

Board gender diversity, investment efficiency and sustainable growth: evidence from Gulf Cooperation Council

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Abstract

Purpose – This study aims to examine the impact of board gender diversity on sustainable growth by considering the mediating role of investment efficiency (INVEFF) in this relationship and the threshold effect between board gender diversity and INVEFF. This investigation focuses on the Gulf Cooperation Council (GCC) region, which is characterized by rapid socio-economic transformations and a recent emphasis on gender diversity.

Design/methodology/approach – Panel data regressions are applied to estimate the impact of board gender diversity on INVEFF using companies listed in the GCC in 2013–2022 as a sample. The estimations consider subsamples of underinvestment and overinvestment, as well as the pre- and post-COVID-19 pandemic periods.

Findings – The empirical results show a nonlinear impact of board gender diversity on INVEFF, a relationship that is more pronounced in the underinvestment subsample. The results indicate that INVEFF mediates the relationship between board gender diversity and corporate sustainable growth, which helps companies optimize their board composition to enhance their sustainable growth strategies.

Research limitations/implications – These findings could inform GCC regulators in mandating further increases in women's presence on boards of directors to improve INVEFF. This study examined only GCC-listed companies. Future research should investigate other factors influencing INVEFF and conduct comparative studies across Middle Eastern and North African countries to consider different regulatory and economic contexts and to examine compliance with international standards.

Social implications – This study reveals the significant nonlinear impact of board gender diversity on INVEFF and the mediation of INVEFF in the relationship between board gender diversity and sustainable growth. These findings will help companies optimize their board of directors' composition by increasing the presence of women on boards to improve their INVEFF and sustainable growth. This study aims to develop knowledge that will not only benefit companies regarding the potential impact of board gender diversity but also help international communities create better gender equality within companies.

Originality/value – To the best of the author's knowledge, this study is the first to explore the relationship between board gender diversity and INVEFF in the emerging economies of the GCC region. It is also the first to examine the nonlinear relationship between board gender diversity and INVEFF and the mediating role of INVEFF in the relationship between board diversity and sustainable growth. This study contributes to the understanding of the financial impact of board gender diversity in improving corporate INVEFF and sustainable growth.

Keywords Board gender diversity, Investment efficiency, Sustainable growth, GCC, Panel data

Paper type Research paper

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1. Introduction

In the last decade, the diversity of corporate boards of directors has attracted growing international public interest, especially after the emergence of the Sustainable Development Goals (SDG) adopted by the United Nations (UN) in 2015. The UN has developed these goals to achieve a sustainable economy. The SDGs include gender equality. The board's

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gender diversity has played a significant role in satisfying society's growing demand for gender equality, and it is considered strong evidence of a company's compliance with the SDGs. The importance of board gender diversity has grown exponentially and attracted the interest of researchers, financial regulators and rating agencies (such as Fitch, Standard and Poor's and Moody's). These agencies have undertaken social assessments based on governance information disclosed by companies to obtain scores that assist society in assessing companies' compliance with social standards.

This study focuses on Gulf Cooperation Council (GCC) countries, where economic transformations and a growing emphasis on gender equality standards and SDGs ([World Bank, 2021](#)). These countries present a unique context in which to examine the impact of board gender diversity on corporate financial decisions. Previous research has broadly explored the association between board gender diversity and various financial metrics, such as financial performance ([Zaid et al., 2020](#); [Marinova et al., 2016](#); [Sarhan et al., 2019](#); [van den Oever and Beerens, 2021](#); [Ali et al., 2020](#); [Mazzotta and Ferraro, 2020](#); [Fernández-Temprano and Tejerina-Gaite, 2020](#); [Vairavan and Zhang, 2020](#); [Issa et al., 2021](#)), dividend payout ([Byoun et al., 2016](#); [Tahir et al., 2020](#)) and working capital management ([Khan et al., 2021](#); [Hatane et al., 2022](#)). However, the specific relationship between board gender diversity, investment efficiency (INEFF) and sustainable growth in the GCC region remains underexplored.

This study aims to bridge this gap by examining the potential impact of board gender INEFF and its role in promoting sustainable corporate growth in the GCC context. A few studies have demonstrated the importance of gender diversity in corporate governance, particularly its impact on investment decisions, highlighting that gender-diverse boards contribute to improved decision-making and risk management ([Jizi and Nehme, 2017](#); [Saad and Belkacem, 2021](#); [Rodriguez et al., 2023](#)), leading to improved INEFF. This importance is especially pertinent in the context of GCC countries, where economic transformations shape corporate practices ([Chowdhury and Maung, 2013](#); [Grassa and Gazdar, 2014](#); [Jizi et al., 2022](#)). Gender diversity brings a variety of perspectives that foster innovative strategies ([Jing and Herremans, 2019](#); [Fouad et al., 2022](#)) vital for INEFF and sustainable growth.

Against this background, we conducted this study to address three main questions:

- Q1. What is the impact of board gender diversity on INEFF?
- Q2. Does the presence of women on the board of directors affect corporate sustainable growth?
- Q3. What is the role of INEFF in the relationship between board gender diversity and sustainable growth?

This study aims to achieve the following objectives:

- examine the relationship between board gender diversity and INEFF (RO1);
- explore the association between board gender diversity and sustainable growth (RO2); and
- investigate the mediating role of INEFF in the relationship between board gender diversity and sustainable growth (RO3).

This study contributes to the literature by providing new insights into the nexus between board gender diversity, INEFF and sustainable growth, particularly in the context of emerging economies like the GCC. It not only enriches the academic debate but also offers practical implications for regional financial regulators and corporate governance frameworks to implement effective mechanisms of gender equality and improve further compliance with board diversity (BDIV) best practices. The empirical findings may inform GCC regulators to further incorporate BDIV into the corporate governance framework and

improve the INVEFF of GCC-listed companies. To the best of the author's knowledge, no study has examined the relationship between board gender diversity and INVEFF in the GCC region. This study provides the first insight into this topic in the context of emerging economies.

The findings indicate that GCC-listed companies nominated more women on their boards. The impact of board gender diversity on INVEFF is examined by applying different panel data estimations, and the empirical results reveal a nonlinear relationship between them. These results suggest that the low presence of women on boards is negatively associated with INVEFF, while reaching a certain percentage of board gender diversity, the presence of women on boards improves INVEFF. Furthermore, INVEFF is shown to be a mediator in the relationship between board gender diversity and sustainable growth. These results contribute to the empirical literature by providing a better understanding of the impact of board gender diversity on corporate INVEFF and sustainable growth. The findings of this study can help listed companies optimize their board of directors' composition and improve their INVEFF and sustainable growth strategies.

The remainder of the paper is organized as follows: Section 2 includes a literature review and hypotheses development. Section 3 presents an overview of gender diversity in GCC countries. Section 4 presents the sample, data, variables and methodology. The empirical results are included in Section 5, and the conclusions are presented in Section 6.

2. Literature review and hypothesis development

2.1 Board diversity and investment efficiency

INVEFF is a company's ability to take on profitable projects with a positive net present value (NPV) in the absence of market antagonisms (such as adverse selection and agency costs). Underinvestment occurs when projects with a positive NPV are not undertaken, whereas overinvestment occurs when projects with a negative NPV are undertaken (Myers and Majluf, 1984).

The role of women in corporate management has been studied under various theories, including the resource dependence theory, institutional theory and critical mass theory. Resource dependence theory states that a company's structure depends on its external and environmental conditions (Pfeffer, 1972). The presence of women on a board can provide access to a broader range of resources, knowledge and perspectives, which may enhance a firm's capacity to make efficient investment decisions. A gender-diverse board can provide unique insights and ideas, thereby facilitating the identification of better investment opportunities and enabling more effective risk management (Wiersema and Bantel, 1992). Institutional theory states that companies implement practices to respond to social rather than economic pressure (Meyer and Rowan, 1977; DiMaggio and Powell, 1983). Social pressures include cultural values and regulations. The presence of women on the board can be considered as a response to institutional pressures for gender diversity to promote gender balance. By responding to these institutional pressures, organizations with female representation on the board may enhance the company's legitimacy within society (Oliver, 1991). This alignment with institutional expectations can improve INVEFF. Critical mass theory states that the influence of minority group members, such as women, on group dynamics and decision-making processes becomes more significant when they achieve a critical mass, often considered to be at least 30% representation (Kanter, 1977). When the proportion of women on the board reaches this critical mass, their diverse perspectives, cognitive styles and experiences are more likely to be recognized, valued and integrated into decision-making processes. Consequently, this can lead to a more comprehensive analysis, informed debate, effective decision-making and enhanced INVEFF.

In the empirical literature, some studies have examined the indirect impact of BDIV on INVEFF and indicated that the presence of women on boards increases investment in

research and development (Midavaine *et al.*, 2016), mitigates information asymmetry (Abad *et al.*, 2017) and improves efficient innovation processes (Bernile *et al.*, 2018), which leads to better INVEFF. Only a few studies have examined the direct relationship between BDIV and INVEFF. Most of these latter studies focused on China (Ali *et al.*, 2022; Ullah *et al.*, 2020; Chu and Oldford, 2022), whereas Med bechir and Jouirou (2021) focused on a more comprehensive Asian context, including China, India, Indonesia, Japan, South Korea and Thailand. Ali *et al.* (2022) confirm the positive impact of BDIV on INVEFF, as female directors bring more innovations and new technologies into a company's operations, which leads to an increase in output by minimizing inputs. Ullah *et al.* (2020) find that the presence of women on boards improves the decision-making process within a company, reducing investment inefficiency. This result is corroborated by Chu and Oldford (2022), who confirmed that female directors improve a company's resource allocation, leading to lower investment inefficiency and higher financial performance. However, Med bechir and Jouirou (2021) indicate that BDIV is negatively associated with Asian companies' INVEFF. This result is explained by the likelihood of female directors being more risk-averse and slower in their decision-making processes than male directors. This result is corroborated by Yu (2023), who confirms that female directors are more conservative in their investment strategy.

