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Do ESG controversies moderate the relationship between CSR and corporate financial performance in oil and gas firms?

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The oil and gas industry is enmeshed in a continuous debate regarding the negative impact that its activity has on the sustainability of the environment. Increasingly, the market and stakeholders are positively evaluating those firms which are socially responsible and penalizing those that are not. Literature has analyzed the market view through the Environmental, Social and Governance (ESG) controversies and their relationship with Corporate Financial Performance (CFP), as well as with Corporate Social Responsibility (CSR) strategy. This study analyzes the influence of ESG controversies as a moderating variable on the relationship between Environmental, Social, and Governance factors and Corporate Financial Performance from a market valuation perspective. To perform this analysis, PLS-SEM structural equations have been applied to a sample of 264 oil and gas firms globally. The results confirm the moderating influence of ESG controversies on the relationship between E, S, and G factors and Corporate Financial Performance.

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Introduction

Corporate Social Responsibility (hereinafter, CSR) is becoming an increasing priority for the competitive strategy of firms. The reputation and vision that the market has of firms with regard to the level of CSR are dominant issues today when evaluating market value or Corporate Financial Performance (hereinafter, CFP). Given the importance of this area, major institutions, such as the United Nations (2015) have urged firms to undertake responsible practices in order to achieve certain goals aimed at improving the environment and society. Actions related to the intention of safeguarding the environment, contributing to an improvement in workers' labor rights, or gender equality in the corporate governance of firms, have put some firms under pressure to carry out changes within its strategy throughout the globe. The market has the opportunity to bring under consideration actions that can contribute to improving the environment, gender equality or workers' rights (Lu and Wang 2021). As a result of this process, environmental, social and governance (hereinafter, ESG) factors have allowed firms to disseminate their responsible practices throughout the entire market. Also, non-responsible practices affecting certain firms could also be assessed through a market lens by means of ESG Controversies (hereinafter, ESGC). In recent years, we have witnessed a great deal of debate around the factors that explain the ESG and ESGC indices, which has led to a more detailed understanding of how these indices are constructed and what their contribution to the CFP of companies in certain sectors is (Gyönyörövá et al. 2021).

Due to the increased awareness regarding the consequences of certain market practices, controversial industries such as energy have been forced to adopt measures to reduce their impact. In recent years, society has witnessed how climate change is becoming a real challenge for the Earth with, for example, rising temperatures and increased rainfall levels. In particular, the oil and gas (hereinafter, O&G) industry has found itself in the spotlight of activists and government institutions which are trying to raise awareness and reduce the negative impact of this industry (Boudet et al. 2014). For example, the fracking activity, one of the most environmentally damaging extraction practices, has been the issue of constant criticism due to the high impact it has on the soil and water consumption (Brantley et al. 2014). Evidently, the O&G industry deserves to be analyzed in detail. According to the International Energy Agency (2021), 62% of energy-related emissions come from O&G consumption and production. Moreover, 56% of the total energy consumed globally is sourced from oil, gas, coal and derivatives, being considered one of the largest contributors to the increase in global warming (British Petroleum 2021). Therefore, reducing emissions and achieving greater efficiency in the use of natural resources are two fundamental priorities of governments and institutions. Initiatives such as the 2030 Agenda (United Nations 2015) or the Sustainable Development Goals of the European Union (Publications Office of the European Union 2021), are, to some extent, behind O&G firms' commitment to reducing the impact of certain activities within their structure.

Not only are there compliance issues, but CSR has become a relevant factor for the economic-financial valuation of firms and investments by the market (Paolone et al. 2021). Reporting on ESG factors in the O&G industry has become a key issue for the market, especially regarding to environmentally responsible performance. Thus, the importance given by the market to ESG factors, has led to market and social punishment of bad practices at the social or environmental level. According to Bodhanwala and Bodhanwala (2020), the market tends to invest in environmentally responsible firms, as opposed to those that carry out bad practices, the aforementioned ESGC. This concept includes news about firms relating to fraudulent activities, scandals to do

with products or legal problems with certain institutions (Tamayo-Torres et al. 2019). Refinitiv (2021) defines ESGC as a firm's exposure to negative events in the global media. Due to its negative character, previous studies have purported that a greater number of negative events leads to an increase in market volatility for certain industries, thereby contributing to an increase in risk for the market value (Aboud and Diab 2019; De Franco 2020). This volatility can be totally or partially alleviated by increasing responsible practices in terms of ESG factors (Aboud and Diab 2018). Therefore, ESGC could act as a moderator of the effect of ESG factors on the CFP of O&G firms by lessening the relationship between both.

ESG factors have ceased to be a simple unit of measurement and their management has become a pillar of great importance in the development of firms' corporate strategy. Previous studies have shown that stakeholders place greater emphasis on firms meeting social and sustainability objectives which enable them to access new financial resources and so create greater market value (Nirino et al. 2021). Authors such as Borralho et al. (2022) confirm that ESG disclosure alleviates information opacity and improves its transparency. For a sample of 67 scandals collected between 2004 to 2014, Utz (2019) finds that, in the year of the scandal, CSR indicators decrease drastically and that companies involved in some kind of scandal present below-average CSR indicators.

Stakeholder theory and legitimacy theory can explain the nexus between ESG factors and their relationship to CFP. Stakeholders theory supports the increase in the market value of the firm, which contributes to the increase in the wealth of shareholders and produces a call effect propitiated by the success as a result of this strategy (Freeman and McVea 2005). Further, the theory of legitimacy endorses the influence that ESGC have on volatility and market value. An increase in this factor diminishes the company's reputation which could result in price volatility reaching historic highs (Alda 2021). Thus, as seen in the previous literature, there exists evidence that ESG factors could influence the CFP of the firm, and that ESGC could contribute to moderating this relationship (López-Toro et al. 2021; Rodríguez-Fernández et al. 2019).

However, part of the previous literature relating to ESG factors focuses on specific aspects of the index such as the diversity of gender in corporate government (Terjesen et al. 2016), product design (Chaiyapa et al. 2018) or human rights (Pegg 2012). Despite the O&G industry being one of the most important contributors to the global economy (International Energy Agency 2021) previous studies have tended to focus only on one factor that explains CFP, this being risk, measured by market volatility (Champagne et al. 2021). Regarding the moderating effect of ESGC in the O&G industry, to the extent of our knowledge, the article by Shakil (2021) is the only example to date. This article studies the moderating effect of ESGC on the relationship between ESG factors and financial risk. This partial vision of the influence of ESG factors as well as ESGC that have an impact on CFP and the firm value of the O&G industry, indicate an interesting research gap that we endeavor to fill and lend a more complete and global view to.

Thus, the main objective of this paper is to confirm whether ESGC have a moderating effect on the relationship between ESG factors and CFP in the O&G industry. To this end, first the link between ESG factors and CFP is analyzed. Regarding these two objectives, the article raises two research questions: to what extent do ESG factors affect CFP? Do ESGC influence the relationship between ESG factors and CFP?

After reviewing the previous literature, we have provided a global sample made up of 264 firms involved in the O&G

industry. The sample collects information from 2019 and for ESGC from 2018. The data has been extracted from the Thomson Reuters Eikon database (Refinitiv 2021). The analytical approach used in this study was the modeling of Partial Least Squares structural equations PLS-SEM (Chin 1998; Wold 1982).

