

The Impact of Gender-Diverse Audit Committees on Risk Management Effectiveness in GCC Firms

L'impact des comités d'audit mixtes sur l'efficacité de la gestion des risques dans les entreprises du CCG

Abstract:

This study explores the impact of gender diversity in audit committees on risk management within Gulf Cooperation Council firms. Analyzing data from 180 public companies over a decade, we found a negative correlation between the number of women on audit committees and operational risk, suggesting that female representation enhances risk management. However, this gender diversity does not significantly affect financial risk as measured by financial leverage. Women with accounting expertise positively influenced operational risk management but were associated with higher financial leverage, indicating a strategic approach to financial risk-taking. The presence of foreign women on audit committees and the size and frequency of committee meetings also played a role in risk management. Overall, our findings support increased gender diversity on audit committees as a strategic asset for effective risk management in GCC firms.

Keywords:

Gender Diversity, Risk Management, GCC Firms, Operational Risk, Financial Risk.

Résumé:

Cette étude explore l'impact de la diversité des genres dans les comités d'audit sur la gestion des risques au sein des entreprises du Conseil de coopération du Golfe. En analysant les données de 180 entreprises publiques sur une décennie, nous avons trouvé une corrélation négative entre le nombre de femmes dans les comités d'audit et le risque opérationnel, ce qui suggère que la représentation féminine améliore la gestion du risque. Toutefois, cette diversité des genres n'a pas d'incidence significative sur le risque financier, mesuré par l'effet de levier financier. Les femmes ayant une expertise comptable influencent positivement la gestion du risque opérationnel mais sont associées à un effet de levier financier plus élevé, ce qui indique une approche stratégique de la prise de risque financier. La présence de femmes étrangères dans les comités d'audit ainsi que la taille et la fréquence des réunions des comités ont également joué un rôle dans la gestion des risques. Dans l'ensemble, nos résultats confirment qu'une plus grande diversité des genres dans les comités d'audit est un atout stratégique pour une gestion efficace des risques dans les entreprises du CCG.

Mots-clés:

Diversité des genres, gestion des risques, entreprises du CCG, risque opérationnel, risque financier.

Introduction

In today's dynamic and uncertain business environment, effective risk management is crucial for the sustainable growth and success of firms (Alshirah et al., 2021). One of the key control mechanisms in place to ensure robust risk management is the role of audit committees (Edogbanya & Kamardin, 2015). Audit committees play a critical role in overseeing the financial reporting process and internal control systems, thus providing assurance regarding the effectiveness of risk management processes within the organization (Oradi & Izadi, 2019). Therefore, understanding the importance of the audit committee's role in firm risk management is essential for ensuring a proactive and agile approach to addressing risks in a constantly evolving business landscape. In recent years, there has been a growing recognition of the importance of gender diversity in corporate governance, including audit committees (Romano et al. 2020). Research has shown that gender-diverse boards and audit committees can bring unique perspectives, skills, and insights that contribute to improved decision-making and risk management effectiveness (Adams & Ferreira, 2009). Gender-diverse audit committees bring a broader range of perspectives and experiences, which can lead to a more thorough evaluation of risk factors and better decision-making processes. Studies have shown that gender-diverse teams are more likely to consider a wider range of potential risks and opportunities, leading to more effective risk management strategies (Khaw & Liao, 2018 ; Alkebeese et al., 2021). Additionally, gender-diverse audit committees may provide a more balanced and comprehensive approach to risk assessment and oversight (Oradi & Izadi, 2019). Research has also indicated that women on audit committees are more likely to prioritize risk management and ethical decision-making (Alkebeese et al., 2021).

Furthermore, a study by Adams and Ferreira found that companies with gender-diverse audit committees were associated with lower levels of risk-taking behavior, indicating a more cautious approach to risk management (Adams & Ferreira, 2009). It is important to consider that while gender diversity may bring different perspectives to the table, the argument that it directly leads to improved risk management effectiveness is not universally supported. Oradi & Izadi (2019) argue that gender differences on the audit committee may lead to a decline in the effectiveness of the audit committee, which could have implications for risk management. These mixed findings underscore the importance of studying the effect of gender diversity within audit committees as a means of enhancing risk management effectiveness and improving overall corporate governance. However, Most of the studies conducted so far on the

impact of gender diversity within audit committees and its influence on risk management effectiveness have been undertaken in the western context. It is essential to recognize the need for similar studies in the Middle East, particularly in the Gulf Cooperation Council countries, due to their unique business environment, cultural dynamics, and corporate governance structures (Nekhili et al., 2019 ; Al Damen et al., 2016).

