Received 24 November 2024
Revised 1 August 2025
Accepted 8 September 2025

The impact of capital expenditure on ESG performance: the moderating role of CEO board membership in Saudi listed firms

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Abstract

Purpose – This paper aims to examine the relationship between capital expenditure (CAPEX) and environmental, social and governance (ESG) performance, along with how CEO board membership moderates this relationship, based on a sample of Saudi listed firms.

Design/methodology/approach – The initial sample comprised all the firms listed on the Saudi Stock Exchange from 2014 to 2023. The authors use ordinary least squares (OLS) regression model to assess whether CAPEX leads to an increase in ESG.

Findings – This study finds that CAPEX is positively and significantly related to ESG performance. The observations also reveal that CEO board membership moderates the impact of CAPEX on ESG, whereby the effect of CAPEX on ESG performance diminishes when the CEO plays the dual role of an executive and a board director. This moderating effect suggests that potential conflicts of interest or governance inefficiencies may reduce the effectiveness of CAPEX investments in driving improvements in ESG.

Originality/value – This paper contributes to the growing body of knowledge on corporate governance and sustainability by highlighting the role of governance structures – specifically, CEO board membership – in shaping the outcomes of capital investments directed towards the promotion of sustainability.

Keywords Capital expenditure (CAPEX), ESG, CEO board membership

Paper type Research paper

1. Introduction

Environmental, social and governance (ESG) practices have gained significant traction in recent years due to increasing stakeholder pressure concerning responsible corporate behaviour. As companies strive to meet stakeholders' expectations, it is crucial to understand the factors that influence ESG performance. Hence, this study investigates the impact of capital expenditure (CAPEX) on ESG performance. Furthermore, this study explores the moderating role of chief executive officer (CEO) board membership on the relationship between CAPEX and sustainable ESG performance. CAPEX plays a dual role here, serving as a key driver of business development and operational success while also posing risks to the achievement of ESG outcomes if not effectively managed and transparently disclosed. Moreover, the CEO's dual role as both a strategic manager and a board member further complicates this dynamic, blending long-term planning with corporate governance responsibilities (Donaldson and Davis, 1991; Muttakin, Khan, and Tanewski, 2019).

International Journal of Islamic and Middle Eastern Finance and Management
Vol. 19 No. 3, 2026
pp. 840-863

1753-8394
DOI 10.1108/IMEFM-11-2024-0579

The findings of the literature concerning CAPEX and ESG are inconclusive, as some studies point towards a positive correlation between capital asset investments and ESG performance (Dhaliwal *et al.*, 2011; Ng and Rezaee, 2015), whereas other studies suggest conflict, particularly when capital projects have negative externalities (Chung *et al.*, 1998; Titman *et al.*, 2004). The relationship between CAPEX, CEO board membership and firms' disclosures of ESG information has not been analysed before, given that the prior literature has focused on the effect of CEO characteristics on both corporate governance and ESG performance (Busenbark *et al.*, 2016; Sheikh, 2019). The present study seeks to address this gap in the literature by investigating the direct impact of CAPEX on ESG performance, as well as determining how CEO board membership moderates the relationship between CAPEX and ESG, to generate a richer understanding of the mechanisms at work.

To test this study's hypotheses, we obtained data on the CAPEX and ESG of publicly listed Saudi firms for the sample period from 2014 to 2023. Saudi Arabia's leading role in the Middle East and North Africa, combined with its significant economic role as both a G20 member and a major oil exporter, makes it an appealing market in which to conduct academic research, particularly in terms of corporate governance and sustainability. As Saudi Arabia's economy continues to grow, the Saudi General Investment Authority emphasises the need for increased accountability and transparency in relation to firms' ESG performance for the benefit of stakeholders. Furthermore, the ISO 14000 series of standards recognise environmental performance as a critical strategic issue for businesses (Sumiani, Haslinda, and Lehman, 2007). To address investor and stakeholder concerns regarding corporate ESG policies, many businesses are voluntarily increasing their social and environmental disclosures. The Saudi Vision 2030 also addresses a number of issues related to ESG. Sustainable growth and the development and implementation of Vision 2030 projects form the core of ESG practices. Since the launch of the Saudi Vision 2030, the Saudi Stock Exchange has been committed to encouraging ESG disclosure across the country's financial ecosystem. Additionally, the Saudi Stock Exchange believes it has a responsibility to assist with the progress of ESG in Saudi Arabia and the wider region; thus, it has published ESG disclosure guidelines in an effort to raise awareness and encourage listed firms to publish ESG disclosures (Saudi Stock Exchange, 2022).

The findings of this study indicate that CAPEX has a positive and significant impact on ESG performance, lending support to the notion that strategic investments in capital assets can enhance a firm's sustainability profile (Dhaliwal, Li, Tsang, and Yang, 2011). However, the presence of the CEO on the board of directors moderates this relationship, thereby weakening the positive effect of CAPEX on ESG. Consequently, this finding implies that while CAPEX is mostly helpful in progressing towards favourable ESG results, the CEO's dual role can limit efficiency or create conflicts of interest (Hermalin and Weisbach, 2003).

This study makes several important contributions to the literature. First, prior studies conducted in Saudi Arabia have examined ESG on the basis of investment efficiency (Kouaib, 2022), corporate governance (Bamahros *et al.*, 2022; Chebbi and Ammer, 2022), stock returns (Alsahlawi, Chebbi, and Ammer, 2021), firm performance (Ghardallou, 2022), institutional ownership (Qasem *et al.*, 2022) and ownership structure (Boshnak, 2022). Studying the relationship between CAPEX and ESG within the Saudi context is both timely and critical, given the increasing focus on sustainable investments and economic diversification. To the best of our knowledge, no prior study has examined CAPEX as a determinate of ESG. Therefore, this study extends the existing literature because it represents a directed and focused investigation of CAPEX and ESG performance, revealing a strong connection between CAPEX and corporate sustainability performance. It indicates whether sustainable investments in ESG-aligned projects can generate sustainable value and

neutralise the financial risks associated with such projects. This study is specifically relevant due to the recent significance of the Saudi economy and its mega- and giga-projects, as well as to the increased pace of development driven by Saudi Arabia's Vision 2030.

Second, this study investigates the role of CEO board membership by incorporating its moderating effect on the relationship between firms' CAPEX and ESG targets. Studying CEO board membership is important because the presence of the CEO on the board can significantly influence a firm's strategic decisions, including those related to CAPEX. This contribution is particularly valuable to the analysis because it concerns the most important and most common type of multiple centres of operations configuration and reveals the possible sources of the static and dynamic contradictions seen in the relationships between CEOs and the boards. Thus, the CEO has the main responsibility for deciding on resource distribution and prioritising employees in terms of ESG practice and disclosure.