The results support a significant and positive relationship between environmental and social factors and the CFP of O&G firms. Regarding the main objective, the results confirm that ESGC have a moderating effect in the relationship between ESG factors and CFP. An increase in bad news results in this relationship being weaker. On the other hand, reduced values of ESGC tend to strengthen the relationship. Results show that a one standard deviation increase in ESGC for an average firm reduced the relationship between environmental and also social factors and CFP by 16.26 and 52%, respectively. Results also show that ESGC negatively affects CFP.

The structure of this paper continues as follows. In Section *Literature*, a literature review is detailed according to the research hypotheses. Section *Materials and methodology* present the data and the methodology used. The results are set out in detail in Section *Results*. Discussion and conclusions can be found in Sections *Discussion and conclusions*.

Literature

The literature on sustainability or Corporate Social Responsibility has substantially evolved over the last few years, although one of the most debated issues that constitute the core of this line of research is that relating to the effectiveness of sustainability policies (Sarkis et al. 2011; Wang and Sarkis 2013). In this vein, the work carried out has tried to measure the influence of ESG controversies on the relationship between ESG factors and CFP and the impact that the ESG factors have on CFP through the *win-win* approach and Elkington's *Triple Bottom Line* theory (Elkington 1998).

Relationship between the environmental factor and CFP. The environmental factor encompasses everything related to environmental protection, climate change awareness, efficient use of natural resources, waste management and pollution emissions, among other issues (Brogi and Lagasio 2019).

Practices aimed at conserving and reducing environmental impact can have short and long-term benefits in any organization (Reinhardt 1999). In the short-term they produce some advantages, such as the reduction of costs and waste that eco-efficiency can entail and the reduction of penalties for non-compliance (Reinhardt 1999; Siegel 2010; Tamayo-Torres et al. 2019). They may also lead to the possibility of exploiting new markets and regions, with the consequent increase in revenues (Reinhardt 1999). In the long term, these practices involve the creation of corporate image and reputation, thus reducing uncertainty and the negative effect of environmental accidents on the market value of the firm (Ding et al. 2016; Doh et al. 2010; Flammer 2021; Godfrey et al. 2009; Tamayo-Torres et al. 2019) while improving the relationship with various stakeholders, such as employees, customers and investors (Delmas and Montiel 2008; Delmas 2001; Freeman 1984; Tamayo-Torres et al. 2019).

The analysis of the effectiveness of environmental policies and practices has focused on studying the impact on the market value of the firm (Brammer et al. 2006; Callan and Thomas 2009; Orlitzky et al. 2003), on financial performance (Lai and Wong 2012; Siegel 2010; Tamayo-Torres et al. 2019; Wang and Sarkis 2013) or both (De Lucia et al. 2020; Ding et al. 2016). However, the results obtained are inconclusive.

Wang and Sarkis (2013) analyze the relationship between environmental and social factors with the supply chain and

economic-financial performance, measured as Return on Assets (ROA) and Return on Equity (ROE), in a sample of 500 listed U.S. firms. Their results show a negative relationship between the environmental factor and profitability. Although, together with the social factor, the impact is positive. Others such as Le et al. (2022) also find a negative relationship between the Environmental and Social pillar with respect to business performance (measured through revenue and market value).

Ding et al. (2016) with a sample of 44 listed firms in the construction industry in Australia, found that the firms with non-financial information indicators outperformed firms that did not show these indicators in some financial performance ratios or in their firms' market valuation, although correlation was not high. In this line, Tamayo-Torres et al. (2019) with a sample of 432 U.S. and European firms, did not find a positive relationship between environmental indicators and financial performance, measured using the Tobin's Q ratio.

On the other hand, there are papers that find evidence of the positive impact of environmental policies on financial performance. Subrahmanya (2006) shows that firms with non-energy dependent activities achieve greater profitability than those which are energy dependent. Similarly, Bunse et al. (2011) show that energy efficiency improvement initiatives produce an increase in economic and financial performance indicators as well as an increase in productivity. Similarly, Fan et al. (2017) with a sample of energy-intensive firms from China demonstrated a positive relationship between energy efficiency and the financial performance indicators, ROE and ROA. More recently, De Lucia et al. (2020), with a sample of 1038 European firms, found a positive relationship between environmental indicators of energy and water efficiency and ROA. The result of Garcia et al. (2017) in a sample of firms from industries with social impacts from Brazil, Russia, India, China, and South Africa is worth noting, showing a positive relationship between environmental performance indicators and financial profitability.

In light of this, following the literature above, the following hypothesis is proposed:

Hypothesis 1. The environmental factor positively impacts on Corporate Financial Performance.

Relationship between social factor and CFP. The social factor considers the relationships in the firm regarding human resources, including ensuring stability in employment, guaranteeing health and safety, human rights, equal treatment and the consideration of gender issues at all levels of the workforce (De Lucia et al. 2020).

Literature about the subject has tried to measure the social factor effect on a firm's financial performance or on its market value. Some research does not find a positive relationship between them (Attig et al. 2013; Erhemjamts et al. 2013; Margolis et al. 2009; Margolis and Walsh 2003; Tamayo-Torres et al. 2019), although other studies show that the social factor can lead to a firm obtaining financial benefits. For example, a firm can benefit from access to sources of financing, if investors appreciate the investment in social practices (Small and Zivin 2005). Responsible investing is making great strides (Chatzitheodorou et al. 2019) and many investors may even elect to eschew investment in firms with bad social practices (Tamayo-Torres et al. 2019).

Furthermore, participation in social activities can lead the firm to the development of new technologies that offer financial and social advantages over existing ones (Porter and Van der Linde 1995; Tamayo-Torres et al. 2019). In addition, there may be a consumer valued competitive advantage to be gained over competitors (Baker and Sinkula 2005). According to authors such as de Roeck and Delobbe (2012) and Raman (2018), the

responsible management of social policies within the mining and petrochemical industry, respectively, contribute to greater worker retention and an improvement in the perception of firms. Social investment could even protect the reputation of organizations against the effect of negative events (Godfrey et al. 2009).

Thus, the following hypothesis can be established:

Hypothesis 2. The social factor positively impacts on Corporate Financial Performance.

Relationship between the governance factor and CFP. The governance factor includes issues such as board independence, corruption and bribery, disclosure policy and shareholder protection (Galbreath 2013) as well as heterogeneity in the board.

A more independent board (with fewer shareholders) may lead to certain improved CSR practices. For example, Velte et al. (2020) suggest that a non-shareholder board should encourage CSR practices in terms of emissions and environmental sustainability. Transparency and the publication of information in this regard can generate an increase in trust and therefore an improvement in financial performance. In the same way, Lueg et al. (2019) and Matsumura et al. (2014) suggest that an increase in transparency could reduce the information gap between shareholders and stakeholders, enabling an increase in transparency, a reduction in risk and an improvement in financial performance.