There is no single study on the direct impact of BDIV on INVEFF in the GCC region. However, Ellili (2020) indicated that the BDIV of UAE-listed companies is associated with a lower cost of capital, which may lead to higher INVEFF. Thus, we argue that such examinations should not be limited to the impact of board gender diversity on INVEFF but should be extended to include nonlinear relationships and threshold effects. Following resource dependence, institutional and critical mass theories, as well as previous studies confirming the association between board gender diversity and INVEFF, we do not formulate a hypothesis for the direct association between board gender diversity and INVEFF, as the link is evident. Thus, we suggest a nonlinear relationship between board gender diversity and INVEFF and propose the following hypothesis:

H1. There is a nonlinear relationship between board gender diversity and INVEFF.

This hypothesis implies that board gender diversity improves INVEFF only by reaching a threshold point to gain more power on the board of directors.

2.2 Board diversity and sustainable growth

Gender diversity is considered an essential board attribute (Miller and Del Carmen Triana, 2009; García-Meca *et al.*, 2015; Vafaei *et al.*, 2015; Reguera-Alvarado *et al.*, 2017; Terjesen *et al.*, 2016; Unite *et al.*, 2019). The role of women on boards has been studied under various theories, including agency theory, stakeholder theory and upper echelon theory. Agency theory states that the board of directors is an effective corporate governance mechanism for controlling managerial behavior and corporate activities (Jensen and Meckling, 1976). According to this theory, a board with female representation may lead to enhanced monitoring and management control. The presence of women on boards could reduce the likelihood of collusion, increase objectivity in decision-making and improve corporate sustainable growth by mitigating conflicts of interest and promoting more judicious decision-making (Fama and Jensen, 1983).

Stakeholder theory holds that a company should consider the various interests of its stakeholders. This theory suggests that a company should design its operations to enhance the satisfaction of its different stakeholders (Freeman, 1984). The presence of women on boards may facilitate the incorporation of broader perspectives, resulting in more balanced stakeholder-centric decisions. By considering the diverse interests of various stakeholder groups, boards with female representation may identify better opportunities that align with the company's strategic objectives and values, as well as the expectations of its

stakeholders, thereby fostering corporate sustainable growth. Upper echelon theory asserts that the managerial background of a company's top executives can predict its performance (Hambrick and Mason, 1984). From this perspective, the presence of women in the top management team, particularly on the board of directors, may boost the implementation of policies and practices that promote diversity, inclusiveness and tolerance among employees and increase a company's performance (Cook and Glass, 2014). A gender-diverse board with various backgrounds and perspectives may enhance corporate sustainable growth by promoting a more comprehensive understanding of the business environment and reducing potential biases in decision-making.

Most empirical studies have explored the impact of gender-diverse boards on financial performance, but there is no consensus on the type of impact. Sarhan *et al.* (2019), Mazzotta and Ferraro (2020), van den Oever and Beerens (2021) and Issa *et al.* (2021) suggest that BDIV has a positive impact on financial performance, suggesting that the presence of women on the board helps the company gain legitimacy, improves the board monitoring function and develops more effective decision-making skills. However, Marinova *et al.* (2016), Fernández-Temprano and Tejerina-Gaite (2020), Vairavan and Zhang (2020) and Issa *et al.* (2021) indicate that board gender diversity has no impact on financial performance, which can be explained by the low presence of women on boards, thus, reducing the possibility of finding significant results.

Recently, many studies have investigated the impact of board gender diversity on sustainability performance, as measured by nonfinancial disclosures. These disclosures provide stakeholders with detailed nonfinancial information, such as environmental impact, social responsibility and corporate governance, and lead to corporate sustainable growth through different mechanisms. These mechanisms vary and include improving transparency, gaining stakeholders' trust, reducing financing constraints and enhancing human capital (Wang *et al.*, 2022). In addition, these disclosures contribute to the improvement of corporate INVEFF (Ellili, 2022b), decrease in the cost of capital (Ellili, 2020), improvement of risk management, reduction of asymmetry problems (Menla Ali *et al.*, 2024), drive of corporate innovation (Chen *et al.*, 2023), gain of customer loyalty, compliance with regulatory requirements (Boufounou *et al.*, 2023) and creation of competitive advantage (Zhou *et al.*, 2022). Nonfinancial disclosures are several and include corporate social responsibility (CSR) disclosure (Ahmad *et al.*, 2018; Harjoto *et al.*, 2015; Hartmann and Carmenate, 2021; Hoang *et al.*, 2018; Aladwey *et al.*, 2022; Azam *et al.*, 2019; Kiliç *et al.*, 2015; Khan *et al.*, 2019; Al Maeeni *et al.*, 2022), environmental disclosure (Galia *et al.*, 2015; Konadu *et al.*, 2022; Tingbani *et al.*, 2020), sustainability disclosure (Al-Jaifi, 2020; Cucari *et al.*, 2018; Ferrero-Ferrero *et al.*, 2013; Ismail and Latiff, 2019) and environmental, social and governance (ESG) disclosure (Lagasio and Cucari, 2019; Wan Mohammad *et al.*, 2022; Bhatia and Marwaha, 2022; De Masi *et al.*, 2021; Jizi *et al.*, 2022; Ellili, 2022a, 2023). The empirical results from these studies do not converge, although most of them highlight the positive impact of board gender diversity on nonfinancial disclosure, suggesting that female directors are more committed to social objectives and values (Harjoto *et al.*, 2015; Hartmann and Carmenate, 2021; Aladwey *et al.*, 2022; Azam *et al.*, 2019; Kiliç *et al.*, 2015; Khan *et al.*, 2019; Al Maeeni *et al.*, 2022; Galia *et al.*, 2015; Konadu *et al.*, 2022; Tingbani *et al.*, 2020; Al-Jaifi, 2020; Ferrero-Ferrero *et al.*, 2013; Lagasio and Cucari, 2019; Wan Mohammad *et al.*, 2022; Bhatia and Marwaha, 2022; De Masi *et al.*, 2021; Ellili, 2023). However, there are studies with either the opposite impact (Cucari *et al.*, 2018; Ismail and Latiff, 2019) or a nonsignificant association due to the low presence of women on boards (Ahmad *et al.*, 2018; Hoang *et al.*, 2018).

Notably, Ain *et al.*'s (2022) study of the impact of board gender diversity on the sustainable growth of Chinese listed companies from 2003 to 2017 revealed that the presence of women on boards positively affects sustainable growth. The findings suggest that female directors contribute to strengthening corporate governance, mitigating agency problems

and improving the board's control abilities, thereby increasing corporate sustainable growth.

In examining the relationship between board gender diversity and sustainable growth, following [Ross et al. \(2022\)](#), *sustainable growth* is defined as the maximum rate at which a company can grow and sustain itself based on its internal resources, without additional equity and debt. BDIV enhances decision-making ([Sarhan et al., 2019](#); [Mazzotta and Ferraro, 2020](#); [van den Oever and Beerens, 2021](#); [Issa et al., 2021](#)), leading to effective resource management aligned with long-term sustainable objectives. In addition, BDIV enhances commitment to social values ([Wan Mohammad et al., 2022](#); [Bhatia and Marwaha, 2022](#); [De Masi et al., 2021](#); [Ellili, 2023](#)), leading to the integration of stakeholder interests into corporate strategies. This integration supports sustainable growth initiatives without the need for external financing.

In the context of the GCC region, no study has been conducted on the impact of BDIV on corporate sustainable growth. However, based on the agency theory, stakeholder theory, upper echelon theory and [Ain et al.'s \(2022\)](#) findings, the presence of women on boards can improve sustainable corporate growth. Hence, we propose the following hypothesis:

H2. There is a positive relationship between BDIV and sustainable growth.

2.3 Investment efficiency and sustainable growth

The association between INVEFF and sustainable growth is essential in corporate finance. Two main theories have been proposed to explain the potential impact of INVEFF on a firm's ability to achieve sustainable growth: the dynamic capabilities theory and the market timing theory. Dynamic capabilities theory suggests that a firm's ability to adapt, integrate and reconfigure its resources in response to rapidly changing environments is essential for sustainable growth ([Teece et al., 1997](#)). INVEFF is crucial for developing dynamic capabilities, as it enables companies to effectively allocate resources to initiatives that enhance their ability to adapt to market changes and maintain a competitive edge, thereby fostering sustainable growth. In contrast, market timing theory emphasizes the importance of a company's ability to invest time according to market conditions ([Baker and Wurgler, 2002](#)). INVEFF plays a significant role in market timing, as it requires companies to accurately assess investment opportunities and make decisions in alignment with current market conditions. Efficient investment decisions enable companies to capitalize on market opportunities and promote sustainable growth.

Despite the importance of this topic, only a few studies have examined the association between INVEFF and sustainable growth, and most have focused on sustainable growth at the macroeconomic level. These studies indicate that national sustainable growth is promoted through efficient investment in innovation ([Castellacci and Natera, 2013](#); [Dosi et al., 2017a, 2017b](#)) or human capital ([Gennaioli et al., 2013](#)). At the microeconomic level, [Becchetti et al. \(2015\)](#) and [Harymawan et al. \(2022\)](#) highlight the positive association between INVEFF and CSR. In particular, [Becchetti et al. \(2015\)](#) investigate the relationship between CSR, stakeholder risk and idiosyncratic volatility to explain the impact of CSR activities on a company's specific risk. The findings reveal that companies with higher CSR performance have lower idiosyncratic volatility and are less exposed to company-specific risk. This finding is explained by the positive impact of CSR on reducing the risk associated with various stakeholders such as employees, customers, suppliers and the environment. These results highlight the importance of integrating CSR strategies into a company's risk management practices to enhance its reputation and long-term financial performance and foster sustainable growth. [Harymawan et al. \(2022\)](#) explore the relationship between INVEFF and ESG disclosure. The results indicate a positive association between ESG disclosure quality and INVEFF, suggesting that transparent ESG disclosures help companies make better investment decisions and allocate resources more effectively.

These results can be explained by the role of ESG disclosure in mitigating information asymmetry, enhancing communication between companies and their stakeholders, increasing long-term financial performance and achieving sustainable growth.

