance of their equipment and the transformation investment. With the improvement of relevant environmental laws and regulations and the strengthening of law enforcement, breach of energy companies in this area will also affect their FP. Firms in industries with high pollution levels increase research and development investments in energy-saving and emission-reduction activities. More environmental protection practices increase depreciating costs of related assets, and increase operation risk, waste disposal costs and other environment-related costs, which impose financial burdens on a business operation (Kai, 2015; Verbeeten *et al.*, 2016; Qureshi *et al.*, 2021). Numerous studies have reported that spending money on environmental practices, adopting environment regulations and implementing environmental management systems such as ISO 14001, increases expenditure, lowers profitability, decreases labour productivity, diminishes competitive advantage and negatively impacts market value (Schaltegger and Synnestvedt, 2002; Filbeck and Gorman, 2004; Lioui and Sharma, 2012; Miroshnychenko *et al.*, 2017; Li *et al.*, 2019; Ma *et al.*, 2020). Furthermore, more environmental information disclosure may increase disposal cost of environmental assets, related costs of environmental monitoring, assessment and budget and environmental administration charges, and then increase firms' operating

costs. When the environmental management of a certain firm improves, it becomes harder to further reduce pollution, requiring more resources and technology to achieve it, and, thus, resulting in more costs which might negatively affect a firm's FP. The cost of investments in such improvements might exceed the financial benefits for the firm, resulting in a negative FP (Khanna and Anton, 2002).

Intriguingly, the dummy variable added in the analysis for renewable energy companies likewise has a consistently strong negative effect (significant at the 10% level or higher), indicating that companies from this industry are characterised by weaker profitability. This holds true, even in model (5), which controls for the EP of the companies. Numerous renewable energy solutions attract investors by elevating the share of renewables in spatial distributions, improving businesses' bottom lines. Much of the prior research on this topic has focused on government approval, especially in China. Subsidies from the government have been proven to significantly impact the economic success of wind energy companies, for example. According to additional research (Zhang *et al.*, 2015), subsidies' effectiveness in improving alternative energy producers' performance in newly established areas varies depending on the energy source used. A subsidy for wind energy, for instance, increases the company's profitability more than a subsidy for solar energy. Many studies have reached the same conclusion regarding the efficacy of government subsidies for the solar industry in comparison to new areas of establishments (Xiong and Yang, 2016; Xu *et al.*, 2020).

As for the other models (3–5) tested, a negligible association was observed between the social and governance factors with the FP and profitability of the companies. The observed weak results for those factors are consistent with the finding of Yoon *et al.* (2018), who observed that ESG factors have a smaller impact on the value of firms in environmentally sensitive industries, such as the energy industry, than they do on the value of firms in non-sensitive industries. Han *et al.* (2016) used the three ESG scores and the ROE, market-to-book ratio and stock return to examine the relationship between CSR and FP. They found that the environmental and governance responsibilities present a negative and a positive relationship with FP, respectively. On the other hand, they found no statistically significant relationship between social responsibility and profitability.

Additional results are provided in the Appendix (Table A1) for three different periods (pre-crisis, crisis and after). As observed, the overall ESG (Model 1) affects the EU energy firms' profitability significantly before the crisis and mainly after the crisis. Moreover, its impact is negative only after the crisis. This was also observed earlier for the results presented for the whole period. Considering all dimensions of ESG (Model 5), the environmental dimension negatively affects profitability over the three examined periods and significantly only before the crisis. The impact of the governance dimension is insignificant across the periods. The results show that environmentally friendly and socially responsible energy firms enhance their FP only before the European debt crisis. Moreover, social responsibility is the only sustainability dimension with a strong positive relationship with ROA during the economic recession. In contrast, the impact of the individual dimensions of ESG is negligible on the energy firms' profitability after the crisis. Firm size influences ROA in the periods before and after the crisis, whereas renewables impact the firms' profitability until 2008.

We conducted a comparative analysis as the final step to examine the reliability of the research findings. Specifically, a model that takes into account the variables of ROA, LEV, CR and the SIZE was carried out. These variables are often used in the literature on the ESG–CFP nexus. The results using these frequently used variables are similar to those found in this research, as indicated in Table A2 (Appendix), demonstrating the validity of the study's conclusions.