Decision-making by corporate governance can cause problems for the legitimacy of the firm. An example of this is the financial fraud of Enron or the recent environmental scandal involving the automotive industry (Brand 2016). Good corporate governance practices include the separation of the functions of CEO and Chairman of the Board or the diversity of board members (Galbreath 2013). However, firms should not focus only on meeting shareholder expectations, but should also take into consideration all stakeholder groups to gain their support and ensure the long-term value of the firm (Gjergji et al. 2021). In this way, greater trust, visibility, and reputation of the firm will lead to greater competitiveness and greater financial performance (Beyer et al. 2010; Gjergji et al. 2021; Ng and Rezaee 2015).

Several studies have empirically demonstrated that firms with high governance indicators lead to positive results. Thus, Niesten et al. (2017), highlight the role of collaboration and networks between the firm and its stakeholders, as a mechanism to improve trust and, therefore, improve its performance. In this line, Husted and Sousa-Filho (2017) emphasize the role of collaborative projects as an indicator of performance improvement compared to internally developed and outsourced projects.

In terms of gender and heterogeneity of the board, women tend to pay more attention to issues relating to environmental policies and CSR strategy (Balti and El 2019). Through the market and investor lens, an increase in the number of women on the board could be considered an indication of equity and CSR, which in turn implies an increase in the market value of the firm and in its financial performance (Amin et al. 2022; Bear and Post 2010). Arayssi et al. (2016) analyze the role of female management on performance. With a sample of panel data between 2007 and 2012, they find that the presence of women on boards of directors positively affects performance. Others such as Valls and Rambaud (2019) also endorse this position for firms belonging to the Spanish stock market index IBEX35.

Good governance lies in avoiding decision-making that could harm the interests of the stakeholders. Stakeholders have the ability to influence financial performance through increased regulation or the cancellation of certain transactions, with senior executives or shareholders acting in their own right to challenge this stance (Busch et al. 2022; Hockerts 2015). CSR strategy allows

for a consensus between both parties to reduce the information gap (Dwyer et al. 2005).

In short, according to the previous literature, the governance factor is positively related to the market value and financial performance of the firm. Authors such as Tamayo-Torres et al. (2019) in their empirical study find that the governance factor is positively related to Tobin's Q performance measure. Similar results are obtained in the work of De Lucia et al. (2020).

Therefore, the following hypothesis is proposed:

Hypothesis 3. The governance factor has a positive impact on Corporate Financial Performance.

Effect of ESGC on ESG—CFP link. Controversies are non-ethical practices such as the exploitation of labor, child labor, environmental pollution, business bribes or the use of illegal raw materials among others that lead to disagreements with stakeholders. In this vein, controversies are understood as conflicts generated with stakeholders due to the practices of the firm and which negatively affect the ESG dimensions (Tamayo-Torres et al. 2019). In order for these bad practices to be evaluated by the market, the ESGC index began to be used as a variable that measures the impact that these published negative events have on firms (Refinitiv 2021). Such public data could undermine investor confidence and hinder the firm's financial performance (Johnson 2003). Following this negative impact, CSR strategy is becoming a strategy with which to restore market loss of confidence and to improve the reputation of the firm (Becker-Olsen et al. 2006).

Controversies increase skepticism about the firm, causing a deterioration in firm credibility (Aouadi and Marsat 2018; Du et al. 2010; Godfrey et al. 2009), due to increased awareness around issues related to sustainability (Adebajo et al. 2016; Diabat and Govindan 2011). Subsequently, the consequences of controversies may be a decrease in sales and an increase in risk and costs (Tamayo-Torres et al. 2019) and a negative impact on the value of the firm (Aouadi and Marsat 2018). Authors such as Nguyen and Nguyen (2015) argue that ESGC could negatively affect investor confidence and thus increase volatility and market risk in firms. Others such as DasGupta (2021) suggest that ESGC have a positive moderating effect on the relationship between financial performance and ESG practices. In line with these results, investors react negatively to negative news, especially if they are related to employees or the environment (Krüger 2015).

The energy industry, particularly the O&G industry, experiences a high level of scrutiny by shareholders and society in general due to the negative impact on its operating activity (Bolton et al. 2011; Brantley et al. 2014). This negative impact can be reduced through an efficient CSR strategy, this being considered a good strategy to abolish the effects of ESGC (Dong and Xu 2020). Indeed, ESGC management can moderate the relationship between ESG factors and the firm's financial performance. In this sense, Shakil (2021) finds that ESGC moderate the relationship between ESG factors and financial risk for a set of 70 O&G firms. Others such as Nirino et al. 2021 find that, for a sample of European firms included in the STOXX Europe 600 index, ESGC negatively impact financial performance. In contrast, the moderating effect was not supported in this study.

In addition to the negative impact that certain practices have on the environment, particularly in the energy industry, the demand for ecological or environmentally friendly products has gained importance over the years (Altmann 2015), leading firms to design strategies regarding the environment to meet the expectations of customers and stakeholders. The effect of the controversies would be a decrease in reputation and credibility, with the consequent negative effect on the relationship of

environmental measures and financial performance. Indeed, investors are becoming increasingly concerned about irresponsible practices in certain industries leading to an interest in alternative business practices to reduce that impact. In the O&G industry case, the energy transition can be an example of these kinds of practices (Egli 2020).

On the other hand, scandals related to social and governance factors would also lead to weakening the relationship between the measures carried out in these areas by the firm and financial performance. Scandals such as Enron or Parmalat are examples of these kinds of practices (Engle 2007).

Following the above, and considering that ESGC can affect one or more factors included in the ESG index, we establish the following hypotheses:

Hypothesis 4a. ESGC moderate the relationship between the environmental factor and Corporate Financial Performance.

Hypothesis 4b. ESGC moderate the relationship between the social factor and Corporate Financial Performance.

Hypothesis 4c. ESGC moderate the relationship between the governance factor and Corporate Financial Performance.

Materials and methodology

In this section we present the composite analysis carried out based on SEM (Yu et al. 2021) as an efficient optimization for defining relationship of the variables between ESG and CFP factors. In addition, we describe the two-step approach method that is appropriate when considering the construct ESGC as a moderating variable (Fassott et al. 2016). All the details about data, materials and analysis output can be found at Supplementary Material S1–S8 spreadsheets online.

Data and variables. The sample of O&G firms was made up of secondary data from the Eikon database of Thomson Reuters. Our final dataset consisted of 264 firms, with observations referred to measure the variable ESGC. We delayed controversies by 1 year, using the 2018 observations for ESGC and the 2019 observations for ESG and CFP factors. We delay ESGC by 1 year to allow time for the transmission of their effects to both CSR and financial performance (Callan and Thomas 2009; Tamayo-Torres et al. 2019).

Our model has five constructs, with the E, S and G pillars and ESGC being the four exogenous variables, expressing only CFP as an endogenous variable. We used pillars E, S, and G separately to test the relevance that CSR practices have on CFP based on indicators used in previous studies (López-Toro et al. 2021; Nirino et al. 2021). In the case of the ESGC variable we assume a negative relationship with CFP in line with previous studies (DasGupta 2021; Tamayo-Torres et al. 2019).

The Environmental pillar was composed of three indicators measured in mode B or formative. Specifically, this construct was formed by the representative indicators of the gases emissions into the atmosphere (E1), the resources used in the development of the firm's activities (E2) and the environmental innovations undertaken to protect the environment (E3) (Refinitiv 2021).