In exploring the relationship between INVEFF and corporate sustainable growth, *INVEFF* is defined as a company's ability to allocate resources optimally to maximize the NPV of future returns (Myers and Majluf, 1984), indicating that investments are optimal when they contribute positively to a firm's value. In addition, *sustainable growth* is defined as the maximum growth rate a company can achieve without additional equity or debt (Ross et al., 2022), promoting a balance between expanding operations and maintaining financial stability without additional funds. These definitions suggest that not all efficient investments are sustainable because they may require external resources, which is not aligned with the definition of sustainable growth. However, sustainable growth does not always require new investments, as it is achieved by improving operational efficiency within existing resources and enhancing the growth rate without additional financing. In addition, not all sustainable investments are efficient, as they might result from an over-investment of internal funds in nonprofitable projects with a negative NPV.

In the context of the GCC region, there no study has been conducted on the impact of INVEFF on corporate sustainable growth. However, based on dynamic capabilities theory, market timing theory and the abovementioned macro- and microeconomic studies, INVEFF improves long-term financial performance, thereby promoting sustainable growth. Hence, we propose the following hypothesis:

H3. There is a positive relationship between INVEFF and sustainable growth.

2.4 Mediation of investment efficiency in the relationship between board diversity and sustainable growth

Board gender diversity enhances corporate decision-making by introducing diverse perspectives, cognitive styles and experiences, leading to more effective investment analysis and decisions (Kanter, 1977). In addition, female directors provide a variety of insights, ideas and experiences, promoting innovative strategies and new technologies (Jing and Herremans, 2019; Fouad et al., 2022), increasing investment in research and development (Midavaine et al., 2016), strengthening corporate governance (Ain et al., 2022), reducing agency problems (Abad et al., 2017) and improving investment decisions (Ali et al., 2020). As a result, the improvement of investment decisions influenced by board gender diversity would contribute to INVEFF, reflected in better resource allocation (Chu and Oldford, 2022) and risk management (Jizi and Nehme, 2017; Saad and Belkacem, 2021; Rodriguez et al., 2023; Wiersema and Bantel, 1992). Moreover, board gender diversity contributes to improving financial performance (Sarhan et al., 2019; Mazzotta and Ferraro, 2020; van den Oever and Beerens, 2021; and Issa et al., 2021) and enhancing CSR (Al Maeeni et al., 2022; Bhatia and Marwaha, 2022; Ellili, 2023; Konadu et al., 2022; Lagasio and Cucari, 2019). These improvements could be achieved through INVEFF that would support corporate sustainable growth through improved profitability and enhanced corporate reputation, which are important for attracting and retaining investors and meeting stakeholders' expectations. Furthermore, INVEFF helps companies to adapt and respond to environmental challenges by maintaining competitiveness and achieving sustainable growth. This capability is important in dynamic and competitive markets, where timely and effective adaptation is key to long-term success (Baker and Wurgler, 2002).

In this study, we posit that the long-term impact of board gender diversity, mediated by improved INVEFF, is sustainable growth. This transition reflects an accumulation of internal resources that enhances a company's ability to grow and sustain over time without external financing. The pathway from board gender diversity through better INVEFF to sustainable

growth includes a strategic improvement in a firm's operational and financial performance. Thus, we propose the following hypothesis:

- H4. INVEFF mediates the relationship between board gender diversity and sustainable growth.

3. Overview of gender diversity in Gulf Cooperation Council countries

Gender diversity is perceived as an important attribute of the board of directors, which significantly contributes to the effectiveness of corporate governance and enhances financial performance (Zaid *et al.*, 2020; Marinova *et al.*, 2016; Sarhan *et al.*, 2019; van den Oever and Beerens, 2021; Ali *et al.*, 2020; Mazzotta and Ferraro, 2020; Fernández-Temprano and Tejerina-Gaite, 2020; Vairavan and Zhang, 2020; Issa *et al.*, 2021). Following the launch of the SDGs and, more particularly, gender equality, there has been increasing recognition of the importance of the role of women in leadership positions in the GCC region.

GCC countries have significantly promoted gender diversity in corporate leadership through the implementation of many initiatives. For instance, Bahrain established the Bahrain Business Women's Society and Supreme Council for Women to promote the presence of women in corporate management. Saudi Arabia's Vision 2030 includes initiatives for women's participation in the workforce. Kuwait's Vision 2035 emphasizes women's economic empowerment. Oman has implemented initiatives for gender equality and women's political participation. Qatar's National Vision 2030 focuses, among others, on increasing women's workforce contributions. The UAE updated its corporate governance code in 2020 and included, among other new rules, empowering female representation on listed companies' boards. Many of these countries are committed to enhancing gender diversity and women's empowerment in corporate management [1], demonstrating regional commitment to women's empowerment in business leadership roles. This approach aligns with global trends and the objectives of the SDGs, reflecting an evolving perspective on gender roles in businesses within the GCC region. The initiatives across GCC countries to enhance female representation on corporate boards and management positions primarily align with SDG 5, which aims to achieve gender equality and empower women. In addition, these efforts contribute to SDG 8, which promotes sustained, inclusive and sustainable economic growth. These efforts aim to achieve full and productive employment; decent work for all women and men, including young people and persons with disabilities; and equal pay for work of equal value.

4. Sample and data

4.1 Data

This study examined the potential impact of BDIV on the INVEFF and sustainable growth of nonfinancial companies listed on GCC financial markets from 2013 to 2022. Following Yu (2023), our sample excludes financial institutions because of their different accounting rules and investment purposes. In the last decade, GCC countries have implemented various initiatives to boost gender equality, primarily to increase women's presence on boards. Thus, the impact of board gender diversity on INVEFF and corporate sustainable growth in the region is worth examining. We collected board gender diversity and accounting data from Bloomberg Terminal. The total number of nonfinancial companies traded in GCC financial markets during 2013–2022 was 264. We exclude companies with no available information on BDIV. The final sample included 34 nonfinancial companies listed on the GCC financial markets, including Bahrain, the Kingdom of Saudi Arabia (KSA), Kuwait, the Sultanate of Oman, Qatar and the United Arab Emirates [2]. Overall, there was low availability of information on board gender diversity across nonfinancial companies in these GCC countries. The UAE had the highest percentage of nonfinancial companies with

available information on board gender diversity compared to other countries in the GCC region. Qatar, Bahrain and KSA were in the middle range, whereas Kuwait and Oman had the lowest percentages of nonfinancial companies with available information on BDIV, indicating a significant gap in publicly available data on this aspect.

Table 1 illustrates the distribution of companies across GCC countries in our sample. Emirati and Saudi companies were the major contributors to the sample. Together, they represent 64.7% of the total number of companies. Omani companies are in the middle range, representing 11.76% of the total sample. Bahraini, Kuwaiti and Qatari companies had a small representation, with less than 10% of the sample.

Table 2 illustrates the distribution of companies across the industries in our sample, with telecommunication being the leading industry with the highest contribution to the sample of 23.53%, followed by real estate and manufacturing, with the respective representations of 20.59% and 17.65%. Together, these industries represent 61.77% of the total sample. Energy was in the mid-range with five companies representing 14.71% of the total sample. Consumer staples and transportation had the lowest representation of the sample, at 11.76% for each.

Figure 1 Presents the theoretical model and hypotheses

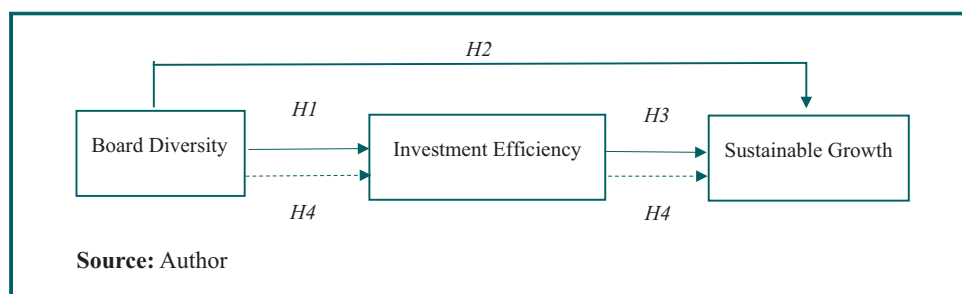


Table 1 Distribution of companies per country

Country	No. of companies	Percentage in the total sample (%)
Bahrain	2	5.88
The Kingdom of Saudi Arabia	10	29.41
Kuwait	3	8.82
The Sultanate of Oman	4	11.76
Qatar	3	8.82
The United Arab Emirates	12	35.29
Total	34	100

Source: The table is developed by the author

Table 2 Distribution of companies per industry

Country	No. of companies	Percentage in the total sample (%)
Consumer staples	4	11.76
Energy	5	14.71
Manufacturing	6	17.65
Real estate	7	20.59
Telecommunication	8	23.53
Transportation	4	11.76
Total	34	100

Source: The table is developed by the author

4.2 Variables

The variables used in this analysis were divided into four main groups: BDIV (subsection 4.2.1), sustainable growth (subsection 4.2.2), INVEFF (subsection 4.2.3) and control variables (subsection 4.2.4).

4.2.1 Board diversity. In this study, the first independent variable was BDIV, measured as the percentage of female representation on the board. Previous studies confirm that BDIV has a positive impact on a company's financial performance (Zaid *et al.*, 2020; Marinova *et al.*, 2016; Sarhan *et al.*, 2019; van den Oever and Beerens, 2021; Ali *et al.*, 2020; Mazzotta and Ferraro, 2020; Fernández-Temprano and Tejerina-Gaite, 2020; Vairavan and Zhang, 2020; Issa *et al.*, 2021). Thus, its potential impact on INVEFF and sustainable growth is worth exploring.

4.2.2 Sustainable growth. There are many measures of corporate sustainability, such as sustainability reports (Braam and Peeters, 2018; Stacchezzini *et al.*, 2016), social and environmental scores (Schaefer, 2004) and ESG scores (Drempetic *et al.*, 2020; Venugopal *et al.*, 2023). In this study, we followed Ross *et al.* (2022) and measured sustainable growth using the sustainable growth rate (g), as it reflects the core aspect of operational performance and dividend policy, supporting corporate sustainable development.