The Gulf Cooperation Council countries play a significant role in the global economy due to their substantial contributions (Iqbal et al., 2022). Studying the impact of gender diversity within audit committees in the GCC is crucial for several reasons. Firstly, the GCC countries are major players in the global oil market, and any developments in their corporate governance, including the composition of audit committees, can have far-reaching effects on the global energy landscape and financial markets (Eskandarany, 2023). Secondly, the GCC countries are hubs for trade and investment, making their corporate governance practices and risk management effectiveness influential beyond their borders. Examining the Gulf Cooperation Council (GCC) is crucial for understanding gender diversity, audit committee effectiveness, and enterprise risk management, especially in the context of Vision 2030 (Eskandarany, 2023 ; Vision 2030, 2017) . The GCC, encompassing countries like Saudi Arabia, shares interconnected economic and social ties, providing a unique regional context. By focusing on the GCC, valuable insights can be gained into governance and diversity dynamics specific to its cultural and regulatory environment. Additionally, Vision 2030's goal of driving substantial economic and social reforms in Saudi Arabia and the broader GCC makes this study particularly relevant. It can inform policy recommendations and implications not only for Saudi Arabia but also for other GCC countries experiencing similar changes, thereby offering comprehensive insights with far-reaching regional implications. Additionally, it is worth considering the role of other factors such as nationality, education, and professional experience in shaping the effectiveness of audit committees in risk management

Therefore, studying the impact of gender-diverse audit committees on risk management effectiveness in GCC firms is not only important for the region itself but also for the global economy and financial stability. It can provide valuable insights into how diversity within audit committees influences risk management practices in a unique business environment, ultimately contributing to a better understanding of corporate governance and risk management on a global scale.

This study rigorously outlines its empirical framework by carefully selecting a sample of 180 distinct corporations publicly traded on the stock exchanges of six Gulf Cooperation Council

nations: Saudi Arabia, the United Arab Emirates, Qatar, Kuwait, Bahrain, and Oman. The study spans from the year 2013 to 2022, totaling 1800 firm-year observations and thus encapsulating a comprehensive decade for analysis. The findings of this research can provide valuable insights into the contributions of women on audit committees in GCC firms and their impact on risk management effectiveness.

The rest of the paper is organized as follows. Section 2 discusses the literature and develops the hypotheses, and Section 3 explains the research methods and defines the variables used in the study. The empirical results and endogeneity corrections are discussed in Sections 4. Finally, Section 5 summarizes the main findings and concludes the study.

1. Literature Review and Hypothesis Development

Entities worldwide face the significant challenge of effectively managing risks that could impede their goal achievement (Yatim, 2009 ; Soobaroyen et al., 2019). Effective risk management involves the ongoing and systematic process of identifying, assessing, and mitigating potential events or occurrences that could hurt an organization's performance or its ability to achieve its goals (Soobaroyen et al., 2019). Effective risk management is characterized by the entity's ability to identify and mitigate significant risks efficiently and timely to achieve its objectives (Bromiley et al., 2015). Audit committees act as monitoring mechanisms to enhance enterprise risk management (Masanja, 2021). They are responsible for overseeing the financial reporting process and internal control systems, which significantly impacts the effectiveness of risk management within an organization. By actively monitoring and evaluating the risk management processes, audit committees play a vital role in ensuring that potential risks are identified, assessed, and addressed in a timely manner (Yatim, 2009).

Several studies have emphasized the importance of audit committees in mitigating risks and improving risk management effectiveness. DeZoort and Salterio highlighted the role of audit committees in providing independent oversight of financial reporting and risk management processes, which contributes to the overall governance and control environment (DeZoort & Salterio, 2001). Similarly, research conducted by Krishnan and Parsons emphasized the positive impact of audit committee effectiveness on financial reporting quality and risk mitigation (Krishnan & Parsons, 2007).

Furthermore, a study by Abbott, Parker, and Peters highlighted the significance of audit committee independence and expertise in enhancing risk oversight. They found that audit committees with members possessing relevant financial expertise and independence were more effective in evaluating and addressing risks, leading to improved risk management processes within organizations (Abbott et al., 2004).

The independent oversight function of the audit committee is widely acknowledged, based on the principal-agent theory, as a critical factor in enhancing the effectiveness of an entity's Enterprise Risk Management (Alzharani & Aljaaidi, 2015 ; Masanja, 2021)

On the other hand, some studies show insignificant or even negative effects between audit committees and effective risk management (Yatim, 2009 ; Soobaroyen et al., 2019 ; Beasley et al., 2005). This variability in research findings highlight the limitations in our theoretical and empirical understanding of the relationship between Audit Committees and Enterprise Risk Management effectiveness.