The Social pillar includes four indicators measured in mode B or formative. The first indicator referred to the workforce score (S1), the second dealt with human rights (S2), the third focused on the community where the firm is located (S3) and a fourth indicator referred to product responsibility (S4) (Refinitiv 2021).

The third pillar of sustainability was the Governance factor, also with a formative scale measure or in mode B and composed of three indicators. The management category measured as the commitment toward following best practice corporate governance principles (G1) was configured as the first of these, followed by

Table 1 Statistical summary.

Indicators	Mean	Minimum	Maximum	Std. deviation
ESGcont ₂₀₁₈	90.64	1.14	100	23.02
P ₂₀₁₉	15.66	0.01	727	50.51
logMVC ₂₀₁₉	9.13	5.51	12.27	0.98
TobinsQ ₂₀₁₉	0.64	0.03	9.86	1.02
E1 ₂₀₁₉	52.14	0.23	99.77	28.75
E2 ₂₀₁₉	52.61	0.41	99.8	29.00
E3 ₂₀₁₉	49.39	30.12	81.06	24.47
S1 ₂₀₁₉	51.92	0.19	99.81	28.87
S2 ₂₀₁₉	50.70	2.17	95.83	28.31
S3 ₂₀₁₉	51.34	0.74	99.81	29.04
S4 ₂₀₁₉	51.58	27.52	99.78	26.02
G1 ₂₀₁₉	54.98	0.05	99.89	30.29
G2 ₂₀₁₉	53.59	0.18	99.78	27.93
G3 ₂₀₁₉	57.10	1.69	99.6	29.74

Data from the Eikon dataset by Thomson Reuters in SmartPLS v. 3.3.

the indicators related to the relationship with shareholders (G2) and the firm's CSR strategy (G3) (Refinitiv 2021).

ESGC is a single-element construct that measures a firm's exposure to negative events reflected in the global media (Refinitiv 2021). Thomson Reuters' methodology uses a percentile scoring formula that compares each firm to its industrial group based on 23 ESGC topics (see Appendix A for more information), with recent controversies reflected in the latest complete period. According to the information provider, no controversy is counted twice in the same fiscal year. On the other hand, the market capitalization bias is taken into account, as large companies tend to attract more media attention than smaller capitalization companies. Severity weightings are applied to avoid this problem (see Appendix B for more information). This procedure yields an ESGC score, reflecting how strongly a firm has been committed to ESGC compared to its industrial group (Fauser and Utz 2021). The ESGC score has a minimum value of 0 and a maximum of 100 (Aouadi and Marsat 2018). The robustness of the data provider's methodology and previous use in research papers are the main reasons why this index has been used to measure ESGC.

The endogenous CFP construct has been designed as a market valuation measure of each firm, since it incorporates the indicators of the price, the Tobin's Q ratio, and the Market Value of Firm (hereinafter MVC). A formative or B mode measurement scale was also used. We advance this construct 1 year with respect to ESGC to capture the time effect and note the influence that bad news can have on CFP. Regarding the indicators that shape the construct, Tobin's Q is the ratio between the market value and the total assets of a firm. The price indicator is the last available closing price of firm shares and the MVC is the consolidated market value of a firm shown in local currency. The three variables are defined by the Eikon database (Refinitiv 2021).

The score E, S, and G of the ten indicators highlighted above range from 0 (lowest) to 100 (highest). The validity of the scales of the three pillars is given by the data provider (Refinitiv 2021) as well as by their use in previous works (Dorfleitner et al. 2020; Svanberg et al. 2022; Utz 2019).

The summary statistics (Table 1) show that the highest values of indicators E, S, and G corresponded to G1: Corporate governance management (99.89) which contains data on the remuneration policy, the board of directors and its independence, the independence of the audit committee or the separation of the CEO and the chairman. Ranking second was S1 or the workforce score (99.81) which relates to training and development policy,

safety and health policy, equal opportunities, flexible hours, wage gaps and employee turnover, among others.

The ESGC (*ESGCont*₂₀₁₈) rating starts from an average value of 90.64, thus highlighting that this dimension weighs heavily on the ESG components of O&G firms as a controversial industry (Aouadi and Marsat 2018) compared to the remaining attributes of pillars E, S, and G. E2 or the emissions score, also represents a high maximum value of 99.8 in the 264 firms with data for this index, in which factors such as total CO₂ emissions, emission policies and objectives, climate change opportunities, environmental restoration, waste management, environmental expenses and revenues and reduction of the impact of labor transport are all taken into consideration.

SmartPLS 3.3.3 software (Ringle et al. 2015) was used to design the nomograms and apply the structural equation algorithms.

Composite-based SEM analysis. The relationship model between E, S, and G pillars with CFP were estimated as composite since we have considered these as being forged concepts. The representative indices of the three sustainability pillars are human conventions that do not exist as phenomena of nature, nor are they behavioral constructs (Henseler et al. 2014; Henseler 2017). In addition, they are weighted linear combinations of other indicators. Hence, we took the decision to operationalize our concepts as emerging variables incorporated into a composite model. This composite model approach has the potential advantage that each construct is fully integrated by observable variables or indicators. Consequently, the statistical method used, composites based on structural equation modeling helps in the interpretation and estimation of path coefficients (Yu et al. 2021) since CSR is a forged concept or human convention. Being a subtype of SEM, it follows the same steps as SEM, that is, first we evaluate the measurement model in order to verify its reliability and validity and second, we evaluate the structural model in order to test the hypotheses and other quality criteria of our models (Chin 2010; Hair et al. 2019; Richter et al. 2016).

The introduction of the moderating variable in our model is justified to indicate that the relationship between E, S, and G scores and CFP may not be constant due to the ESGC effect. The incidence of negative CSR events in the media can change the

intensity and direction of the relationship between E, S, and G and CFP.

Within the area of interaction effects, there are three approaches to the creation of the moderator term (Henseler and Chin 2010; Rigdon et al. 2010): (a) the product indicator approach, (b) the orthogonalization approach and (c) the two-stage approach. Henseler and Fassott (2010) recommend that when the tested model contains formative exogenous variables, the two-stage approach be applied instead of the product indication. Consequently, during the first stage the model was estimated without the term moderator, obtaining the scores of the constructs. In the second stage, these scores were used to multiply them by the moderate variable. A single-item measure was thus obtained and used for the term interaction (Chin et al. 2003).