The growth rate (g) is calculated as follows:

$$g = \text{return on equity} \times \text{retention rate}$$

where the retention rate is the percentage of net income not paid out as dividends to the shareholders.

$$\text{Retention rate} = (\text{net income} - \text{dividends})/\text{net income}$$

4.2.3 Investment efficiency. In this study, we consider the INVEFF metric developed by Zhong and Gao (2017), based on the absolute residuals derived from the investment model proposed by Biddle *et al.* (2009). In this model, the absolute value captures all deviations associated with the efficiency of a company's investment choices. A negative residual from equation (1) signals an underinvestment problem, whereas a positive residual suggests an overinvestment problem. The absolute value of the residuals is multiplied by -1 , with a higher value indicating better INVEFF.

Investment (INV) is a function of sales growth, as shown in equation (1):

$$\text{INV}_{i,t} = \beta_0 + \beta_1 \text{NEG}_{i,t-1} + \beta_2 \text{GROWTH}_{i,t-1} + \beta_3 \text{NEG}_{i,t-1} * \text{GROWTH}_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where:

INV = (investment expenditures/beginning value of assets) $\times$ 100.

NEG = dummy variable taking the value of 1 if sales growth is negative and 0 otherwise.

GROWTH = ([ending value of sales – beginning value of sales]/beginning value of sales) $\times$ 100.

4.2.4 Control variables. The control variables included other attributes of the board of directors, such as size (BSIZE) and independence (BIND). We did not consider board duality in this study because none of the companies in the sample had a dual board. The control variables include financial performance (ROA), financial resources (SLACK), asset tangibility (TANG), leverage (LEV), size (SIZE) and age (AGE). Table 3 presents the notations and measures of all control variables. We included all of these control variables in our analysis because of their potentially significant impacts on INVEFF. Smaller boards are more effective (Yermack, 1996; Eisenberg *et al.*, 1998; Conyon and Peck, 1998; Bennedsen *et al.*, 2008), whereas larger boards offer stability but are less dynamic in their investment decision-making (Cheng, 2008). BIND can enhance INVEFF through its involvement in strategic decision-making by fostering a collaborative environment, leading to more effective corporate governance

Table 3 Control variables

Variables	Notation	Measure
Board size	BSIZE	The number of directors on the board
Board independence	BIND	The percentage of independent directors on the board
Return on assets	ROA	(Net income/total assets) × 100
Financial resources	SLACK	Cash/ fixed assets
Assets' tangibility	TANG	(Fixed assets/total assets) × 100
Leverage	LEV	(Total liabilities/total assets) × 100
Size	SIZE	Logarithm (total assets)
Age	AGE	Age of the company

Source: The table is developed by the author

(Westphal, 1999). Furthermore, independent directors contribute to better decision-making, as they are less influenced by internal management and are more likely to prioritize shareholder interests (Uribe-Bohorquez *et al.*, 2018). High financial performance improves INVEFF, suggesting that improved financial performance enhances a firm's ability to allocate resources effectively and reduces both overinvestment and underinvestment (Yu, 2023). Abundant financial resources and high asset TANG improve INVEFF because they contribute to reducing constraints on a firm's investment choices and improve INVEFF (Elili, 2022b). In particular, financial resources provide firms with the flexibility to make timely and effective investment decisions, and asset TANG enhances a firm's access to external funds as tangible assets are used as collateral. Furthermore, low LEV can improve INVEFF (Ling and Wu, 2022), because high LEV can lead to reluctance to invest in profitable projects or engage in risky investment. A larger company decreases INVEFF; thus, the size of the company constitutes an obstacle to INVEFF. This result might be due to the complex organizational structures leading to inefficiencies in communication and decision-making processes (Elili, 2022b). A company's age can also enhance INVEFF because older companies have more stable market positions and cash flows, leading to more effective resource allocation (Elili, 2022b).

4.3 Methodology

The first stage of this study tests the potential impact of BDIV on INVEFF and sustainable growth. The second stage explored the impact of INVEFF on sustainable growth. Models 2, 3 and 4, which test *H1*, *H2* and *H3*, respectively, are as follows:

$$\begin{aligned} \text{INVEFF}_{i,t} = & \beta_0 + \beta_1 \text{BDIV}_{i,t-1} + \beta_2 \text{BDIV}_{i,t-1}^2 + \beta_3 \text{BSIZE}_{i,t-1} + \beta_4 \text{BIND}_{i,t-1} + \beta_5 \text{ROA}_{i,t-1} \\ & + \beta_6 \text{SLACK}_{i,t-1} + \beta_7 \text{TANG}_{i,t-1} + \beta_8 \text{LEV}_{i,t-1} + \beta_9 \text{SIZE}_{i,t-1} + \beta_{10} \text{AGE}_{i,t-1} \\ & + \beta_{11} \text{Dummy Country}_{i,t-1} + \beta_{11} \text{Dummy Industry}_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

$$\begin{aligned} g_{i,t} = & \beta_0 + \beta_1 \text{BDIV}_{i,t-1} + \beta_2 \text{BDIV}_{i,t-1}^2 + \beta_3 \text{BSIZE}_{i,t-1} + \beta_4 \text{BIND}_{i,t-1} + \beta_5 \text{LEV}_{i,t-1} \\ & + \beta_6 \text{SIZE}_{i,t-1} + \beta_7 \text{AGE}_{i,t-1} + \beta_8 \text{Dummy Country}_{i,t-1} + \beta_9 \text{Dummy Industry}_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

$$\begin{aligned} g_{i,t} = & \beta_0 + \beta_1 \text{INVEFF}_{i,t-1} + \beta_2 \text{LEV}_{i,t-1} + \beta_3 \text{SIZE}_{i,t-1} + \beta_4 \text{AGE}_{i,t-1} \\ & + \beta_5 \text{Dummy Country}_{i,t-1} + \beta_6 \text{Dummy Industry}_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

5. Empirical results

5.1 Descriptive statistics

Table 4 shows the descriptive statistics of BDIV, INVEFF, sustainable growth and control variables. The statistics indicate that on average, the companies have a very low presence of

Table 4 Descriptive statistics for all variables

<i>Variables</i>	<i>No. of observations</i>	<i>Mean</i>	<i>SD</i>	<i>Minimum</i>	<i>Maximum</i>
BDIV	340	3.92	5.9244	0	22.22
BSIZE	340	8.74	1.6293	5	18
BIND	340	57.93	26.5741	0	100
INVEFF	340	−3.34	4.1732	−41.11	0
g	340	5.58	12.5719	−49.42	160.57
ROA	340	5.41	7.6133	−52.50	38.19
SLACK	340	0.37	0.6380	0.02	9.10
TANG	340	45.03	22.7634	4.26	92.40
LEV	340	27.38	17.2186	0	77.71
SIZE	340	3.95	0.8637	1.90	5.68
AGE	340	26.79	14.7401	6	67

Source: The table is developed by the author

women on their boards of directors, with an average of 3.92%. The average BSIZE was 8.74 members, while the average BIND was 57.93%. On an average, companies invested efficiently at a level of 3.34. ROA has an average of 5.41%. On average, cash represents 37% of fixed assets and fixed assets represent 45.03% of total assets. The companies in the sample have an average LEV of 27.38% and a mean age of 26.79 years.

Table 5 shows the trend of the presence of women on boards during 2013–2022 and reflects the different impacts of the various gender diversity initiatives described in Appendix 1. Although the overall percentage is low, there is a positive trend from 2.62% in 2013 to 7.69% in 2022. The trend in BDIV was unstable over the observation period, starting from 2.62% in 2013 to 4.25% in 2016, and then decreasing to 3.03% in 2017 and 2.59% in 2018. In 2019, BDIV slightly increased to 2.73% and continuously increased in the remaining years, reaching the highest value of 7.69% in 2022. Board gender diversity remains low, with the most significant increase occurring in 2021 and 2022, indicating a regional focus on gender equality. In terms of BDIV statistics per country, Table 5 illustrates that Bahrain started with no board gender diversity in 2013, and then the presence of women on its companies' boards increased to 5% in 2015, remained stable at 10% between 2015 and 2020 and continuously increased to 6.24% and 7.69% in 2021 and 2022, respectively. This gradual increase in board gender diversity reflects Bahrain's consistent efforts at gender diversity, such as the establishment of the Bahrain Business Women's Society. The KSA had no BDIV until 2015, but starting in 2016, the presence of women on board witnessed a slight but steady increase until 2022, reaching 4.54%. This indicates that the KSA's Vision 2030 and its associated reforms are yet to translate into significant BDIV. Kuwait began with a relatively high board gender diversity in 2013, at 13.39%, with a slight decrease in 2015 and a sharper decrease in 2017. Later, its board gender diversity fluctuated, but remained around 8% and 9%, reaching 8.92% in 2022. The most recent increase reflects Kuwait's Vision 2035 for gender equity, leading to a steadier improvement in female representation on boards. The Sultanate of Oman started with no

Table 5 Trend in board gender diversity of GCC-listed companies per country (%)

	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>2022</i>
Overall	2.62	2.79	3.73	4.25	3.03	2.59	2.73	3.50	6.24	7.69
Bahrain	0	5	10	10	10	10	10	10	15	15
KSA	0	0	0	2.24	2.24	2.02	2.15	1.81	3.63	4.54
Kuwait	13.39	13.39	12.63	12.63	8.46	9.25	7.14	8.46	8.46	8.92
The Sultanate of Oman	0	0	0	0	0	0	0	0	0	4.67
Qatar	18.25	4.76	8.46	8.46	4.76	0	0	0	0	0
UAE	1	2.42	2.96	2.96	1.68	1.68	2.87	4.63	10.39	11.43

Source: The table is developed by the author

gender diversity on its board from 2013 to 2020. However, by 2022, it increased to 4.67%, indicating a recent focus on gender diversity, reflecting Oman's long-term commitments to gender equality. Qatar started with the highest BDIV among all GCC countries in 2013 at 18.25%. However, there was a sharp decrease in 2014, with fluctuations until 2016, and then remained at zero from 2017 to 2022. This trend might reflect the challenges in translating national commitments into corporate practices. In the UAE, BDIV gradually increased between 2013 and 2016, with a few fluctuations in 2017 and 2018, and it increased significantly in the remaining years, reaching 11.43% in 2022. This trend reflects the UAE's recent legislative efforts to increase female representation on boards, showing a promising increase and alignment with its leading position in female workforce participation in the GCC region.