Third, understanding the link between CAPEX and ESG can be of great interest to several stakeholders, such as investors, creditors, and policymakers. The results help investors and creditors assess whether firms allocate their resources and expenditures in a manner that supports long-term sustainability and value creation. The study provides evidence that CAPEX can serve as a meaningful signal of a firm's responsibility towards ESG objectives, thus aiding investors and creditors in identifying forward-looking companies that balance profitability with responsible business practices. The insights from this study can also inform policymakers and regulators in designing incentives for ESG-aligned capital investments and in integrating sustainability into corporate strategic planning and governance.

The remainder of this paper is organised as follows. Section 2 provides an overview of the literature review and hypotheses development in this study. Section 3 discusses the research method and its subtopics. Section 4 sets out the main results and tests the sensitivity analysis. Finally, Section 5 concludes the paper.

2. Literature review and hypotheses development

2.1 ESG

The rising importance of ESG disclosure reflects stakeholders' demand for transparency on a company's social responsibility, environmental impact, and related risks. Deegan (2014) emphasises that while a multitude of theories exist regarding the motivations for corporate ESG information reporting, the primary drivers of it are demonstrably linked to regulatory frameworks, established standards and the need to maintain legitimacy among stakeholders. Indeed, ESG disclosure can significantly impact a company's financial value by influencing factors such as its access to capital, cost of capital, reputation, competitiveness and profitability.

ESG investment can be driven by "value" or "values" considerations (Starks, 2023). These two incentives for companies to disclose ESG information represent financial value and social values, respectively (Friedman, Heinle, and Luneva, 2021). Investors might be interested in either the financial benefits of ESG practices (e.g., how they affect cash flow) or the social and environmental impacts (e.g., reduced pollution). Companies can choose to report in a way that highlights the financial benefits or the actual ESG activities (Krueger, Sautner, Tang, and Zhong, 2024). Mandating ESG disclosure reduces information asymmetry, helps investors assess its financial impact, limits insider information advantages, and fosters trust between companies and investors. On the social value side, even though some company information does not directly affect the company's monetary value (e.g., environment, social responsibility), it can still prove useful for investors who are likely to prioritise investments in companies that care about the environment and people. Moreover, some funds that follow ESG rules choose companies based on disclosures concerning

pollution, treatment of workers and diversity (Heath *et al.*, 2023). For these investors, more and better information about ESG helps them to choose the right companies because publicly available information aids investors in making informed investment decisions regarding how good a company is for the environment and society, thereby mitigating the risk of ESG rating divergence (Berg, Kölbel, and Rigobon, 2022).

The growth in terms of analysing and reporting ESG practices in the corporate sector is becoming significant in many developing countries (Bouten, Everaert, and Roberts, 2012; Vinodkumar and Alarifi, 2022). In fact, ESG analysis and reporting are now seen as key aspects of investment decision-making by various stakeholders (Jenkins and Yakovleva, 2006). Sustainable finance brings additional benefits to society, as well as to the companies involved (Schoenmaker, 2017). For example, companies that integrate ESG performance into their business practices benefit from a lower cost of capital (Lins, Servaes, and Tamayo, 2017).

Recent research has shown that ESG factors, particularly environmental performance, are positively related to the credit ratings of European banks, supporting the stakeholder theory. However, the impact of social and governance dimensions appears inconsistent with credit ratings, reflecting short-term concerns aligned with agency theory (Chen, Wang, and Chen, 2025).

Several studies have investigated the relationship between ESG and firm performance. Bruna, Loprevite, Raucci, Ricca, and Rupo (2022) analysed this relationship using a sample of 350 European firms. They identified a significant correlation between ESG performance and financial success, particularly when additional financial reporting was required. Similarly, Chininga, Alhassan, and Zeka (2024) found that the environmental component of ESG tends to enhance financial performance indicators. Another study conducted in the Malaysian context found that ESG performance positively impacts return on equity (ROE) and Tobin's Q. Importantly, ESG performance moderates the relationship between board gender diversity and financial performance, particularly in the context of ROE Sahu, Alahdal, Pandey, Baatwah, and Bajaher (2025).

2.2 ESG in Saudi Arabia

The purpose of Saudi Arabia's 2017 corporate governance code was to bring the country in line with Organisation for Economic Co-operation and Development (OECD) principles and other international norms concerning corporate governance (Boshnak, 2022). Social responsibility, openness and honesty, shareholder rights, the legislature and the board of directors are all included in the code. At the annual shareholder meeting, the board of directors may propose a plan to strike a balance between the company's objectives and the community's needs, and shareholders can then vote on the plan (Article 84). This strategy is intended to enhance the community's social and economic situation. To propose social projects, the board must first create programs. As part of such efforts, metrics are created to measure how well the business is doing in relation to its social goals and to compare it to other businesses in the same industry. In addition, the programs should educate workers about the importance of social responsibility and the company's aims in this area (Article 85). A company's social contributions must also be included in the board's report according to the legislation, such as Article 87 (Saudi Capital Market Authority, 2023).

In its efforts to transition to a green economy, improve the quality of life, and protect the environment, Saudi Arabia launched the Saudi Green Initiative (SGI) in 2021. It plans to invest more than $18bn through a collaboration between the government and the private sector. The Kingdom's commitments have been turned into actions, supporting global goals.

The International Monetary Fund (IMF) identifies Saudi Arabia's substantial steps to reduce greenhouse gas emissions and decarbonise its economy. Despite its large energy sector, Saudi Arabia has one of the lowest carbon intensities among major oil producers just behind Denmark (IMF, 2024). Efforts are underway to strengthen the anti-corruption framework, including enhancing enforcement and increasing transparency in public procurement. In February 2024, Saudi Arabia enacted a law to provide legal protection for whistleblowers. These measures are crucial for strengthening governance as they promote ethical practices, accountability, and trust in public institutions.

2.3 CAPEX and ESG

CAPEX refers to investments, in contrast to operational costs (OPEX), which are utilised in day-to-day operations. Instead of appearing as revenue expenses, these costs are "capitalised" on the balance sheet. Moreover, rather than cutting into profits in the year of expenditure, this method ensures that the expense is spread out across the asset's useful life. CAPEX per share is a key indicator of a company's growth strategy, asset sustainability, and financial health, making it a valuable tool for informed investment decisions. Various business outcomes have been linked to CAPEX in prior research. According to Chung, Wright and Charoenwong (1998), an announcement concerning a rise in CAPEX could be detrimental to a company's stock price if there are no investment possibilities. Additionally, companies with high CAPEX often have negative benchmark-adjusted returns (Titman, Wei, and Xie, 2004). A more recent analysis performed by Cordis and Kirby (2017) also shows a negative correlation between CAPEX and stock returns. According to Amir, Guan, and Livne (2007), research and development (R&D) and CAPEX investments are linked to future earnings unpredictability. Based on their findings, R&D expenditures, rather than CAPEX, are the primary driver of profit volatility in R&D-intensive sectors.