In short, the analysis used in this study was the composites-based SEM described by Yu et al. (2021) justified by the use of forged variables. We used two models to test the hypotheses. The first model estimated the relationships between the E, S, and G scores, as well as ESGC with respect to CFP, as shown in the Eq. 1 (model 1).

$$CFP_{i,2019} = \beta_0 + \beta_1 E_{i,2019} + \beta_2 S_{i,2019} + \beta_3 G_{i,2019} + \beta_4 ESGCont_{i,2018} + \varepsilon_i \quad (1)$$

The second model introduced the moderating effect of ESGC on the relationship between E, S, and G scores and CFP. We incorporated the interaction variables (Environmental*ESGCont), (Social*ESGCont) and (Governance*ESGCont) in Eqs. 2, 3 and 4 (model 2).

$$CFP_{i,2019} = \beta_0 + \beta_1 E_{i,2019} + \beta_2 S_{i,2019} + \beta_3 G_{i,2019} + \beta_4 (E_{i,2019} * ESGCont_{i,2018}) + \varepsilon_i \quad (2)$$

$$CFP_{i,2019} = \beta_0 + \beta_1 E_{i,2019} + \beta_2 S_{i,2019} + \beta_3 G_{i,2019} + \beta_4 (S_{i,2019} * ESGCont_{i,2018}) + \varepsilon_i \quad (3)$$

$$CFP_{i,2019} = \beta_0 + \beta_1 E_{i,2019} + \beta_2 S_{i,2019} + \beta_3 G_{i,2019} + \beta_4 (G_{i,2019} * ESGCont_{i,2018}) + \varepsilon_i \quad (4)$$

The use of both models is consistent with the approach applied in Becker et al. (2018). The first model (Fig. 1) is proposed to

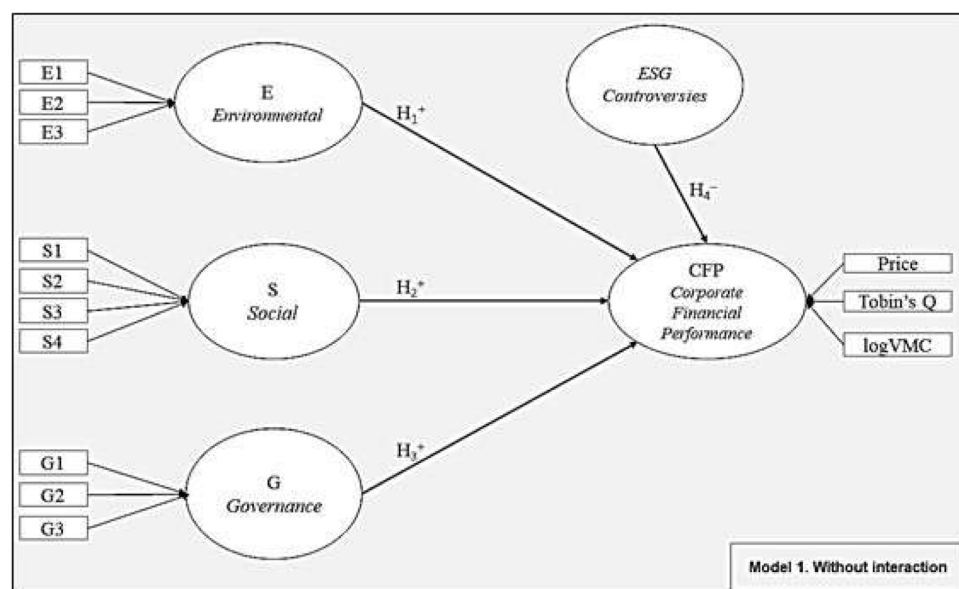


Fig. 1 Relationship between construct without interaction—moderation effect through SmartPLS v. 3.3. Model 1 → The first model is proposed to provide empirical evidence on the positive relationship between E, S, and G scores and CFP (H_1^+ , H_2^+ , H_3^+) and the negative relationship between ESGC and CFP (H_4^-).

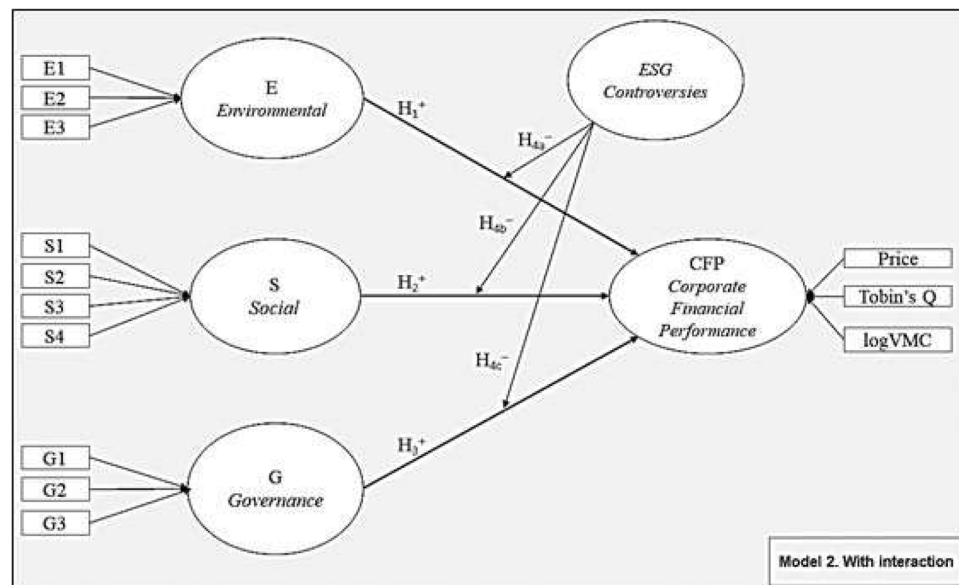


Fig. 2 Relationship between constructs with interaction—moderation effect through SmartPLS v. 3.3. Model 2 → Model 2 highlights the ESGC role as a moderating variable that impact on the positive effect of ESG activities.

provide empirical evidence on the positive relationship between E, S, and G scores and CFP (H_1^+ , H_2^+ , H_3^+) and the negative relationship between ESGC and CFP (H_4^-).

In this vein, we study the explanatory power of ESGC to predict CFP, assuming a significant negative path coefficient to provide support on the relevance of this variable (model 1). In addition, because of the inconclusive results obtained from the previous literature on the hypothetical direction between E, S, and G and CFP, we have incorporated an effect that moderates this relationship through the ESGC construct (model 2).

Model 2 highlights the ESGC role as a moderating variable that impact on the positive effect of ESG activities (Fig. 2). By controlling the reliability and validity of the two models during the analysis period, the aim was to determine whether there were differences between CFP and moderated CFP.

Results

Evaluation of model 1 results. The first set of results obtained after processing model 1 proved the validity of the construct scale, that is, the evaluation of the measurement model. As the measurement model was designed in mode B or formative, it was verified through the collinearity statistics of the variance inflation factor. The multicollinearity of the training indicators was not a problem, since they did not exceed the reference value of 3.3. In addition, the relevance and significance of the weights were studied. A bootstrapping process was carried out with 10,000 subsamples, bootstrap percentile, at a significance level of 5%, along with the test of 95% confidence intervals (Table 2).

Table 2 shows that, for the environmental construct, the most relevant indicator of the sample of O&G firms was gas emissions ($A2 = 0.703$) followed by resource use ($A1 = 0.401$). Furthermore, both weights were significant with p values under 0.05, unlike the environmental innovation indicator ($A3$) which did not reach relevance (weight = -0.004) or significance (p value = 0.482) in the formation of the environmental construct. For the social construct, the most important indicator of the sample was the workforce ($S1 = 0.555$) followed by product responsibility ($S4 = 0.463$), both significant (p value = 0.000), and the social community ($S3 = 0.176$) which was also significant ($p = 0.049$). However, the score relative to Human Rights ($S2 = 0.069$) was not significant (p value = 0.214) and was irrelevant because it was close to zero.