Overall, there was an increase in board gender diversity in the GCC countries, except for Qatar, which had a trend different from that of the other countries, starting with a high value of board gender diversity but ending with no diversity. Bahrain, the KSA, Kuwait and the UAE showed an improvement in board gender diversity from 2020 onwards, indicating a recent emphasis on the role of women on the board of directors.

Table 6 presents the pairwise correlation coefficients between various variables, including BDIV, INVEFF and the control variables. As shown below, BDIV is negatively correlated with assets' TANG and positively correlated with the age of the company (AGE). BSIZE is negatively correlated with both sustainable growth (g) and LEV, while it is positively correlated with company SIZE and AGE. BIND is positively correlated with financial resources (SLACK), but negatively correlated with LEV, SIZE and AGE of the company. INVEFF and financial performance are negatively correlated with both assets' TANG and LEV. Sustainable growth (g) is positively correlated with financial performance (ROA) and negatively correlated with the age of the company (AGE). Table 7 reveals that all correlation coefficients have an absolute value lower than 0.7, indicating the absence of multicollinearity among the independent variables in the regression (Kervin, 1992). Furthermore, the results presented in Table 5 demonstrate that all variance inflation factors (VIF) are very low, confirming the absence of multicollinearity.

5.2 Impact of board diversity on investment efficiency

The regression of panel data with fixed effects validated the presence of individual effects. The Hausman test indicated that regression with random effects was more efficient than that with fixed effects. Moreover, the VIF confirmed the absence of multicollinearity. Breusch–Godfrey and Breusch–Pagan tests detected the respective problems of autocorrelation and heteroskedasticity that have been fixed using Generalized Least Square (GLS) (Med bechir and Jouirou, 2021). The results of Model 2 regressions are presented in Table 8.

Table 6 Pearson correlation coefficients

	BDIV	BSIZE	BIND	INVEFF	g	ROA	SLACK	TANG	LEV	SIZE	AGE
BDIV	1										
BSIZE	0.0628	1									
BIND	0.0503	0.0107	1								
INVEFF	0.0238	0.0094	0.0226	1							
g	0.0862	0.1354*	0.0136	0.0355	1						
ROA	0.0587	0.065	0.0448	0.0122	0.2332*	1					
SLACK	0.032	0.0353	0.1232*	0.0866	0.0658	0.2994*	1				
TANG	0.1596*	0.0718	0.0470	0.2358*	0.0869	0.1165*	0.4574*	1			
LEV	0.0272	0.1549*	0.2133*	0.1650*	0.0079	0.3770*	0.2739*	0.4448*	1		
SIZE	0.0859	0.2385*	0.2148*	0.026	0.0339	0.0047	0.0746	0.1320*	0.0852	1	
AGE	0.1805*	0.2824*	0.2504*	0.0902	0.1633*	0.1109*	0.0600	0.0520	0.0066	0.1207*	1

Note: *Significant at a level of 5%

Source: The table is developed by the author

Table 7 Variance inflation factors (VIF)

<i>Variable</i>	<i>VIF</i>	<i>1/VIF</i>
TANG	2.09	0.478141
SLACK	1.87	0.534149
AGE	1.45	0.691189
LEV	1.42	0.703092
BSIZE	1.34	0.743584
ROA	1.25	0.801075
BIND	1.23	0.812677
SIZE	1.19	0.841273
INVEFF	1.10	0.910264
BDIV	1.10	0.913073
Mean VIF	1.40	

Source: The table is developed by the author

Table 8 Impact of board diversity on investment efficiency

<i>Independent variables</i>	<i>Random effects</i>	<i>GLS</i>
BDIV _{t-1}	-0.4184*** (-2.93)	-0.3930*** (-2.72)
BDIV ² _{t-1}	2.3757** (2.44)	2.2503** (2.10)
BSIZE _{t-1}	0.0173 (1.28)	0.0630 (1.26)
BIND _{t-1}	-0.0344*** (-2.71)	-0.0223*** (-2.59)
ROA _{t-1}	0.0215 (1.54)	0.0223* (1.72)
SLACK _{t-1}	-0.0579 (-1.26)	-0.1867* (-1.86)
TANG _{t-1}	-0.0285 (-1.42)	-0.0385** (-2.05)
LEV _{t-1}	0.0317 (0.52)	0.0173 (0.97)
SIZE _{t-1}	0.5380 (1.28)	0.4449 (1.29)
AGE _{t-1}	-0.0734*** (2.63)	-0.0565*** (3.33)
Country effect	No	No
Industry effect	No	No
Prob > chi ²	0.0004	0.000

Notes: *Significant at a level of 10%; **Significant at a level of 5%; ***Significant at a level of 1%

Source: The table is developed by the author

The results in [Table 8](#) validate *H1* and reveal a nonlinear relationship between BDIV and INVEFF, and both BDIV and BDIV² have significant impacts. In particular, BDIV has a negative impact, whereas the impact of BDIV² is positive. This result confirms that female directors with low presence on the board negatively influence INVEFF, corroborating the results of [Med bechir and Jouirou \(2021\)](#) and [Yu \(2023\)](#). BDIV² has a positive impact on INVEFF. This result corroborates [Ullah et al. \(2020\)](#) and [Chu and Oldford \(2022\)](#), suggesting that the presence of women on boards improves the decision-making process and enhances resource allocation.

Moreover, the results reveal that once the percentage of women on boards reaches an inflection point of 8.73% [\[3\]](#), the impact of board gender diversity on efficiency becomes positive. This result confirms the suggestion of the critical mass theory ([Kanter, 1977](#)), which holds that once women reach a critical mass on board, their experiences are more likely to be recognized and valued. Female directors are more likely to be integrated into decision-making processes, leading to more comprehensive analysis and better INVEFF.

Both BIND and age of the company (AGE) have negative and significant impacts on INVEFF, contradicting the findings of [Westphal \(1999\)](#) and [Elili \(2022b\)](#), respectively. Our results indicate that independent directors are more risk-averse and conservative in corporate investment strategies. They may also prioritize short-term results over long-term value creation, which reduces INVEFF and growth opportunities. Similarly, older companies have lower INVEFF, which may be due to their industry stability and market dominance, leading to a lack of investment opportunities. Financial performance (ROA) has a positive and significant impact

on INVEFF, thus, confirming Yu's (2023) results. This result indicates that profitable companies enhance their INVEFF by selecting profitable projects because of their easier access to capital for future growth, optimal resource allocation and efficient risk management practices.

Both financial resources (SLACK) and assets' TANG have negative and significant impacts on INVEFF, contradicting Elili's (2022b) results. Our results reveal that companies with abundant financial resources have a lower INVEFF. This result might be due to two main reasons: a low opportunity cost associated with the abundance of cash leading to overinvestment or a nonefficient resource allocation leading to underinvestment. Moreover, the results reveal that tangible assets reduce INVEFF, which might be due to the low flexibility of companies with highly illiquid assets to financial opportunities and challenges, high maintenance costs associated with this type of asset decreasing the return on investment and low diversification in the assets' portfolio.

5.3 Impact of board diversity on sustainable growth

The regression of the panel data with fixed effects confirmed the existence of individual effects. Based on the Hausman test, a regression with fixed effects was more efficient than a regression with random effects. Furthermore, the VIF confirmed the absence of multicollinearity. The Breusch–Godfrey and Breusch–Pagan tests detected autocorrelation and heteroskedasticity, respectively, which were corrected by GLS regression. Table 9 presents all the results of the Model 3 regressions.

The results in Table 9 reject *H2* and indicate that BDIV does not have a significant impact on sustainable growth, contradicting the results of Ain *et al.* (2022). BIND is negatively and significantly associated with sustainable growth, which confirms the results in Table 8 and suggests that independent directors prioritize short-term objectives over long-term growth. Financial performance (ROA) has a positive and significant impact on sustainable growth and confirms that profitable companies efficiently utilize their assets to sustain their long-term growth and have easier access to capital and better resource allocation to maintain their long-term performance. Similarly, LEV significantly and positively affects sustainable growth, indicating that companies allocate debt resources efficiently and use them to finance profitable investments, thereby contributing to their sustainable growth.

Company SIZE and AGE are negatively and significantly associated with sustainable growth. This result indicates that larger and older companies face challenges in achieving highly sustainable growth for two reasons. Larger and older companies have, in general, well-established, complex and bureaucratic systems and processes, leading to their

Table 9 Impact of board diversity on sustainable growth

Independent variables	Fixed effects	GLS
BDIV _{t-1}	-0.1802 (1.10)	-0.0676 (-1.25)
BDIV ² _{t-1}	1.4905 (1.23)	0.4232 (1.47)
BSIZE _{t-1}	0.6787 (1.12)	0.0487 (1.17)
BIND _{t-1}	-0.0587** (-1.72)	-0.0237* (-2.02)
ROA _{t-1}	0.2001** (2.26)	0.2892*** (3.11)
LEV _{t-1}	0.0806 (1.23)	0.0762* (1.81)
SIZE _{t-1}	-1.2460* (-1.92)	-0.1529** (-2.30)
AGE _{t-1}	-0.0962* (-1.67)	-0.0885* (-1.73)
Country effect	No	No
Industry effect	No	No
Prob > F	0.0079	
Prob > chi ²		0.0070

Notes: *Significant at a level of 10%; **Significant at a level of 5%; ***Significant at a level of 1%

Source: The table is developed by the author

resistance to change and mitigation of their adaptability to restructure their systems, which is usually associated with high costs. Generally, these companies operate in mature and saturated markets, thus, limiting their growth opportunities.

5.4 Impact of investment efficiency on sustainable growth

The regression of panel data with fixed effects validates the individual effects. The Hausman test indicated that a regression with fixed effects was more efficient than a regression with random effects. The VIF confirmed the absence of multicollinearity. The Breusch–Godfrey and Breusch–Pagan tests detected the respective problems of autocorrelation and heteroskedasticity. We applied GLS regression, and the results of the Model 4 regressions are presented in Table 10.

The results in Table 10 validate *H3* and show a positive and significant relationship between INVEFF and sustainable growth, confirming the suggestions of dynamic capabilities (Teece *et al.*, 1997) and market timing theories (Baker and Wurgler, 2002). These results corroborate the findings of Becchetti *et al.* (2015) and Harymawan *et al.* (2022), confirming a positive association between INVEFF and sustainable growth, as measured by CSR and ESG disclosures. INVEFF results from effective resource allocation that mitigates company-specific risks, leading to long-term financial performance and sustainable growth.