Markets should be informed about the environmental effects of companies' operations particularly when companies spend more on capital investment. Companies accomplish this by being more transparent regarding the environmental duties that they face. The relationship between enterprises' voluntary corporate social responsibility (CSR) disclosure and the cost of equity capital has been studied by Dhaliwal *et al.* (2011), who report that CSR disclosures are more common among firms with high equity capital expenses.

The incorporation of ESG reporting within the above-mentioned framework highlights its alignment with stakeholder theory, which is crucial because sustainability decision-making involves addressing the needs of various stakeholders. Indeed, according to stakeholder theory, organisations should cater to the needs of different interest groups, both within and outside the company (Freeman and McVea, 2005). Stakeholder theory also states that businesses should answer to everyone, from their customers and workers to their shareholders and the government, as well as to society at large (Donaldson and Preston, 1995; Freeman, 1984). Based on this normative approach, a variety of stakeholders should be considered when company management makes choices. Accordingly, there has been a push for increased ESG disclosure on the part of companies (Eliwa, Aboud, and Saleh, 2021; Ng and Rezaee, 2015), as such disclosures are a direct mechanism for companies to communicate with and respond to the diverse demands of their stakeholders. By facilitating innovation and development, CAPEX demonstrates management's commitment to stakeholder involvement and satisfaction (Ng and Rezaee, 2015), thereby aligning capital allocation with stakeholder interests and potentially enhancing long-term value, as prescribed by stakeholder theory.

Another theory that elucidates the interplay between CAPEX and ESG dynamics is resource dependency theory. Firms' environmental management in the external mode is

defined by this theory as a process that revolves around the acquisition and maintenance of vital resources. From this perspective, CAPEX represents a strategic investment aimed at securing and enhancing the resources necessary for a firm's long-term viability and adaptation to its environment. Pfeffer and Salancik (1978), as well as Hillman, Withers and Collins (2009), highlight CAPEX as a means by which businesses can acquire the resources they need to succeed. In addition to increasing a company's market share and profitability, CAPEX improves its efficiency and quality (Moussa and Elmarzouky, 2023), thereby reducing external dependencies and strengthening the firm's position in its operating environment, consistent with the core tenets of resource dependency theory.

A company's strategic focus on long-term sustainability is shown in the mutually beneficial interaction between CAPEX and ESG factors. This interaction is deeply rooted in the principles of stakeholder theory, which emphasises managing relationships with diverse groups for long-term value, and resource dependency theory, which views investments as crucial for securing vital resources and adapting to environmental demands. In addition, a company's dedication to growth and stability in terms of its operations may be shown by its increased CAPEX investment. Companies that invest significantly in CAPEX therefore face growing pressure to make their ESG disclosures clearer. Hence, to meet the changing needs of investors and remain in line with legal frameworks, there is a greater focus on transparency. Given the theoretical foundations that link strategic capital allocation (CAPEX) with the need for stakeholder engagement, resource acquisition, we posit that firms undertaking significant CAPEX will be compelled to provide comprehensive ESG reporting to justify these investments and manage external stakeholders' perceptions. Based on the above, the following hypothesis is developed:

H1. There is a positive and significant relationship between CAPEX and ESG reporting.

2.4 Moderating *role* of CEO board membership

The presence of the CEO on the board of directors facilitates an expedited and well-informed decision-making process. By virtue of their familiarity with the company's operations, strategic objectives and current challenges, the CEO can provide insights during board deliberations. Therefore, CEO board membership ensures that board decisions are better aligned with the management team, fostering a more efficient implementation process. In line with social network theory, the presence of executives on the board and the fact that they interact regularly with other directors foster stronger connections (Muttakin *et al*., 2019), suggesting that the CEO's board participation stimulates enhanced communication and coordination between the board and the company's management team.

Stewardship theory posits the CEO to be a dedicated steward, maximising the firm value via consistent high performance, which is achieved within a supportive board structure that facilitates strategic planning and implementation (Donaldson and Davis, 1991). The regular communication facilitated by board participation allows other board members to extract more private information regarding operational matters from the CEO. This not only reduces information transfer costs but also facilitates organisational effectiveness by promoting informed decision-making, ultimately enhancing the firm value (Li and Roberts, 2018). While CEO board membership has certain benefits, there are also potential drawbacks. Agency theory, which is central to understanding corporate governance structures, provides a counter-perspective. Hermalin and Weisbach (2003) provide a hypothesis linking board independence to board effectiveness. An analysis of the theoretical foundations of CEO board membership shows that it can pose a threat to the board's utility in terms of monitoring the CEO. The problem is that the practice of having the CEO be a member of the board

destroys the whole "arms-length bargaining model", which may result in plain opportunism on the CEO's part (Li and Roberts, 2018). Kateb and Alahdal (2024) highlights the importance of corporate governance in addressing environmental and social challenges. Moreover, this dynamic can negatively affect the board's ability to form independent judgments and make decisions, and it can also enhance the CEO's power over the board (Boivie, Bednar, and Barker, 2015). It is possible that the outlined structure of the board will result in power being concentrated within the scope of the CEO position, rendering the board ineffective in dealing with stakeholders' issues. Such power concentration makes it problematic when the CEO's objectives contrast with those of the shareholders or the permanent interests of the firm.

Over the last few years, an increasing number of studies have analysed the effects of a CEO's traits and motivators on the CSR and business performance of a firm (Berns and Klarner, 2017; Busenbark, Krause, Boivie, and Graffin, 2016). Such studies have, however, produced inconsistent outcomes. There is interest in the CEO power among several research streams. Structural power is further categorised into duality and ownership, ownership power into direct equity ownership and family links, and expert power into tenure. The association between CEO power and ESG outcomes remain complex and marked by conflicting findings. While some studies emphasise the detrimental impact of certain types of CEO power, others highlight potential benefits. For Instance, Abdullah *et al.* (2024) indicate that CEO structural and duality power tend to diminish ESG performance. In the hospitality sector specifically, Arici, Aladag, and Koseoglu (2024) reort in their findings that CEO duality are negatively associates with environmental pillar but not the other outcomes (i.e. governance and social pillar scores). Sheikh (2019) notes that CSR performance decreases when structural and ownership power increase, meaning that there is a low regard for social responsibilities when the CEO holds more power. Nonetheless, using data covering the years 2010–2017 for the USA, Canada, France and Spain, Jouber (2019) establishes a positive association between the measurement of CSR disclosure and CEO pay slice. Similarly, Velte (2020) argue that CEO power can enhance the relationship between ESG performance and financial success. These mixed results underscore certain considerations regarding the mutual influence between the CEO's power and CSR.