For the governance construct, the indicator with greater weight of our O&G firms' sample was CSR strategy ($G3 = 0.813$) followed by the board management ($G1 = 0.409$), with an adequate level of significance in both cases. The $G2$ indicator relating to the shareholders relationship (p value = 0.213) was not significant. Regarding the financial performance construct, only the market value of the firm was significant at a 5% level.

The second set of results obtained after processing model 1 show the structural model evaluation, that is, the relationships between the proposed constructs or hypotheses, also assessing a series of quality statistics of the model such as, for example, the coefficient of determination.

In this phase of evaluation of the structural model, it was verified in the first instance that there was no multicollinearity between constructs as the variance inflation factor returned values lower than 3.3.

The coefficient of determination R^2 for financial performance was 0.388, indicating that a moderate amount of variance was explained by the predictive constructs in the model, according to Chin (1998). In addition, to evaluate the R^2 values of all the endogenous constructs, the size of the effect (f^2) was calculated. Specifically, the f^2 value of the positive effect of ESGC was 0.042, the positive environmental effect was 0.026, and the social effect was 0.057. In addition, the effect size of positive governance was 0.004. All f^2 size effects, except governance, were higher than the minimum cut-off value of 0.02 (Cohen 1988). Finally, to evaluate the predictive capacity of the model outside the sample as a criterion of predictive accuracy, the Value of Q^2 of Stone-Geisser was calculated (Geisser 1974; Stone 1974). Through the blindfolding procedure, a Q^2 or predictive relevance of the model was obtained, which revealed that all endogenous variables had values above the threshold of 0.

The results shown in Table 3A) reveal that the social and environmental pillars had a positive and significant effect on financial performance (path = 0.309 and 0.224, respectively; p value = 0.001 and 0.010, respectively), and ESGC had a negative and significant effect on the performance (path = -0.170 ; p value = 0.000). While the governance rating was neither relevant nor significant (path = 0.063; p value = 0.156).

According to the estimates of model 1, this study supports Hypotheses 1 and 2 (H_1 , H_2), which reveal a significant and

Table 2 Weights, statistic t, p values, and confidence intervals of the formative model indicators.

Measurement ratios	Weight	Statistic t	p value	CI 5%	CI 95%
E1 – Environmental	0.401	3.881	0.000***	0.217	0.555
E2 – Environmental	0.703	7.799	0.000***	0.551	0.845
E3 – Environmental	–0.004	0.045	0.482 ^{ns}	–0.153	0.150
S1 – Social	0.555	4.938	0.000***	0.364	0.733
S2 – Social	0.069	0.794	0.214 ^{ns}	–0.072	0.215
S3 – Social	0.176	1.659	0.049*	–0.002	0.348
S4 – Social	0.463	5.213	0.000***	0.307	0.597
G1 – Governance	0.409	3.273	0.001**	0.172	0.584
G2 – Governance	–0.108	0.796	0.213 ^{ns}	–0.323	0.123
G3 – Governance	0.813	9.841	0.000***	0.663	0.934
P – CFP	0.048	0.420	0.337 ^{ns}	–0.133	0.240
Tobin's Q – CFP	–0.179	1.518	0.064 ^{ns}	–0.411	–0.032
logMVC – CFP	1.001	37.776	0.000***	0.959	1.048

Bootstrapping procedure through SmartPLS v. 3.3.

Statistical significance t and 95% percentile confidence interval (CI) performed using a 10,000-repetition bootstrapping procedure.

^{ns} not significant.

*p < 0.05; **p < 0.01; ***p < 0.001.

Table 3 Results of the structural model tests.

Structural relationships	Path	t	p value	CI95%	Conclusion
A) Model 1					
ESGC – CFP	–0.170	3.718	0.000***	[–0.238, –0.089]	H ₄ supported
Environmental – CFP	0.224	2.330	0.010*	[0.057, 0.372]	H ₁ supported
Social – CFP	0.309	3.259	0.001**	[0.168, 0.481]	H ₂ supported
Governance – CFP	0.063	1.010	0.156 ^{ns}	[–0.030, 0.177]	H ₃ not supported
B) Model 2					
Moderation effect					
Environmental*Controv. – CFP	–0.102	2.160	0.015*	[–0.187, –0.034]	H _{4a} supported
Social*Controv. – CFP	–0.109	2.325	0.010*	[–0.194, –0.042]	H _{4b} supported
Governance*Controv. – CFP	–0.068	1.429	0.076 ^{ns}	[–0.158, –0.003]	H _{4c} not supported

Bootstrapping procedure through SmartPLS v. 3.3.

Statistical significance t and 95% percentile confidence interval (CI) performed using a 10,000-repetition bootstrapping procedure.

^{ns} not significant.

*p < 0.05; **p < 0.01; ***p < 0.001.

positive effect of the environmental and social scores on CFP but finds a negligible effect of governance on CFP (H₃). In addition, the results support Hypothesis 4 (H₄) which indicates a significant adverse effect of ESGC on CFP. Thus, model 1 seems to suggest that ESG practices benefit CFP, while bad news from the media or CSR practices harm CFP.

A good fit is required before interpreting moderation analysis in a structural model in the context of PLS-SEM (Henseler et al. 2016). Consequently, we studied several goodness of fit indices for model 1. These include an approximate adjustment measure or Standardized Root Mean Square Residual (SRMR) (Hu and Bentler 1998, 1999) and exact adjustment tests based on bootstrapping (Dijkstra and Henseler 2015). The absolute measure of SRMR adjustment was 0.044 less than the recommended value 0.08.

Similarly, the bootstrap results showed a good fit for model 1 (see Table 4); both bootstrap-based SRMR, as well as the unweighted least squares discrepancy (d_{ULS}) and the geodesic discrepancy (d_G) were lower than the value of the 95% confidence interval (Henseler et al. 2016). Thus, this goodness of fit analysis seems to support the composite model, and the research appears to act as a confirmatory type (Henseler 2017).

Evaluation of model 2 results with moderation effect. From a theoretical perspective, ESGC are expected to moderate the effects of positive CSR activities on CFP (Fauser and Utz 2021). Thus,

Table 4 Model 1 goodness of fit analysis.

	Original value	CI95%
SRMR Measurement	0.044	0.051
Euclidean distance d_{ULS}	0.205	0.276
Geodesic distance d_G	0.066	0.082

10,000-repeat bootstrap process in SmartPLS v. 3.3.

for example, firms are unlikely to intend to apply CSR practices simply because they believe they can do so. However, ESGC can determine how and to what extent CSR influences the variability of CFP.

Moderation analysis showed that the term environmental interaction by ESGC had a significant effect on CFP, also the social term of ESGC had a significant effect on CFP. However, moderation was not found to be significant for the governance term (see Table 3B).

The results of model 2 supported Hypotheses 4_a and 4_b (H_{4a}, H_{4b}) and found that there is a significant moderating effect of ESGC on the relationship between the environmental and social pillars with CFP but did not find a significant moderating effect of ESGC in the case between the governance and CFP score (H_{4c}).