5.5 Mediation of investment efficiency in the relationship between board diversity and sustainable growth

Following the results of Models 1, 2 and 3 in Tables 8, 9 and 10, respectively, BDIV does not have any direct impact on sustainable growth, although it is significantly related to INVEFF. In addition, INVEFF is significantly associated with sustainable growth. According to Baron and Kenny's (1986) mediation method, these findings validate *H4* and indicate that INVEFF mediates the relationship between BDIV and sustainable growth. To test this relationship, we developed Model 5 as follows:

$$g_{i,t} = \beta_0 + \beta_1 BDIV_{i,t-1} + \beta_2 BDIV_{i,t-1}^2 + \beta_3 INVEFF_{i,t-1} + \beta_4 BSIZE_{i,t-1} + \beta_5 BIND_{i,t-1} + \beta_6 ROA_{i,t-1} + \beta_7 LEV_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 AGE_{i,t-1} + \beta_{10} \text{Dummy Country}_{i,t-1} + \beta_{11} \text{Dummy Industry}_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

The regression of the panel data with fixed effects validated the individual effects, and the Hausman test indicated that regression with fixed effects was more efficient than regression with random effects. The VIF also confirmed the absence of multicollinearity. The Breusch–Godfrey and Breusch–Pagan tests detected problems of autocorrelation and

Table 10 Impact of investment efficiency on sustainable growth

Independent variables	Fixed effects	GLS
INVEFF _{t-1}	0.2377* (1.84)	0.1022** (2.06)
LEV _{t-1}	0.0570 (1.07)	0.0405 (1.42)
SIZE _{t-1}	−10.4039* (−1.78)	−0.3052** (−2.25)
AGE _{t-1}	−0.2253 (−1.43)	−0.0860** (−2.26)
Country effect	No	No
Industry effect	No	No
Prob > F	0.0021	
Prob > chi ²		0.000

Notes: *Significant at a level of 10%; **Significant at a level of 5%; ***Significant at a level of 1%

Source: The table is developed by the author

heteroscedasticity, respectively. We applied GLS regression, and the results of the Model 5 regressions are presented in Table 11.

The results in Table 11 show that the impacts of both BDIV and BDIV² are not significant, while INVEFF is positively and significantly associated with sustainable growth, indicating that board gender diversity does not directly improve corporate sustainable growth, but through INVEFF. This result leads to the conclusion that INVEFF is a full mediator in the relationship between board gender diversity and sustainable growth. When the proportion of women on the board of directors reaches an inflection point, they are more empowered to influence investment strategies directly and contribute to the decision-making process and selection of profitable projects. Consequently, companies with board gender diversity that reach the inflection point effectively allocate their resources, improve their INVEFF, increase their long-term financial performance and ensure sustainable growth.

Table 11 confirms the negative impact of BIND and positive impact of financial performance (ROA), as presented in Table 9. These results indicate that independent directors are risk-averse and prioritize short-term objectives over long-term growth. Furthermore, profitable companies efficiently utilize their assets to sustain long-term growth and allocate better resources to maintain long-term performance.

The impact of company SIZE and AGE are also similar to the results presented in Tables 9 and 10, revealing that larger and older companies have lower sustainable growth due to the maturity of their respective markets and the saturation of their industries.

5.6 Robustness analyses

5.6.1 Impact of board diversity on underinvestment and overinvestment. To further examine the relationship between board gender diversity and INVEFF, Model 1 was estimated separately for the two subsamples of underinvestment and overinvestment. The underinvestment subsample includes companies with negative residuals from equation (1), while the overinvestment subsample includes the remaining companies with positive residual values. In the underinvestment subsample, a higher value of negative residuals indicates lower underinvestment. In the overinvestment subsample, a higher value of positive residuals indicates higher overinvestment. The regression of panel data with fixed effects rejected individual effects, which led to the application of a pooled Ordinary Least Squares (OLS) regression. The VIF also confirmed the absence of multicollinearity. Breusch–Godfrey and

Table 11 Mediation of investment efficiency in the relationship between board diversity and sustainable growth

Independent variables	Fixed effects	GLS
BDIV _{t-1}	−0.1768 (1.03)	−0.0836 (−1.46)
BDIV ² _{t-1}	1.4694 (1.46)	0.8748 (1.57)
INVEFF _{t-1}	0.1763* (1.78)	0.2190** (2.13)
BSIZE _{t-1}	0.8725 (1.41)	0.07033 (1.32)
BIND _{t-1}	−0.0589* (−1.92)	−0.0480*** (−2.69)
ROA _{t-1}	0.2051* (2.31)	0.3112*** (3.26)
LEV _{t-1}	0.0631 (1.41)	0.01875 (1.55)
SIZE _{t-1}	−9.9552** (−2.11)	−1.9040** (−2.51)
AGE _{t-1}	−0.1823 (1.36)	−0.0889*** (−2.62)
Country effect	No	Yes
Industry effect	No	No
Prob > F	0.0075	
Prob > chi ²		0.000

Notes: *Significant at a level of 10%; **Significant at a level of 5%; ***Significant at a level of 1%

Source: The table is developed by the author

Breusch–Pagan tests detected problems of autocorrelation and heteroscedasticity, respectively. To control for these problems, we apply a pooled OLS regression with clustered robust errors (Baum and Hurn, 2021). The results are presented in Table 12.

Overall, Table 12 indicates that the impact of board gender diversity on INVEFF is more pronounced in the underinvestment subsample. The impacts of BDIV and BDIV² are similar to the results of the overall sample presented in Table 8, revealing a nonlinear relationship between board gender diversity and INVEFF. At a low level of gender diversity, female directors increase underinvestment, confirming that they are conservative. However, once the presence of female directors reaches the inflection point of 9.11% [4], the boards are more empowered in the decision-making process and more able to influence investment decisions and decrease underinvestment. These results corroborate the suggestions of critical mass theory (Kanter, 1977), which holds that when the proportion of women on the board reaches this critical mass, female directors' perspectives, cognitive styles and experiences are more likely to be acknowledged, considered and incorporated into decision-making processes. This results in more extensive analyses, insightful debates and more reliable decisions, thereby improving INVEFF.

The results also reveal that BSIZE has a negative and significant impact on overinvestment, confirming that BSIZE reduces investment inefficiency. A large board of directors reduces overinvestment, suggesting that additional directors ensure diverse expertise and backgrounds. This diversity leads to a more comprehensive assessment of projects and more accurate decision-making processes, leading to the rejection of investment in nonprofitable projects.

Both financial resources (SLACK) and SIZE have a positive and significant impact on overinvestment, indicating that companies with abundant financial resources are more likely to overinvest because they have low opportunity costs associated with the abundance of cash, leading to overinvestment and an increase in size. LEV has a negative and significant impact on underinvestment, whereas it is positively and significantly associated with overinvestment. This result indicates that a low level of debt increases underinvestment due to a shortage of long-term funds and a high opportunity cost. In contrast, a high level of debt is associated with overinvestment because of the abundance of funds to companies and less effective resource allocation.

5.6.2 Impact of board diversity on investment efficiency: pre- and post-COVID-19 pandemic. To further examine the relationship between board gender diversity and INVEFF, Model 1 was estimated separately in the two subsamples of the pre- and post-COVID-19

Table 12 Impact of board diversity on under-investment and over-investment

<i>Independent variables</i>	<i>Under-investment</i>	<i>Over-investment</i>
BDIV _{t-1}	−0.2079** (−2.66)	0.4490 (1.40)
BDIV ² _{t-1}	1.1414** (2.31)	−2.0651 (−1.12)
BSIZE _{t-1}	0.2027 (1.32)	−2.6260** (−2.78)
BIND _{t-1}	0.0059 (1.61)	−0.0174 (−1.06)
ROA _{t-1}	0.0252 (1.56)	−0.0584 (−1.60)
SLACK _{t-1}	−0.7235 (−1.38)	11.5174** (2.23)
TANG _{t-1}	−0.0051 (−1.36)	−0.0199 (−1.23)
LEV _{t-1}	−0.0293** (−2.30)	0.2082*** (3.17)
SIZE _{t-1}	−0.1700 (−1.63)	5.2554*** (4.45)
AGE _{t-1}	−0.0136 (−1.58)	0.0204 (1.48)
Country effect	No	No
Industry effect	No	Yes
Prob > F	0.0000	0.0000
R-squared	0.3380	0.7689

Notes: *Significant at a level of 10%; **Significant at a level of 5%; ***Significant at a level of 1%

Source: The table is developed by the author

pandemic. The pre-COVID-19 pandemic subsample includes observations from 2013 to 2019, and the post-COVID-19 pandemic subsample consists of the remaining observations from 2020 to 2022. A regression analysis of panel data with fixed effects confirmed the existence of individual effects. Based on the Hausman test, a regression with fixed effects was more efficient than a regression with random effects. Furthermore, the VIF confirmed the absence of multicollinearity. The Breusch–Godfrey and Breusch–Pagan tests detected autocorrelation and heteroskedasticity, respectively, which were corrected by GLS regression. The results are presented in Table 13.

Table 13 presents the nonlinear relationship between board gender diversity and INVEFF. The impacts of BDIV and BDIV² are similar to the results of the overall sample presented in Table 8. At a low level of board gender diversity, the female directors decrease the INVEFF, but once their presence on boards reaches the inflection points of 8.98% [5] (pre-COVID-19 subsample) and 8.90% [6] (post-COVID-19 subsample), they are more empowered in the decision-making process and more able to improve investment decisions and INVEFF. According to Kanter (1977), when the proportion of women on a board reaches a critical mass, female directors' perspectives, cognitive styles and experiences are more likely to be considered and incorporated during decision-making. This enhances INVEFF by allowing for more comprehensive analysis, insightful debate and more reliable decisions.