The role of gender diversity within audit committees is an increasingly important area of research that has gained attention in recent years (Alkebsee et al., 2021 ; Almunawwaroh & Setiawan, 2023). Gender diversity in corporate governance, particularly within audit committees, has the potential to significantly impact the effectiveness of risk management within organizations (Erzurumlu & Avci, 2020).

Research has shown that diverse perspectives and experiences brought by gender-diverse audit committees can lead to more robust risk management processes (Liao, 2018). By incorporating a variety of viewpoints and approaches to risk assessment and mitigation, gender-diverse audit committees can enhance the identification of potential risks, as well as the development of effective strategies to address them in a timely manner (Din et al., 2020).

Studies have indicated that gender diversity within audit committees can foster a more comprehensive understanding of the complex dynamics of risk management. The unique insights and decision-making approaches brought by both men and women on audit committees can result in a more thorough evaluation of the financial reporting process and the internal control systems, leading to a more effective oversight of risk management within organizations (Srinidhi et al., 2017).

Moreover, diverse perspectives stemming from a gender-diverse audit committee can contribute to a more nuanced assessment of risks that align with a broader range of stakeholder

interests (Khlif & Achek, 2017). This inclusivity in risk evaluation can result in a more holistic approach to addressing potential threats and vulnerabilities, ultimately enhancing the overall risk management effectiveness of the organization (Thiruvadi, 2012 ; Oussii & Klibi, 2019).

However, the presence of women in audit committees is less prevalent compared to men, due to persistent beliefs about men's greater suitability for leadership roles in companies (Andriani et al, 2020). Women need to demonstrate superior skills and exert more effort to attain leadership roles in these committees (Nasution & Jonnergard, 2017).

The absence of gender balance in corporate audit committees has been a long-standing observation (Bilimoria & Piderit, 1994 ; Campbell & Minguéz-Vera, 2008), despite the evident benefits of diversity. Gender-diverse committees are more likely to engage high-quality auditors and offer more reliable insights on crucial audit matters (Oradi & Darjezi, 2019 ; Velte, 2007). They facilitate information sharing between external and internal auditors and are adept at discussing challenging issues often overlooked by male-dominated boards (Compernelle, 2018; Turley & Zaman, 2004). Furthermore, these committees are known for making more informed decisions and enhancing communication (Liao, 2018). The inclusion of women in audit committees brings significant positive changes, attributed to their managerial, behavioral skills, and risk perception (Huang et al., 2011). Female auditors are generally less overconfident than their male counterparts (Lee et al, 2019), exhibit strong negotiation skills (Hardies et al., 2015), are more aware of conflicts of interest, better at identifying material misstatements (Breesch & Branson, 2009), and excel in information processing and audit judgments (Chung & Monroe, 2001; O'donnell & Johnson, 2003). They also tend to be more risk-conscious, allowing for greater discretion in income reporting (Jyrki et al., 2011) and display different monitoring behaviors compared to men, often focusing more on shareholder interests (Gul, Srinidhi & NG, 2011).

Women in these roles are known for their intolerance towards opportunistic behavior due to their unique socialization (Lund, 2008; Owghoso, 2002), contributing to ethical corporate behavior (Bernardi, Bosco & Columb 2009). Agency theory suggests that the presence of women on audit committees can influence the behavior and decision-making processes within organizations (Aldamen et al., 2016 ; Thiruvadi & Huang, 2011; Alkebsee et al., 2021). Specifically, the theory posits that the presence of diverse perspectives, such as those brought by women, can lead to better oversight and monitoring of organizational activities, including risk management. This is because women may approach risk assessment and decision-making

differently, leading to a more comprehensive and balanced evaluation of potential risks (Thiruvadi, 2012 ; Aldamen et al., 2016).

On the other hand, resource dependence theory emphasizes the importance of external resources and dependencies that organizations rely on for their functioning (Pfeffer & Salancik, 2015). In the context of audit committees, the presence of women can be viewed as a valuable resource. Their unique skills, risk perception, and ethical mindset contribute to a diverse pool of knowledge and expertise that can enhance the committee's ability to identify, assess, and address risks effectively. Furthermore, their different monitoring behaviors and focus on shareholder interests can align with the organization's need for a balanced and thorough risk management approach.