This study examines ESGC at three levels to determine whether the relationships between E, S, and G and CFP vary with different

Table 5 Conditional analysis of moderation.

Exogenous variable	ESGC Moderator	Path	P values	f ²
Environmental	-1SD	0.34*	0.015	0.016
	Mean	0.23**	0.008	0.029
	+1SD	0.13*	0.015	0.016
Social	-1SD	0.43*	0.010	0.016
	Mean	0.32***	0.000	0.063
	+1SD	0.21*	0.010	0.016
Governance	-1SD	0.14 ^{ns}	0.076	0.007
	Mean	0.07 ^{ns}	0.141	0.005
	+1SD	0.00 ^{ns}	0.076	0.007

Procedure through SmartPLS v. 3.3. The moderator values are the mean and plus/minus one standard deviation of the mean.

^{ns}not significant.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

levels of ESGC. The analysis of the conditional moderating effects of Table 5 shows the effects of E, S and G at three levels of ESGC: one standard deviation (SD) minus one, which equates to low levels of ESGC; the mean, which is equivalent to the average levels of ESGC in the sample; and one standard deviation plus one, which equates to high levels of ESGC.

The strength of the association between E, S and G and CFP decreased as the values of the ESGC increased. The conditional analysis revealed the extent of the moderation effect. As can be seen in Table 3, the environmental term interaction by ESGC has a negative effect on CFP (−0.102). While the results of Table 5 suggest that the relationship between the environmental pillar and CFP is 0.23 for an average level of ESGC, for higher values of ESGC (e.g., if ESGC is increased at one point in the standard deviation), the relationship between environmental score and CFP is reduced based on the dimension of the interaction term (i.e., 0.13). Conversely, for low levels of ESGC (e.g., if ESGC is reduced at one point in its standard deviation), the ratio between the environmental pillar and CFP becomes 0.34. Therefore, higher levels of the environmental pillar are closely related to higher levels of CFP, but due to the negative term interaction, higher levels of ESGC lead to a weaker relationship between environmental score and CFP. While lower levels of ESGC imply a stronger relationship between the environmental pillar and CFP.

Similarly in Table 3, the social term interaction due to ESGC has a negative effect on CFP (−0.109). The results of Table 5 suggest an average relationship between the social pillar and CFP of 0.32. For higher values of ESGC, the ratio is reduced to 0.21. Conversely, for low levels of ESGC, the ratio increases to 0.43. Consequently, variability occurs in the relationship between the social pillar and CFP when ESGC levels are higher or lower respectively. Therefore, applying the same procedures, the findings in Table 5 are consistent with H_{4b}, suggesting that the positive effect of the social pillar on CFP is moderated by ESGC. The effect is strongest when ESGC are favorable and weaker when ESGC are unfavorable. In the case of the governance pillar, the moderation hypothesis was not supported in the sample of O&G firms used.

Figure 3a and b illustrate the slopes of CFP variability based on ESGC levels.

The coefficient of determination R^2 for moderate CFP grew to 0.398, indicating that model 2 including the moderating effect of ESGC explained the relationships tested better than model 1. In addition, model 2 using conditional sensitivity analysis provided more detailed information.

Discussion and conclusions

The main goal of this paper is to determine to what extent controversies influence O&G's industry performance. To this end, a sample of 264 O&G firms were analyzed, for which the relationship of environmental, social and governance factors in CFP had previously been analyzed. Based on previous research we predicted that ESGC moderate the relationships between the ESG factors and CFP. The results have found that ESGC negatively influence the relationship between the environmental and social factors and CFP (supports H_{4a} and H_{4b}), but not the relationship between governance factor and CFP (reject H_{4c}). Furthermore, this study also finds that there is a significantly positive relationship between environmental and social factors (supports H₁ and H₂) and CFP but not for governance factor (reject H₃).

Regarding the environmental factor, mainly influenced by emissions and the use of natural resources, positively impact the CFP of O&G firms. That is, if O&G firms reduce emissions, and become more energy and water efficient, they will benefit from an increase in their market value. This conclusion is explained by the priority that financial markets are giving to reducing the environmental impact from the sustainable finance perspective (Aich, et al. 2021). Climate risk stemming from negative environmental practices has become a reason for the decline in stock value, due in turn to the loss of confidence that shareholders and investors convey to less responsible firms. Authors such as Bunse et al. (2011) or De Lucia et al. (2020) have already shown that energy efficiency and environmental innovation policies can improve financial performance indicators. However, it is noted that this result may differ depending on the environmental impact of the sector. For example, Fan et al. (2017) and Le et al. (2022) find a positive relationship between the environmental factor and corporate financial performance for industries such as electricity, steel, technology and aviation. But when studying sectors, a priori, with lower impact, the environmental factor can even be detrimental to financial performance. A relationship that has been empirically demonstrated by Brammer et al. (2006) and Wang and Sarkis (2013) for the financial, wholesale and manufacturing sectors. The heterogeneity of results suggests that O&G industry might be giving more importance to these kinds of factors given the high impact of its activity. Indeed, due to this industry is one of the highest contributors to CO₂ emissions globally (International Energy Agency 2021), it is to be expected that investors will take this issue as a matter of urgency, rewarding environmentally responsible companies over those that are not (Bodhanwala and Bodhanwala 2020).

In the same sense, it has been confirmed that the social factor, through the workforce and product responsibility mainly, positively influences financial performance in the O&G sector. It can be seen how issues related to a safe and healthy workplace or a product and service where consumer safety is integrated are relevant issues for a sector such as the O&G where its working practices and production processes can sometimes have devastating consequences for the worker or the consumer (Zerrouki, et al. 2023). A optimal health and safety policy in the workplace and during the production process will allow the sector not only to benefit from a reduction of possible unintentional accidents, but will also allow it to increase stock value, as the results obtained corroborate. Authors such as Hira et al. (2023) and Bahadori et al. (2021) are in line with this positive relationship between the social factor and financial performance. Raman (2018) finds similar results for the mining industry, an activity that like O&G can be greatly affected by accidents during the production process. In contrast, for sectors such as technology or real estate, the relationship is not significant between the social factor and financial performance (Almeyda and Darmansyah,