Table 13 indicates that none of the control variables have the same impact on INVEFF in either subsample, and their impacts vary across the subsamples. These variables can be categorized into three groups. The first group consists of variables that are significant only in the pre-COVID-19 pandemic subsample, including BIND, financial resources (SLACK) and company age (AGE). The second group includes variables that are significant only in the post-COVID-19 pandemic subsample, including BSIZE and financial performance (ROA). The third group consists of variables that are significant in both subsamples but have opposite impacts, including asset TANG, LEV and company SIZE.

5.6.3 Generalized method of moment. To further examine the nonlinear relationship between board gender diversity and INVEFF, following Nobanee and Ellili (2022), we applied the robust generalized method of moment (GMM) system estimation to dynamic panel data, as proposed by Arellano and Bover (1995) and Blundell and Bond (1998). Table 14 presents the results.

Table 13 Impact of board diversity on investment efficiency: Pre- and post-COVID-19 pandemic

Independent variables	Pre-COVID-19		Post-COVID-19	
	Fixed	GLS	Fixed	GLS
BDIV _{t-1}	−0.5643** (−2.21)	−0.3836** (−2.36)	−0.0978** (−2.22)	−0.5392*** (−3.37)
BDIV ² _{t-1}	2.9264* (1.73)	2.1352** (1.98)	—	3.0281*** (2.82)
BIND _{t-1}	−0.0660** (−2.34)	−0.0112*** (−3.91)	0.0143 (1.06)	0.0051 (1.58)
BSIZE _{t-1}	−0.6126 (−1.33)	−0.0565 (1.25)	0.1814 (1.02)	−0.4394* (−1.86)
ROA _{t-1}	−0.0348 (−1.35)	0.0219 (1.54)	0.0069 (1.22)	0.0795*** (3.81)
SLACK _{t-1}	0.4139 (1.20)	0.3423* (1.82)	−0.9116 (−1.24)	0.3166 (1.32)
TANG _{t-1}	−0.0159 (−1.22)	−0.0900*** (−2.69)	0.0003 (1.02)	0.1243*** (3.62)
LEV _{t-1}	0.0321 (1.37)	0.0541** (2.37)	−0.0450 (−1.41)	−0.0844*** (−3.56)
SIZE _{t-1}	7.4016 (1.43)	1.0395*** (3.66)	−1.9617 (−1.26)	−2.5763*** (−3.16)
AGE _{t-1}	0.0162 (1.07)	−0.0777** (−2.03)	−0.8472* (−1.94)	0.0305 (1.42)
Country effect	No	No	No	Yes
Industry effect	No	No	No	Yes
Prob > F	0.0094		0.0043	
Prob > chi ²		0.000		0.000

Notes: *Significant at a level of 10%; **Significant at a level of 5%; ***Significant at a level of 1%

Source: The table is developed by the author

Table 14 Impact of board diversity on investment efficiency: GMM

Independent variables	GMM
INEFF _{t-1}	0.2843*** (5.66)
BDIV _{t-1}	-0.1283* (-1.85)
BDIV ² _{t-1}	0.6540* (1.74)
BSIZE _{t-1}	0.0290 (1.07)
BIND _{t-1}	-0.0360* (-1.96)
ROA _{t-1}	0.0793 (1.55)
SLACK _{t-1}	-0.3956 (-1.24)
TANG _{t-1}	-0.1143** (-2.07)
LEV _{t-1}	0.2179*** (4.40)
SIZE _{t-1}	1.8639 (1.32)
AGE _{t-1}	-0.0520 (-1.04)
Country effect	No
Industry effect	No
Prob > chi ²	0.0000

Notes: *Significant at a level of 10%; **Significant at a level of 5%; ***Significant at a level of 1%
Source: The table is developed by the author

According to Table 14, there is a nonlinear relationship between board gender diversity and INVEFF. The impact of BDIV is negative, while that of BDIV² is positive, confirming the results of Model 2 presented in Table 8. When board gender diversity is low, female directors reduce their INVEFF. However, once the women's presence on boards reaches the inflection point of 9.81% [7], the female directors become more empowered in decision-making and can make better investment decisions. This result confirms the suggestion of the critical mass theory (Kanter, 1977).

Regarding the control variables, there is agreement that BIND and asset TANG reduce INVEFF. This result confirms that independent directors tend to be conservative and risk averse in their investment decisions. In addition, tangible assets decrease INVEFF, possibly because companies with highly illiquid assets have limited flexibility to respond to financial opportunities and challenges.

5.6.4 Alternative measure of investment efficiency. In this robustness analysis, we considered an alternative measure of INVEFF. Following Richardson (2006), INVEFF was measured as the deviation from the optimal investment level. Specifically, INVEFF is calculated as the residuals from Model (6). Positive residuals indicate overinvestment, whereas negative residuals indicate underinvestment. The absolute value of the residuals reflects the INVEFF; the higher the value, the lower the INVEFF. Following Zhong and Gao (2017), the absolute values were multiplied by -1, where higher values indicate better INVEFF.

$$\begin{aligned} \text{Invest}_{i,t} = & \beta_0 + \beta_1 \text{Size}_{t-1} + \beta_2 \text{Lev}_{t-1} + \beta_3 \text{Cash}_{t-1} + \beta_4 \text{Growth}_{t-1} + \beta_5 \text{ListAge}_{t-1} \\ & + \beta_6 \text{Return}_{t-1} + \beta_7 \text{Invest}_{t-1} + \sum \text{Dummy Industry} + \sum \text{Dummy Year} + \epsilon_i \end{aligned} \quad (6)$$

Invest is total investment divided by total assets at the beginning of the period; *Size* is the logarithm of total assets; *Lev* is the LEV measured by total debt divided by total assets; *Cash* is cash holdings divided by total assets at the end of the period; *Growth* is growth opportunities proxied by Tobin's (1969) Q; *ListAge* is the natural logarithm of the years the company has been listed; and *Return* is the annual stock return.

The regression of panel data with fixed effects confirmed the presence of individual effects. The Hausman test indicates that random effects are more efficient than fixed effects. The VIF also confirmed that there was no multicollinearity. Breusch–Godfrey and Breusch–Pagan tests

detected autocorrelation and heteroskedasticity, respectively, which were fixed using GLS (Med bechir and Jouriou, 2021). All the regression results are shown in Table 15.

The results in Table 15 validate corroborate those of Table 8 and indicate a nonlinear relationship between BDIV and INVEFF, showing a negative impact of BDIV and a positive impact of BDIV², confirming that female directors improve INVEFF once reach a presence on the board of 8.84% [8]. This result supports critical mass theory (Kanter, 1977), which states that women's experiences become more valued once they reach a critical mass on board, which would lead to better INVEFF.

In addition, there is agreement that independent directors are more conservative in investment decisions and older companies are less likely to invest because of their stability and dominance in the market. Moreover, companies with highly tangible assets are less flexible in terms of financial opportunities and challenges, which reduces INVEFF.

5.6.5 Alternative measure of sustainable growth rate. In this robustness analysis, we consider an alternative measure of and sustainable growth rate. Following Higgins (1977), the sustainable growth rate is measured by the maximum growth rate of a company's sales without depleting financial resources, reflecting the core aspect of sustainable development and the ability to maintain growth over time. The sustainable growth rate (g) was calculated as follows:

$$g^* = \frac{p(1-d)(1+L)}{t - p(1-d)(1+L)}$$

p is the profit margin, d is the dividend payout ratio, so $(1-d)$ indicates the retention rate, L is the total debt-to-equity ratio and t is total assets divided by net sales.

The regression of the panel data with fixed effects indicated no individual effects, leading to the application of the pooled OLS regression. In addition, the VIF confirmed the absence of multicollinearity. The Breusch–Godfrey and Breusch–Pagan tests revealed problems of autocorrelation and heteroskedasticity, respectively. These problems were resolved by applying pooled OLS regression with clustered robust errors (Baum and Hurn, 2021). The results are presented in Table 16.

The results in Table 16 indicate that neither BDIV nor BDIV² has a significant impact on sustainable growth, whereas the impact of efficiency (INVEFF) is positive and significant. These results corroborate those in Table 11 and confirm that INVEFF mediates the relationship between BDIV and sustainable growth. In addition, Table 16 confirms the

Table 15 Alternative measure of investment efficiency: Richardson's (2006)

Independent variables	Random effects	GLS
BDIV _{t-1}	-0.2246** (-2.37)	-0.1246** (-2.42)
BDIV ² _{t-1}	1.2571** (2.01)	0.7048** (2.11)
BSIZE _{t-1}	0.1895 (1.32)	0.3121*** (3.06)
BIND _{t-1}	-0.0397*** (-4.07)	-0.0326*** (-5.12)
ROA _{t-1}	-0.0153 (-1.01)	-0.0633 (-1.28)
SLACK _{t-1}	0.0109 (-1.28)	0.0217** (2.04)
TANG _{t-1}	-0.0369*** (-3.02)	-0.0281*** (-3.75)
LEV _{t-1}	0.0193 (0.71)	0.0416 (1.38)
SIZE _{t-1}	-0.3589 (-0.94)	-0.5341** (-2.24)
AGE _{t-1}	-0.0310* (-1.82)	-0.0349*** (-2.88)
Country effect	No	No
Industry effect	No	No
Prob > chi ²	0.0003	0.000

Notes: *Significant at a level of 10%; **Significant at a level of 5%; ***Significant at a level of 1%

Source: The table is developed by the author

Table 16 Alternative measure of sustainable growth rate: Higgins's (1977)

<i>Independent variables</i>	<i>Pooled OLS</i>
$BDIV_{t-1}$	-0.2555 (-1.29)
$BDIV^2_{t-1}$	1.4754 (1.07)
$INVEFF_{t-1}$	0.3145* (1.66)
$BSIZE_{t-1}$	0.1767 (1.39)
$BIND_{t-1}$	-0.0239 (-1.37)
ROA_{t-1}	0.18415** (2.09)
LEV_{t-1}	0.1421*** (3.09)
$SIZE_{t-1}$	-1.0276 (-1.07)
AGE_{t-1}	-0.1269** (-2.33)
Country effect	No
Industry effect	No
Prob > F	0.0059
R-Squared	0.1704

Notes: *Significant at a level of 10%; **Significant at a level of 5%; ***Significant at a level of 1%

Source: The table is developed by the author

positive impact of financial performance (ROA) and shows that profitable companies allocate better resources to maintain long-term performance and sustain long-term growth. The impact of company age (AGE) is also similar to the results in Table 11. This reveals that older companies have lower sustainable growth because of their respective markets' maturity and industry saturation.