However, the relationship between CAPEX and ESG outcomes is not always straightforward. Indeed, high CAPEX can sometimes be associated with projects that have adverse environmental or social impacts, for example, large-scale industrial developments. Therefore, the moderating role of CEO board membership becomes crucial. A CEO who is actively engaged in both the executive and governance roles in the company may choose to either increase the ESG reporting to highlight positive aspects or decrease the ESG reporting to obscure the effects of CAPEX spending. This dual potential creates a situation where CEO board membership is expected to significantly influence how CAPEX translates into reported ESG outcomes. Accordingly, the second hypothesis of this study is as follows:

H2. There is a significant moderating effect of CEO board membership on the relationship between CAPEX and ESG reporting.

3. Research design

3.1 Sample selection

The initial sample comprised all the firms listed on the Saudi Stock Exchange from 2014 to 2023, resulting in 1910 firm-year observations. Nonetheless, the sample was limited to 1590 firm-year observations after omitting financial firms whose sample size comprised 320 observations. We followed the approach of prior studies and excluded financial firms due to the

significant differences in their accounting practices and estimations when compared with other types of firms, in addition to the distinct regulatory requirements they face (Kouaib, 2022; Moussa and Elmarzouky, 2023). Both financial data and ESG data were obtained from the Refinitiv database. Subsequently, we further reduced the sample to 182 firm-year observations after excluding 1398 observations with missing ESG values and 10 observations with missing values that were required to calculate the variables for the main regression analysis. Table 1 below provides a detailed breakdown of the sample selection process.

3.2 ESG measure

The dependent variable in this study is ESG performance, which is measured using data from the Refinitiv database. The ESG score is shown on a scale from 0 to 100, which indicates how well a company has done in terms of environmental, social, and governance issues. The higher this rating is, the better the ESG performance. It is given as a percentage.

3.3 Capital expenditure measure

Capital Expenditure (Capex) is our independent variable in this study and we measure it as the natural logarithm of the ratio of capital expenditure to total assets. We used the same method as Moussa and Elmarzouky (2023) in their study, which is a key reference for our empirical design. The logarithmic transformation fixes the raw Capex data's natural positive skewness and unstable variance. It makes model estimation more reliable by stabilising variance, lowering the effect of outliers, and making sure that linear regression models follow their assumptions.

3.4 CEO board membership measure

The moderating variable we employ is the CEO_BOARD_MEMBER, a dummy variable with a value of 1 when the CEO is a board member simultaneously, and 0 in the other situations. This variable gives us the perfect two sides of the CEO. It allows us to determine

Table 1. Sample description

Panel A: Sample selection	
Total number of firm-year observations (2014–2023)	1910
Less: Financial firms	(320)
Less: Missing value of ESG	(1398)
Less: Missing value to calculate the var	(10)
Final sample	182
Panel B: Year distribution	
2014	5
2015	5
2016	7
2017	8
2018	11
2019	19
2020	23
2021	27
2022	36
2023	41
Total	182

Source(s): Created by the authors

whether board membership moderates the relationship between capital expenditure and ESG performance.

3.5 Control variables

We use some of the control variables used in earlier studies (Bamahros *et al.*, 2022; Frank and Shen, 2016; Habbash, 2016; Alotaibi and Hussainey, 2016) and borrow them as our control variables. To get a company's SIZE, we take the natural logarithm of total assets. One way to calculate leverage (LEV) is the ratio of total debt to total assets. To measured return on assets (ROA), we divided net income to total assets. The dummy variable LOSS takes on the value 1 when the net income is negative and 0 otherwise. The age of a firm, abbreviated as AGE, is determined by taking the natural logarithm of the company's age, which is determined by subtracting the current year from the founding date. Board size (BOARD_SIZE) is the number of directors makes up the board's size and independent board members (IND_BOARD) is ratio of independent board members to board size number. Finally, we include industry and year dummy variables in our regression model to account for sector-specific and time factors. All continuous variables are winsorized at the 1st and 99th percentiles to overcome the presumable effect of extreme outliers, and to minimise the possible bias they can cause to the regression estimates.

3.6 Regression model

This paper adopts the Ordinary Least Squares (OLS) regression model in analysing the relationship of capital expenditure (CAPEX) and ESG performance including the corporate governance variable as a moderator. The factor in selecting OLS is that it is assumed that we have a non-financial firm-year structure on non-financial companies that will be retained in the Saudi Stock Exchange during the observation period between 2014 and 2023. Given the limited number of repeated observations per firm, panel data methods such as firm fixed effects were not suitable without a substantial loss in degrees of freedom and statistical power. OLS provides a robust and interpretable estimation framework under these conditions and is widely adopted in ESG-finance literature for similar cross-sectional settings (Moussa and Elmarzouky, 2023).

To assess whether CAPEX leads to an increase in ESG, we used the following baseline model:

$$ESG_{i,t} = \alpha_0 + \beta_1 \text{CAPEX}_{it} + \beta_2 \text{SIZE}_{it} + \beta_3 \text{LEV}_{it} + \beta_4 \text{ROA}_{it} + \beta_5 \text{LOSS}_{it} + \beta_6 AGE_{it} + \beta_7 \text{BOARD\_SIZE}_{it} + \beta_8 \text{IND\_BOARD}_{it} + INDS + Year + \varepsilon \quad (1)$$

To test the moderating effect of CEO_BOARD_MEMBER on the association between ESG and CAPEX, we used the following regression model:

$$ESG_{i,t} = \alpha_0 + \beta_1 \text{CAPEX}_{it} + \beta_2 \text{CEO\_BOARD\_MEMBER}_{it} + \beta_3 \text{CAPEX} * \text{CEO\_BOARD\_MEMBER}_{it} + \beta_4 \text{SIZE}_{it} + \beta_5 \text{LEV}_{it} + \beta_6 ROA_{it} + \beta_7 \text{LOSS}_{it} + \beta_8 \text{AGE}_{it} + \beta_9 \text{BOARD\_SIZE}_{it} + \beta_{10} \text{IND\_BOARD}_{it} + INDS + Year + \varepsilon \quad (2)$$

Appendix presents the definitions and measurement methods of all variables employed in this study.

4. Results

4.1 Descriptive statistics

Table 2 presents descriptive statistics concerning the primary variables used in our study. The ESG score's mean (median) is 30.975 (30.205), while its standard deviation is 20.607. The CAPEX value has a mean (median) of −3.715 (−3.341) and a standard deviation of 1.635. The CEO_BOARD_MEMBER has approximately 37% of CEOs serve on the board. The control variables' median and mean values are mostly in line with those found in previous research (Bamahros *et al.*, 2022; Moussa and Elmarzouky, 2023).