5. Conclusions

Adopting sustainable practices enables businesses to gain a competitive advantage over their rivals in the industry by boosting productivity and reducing risk exposure. The energy industry, like all businesses, is expected to adopt sustainability practices to enhance its credibility and attract stakeholders' interest while contributing to climate change mitigation. Through its ability to influence global markets, the European energy industry can play a critical role in the transition to a sustainable future. However, whether embracing ESG practices would increase, decrease or have no effect on profitability is still debatable. The existing literature presents competing explanations of the ESG–FP relationship, as some researchers argue that superior ESG performance positively impacts a company's FP. In contrast, others argue that trade-offs exist or that there is no relationship between these two. Thus, this paper build on prior research to dispel the current debate's confusion and inconsistency. Consequently, this study aimed to shed light on this by determining how ESG impacts FP, focusing on environmentally sensitive industries such as energy companies. Investigating the ESG–CFP nexus can offer insight into whether sustainability investments can boost energy companies' FP. The ESG performance scores and their components were used for this study when investigating the ESG–CFP nexus with the ROA indicator serving as a proxy for CFP.

The empirical findings revealed a negative but insignificant association between the ESG score and the firms' CFP, indicating that energy companies could not save their operational costs from ESG expenditures. This observation is explicable from the trade-off perspective and agency theory. One possible explanation for the negative correlation is that sustainability practices necessitate a long-term investment, which adversely affects profitability. Despite the weak relationship between ESG and CFP, it is essential to emphasise that sustainability offers various benefits that may take time to manifest in a company's profitability. A negative association has also been observed between the environmental dimension of ESG and energy firms' profitability, with that association being significant. The factor characterising renewable energy companies also has a significantly negative influence. On the other hand, the social and governance dimensions have a positive but negligible effect on CFP. The positive impact of governance responsibility on profitability is not surprising given that strong corporate governance leads to greater asset utilisation profitability that enables companies to increase their FP (ROA). This finding is consistent with that of Rahi *et al.* (2022), who investigated the impact of ESG on the FP of Nordic public firms and concluded that strong governance responsibility leads to higher profitability. The study's findings also align with Saygili *et al.* (2022), who concluded that companies' FP is negatively affected by environmental practices, whereas social and governance responsibilities have a positive impact on it. As observed, profitable firms in the energy sector have sufficient corporate social and governance responsibilities, present growth on the market, are large-sized and have lower debt.

ESG principles are one of the fastest-growing trends gaining increasing attention among investors, policymakers, ESG analysts and managers over the last few years. This study contributes to the ongoing debate on the ESG–CFP nexus and validates recent developments in the literature, which suggest that ESG factors have contradictory effects on CFP. In particular, this study adds value and importance to the ESG literature and sustainable business practice for energy companies in the EU. Thus, this study is a valuable decision-making resource that could benefit researchers, company stakeholders and decision makers.

Understanding the effect of sustainability on firms' profitability is beneficial for taking the appropriate decision-making initiatives and actions. The findings have theoretical and practical implications for investors, managers, ESG researchers, shareholders, decision

makers and government and industry regulatory authorities. The results show that energy companies should be more cautious regarding ESG by viewing associated actions not just as expenditures but also as long-term investments for environmental sustainability.

From a practical point of view, understanding the impact of ESG principles on FP may assist energy company management in navigating between ESG and FP objectives to facilitate transformation and undertake efforts to promote sustainability in the energy business. The results can guide investors while considering sustainable investments, as in the short run, investments in energy companies may not result in value creation. They can also guide fund managers further regarding energy stock investments as a part of long-term portfolio strategy.

This study demonstrates that, from a managerial standpoint, business managers and other stakeholders should prioritise the environmental responsibility of energy companies and focus on identifying the right trade-off between improving the environmental footprint of their companies and maintaining strong financial results. The findings can aid energy companies in figuring out the effect of ESG disclosures on profitability and developing their business strategy accordingly. For example, managers of energy companies can use these findings to investigate why a high score in ESG disclosures does not increase firm value, thereby gaining a better understanding of whether to prioritise the overall ESG score or the score of each element. This article will enable investors to pay more attention to the company's EP when making investment decisions. Another immediate managerial implication of the findings suggests that corporate managerial bodies should establish and put into practice the essential ESG strategies in accordance with the needs, keeping in mind that ESG operations are also sustainable investments in the future of the environment and society. When building their portfolios, fund managers can use the research findings to make investments in ESG-focused funds. The results can direct them further in terms of investing in energy stocks as part of a long-term portfolio strategy, as doing so can be overly hazardous and possibly unprofitable in the stock market in the short term.