6. Conclusion

This study examines the impact of board gender diversity on INVEFF and sustainable growth, using a sample of GCC-listed companies from 2013 to 2022. This research extends previous studies by considering the nonlinear impact of board gender diversity on INVEFF and the mediating role of INVEFF in the relationship between board gender diversity and sustainable growth. The data show that companies nominate more women to their boards of directors over time. The study also considers different subsamples of underinvestment and overinvestment and the pre and post-COVID-19 pandemic periods. The main empirical results reveal a nonlinear and significant relationship between BDIV and INVEFF in the overall sample and in all subsamples. This result indicates that at a low level of the presence of women on boards, female directors decrease INVEFF. However, once board gender diversity reaches an inflection point ranging from 8 to 10%, the female directors have more power to influence investment decisions and improve INVEFF accordingly. Our results further reveal that board gender diversity does not directly affect sustainable growth, but that INVEFF plays a mediating role in this relationship.

The findings of this study provide GCC-listed companies with an essential understanding of the advantages of nominating more female directors on their boards to enhance INVEFF and maintain their sustainable growth.

This study has several economic, academic, practical and policy implications. From an economic perspective, this study's findings can guide corporate financial strategies in the GCC, emphasizing the economic value of gender diversity on boards for INVEFF. In addition, by promoting gender diversity on boards, companies can take advantage of a broader range of viewpoints and skills that can drive innovation and strategic thinking. This variety could contribute to sustainable economic growth in the GCC region, because diverse leadership is better equipped to handle complex global economic issues. From an academic perspective, this study adds to the growing body of literature on board gender diversity, specifically in the context of the GCC region. This regional focus provides unique insights into the cultural and economic characteristics of GCC. Moreover, this study bridges the gap between gender

studies, corporate governance and economic growth, encouraging interdisciplinary approaches to understanding the complex business dynamics. From a practical perspective, GCC-listed companies can implement policies that promote gender diversity in board composition to improve INVEFF and decision-making. These findings may also encourage GCC-listed companies to develop gender diversity training programs to prepare future board members and foster diversity and competence on the board. The policy implications of the study's findings include insights to help financial regulatory authorities in the GCC region further implement gender diversity in corporate management and apply effective mechanisms to empower women in leadership positions to manage their financial decisions more efficiently and maintain their sustainable growth.

This study has a few limitations. First, the sample used in the analysis includes only GCC-listed companies with available information on board gender. Second, this study considers only the attributes of the board of directors; it would be beneficial to include other corporate governance mechanisms, such as ownership structure, that would affect INVEFF. Third, the INVEFF variable does not explicitly account for sustainable investments that affect corporate governance and financial performance, which may affect the generalizability of our results.

Future research could extend the scope of this study by considering Middle Eastern and North African listed companies and conducting comparative analyses between emerging and developed economies. This recommendation would be an interesting research opportunity, as most countries are experiencing growth in their board gender diversity and are making substantial efforts to demonstrate high compliance with gender equality best practices and achieve the UN's SDGs. In addition, future research should consider revising the INVEFF model to include measures of sustainable investment by integrating ESG indicators into the INVEFF variable. This integration would allow for a more in-depth analysis of the impact of sustainability-focused investments on corporate financial strategies.

Notes

1. See [Appendix 1](#) for detailed country-specific initiatives.
2. See [Appendix 2](#) for a detailed description of the available information on board gender diversity across GCC countries.
3. The inflection point of the quadratic function is calculated by deriving and solving the equation: $-0.3930x + 2.2503x^2 = 0$.
4. The inflection point of the quadratic function is calculated by deriving and solving the equation: $-0.2079x + 1.1414x^2 = 0$.
5. The inflection point of the quadratic function is calculated by deriving and solving the equation: $-0.3836x + 2.1352x^2 = 0$.
6. The inflection point of the quadratic function is calculated by deriving and solving the equation: $-0.5392x + 3.0281x^2 = 0$.
7. The inflection point of the quadratic function is calculated by deriving and solving the equation: $-0.1283x + 0.6540x^2 = 0$.
8. The inflection point of the quadratic function is calculated by deriving and solving the equation: $-0.1246x + 0.7048x^2 = 0$.
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Appendix 1: Overview of gender diversity initiatives in GCC countries

This appendix provides a comprehensive examination of the initiatives and policies implemented in Gulf Cooperation Council (GCC) countries to promote gender diversity, particularly in corporate management and governance. It offers an understanding of each country's specific efforts and progress in enhancing the role of women in leadership and decision-making positions.

1. **The Kingdom of Bahrain:** Establishment of the Bahrain Businesswomen's Society in 2001 and the Supreme Council for Women in 2001, promoting women in corporate management [9]. It adheres to international corporate governance standards [10]. It collaborates with global organizations for gender diversity, such as the United Nations Women, the United Nations Development Program (UNDP), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and regional organizations such as the Arab League (Shalaby and Marnicio, 2020).
2. **The Kingdom of Saudi Arabia:** Vision 2030 includes the National Transformation Program focusing on increasing women's labor force participation and rights in the workplace, such as the launch of the National Transformation Program (NTP) in 2016 by the Saudi Council of Economic and Development Affairs aiming, among others, to increase Saudi women's participation in the labor force and the achievement of economic and social development [11]. Significant milestones in women's roles in business and politics, such as the election in 2009 of a Saudi woman as second deputy chairman of the board of directors of the Jeddah Chamber of Commerce and Industry [12], and the appointment of two Saudi women in 2014 as members of its board. The appointment of 30 Saudi women in 2013 as members of the Shura Council, an advisory board [13]. The prohibition by Ministerial Decision 2370/1 of wage discrimination between male and female employees for work with equal value. Since 2018, Saudi women have been allowed to open a business without the consent of a male guardian [14].
3. **Kuwait:** Vision 2035 emphasizes women's economic empowerment, with initiatives such as the Women's Empowerment Program and collaborations with UN entities for gender equity in employment and education as part of the SDG 5 program of the Supreme Council for Planning and Development [15]. Kuwait University Women's Research and Studies Center, UN Women and the UN Development Program (UNDP) collaborated with Kuwait University to launch the Women's Empowerment Program (WEP) [16]. The nomination of a female president at the University of Kuwait from 1993 to 2022 [17]. In 2021, the World Bank Kuwait Country Engagement Framework (CEF) mandated the integration of gender considerations into all advisory services and the formation of Women's Affairs by the Supreme Council of Planning and Development. The CEF collaborated with the World Bank's Business Regulations for Gender Equity Advisory Team under its National Jobs Strategy Project to eliminate gender discrimination in employment [18].
4. **Oman:** Initiatives include the foundation of the Omani Women's Association in 1971, offering training programs to improve women's skills to be self-employed and self-sufficient. In 2002, the Omani government established Universal Suffrage, guaranteeing all Omani people equality and protection under the law [19]. In 2006, the Convention on Elimination of All Forms of Discrimination against Women (CEDAW) was approved. In 2008, a royal decree gave Omani women the right to own land as their male counterparts. More recently, a Decent Work Country Programme was implemented between 2010 and 2013 to offer job opportunities to Omani women [20]. In 1999, the first Omani woman was appointed ambassador to the Netherlands. In

2004, the first Omani woman was appointed Minister of Higher Education. In 2019, two Omani women were elected to Oman's Shura Council, and seven were elected to Oman's municipal council [21].

5. **Qatar:** Qatar National Vision 2030 and the National Development Strategy focused on increasing Qatari women's contributions to the workforce and national development. Qatar is a part of many agreements, such as the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) [22] and removed the provisions discriminating against women from the laws by granting several rights such as equal payment like men for the same job and equal opportunities for training and promotion. Qatar's Ministry of Labour collaborated with the International Labour Organization and engaged in many activities to promote further gender equality, diversity and inclusion, such as the organization of workshops in partnership with Qatar's university to embed women's rights into the College of Business and Economics curriculum [23]. Since 2003, three women have been appointed to ministerial positions. In addition, two women were elected to the Municipal Council in 2015, and four women were appointed to Qatar's Shura Council in 2017 (Liloia, 2019).
6. **UAE:** In 2021, the UAE cabinet required corporations and government agencies to nominate women on their boards. In addition, the Securities and Commodities Authority (SCA) [24] updated the corporate governance code in 2020 and included, among other new rules, empowering female representation on listed companies' boards. Clause 3 of Article 9 of the SCA Board Chairman's Decision No. (3/Chairman) of 2020 introduced the requirement for listed companies to nominate at least one female director on their board [25]. The UAE has the highest female participation in the workforce in the Middle East and Africa. According to the World Bank, in 2020, about 57.5% of women participated in the country's labor force [26]. In 2020, the country became the first in the region to implement paid parental leave programs in the private sector [27]. The appointment of a woman as the group chief executive officer of First Abu Dhabi Bank [28], the country's largest bank, has further highlighted the country's commitment to gender equality.

Appendix 2

Table A1 Description of the available information on board gender diversity across GCC countries during 2013–2022

Country	Total number of nonfinancial listed companies	Total number of nonfinancial listed companies with available information on board diversity	Percentage of nonfinancial listed companies with available information on board diversity
Bahrain	14	2	14.29
KSA	78	10	12.82
Kuwait	67	3	4.48
Oman	55	4	7.27
Qatar	17	3	17.65
UAE	33	12	36.36
Total	264	34	12.88

Source: The table is developed by the Author

About the author

Nejla Ould Daoud Ellili is currently a Professor of Finance at Abu Dhabi University, United Arab Emirates. She received her PhD degree in Finance from Institut Supérieur de Gestion, Tunis, Tunisia. Her research and teaching activities have been in the areas of corporate finance, corporate governance, corporate disclosure and sustainability. Her works have been published in *Renewable and Sustainable Energy Reviews*, *Corporate Governance: The International Journal of Business in Society*, *Corporate Social Responsibility and Environmental Management*, *Review of Managerial Science*, *International Review of Economics and Finance* and *Journal of Sustainable Finance and Investment*, among others. Nejla Ould Daoud Ellili can be contacted at: oulddaoudnejla@yahoo.fr

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