Table 3 displays the Pearson correlation between ESG and CAPEX. At the 1% level of significance ($p < 0.01$), the correlation between ESG and CAPEX is 0.3947, providing early support for *H1* by demonstrating a favourable association between ESG and increasing CAPEX. The association between ESG and SIZE is 0.3939, which is significant at the 1% level. This means that larger firms often have better ESG ratings. The reason for this might be that larger firms have greater resources to dedicate to ESG initiatives. At the 1% level of significance, there is a correlation of 0.2274 between ESG and LEV, which implies that firms with better ESG ratings are also likely to have more leverage. Given their better ESG performance, this could mean that such firms can afford to take on additional debt. The Pearson correlation also shows that ESG is negatively but not statistically significantly associated with ROA, meaning that there is no association between ESG and ROA. Furthermore, there is negative correlation between ESG and LOSS at the 10% level of significance, which indicates that firms with better ESG scores are less likely to report losses. The correlation between ESG and AGE is negative and statistically significant at the 10% level, suggesting that younger firms may have somewhat better ESG ratings than their more seasoned counterparts. According to the correlation between ESG and BOARD_SIZE, which is 0.1694 and significant at the 5% level, firms with bigger board sizes tend to have better ESG ratings. Finally, there is no significant correlation between ESG and IND_BOARD, indicating that board independence members do not strongly correlate with ESG performance. The conclusions that can be drawn from Table 3 point to a correlation between ESG performance and firm characteristics such as firm size, leverage and governance structure. Hence, these factors may impact the way in which firms handle their finances and invest in capital projects.

4.2 Baseline result

The findings of the regression analysis that looked at the connection between ESG and CAPEX are shown in Table 4. The coefficient for CAPEX is 0.2373, which is positive and

Table 2. Descriptive statistics

Variables	N	Mean	SD	Q1 (25th)	Q2 (Median)	Q3 (75th)
ESG	182	30.975	20.607	11.03	30.205	48.790
CAPEX	182	−3.715	1.635	−4.079	−3.341	−2.754
CEO_BOARD_MEMBER	182	0.368	0.484	0	0	1
SIZE	182	9.831	1.626	8.447	10.01	10.581
LEV	182	0.183	0.145	0.05	0.171	0.276
ROA	182	0.059	0.081	0.009	0.048	0.102
LOSS	182	0.176	0.382	0	0	0
AGE	182	3.286	0.487	2.833	3.219	3.761
BOARD_SIZE	182	9.137	1.991	8	9	10
IND_BOARD	182	0.485	0.271	0.364	0.465	0.559

Source(s): Created by the authors

Table 3. Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) ESG	1.0000								
(2) CAPEX	0.3947***	1.0000							
(3) SIZE	0.3939***	0.1545**	1.0000						
(4) LEV	0.2274***	0.0877	0.3013***	1.0000					
(5) ROA	−0.0597	0.1955***	−0.1797**	−0.3675***	1.0000				
(6) LOSS	−0.1326*	−0.1260*	−0.0105	0.2146***	−0.5743***	1.0000			
(7) AGE	−0.1288*	0.0216	−0.1958***	−0.3622***	0.3581***	−0.3007***	1.0000		
(8) BOARD_SIZE	0.1694**	0.0161	0.1682**	0.0914	−0.1308*	0.1207*	0.0088	1.0000	
(9) IND_BOARD	0.0020	0.0276	−0.1984***	0.0365	−0.0576	−0.0217	−0.0961	−0.2380***	1.0000

Note(s): ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Created by the authors

Table 4. Regression result – association between CAPEX and ESG

Variables	ESG
CAPEX	*0.2373*** (3.54)*
SIZE	0.2974*** (5.85)
LEV	−0.3595 (−0.68)
ROA	−1.7811* (−1.85)
LOSS	−0.4620** (−2.54)
AGE	−0.3466** (−2.14)
BOARD_SIZE	0.0472* (1.68)
IND_BOARD	0.2008 (0.92)
Constant	1.3322* (1.86)
Observations	182
Adjusted *R*-squared	0.430
YEAR	Yes
INDUSTRY	Yes

Note(s): Robust *t*-statistics in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All variables are defined in Appendix
Source(s): Created by the authors

statistically significant at the 1% level (t = 3.54). It can be inferred that firms with rising CAPEX tend to have better ESG scores, which supports the hypothesis that CAPEX is positively related to ESG. Approximately 43% of the volatility in ESG may be attributed to the independent variables included in the model, which the adjusted R squared value of 0.430 indicates in the suggested model. The size, ROA, loss, age and board size all have substantial coefficients that show other determinates of ESG. Taken together, these regression results strongly suggest that hypothesis *H1* can be confirmed – that is, CAPEX is positively correlated with ESG. The findings of this study provide evidence that CAPEX is a component of ESG performance, suggesting that companies investing in fixed assets are more likely to be interested in sustainable practices. In addition, the firm size variable, age and governance factors, such as the board size, indicate that a firm's internal features affect its capacity to manage and enhance its ESG results. From a practical standpoint, for firms that are keen to enhance their ESG performance, more attention should be paid to the capital investment priorities that support both governance and sustainability goals. Firms might also need to reconsider their board composition and governance practices to better align with their ESG goals, given that larger boards seem to have a positive influence on ESG performance. Furthermore, the negative association between profitability and ESG suggests that firms may need to balance short-term financial performance with long-term sustainability goals. Investment in ESG might come at a cost initially, although the long-term benefits – such as enhanced reputation, compliance and risk management – can outweigh such cost over time.

4.3 Moderation result

Table 5 presents the regression results derived from the analysis of the impact of CEO board membership on the association between CAPEX and ESG. The dependent variable in this table is the ESG score. The CEO_BOARD_MEMBER is a binary variable that takes a value of 1 if the CEO is a board member and 0 otherwise. At the 10% level of significance (t = 1.92), the CAPEX coefficient of 0.1220 is positive and statistically significant. There is a negative coefficient for CEO_BOARD_MEMBER, which is −0.5016, although this coefficient is not significant. The coefficient for the interaction term (CAPX1_ln *

Table 5. Moderation test of CEO board member on the association between CAPEX and ESG

Variables	(1) ESG
CAPEX	*0.1220* (1.92)*
CEO_BOARD_MEMBER	*−0.5016 (−1.38)*
CAPEX * CEO_BOARD_MEMBER	*−0.1752* (−1.93)*
SIZE	0.3024*** (5.97)
LEV	−0.3646 (−0.63)
ROA	−1.8008 (−1.47)
LOSS	−0.4312** (−2.14)
AGE	−0.3925** (−2.14)
BOARD_SIZE	0.0640** (2.16)
IND_BOARD	0.0390 (0.25)
Constant	1.0870 (1.42)
Observations	152
Adjusted *R*-squared	0.469
YEAR	Yes
INDUSTRY	Yes

Note(s): Robust *t*-statistics in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All variables are defined in Appendix
Source(s): Created by the authors

CEO_BOARD_MEMBER) is −0.1752, with a t-statistic of −1.93. A *p*-value of less than 0.1 signifies that the interaction term is statistically significant at the 10% level. The negative coefficient indicates that the positive impact of CAPEX on ESG is weakened when the CEO concurrently serves as a board member. An increase in CAPEX often enhances ESG; however, this positive effect diminishes by 0.1752 when the CEO occupies a board position. More specifically, while an increase in CAPEX generally leads to higher ESG performance, this positive impact is reduced by 0.1752 when the CEO holds a board position.