In addition, the findings could be used to draft new legislation and amendments to enhance the effectiveness of ESG elements in enhancing profitability. The study's results benefit policymakers and government regulatory authorities, offering them a strategic roadmap to develop new regulations and amendments regarding the effectiveness of ESG elements in enhancing profitability while facilitating a just transition and sustainable development. To increase the long-term profitability of energy companies, they must place environmental practices at the heart of sustainability policies. This study's findings will also be helpful for academicians to evaluate the causality and impact of CSP–CFP relationship in higher energy-consuming and greater waste-polluting industries.

There are a few limitations to this study that could inspire additional investigation. Due to the limited availability of ESG data for EU companies in major databases such as Eikon, the sample size is relatively small. Therefore, additional research is required to strengthen ESG reporting in the EU Future research should expand the reach to include regions outside the EU In addition, while this study examined the COVID-19 situation, encompassing data from 2019 to 2020, it does not focus just on this time frame. This may reduce the validity of the ESG–CFP nexus results during an unexpected global crisis. A further drawback of our study is that other variables (e.g. business climate, etc.) may influence the analysed relationships. Another limitation of the study is the failure to analyse the locations of energy companies which can significantly influence the relationship between ESG and FP.

Future research could combine quantitative and qualitative methods to understand better how ESG can be incorporated into business strategies. ESG assessment is essential, particularly in the energy sector, as ESG disclosure and corporate financial reporting are

becoming mandatory. Therefore, additional research into the ESG–CFP link is required, mainly focusing on the investigation of long-term effects. The study focuses on listed European companies. Therefore, the results cannot be generalised to all types of companies. Among our recommendations for future research are the addition of energy companies operating outside the EU to the data set, the extension of the study period to cover more recent data, and the implementation of alternative estimation methodologies. Investigating how other factors affect the relationship between ESG and CFP might be important. Moreover, given the recent turmoil in the global energy markets due to the COVID-19 pandemic and the geopolitical events in Europe, it would be interesting to examine how energy firms with different ESG characteristics have been affected by the volatility in the markets. Finally, ESG scores from sources other than Thomson Reuters can be incorporated into future research to explore the discrepancies that are commonly observed between different rating agencies (Berg *et al.*, 2022).

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Appendix

Table A1. Regression analysis results by time (pre-crisis, crisis and after the crisis)

Variable	Before crisis (2002–2007) (1)	(2)	(3)	(4)	(5)	During crisis (2008–2012) (6)	(7)	(8)
ESG	0.105* (0.061)					0.036 (0.310)		
E		0.004 (0.922)			−0.080* (0.097)		−0.006 (0.827)	
S			0.099** (0.027)		0.106** (0.048)			0.040* (0.052)
G				0.071 (0.229)	0.080 (0.265)			
RENEW	4.814* (0.078)	−13.408*** (0.000)	4.247 (0.165)	−10.975*** (0.000)	6.630** (0.012)	−0.731 (0.768)	−2.625** (0.049)	−0.134 (0.958)
CR	−0.070 (0.954)	−0.085 (0.942)	−0.103 (0.927)	−0.159 (0.899)	−0.285 (0.806)	0.523 (0.211)	0.573 (0.159)	0.514 (0.211)
MBV	0.222* (0.058)	0.224* (0.056)	0.231* (0.055)	0.211** (0.041)	0.220** (0.028)	0.070* (0.060)	0.076** (0.042)	0.072* (0.051)
SIZE	−1.621** (0.049)	−0.921 (0.205)	−1.488** (0.035)	−1.419* (0.092)	−1.523* (0.091)	−0.070 (0.881)	0.305 (0.550)	−0.133 (0.758)
LEV	−14.052 (0.230)	−14.403 (0.195)	−14.766 (0.200)	−12.597 (0.234)	−12.786(0.216)	−5.714 (0.258)	−5.883 (0.233)	−6.125 (0.218)
Constant	32.293* (0.054)	22.565 (0.178)	28.233* (0.059)	28.975* (0.075)	25.763 (0.136)	0.000 (.)	0.000 (.)	7.859 (0.409)
N	105	105	105	105	105	224	224	224
Within R^2	0.433	0.407	0.438	0.440	0.472	0.255	0.255	0.260
Between R^2	0.334	0.341	0.326	0.331	0.307	0.345	0.338	0.347
Overall R^2	0.288	0.302	0.290	0.289	0.282	0.252	0.243	0.255