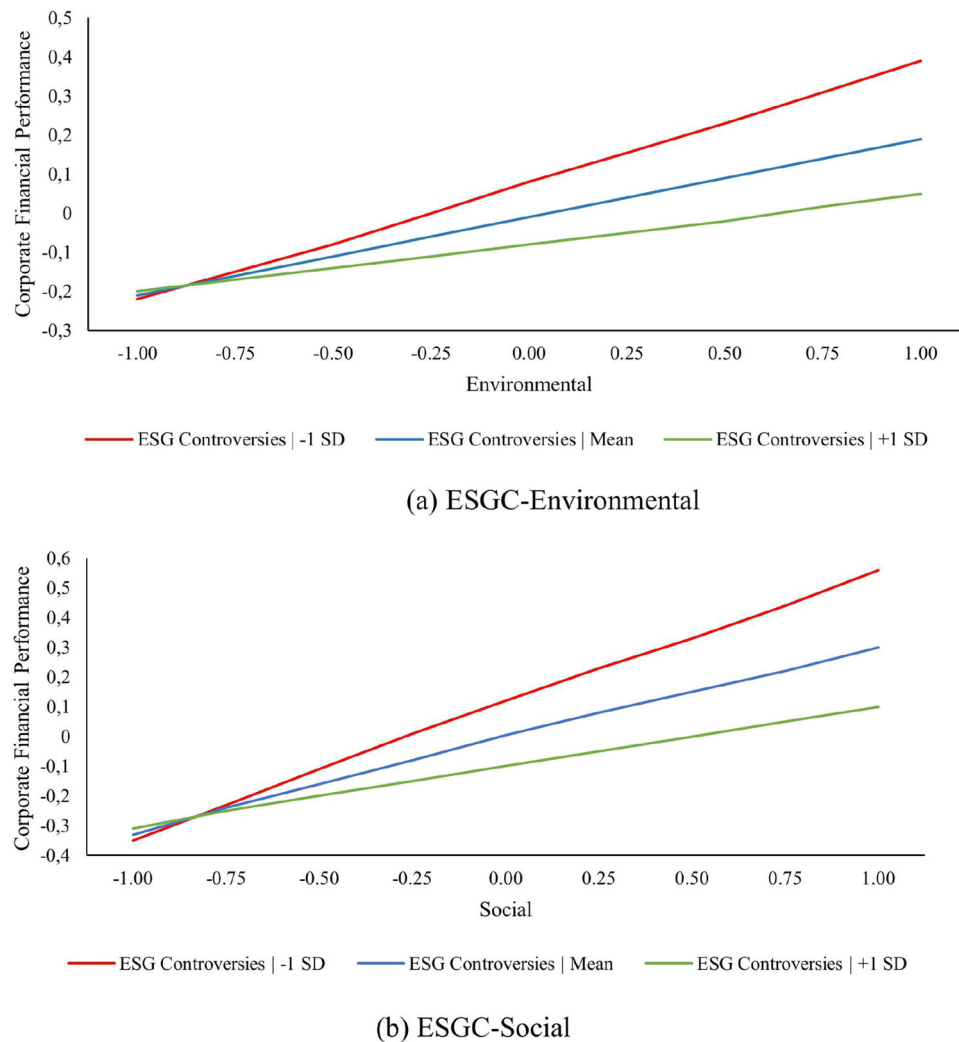


Fig. 3 Moderation relationship ESG - Environmental/Social controversies through SmartPLS v3.3. Figure (a) and (b) illustrate the slopes of CFP variability based on ESGC levels.

2019; Le et al. 2022). Therefore, the results differ depending on the sector studied. In short, as the O&G industry is a controversial sector, companies are often in the spotlight. Investors and society consider important issues such as respect for Human Rights (Pegg 2012), or how responsible they are in terms of their production processes.

Surprisingly, the governance factor, measure by CSR strategy and the board management, does not have a significant influence on CFP of the O&G industry. This sector is criticized mainly for its environmental and social policies, which means that issues such as corporate governance principles or CSR strategy take a back seat. According to the results obtained, financial markets are more influenced by the impact that the sector has on the environment and on society but corporate governance issues should not be forgotten. For example, board gender is understood as a measure of good governance that can sometimes contribute to the volatility decrease, as corroborated by Shakil (2021) for 70 O&G firms. Other such as Arayssi et al. (2016) also suggest that as the participation of women on boards of directors increases, the volatility decreases. However, the impact of governance may vary depending on the sector under study. The significant relationship between the governance factor and financial performance is not corroborated for sectors such as transportation, communication, industrial, or finance (Marinova et al. 2016; Ahlklö and Lind

2018). In line with this result, Almeyda and Darmansyah (2019) demonstrate the same conclusion for the real estate sector. After all, the financial markets pay more attention to the direct environmental impact of O&G companies, which can also have an impact on possible accidents in the production process or in the workplace, while they are less influenced by the CSR strategy.

Moving on, and in line with our main goal, we analyze the influence of ESGC on the relationship between the ESG factors and CFP in the O&G industry. In this vein, results support that ESGC negatively influence the relationship between the environmental and social factor regarding CFP. When there is less harmful news, social and environmental practices contribute to improving CFP. Specifically, the lower the value of ESGC is, the stronger the relationship between environmental factor and CFP is. We note the same regarding the social factor. Those firms that are less affected by this kind of news will see how their responsible policies have a greater positive impact on financial performance, compared to those that are affected by bad news (Aouadi and Marsat 2018; DasGupta 2021). Shakil (2021) demonstrates that ESGC have a moderating effect on the relationship between ESG factors and financial risk. The results are in line with authors such as Nirino et al. (2021) and Tamayo-Torres et al. (2019). However, there is no moderating effect between the governance factor and CFP. The results suggest that the study sample is more exposed to adverse news when this refers to

environmental and social issues. Indeed, the industry under study is sometimes criticized for its unethical practices regarding oil extraction, such as “fracking” (Brantley et al. 2014).

The previous considerations permit us to conclude that higher levels of ESGC are detrimental to the positive influence of ESG practices on the CFP of O&G firms. In this sense, the article contributes new knowledge to the field, particularly in the flourishing literature on ESG and, more specifically, in the area of controversies. In this way the article contributes to reinforcing the United Nations statement (2015) calling for responsible practices within firms, in this case in the influential O&G industry, with the objective of improving the environment and society. It has been demonstrated that controversies have an important effect on performance and therefore deter firms from entering into certain questionable social practices and encourage adoption of measures to reduce their impact. In this regard, government regulation that raises awareness in society would appear to be constructive because this awareness would foster a greater change in business actions as controversies become more prevalent and more impactful. Industries such as energy, namely O&G, must be the focal point of promoting environmentally responsible policies that contribute to the reduction of emissions and an improvement in efficiency in the use of natural resources. We have seen how investors and society have become increasingly involved in making firms accountable in these aspects, contributing to their corporate governance and dictating social and environmental policies that mitigate the negative impact of certain practices. This transition toward less polluting energies should emerge from greater awareness, commitment and support from policymakers and government agencies, so that industries can carry out, in an economically viable way, the changes that enable an improvement in the health of our planet.

On the other side of the coin, the managers of O&G's firms must be made aware about the impact that ESGC have on performance, so that they place greater attention to environmental, social and governance factors in order not to damage the value of the firm and harm stakeholders.

This study has certain limitations that suggest new lines of research. First, the results have been provided in an international context, but the degree of regulation differs between countries and thus controversies should be considered differently manner in different areas which suggests the convenience of new research that discriminates between countries. Second, controversies exert their impact in a later period, but we do not know the duration of their impact. Thus introducing a longer period for measuring impacts could be of interest to appreciate the different intensity of news and to give guidance to government and firms.

Data availability

Supplementary information is provided including the data from the reference database, as well as the detailed statistical process carried out during the analysis and the results extracted.

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AG-A: Conceptualization, Writing-original draft, Writing-review & editing, Visualization; AR-O: Conceptualization, Writing-original draft, Methodology, Validation, Formal analysis, Writing-review & editing; AAR-R: Writing-original draft, Writing-review & editing; MPC-B: Writing-original draft, Writing-review & editing.

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