4.4 Additional analyses

4.4.1 Alternative measures of ESG. Table 6 provides the results of the regression that analysed the impact of CAPEX on ESG by using different measures of ESG. We measured the dependent variable using the environmental pillar score (EPS), social pillar score (SPS) and governance pillar score (GPS), as shown in columns (1), (2) and (3), respectively. The positive impact of CAPEX on the EPS and SPS is positively and statistically significant ($p < 0.01$), suggesting that higher CAPEX improves environmental and social performance. However, CAPEX's impact on the GPS is positive but not significant (coefficient of 0.0642). The model accounts for both year and industry effects, with the adjusted R-squared values indicating that the model explains 41.1%, 39.1% and 32.2% of the variability in the EPS, SPS and GPS, respectively.

To further verify the moderating impact's strength, we carried out the analysis by including the three subcomponents of ESG. We added the interaction term of CAPEX and CEO board membership (CEO_BOARD_MEMBER) to test whether CEO board membership moderates the CAPEX-ESG performance relationship. As columns (4) to (6) of Table 6 indicate, the interaction term (CEO_CAPX) with social pillar score (SPS) and governance pillar score (GPS) is also negative and highly significant. These findings indicate that the positive relationship between CAPEX and environmental and social performance is diluted in the presence of the CEO as the board chair, as indicated by our core results. It is

Table 6. Additional test – alternative measures of ESG

Variables	(1) EPS	(2) SPS	(3) GPS	(4) EPS	(5) SPS	(6) GPS
CAPX	0.4630*** (3.00)	0.4351*** (4.87)	0.0642 (1.18)	0.4557** (2.47)	0.4868*** (5.87)	0.0921 (1.59)
CEO_BOARD_MEMBER				−0.1281 (−0.13)	−1.3952*** (−2.68)	−0.7314** (−2.15)
CAPEX * CEO_BOARD_MEMBER				0.0131 (0.05)	−0.4551*** (−3.32)	−0.1912** (−2.28)
SIZE	0.4523*** (4.20)	0.3568*** (5.18)	0.0693* (1.68)	0.4469*** (3.47)	0.3803*** (6.17)	0.0782* (1.78)
LEV	−1.1065 (−0.94)	−1.7599** (−2.25)	1.6813*** (3.54)	−1.2376 (−1.04)	−1.9109** (−2.49)	1.5852*** (3.32)
ROA	−6.1160** (−2.40)	−2.7693* (−1.96)	−0.4493 (−0.54)	−6.2606** (−2.27)	−2.7003** (−2.09)	−0.4503 (−0.55)
LOSS	−1.0130** (−2.52)	−0.5944** (−2.30)	−0.1049 (−0.77)	−1.0269** (−2.23)	−0.4500* (−1.77)	−0.0601 (−0.44)
AGE	0.0259 (0.06)	−0.3260 (−1.52)	0.0854 (0.51)	0.0967 (0.21)	−0.4278** (−2.04)	0.0759 (0.45)
BOARD_SIZE	0.0671 (0.86)	0.0399 (1.12)	0.0516** (1.98)	0.0701 (0.90)	0.0372 (0.99)	0.0553** (2.07)
IND_BOARD	−0.4182 (−1.24)	0.2135 (1.05)	0.3175 (0.90)	−0.4451 (−1.20)	0.2562 (1.26)	0.2996 (0.84)
Constant	0.1450 (0.09)	0.9631 (0.98)	1.9597** (2.54)	0.1362 (0.09)	1.2504 (1.26)	2.0893*** (2.68)
Observations	125	182	182	125	182	182
Adjusted *R*-squared	0.411	0.391	0.322	0.402	0.437	0.336
YEAR	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes

Note(s): Robust *t*-statistics in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All variables are defined in Appendix
Source(s): Created by the authors

another confirmation that the governance structure is essential to determining the ESG implications of investment decisions.

4.4.2 Lagged model. Table 7 displays the results of the regression analysis addressing the influence of lagged CAPEX and other lagged firm characteristics on ESG. The incorporation of lagged variables is relevant to this analysis because it captures the time it takes for such factors to "translate" to ESG results, given that most corporate strategies, such as capital investments or structural changes, are likely to require time before being reflected in improved ESG scores. This approach provides a proper conception of the situation, especially in terms of identifying the temporal relations between past actions and current sustainability practices. Moreover, the results demonstrate a significant positive association between lagged CAPEX and ESG, with a coefficient of 0.2683 ($p < 0.01$). This significant association indicates that capital investment, which includes investments in new technologies, infrastructures or sustainability projects in the previous period, has a significant and positive effect on the ESG score of firms in the current period. This suggests that those firms that invest in CAPEX likely increase their level of investment in improvements that will improve their ESG standing in the long-run.

To further test the robustness of our findings – particularly regarding the moderating role of CEO board membership – we extended the lagged regression analysis by incorporating an interaction term between lagged CAPEX and CEO board membership (L.CAPEX × CEO_MEM). This specification enables us to evaluate whether the moderating effect holds when accounting for the temporal delay in translating capital investments into ESG outcomes. The regression findings (Column 2, Table 7) indicate that the interaction term is negative and significant. This means that the positive moderating role of lagged CAPEX on the ESG performance is diminished when the CEO is a board member too. This conclusion aligns with *H2*, which proposed that the relationship between CAPEX and ESG is moderated by the CEO's membership on the board of directors because it influences whether the investment choices are made with the sustainability goals in mind. The persistence of this

Table 7. Additional test – effect of CAPEX on ESG using the lag model

Variables	(1) ESG	(2) ESG
L.CAPX	*0.2683*** (3.82)*	*0.2768*** (3.86)*
L.CEO_BOARD_MEMBER		*−0.4433 (−1.25)*
L.CAPEX * L.CEO_BOARD_MEMBER		*−0.1848* (−1.80)*
L.SIZE	0.3221*** (4.78)	0.3272*** (5.17)
L.LEV	−0.7391 (−1.35)	−0.7563 (−1.39)
L.ROA	−1.9313** (−2.08)	−1.7736* (−1.97)
L.LOSS	−0.5589*** (−3.18)	−0.4902*** (−2.79)
L.AGE	−0.3558** (−2.14)	−0.4250*** (−2.62)
L.BOARD_SIZE	0.0363 (1.13)	0.0362 (1.12)
L. IND_BOARD	−0.0237 (−0.18)	0.0109 (0.08)
Constant	1.4589* (1.93)	1.5573** (2.04)
Observations	163	163
Adjusted R^2	0.446	0.461
YEAR	Yes	Yes
INDUSTRY	Yes	Yes

Note(s): Robust *t*-statistics in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All variables are defined in Appendix
Source(s): Created by the authors

interaction effect within the lagged model supports our conceptual framework's robustness and theoretical coherence.