Notes: p-values in parentheses, $*p < 0.1$; $**p < 0.05$ and $***p < 0.01$
Source: Created by the authors

(continued)

Table A1.

Variable	During crisis (2008–2012) (9)	(10)	(11)	After crisis (2013–2020) (12)	(13)	(14)	(15)
ESG			−0.057** (0.043)				
E		−0.039 (0.294)		−0.044* (0.071)			0.037 (0.344)
S		0.062** (0.042)			−0.032 (0.150)		−0.010 (0.789)
G	0.018 (0.446)	0.016 (0.479)				−0.013 (0.516)	−0.006 (0.755)
RENEW	−0.659 (0.798)	1.151 (0.712)	−1.377 (0.392)	−1.317 (0.420)	−1.122 (0.490)	−0.685 (0.662)	−1.328 (0.419)
CR	0.551 (0.200)	0.534 (0.214)	−0.364 (0.423)	−0.371 (0.417)	−0.318 (0.488)	−0.298 (0.530)	−0.375 (0.413)
MBV	0.073** (0.045)	0.078** (0.037)	0.049 (0.774)	0.045 (0.788)	0.047 (0.779)	0.049 (0.773)	0.046 (0.787)
SIZE	0.139 (0.682)	−0.016 (0.974)	1.318** (0.026)	1.264** (0.029)	1.178** (0.042)	1.057* (0.059)	1.311** (0.026)
LEV	−5.246 (0.327)	−5.178 (0.326)	−6.565** (0.043)	−6.371** (0.047)	−6.401** (0.048)	−6.286* (0.052)	−6.438** (0.047)
Constant	2.908 (0.732)	4.760 (0.647)	−20.419 (0.116)	0.000 (.)	−18.797 (0.151)	−17.184 (0.187)	0.000 (.)
N	224	224	466	466	466	466	466
Within R^2	0.256	0.269	0.055	0.058	0.058	0.059	0.057
Between R^2	0.338	0.343	0.340	0.325	0.311	0.288	0.335
Overall R^2	0.247	0.260	0.218	0.218	0.210	0.205	0.219

Variable	(1)	(2)	(3)	(4)	(5)
ESG_{t-1}	−0.026 (−0.237)				
E_{t-1}		−0.038** (−0.037)			−0.049** (−0.036)
S_{t-1}			−0.01 (−0.52)		0.016 (−0.421)
G_{t-1}				0.002 (−0.927)	0.01 (−0.627)
LEV_{t-1}	−8.076*** (−0.003)	−8.052*** (−0.004)	−8.067*** (−0.004)	−8.099*** (−0.003)	−7.958*** (−0.003)
CR_{t-1}	0.101 (−0.771)	0.091 (−0.792)	0.12 (−0.732)	0.125 (−0.721)	0.083 (−0.813)
$SIZE_{t-1}$	0.608 (−0.158)	0.733* (−0.073)	0.501 (−0.219)	0.424 (−0.275)	0.642 (−0.132)
Constant	−12.964 (−0.276)	−15.942 (−0.187)	−11.211 (−0.357)	−10.074 (−0.363)	−15.032 (−0.205)
N	795	795	795	795	795
Within R^2	0.208	0.214	0.209	0.21	0.217
Between R^2	0.271	0.276	0.26	0.249	0.264
Overall R^2	0.237	0.239	0.235	0.234	0.24

Notes: p-values in parentheses, *$p < 0.1$; **$p < 0.05$ and ***$p < 0.01$
Source: Created by the authors

Table A2.
Regression analysis results considering the repeatedly used variables

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