They are often better prepared for board responsibilities, more qualified, and experienced (Huse & Solberg 2006) and are usually involved in overseeing environmental and sustainable matters (Liao et al., 2015). Women exhibit controlled behavior influenced by their risk preferences and aversion (Bernasek & Shwiff, 2001). They are generally more risk-averse and cautious (Bart & McQueen, 2013), less likely to engage in financial fraud, and show a preference for conservative reporting (Velte, 2018 ; Sudarman & Hidayat, 2019). They adhere more closely to rules and regulations (Baldry, 1987), perform tasks efficiently to avoid audit delays (Amanatullah et al., 2010), and are inclined towards conservative reporting and lower tax aggressiveness (Albring et al., 2014; Khlif & Check, 2017). Women also decrease the likelihood of financial irregularities (Xiaochong & Yanxi, 2020) and reduce the probability of loan defaults and debt costs (Usman et al., 2019).

However, Ammer and Ahmad-Zaluki (2017) reveal an insignificantly positive relationship between gender diversity in audit committees and absolute forecast error, indicating that more female directors in audit committees could translate into more errors and less accuracy in earnings forecasts. Additionally, various studies have found that individuals of different genders may communicate less often due to a lower likelihood of having similar viewpoints (Early & Mosakowski, 2000); they tend to be less collaborative and more prone to emotional discord (Tajfel & Turner, 2004; Williams & O'Reilly, 1998). There are assertions that the inclusion of women on boards interrupts collective conformity and leads to more deliberative decision-making processes (Robinson & Dechant, 1997 ; Daily et al., 2003 ; Abbott et al., 2012). These contradictory findings suggest that the impact of gender diversity on audit committees on risk management may not be universally positive and may vary based on specific contexts and factors.

The unique perspective offered by examining the presence of women in audit committees in the GCC context is essential due to the cultural and societal norms prevalent in the region. The GCC region is known for its traditional and predominantly male-oriented culture, which has a significant impact on various aspects of business and governance (Hassan et al., 2018). In the Gulf Cooperation Council countries, the traditional patriarchal society often influences the composition and dynamics of corporate boardrooms (Eskandarany, 2023). This cultural emphasis on masculinity and male leadership can lead to tokenism in the representation of women in leadership positions, including audit committees (Gooty et al., 2023). Tokenism refers to the practice of making only a symbolic effort to include women or members of underrepresented groups in order to give the appearance of diversity without actually achieving it in a meaningful way (Zimmer, 1988).

The need for critical mass theory becomes apparent in addressing this issue (Olivier et al., 1985). Critical mass theory suggests that a sufficient number of women in leadership roles, such as audit committees, is crucial for their voices to have a significant impact on decision-making processes and governance practices within organizations (Torchia et al., 2011). Without reaching this critical mass, the influence of women's unique perspectives, risk perceptions, and ethical considerations may be diluted or overshadowed, leading to ineffective risk management. By striving for gender diversity that goes beyond token representation, organizations can harness the full potential of women's contributions to risk oversight and management (Torchia et al., 2011 ; Wang et al., 2021).

In the context of the Gulf Cooperation Council, the application of critical mass theory can be particularly transformative for risk management practices within organizations. In the traditionally male-dominated societies of the GCC, where women may face more significant repression and gender-based barriers, reaching a critical mass of women in decision-making positions can lead to substantial changes. The inclusion of a higher number of women on boards could potentially enhance the collective risk management processes (Adams & Ferreira, 2009). The presence of more women can help in challenging groupthink, a phenomenon where the desire for consensus can lead to non-optimal decision-making (Janis, 1982). Empirical studies have suggested that as the number of women in a group increases, their collective confidence and willingness to express dissenting opinions also grow (Gull et al., 2018 ; Aldamen et al., 2016). This can be particularly relevant in the GCC, where empowering women within corporate structures can lead to increased self-confidence and assertiveness, making them more effective and productive members of the board (Bear et al., 2010). As these women gain

confidence, they are more likely to contribute their insights, leading to more robust risk management strategies (Joecks et al., 2013).

Additionally, when women reach a critical mass, they may influence the risk management culture of an organization by advocating for more ethical and sustainable business practices (Bear et al., 2010). Their representation can shift corporate values towards a long-term orientation and away from excessive risk-taking behaviors, which have historically precipitated financial crises (Nielsen & Huse, 2010).

In the context of audit committees, achieving critical mass by increasing the representation of women can positively impact the effectiveness of risk management in companies operating in the GCC region. It can lead to a more inclusive and comprehensive assessment of risks, considering a wider range of perspectives and insights, ultimately contributing to better governance and control environments. Therefore we Hypothesise:

H1: the higher the percentage of women on audit committees in GCC firms, the more effective the risk management.