4.4.3 After implementation of the international financial reporting standards in 2017. Table 8 presents a comparative regression analysis to evaluate whether adopting IFRS in 2017 altered the relationship between capital expenditure and ESG disclosure. In the pre-IFRS period (2014–2016), column 1, CAPEX has a positive but statistically insignificant effect on ESG performance. Column 2, investigated the impact of CAPEX on ESG performance after the adoption of the International Financial Reporting Standards (IFRS) in 2017. The findings show that CAPEX has a positive relationship with the ESG score, with an estimated coefficient of 0.2420 ($p < 0.01$), implying that, after the adoption of the IFRS, a firm's capital investment is highly correlated with its ESG performance. The rise in the trend of CAPEX–ESG correlation after 2017 indicates that the IFRS might have maintained or even improved the soundness and accountability of firms, thereby effectively increasing direct CAPEX in way that could assist firms in boosting their ESG scores.

4.4.4 Propensity score matching. To mitigate the potential endogeneity and functional form misspecification, we utilised propensity score matching (PSM), as illustrated in Table 9 (Shipman, Swanquist, and Whited, 2017). Armstrong, Jagolinzer and Larcker (2010) conclude that PSM can help to reduce the problem of confounding information by ensuring the balance of the covariate between the treatment and control groups. In line with the approach of Shipman *et al.* (2017), we ran a logistic regression model with the same control variables as in the baseline regression model. Next, we generated a dummy variable for CAPEX, setting it to 1 when CAPEX is higher than the mean and 0 otherwise. We matched the treatment firm observations (CAPEX_DM = 1) with the control firm observations (CAPEX_DM = 0) on a one-to-one basis by industry and year using the expected propensity scores from the logistic model. Moreover, the psmatch2 STATA command was utilised to perform the PSM with MEAN_CAPEX as the treatment variable, ESG as the outcome and the pscore as the propensity score. The common support was enforced, and a calliper of 0.01 was used for the radius matching procedure. We then obtained pooled samples from the matched pairs for our baseline regression analysis.

Table 8. Regression result – effect of CAPEX on ESG after 2017

Variables	(1) Pre 2017	(2) post 2017
CAPX	*0.1314 (0.86)*	*0.2403*** (3.56)*
SIZE	0.4410** (6.66)	0.2727*** (5.33)
LEV	−1.3333 (−1.93)	−0.3695 (−0.67)
ROA	1.7685 (2.52)	−1.5752 (−1.51)
LOSS	−1.9293** (−4.94)	−0.4301** (−2.09)
AGE	−4.9952** (−5.65)	−0.3577** (−2.15)
BOARD_SIZE	0.0865 (1.09)	0.0462 (1.62)
IND_BOARD	1.2825* (2.97)	0.2145 (0.96)
Constant	15.8928** (4.33)	1.4495* (1.87)
Observations	17	165
Adjusted R^2	0.991	0.413
YEAR	Yes	Yes
INDUSTRY	Yes	Yes

Note(s): Robust *t*-statistics in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All variables are defined in Appendix
Source(s): Created by the authors

Table 9. Additional test – propensity score match results

Variables	(1) ESG	(2) ESG
CAPX	*0.2314*** (2.89)*	*0.2667*** (3.24)*
CEO_BOARD_MEMBER		*−1.3589** (−2.57)*
CAPEX * CEO_BOARD_MEMBER		*−0.3639*** (−3.40)*
SIZE	0.3054*** (2.85)	0.3690*** (4.37)
LEV	−0.1815 (−0.16)	−0.7979 (−0.71)
LOSS	−0.1158 (−0.34)	−0.0287 (−0.09)
AGE	0.0976 (0.28)	−0.0204 (−0.06)
BOARD_SIZE	0.0641 (1.22)	0.0661 (1.23)
IND_BOARD	1.6291 (1.51)	1.8084 (1.65)
Constant	−1.1373 (−0.60)	−1.0419 (−0.58)
Observations	79	79
Adjusted R^2	0.385	0.454
YEAR	Yes	Yes
INDUSTRY	Yes	Yes

Note(s): Robust *t*-statistics in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All variables are defined in Appendix
Source(s): Created by the authors

The PSM procedure results in Table 9 column 1 demonstrate that CAPEX and ESG performance have a positive relationship, with a combined PSM estimate of 0.2314 ($p < 0.01$), supporting our hypothesis that CAPEX is positively related to ESG performance. By using PSM in this analysis, we observe that the observed link between CAPEX and ESG is less biased due to being confounded by other factors, boosting the evidence in support of our findings.

As an additional robustness test to determine the strength of the moderating effect of CEO board membership, we are also using a Propensity Score Matching (PSM) method to eliminate possible endogeneity bias with the firm characteristics that may influence capital investment decision-making and ESG performance concurrently. This specification estimates the interaction effect between CAPEX and CEO board membership using matched samples to ensure greater comparability between treatment and control groups. The coefficients in Table 9, Column 2, indicate that the interaction term is negative and significant, explaining the adverse effects of the CEO on the board to the positive impact of CAPEX on ESG outcomes, as we found earlier. This result further supports *H2* and highlights the robustness of the moderating impact even after accounting for selection bias. Overall, the consistency of findings across matched samples strengthens the credibility of our proposed mechanism.

4.4.5 Two-stage least squares regression. We performed a two-stage least squares (2SLS) regression, as outlined by Wooldridge (2010), to mitigate the potential endogeneity problems in our analysis. In line with Hasan *et al.* (2014), Cook, Moser, and Omer (2017), we employ the industry-year mean CAPEX (MEAN_CAPEX) as an instrumental variable to eliminate the potential endogeneity in the firm-level capital expenditure. Here, we employed the industry-mean CAPEX (MEAN_CAPEX) as an instrumental variable in relation to the possibly endogenous CAPEX variable. The MEAN_CAPEX is defined by taking the mean CAPEX for the industry in that year. It fulfils the relevance requirement because it would be expected that firms in the same industry and the same year are exposed to more or less the same environmental pressures of economic and regulatory factors and, therefore, face some

similarity in their investment behaviour. It also satisfies the exogeneity condition, as industry-level CAPEX is unlikely to directly influence a specific firm's ESG disclosure score, except through its effect on its investment behaviour. The first-stage regression confirms the instrument's strength and significance, supporting its validity. The first stage equation is presented in column 1 of Table 10, exploring the relationship between MEAN_CAPEX and CAPEX, which is significantly negative ($t = -2.3391$, $p < 0.01$). This implies that a firm with lower industry-level CAPEX is likely to have a higher CAPEX at the individual level.

The result of the second-stage regression is presented in column 2 of Table 10. The coefficient of CAPEX is again significantly positive at 0.2218 ($p < 0.01$), showing an association with ESG performance. This result suggests that firms with higher CAPEX tend to have superior ESG performance, even after controlling for possible endogeneity. In accordance with the hypothesis of the present study, the linear regression coefficient when applying the 2SLS method reflected the positive correlation of CAPEX with ESG performance. This approach enhances the credibility of the findings by reducing the endogeneity problem that might otherwise have affected the research when using a cross-sectional analysis to test for CAPEX's positive effects on ESG.

We examine whether the interaction between CAPEX and CEO board membership remains robust when accounting for potential simultaneity between ESG performance and investment decisions. As reported in Table 10, Column 4, the interaction term remains negative and statistically significant, consistent with our baseline in Table 5. This finding suggests that CEO board membership continues to weaken the positive association between CAPEX and ESG outcomes even after correcting for endogeneity. The persistence of this moderating effect under the 2SLS framework provides further empirical support for *H2*, reinforcing the theoretical and statistical robustness of our results.

5. Conclusion

This study examines the association between CAPEX and ESG performance in Saudi non-financial firms from 2014 to 2023 and explores how CEO board membership moderates this relationship. This study posits that CAPEX and ESG reporting are positively and significantly related. It also assumes that the relationship between CAPEX and ESG is moderated by CEO board membership. In fact, the results indicate a positive and statistically significant association between CAPEX and ESG, which supports the assumption that firms that invest more in CAPEX have better ESG outcomes. This signifies that firms that are dedicated to long-term strategic investments are inclined to emphasise sustainable policies, as evidenced by their ESG scores. The results highlight the importance of capital investment in enhancing a firm's ESG performance and sustainability. Moreover, A key insight of the study is the moderating effect of CEO board membership. The analysis reveals that CEO presence on the board weakens the positive relationship between CAPEX and ESG, potentially due to governance challenges or conflicts of interest. This indicates that leadership structure – particularly CEO board membership – can influence whether capital investments are effectively aligned with sustainability goals. The present study makes a number of significant contributions to the literature. Prior studies have not considered CAPEX as a determinant of ESG; hence, this study is the first in the Saudi context to investigate the impact of CAPEX on ESG. Therefore, it extends the existing literature because it is a directed and focused study on CAPEX and ESG performance, revealing a strong connection between CAPEX and corporate sustainability performance. Additionally, this research extends the existing literature by incorporating the moderating role of CEO board membership in the context of analysing the role of governance mechanisms in

Table 10. Additional test – two-stage least squares regression analysis

Variables	(1) First-stage model	(2) ESG	(3) First-stage model	(4) ESG
CAPEX		0.2218*** 4.03		0.2610*** 4.45
CEO_BOARD_MEMBER			0.5020 (1.03)	−0.7417** (−2.08)
CAPEX * CEO_ BOARD_MEMBER			0.1289 (1.04)	–0.2708*** (−3.00)
MEAN_CAPEX	−2.3391*** (−13.33)		−2.2693*** (−11.99)	
SIZE	−0.068 (−1.10)	0.2982*** −6.63	−0.0714 (−1.15)	0.3121*** (7.18)
LEV	2.9122*** −4.85	−0.312 (−0.66)	2.9247*** 4.85	−0.4194 (−0.91)
ROA	2.9871** −2.31	−1.6843* (−1.70)	2.9668** 2.29	−1.7012* (−1.77)
LOSS	0.5747** −2.45	−0.4534*** (−2.60)	0.5342** 2.23	−0.3644** (−2.15)
AGE	0.0008 0	−0.3479** (−2.55)	0.0043 0.02	−0.4277*** −3.18
BOARD_S~E	−0.0496 (−1.35)	0.0469* −1.74	−0.0511 (−1.38)	0.0425 (1.62)
IND_BOARD	−0.148 (−0.52)	0.2014 −0.97	−0.1291 (−0.45)	0.2481 (1.23)
Constant	−2.5539** (−2.58)	1.2610* −1.66	−2.6145*** (−2.63)	1.4830** (2.00)
Observations	182	182	182	
Adjusted R^2		0.43	0.43	

Note(s): Robust *t*-statistics in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All variables are defined in Appendix
Source(s): Created by the authors

enhancing the effectiveness of CAPEX in achieving ESG targets. Firms may need to pay special attention to the impact of the CEO's board membership on coordinating CAPEX with ESG objectives. These outcomes indicate the urgency of the need for firms to pursue profitability in the context of the Saudi Vision 2030. Thus, cutting-edge ESG concepts must be incorporated into company management without compromising profitability. In sum, future researchers may re-examine the findings of this study by extending the sample period to assess the impact after the Saudi Stock Exchange announced the ESG disclosure standards at the end of 2021. Future researchers may apply the approach of this study in different contexts to compare the results with those derived in the Saudi context.

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Further reading

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Appendix

Table A1 Definitions of utilised variables

Variable	Definition
CAPEX	Natural log of the ratio of CAPEX to total assets
ESG	We obtained ESG measure from the Refinitiv database and is measured on a continuous scale from 0 to 100, representing a firm's overall performance across environmental, social, and governance dimensions. The score is expressed as a percentage, with higher values indicating stronger ESG performance
CEO_BOARD_MEMBER	Dummy variable coded as 1 if the CEO concurrently serves as a board member, and 0 otherwise
SIZE	The natural logarithm of the total assets
LEV	The ratio of the total debt to total assets
ROA	Net income divided by total assets
LOSS	Dummy variable that takes on the value 1 when the net income is negative and 0 otherwise
AGE	The natural logarithm of the company's age, which is determined by subtracting the current year from the founding date
BOARD_SIZE	The number of directors makes up the board's size and independent board members
IND_BOARD	Ratio of independent board members to board size number

Source(s): Created by the authors

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