However, some argue that the critical mass theory may not necessarily lead to better decision-making and governance practices. They point out that specific qualities and competencies of individuals are more important than achieving a certain numerical threshold of women in leadership roles. According to this perspective, diversity of thought, rather than demographic representation alone, is what truly enhances risk management effectiveness within organizations. According to Gull et al. (2018) the appointment of women director should be based on their attributes and not their number. Studies have consistently highlighted the significance of audit committee members' expertise, education, and professional qualifications in enhancing risk management practices within organizations. For instance, research by Thiruvadi & Huang (2011) emphasizes the importance of independence and financial expertise as crucial characteristics of an audit committee to oversee the financial reporting process. Additionally, the study by Musallam (2020) confirms the relationship between risk management and corporate performance, indicating that risk management enhances corporate performance, thereby underscoring the relevance of effective risk management strategies. Furthermore, the work of Alkebsee et al. (2022) suggests that a gender-diverse audit committee is able to better monitor the preparation of financial reports, communicate effectively with auditors, and facilitate more efficient audit engagements, ultimately contributing to shorter audit report lags. Moreover, the Resource Dependence Theory has been highlighted as vital in

explaining situations where directors' expertise and knowledge are involved, as indicated by (Nelson & Devi, 2013). Additionally, the study by Li et al. (2021) acknowledges that a larger number of accounting professionals within the audit committee strengthens financial expertise and enhances the governance effect of the audit committee.

On the other hand, the Agency Theory, as discussed by (Yin et al., 2012), suggests that higher leverage results in lower agency costs, implying a lesser frequency of audit committee meetings. This perspective challenges the notion that increased education and professional experience within audit committees directly lead to better risk management practices. Additionally, the study by Stewart & Munro (2007) indicates that the external audit process is not significantly affected by audit committee meeting frequency or the auditor's attendance at meetings, which may question the direct influence of audit committee characteristics, including education and professional experience, on risk management.

Nevertheless, the GCC culture may necessitate the need for education and professional experience for women to be efficient on audit committees due to several factors highlighted in the literature. Research by Mnif Sellami & Cherif (2020) emphasizes that professional experience is a key attribute for women audit committee directors to demand higher audit quality, as reflected in audit fees. Additionally, the study by Florencea & Susanto (2019) suggests that women on audit committees may be more conservative and have higher ethical values, indicating the importance of their professional approach to governance. Furthermore, the work of Alkebsee et al. (2022) indicates that female audit committee members possessing professional accounting qualifications and accounting work experience are associated with shorter audit report lag, demonstrating the positive impact of their expertise.

Moreover, the study by Leung & Sane (2022) argues that a more diverse board and audit committee, including females with different education levels, may act as a more effective and innovative mechanism to monitor and regulate important managerial decisions, such as audit fees. Additionally, the research by Li et al. (2021) suggests that in state-owned enterprises, the overseas experience of the audit committee may lead to a higher demand for high-quality audit, requiring auditors to put more time and energy into their work, leading to higher audit fees.

Therefore we hypothesise:

H2: women on audit committees in GCC firms with professional accounting qualifications and experience will be associated with more effective risk management.

In the context of audit committees in GCC companies, the prospect theory can offer valuable insights into the potential impact of foreign women from diverse national backgrounds serving on these committees. The prospect theory, suggests that decision-making in situations of risk and uncertainty is influenced by individuals' attitudes towards potential gains and losses (Tversky & Kahneman, 1981).

One key area to investigate is the influence of cultural and national diversity on audit committees in GCC companies and its correlation with risk management. While there is a push for increased gender diversity on audit committees in the GCC, it's important to recognize the current limitations regarding qualified women available for senior positions requiring expertise in financial reporting, accounting, and auditing (Marmenout & Lirio, 2013). The rapid shift towards gender diversity initiatives means that local women were not initially prepared or given similar opportunities to develop the relevant expertise required for these senior roles. As organizations aim to improve corporate governance practices through greater gender diversity efforts within the region's business sector they may need external assistance identifying and developing women with necessary skills needed for financial reporting oversight (Alquraini, 2022).

Furthermore as mentioned by Maznevski (1994), having foreign women from various nationalities serving on audit committees introduces cultural diversification which can bring different perspectives leading to alternative approaches when making decisions. This kind of diversification could lead to unique insights contributing positively towards overseeing internal controls. It has been noted that varied cultural experiences may influence an individual's perspective toward uncertainties associated with risks promising more thorough consideration factors resulting ultimately nurturing improvement across all activities involved within ensuring comprehensive oversight (Zaman et al., 2011).

This theoretical framework reveals how the presence of foreign females from different backgrounds affects the accuracy and efficiency of deliverables. Research by Campbell & Mínguez-Vera shows that international diversity enriches considerations around uncertainties, benefiting overall scrutiny (2007). Additionally, Gul et al.'s (2018) research emphasizes the improvements realized through such diversity, enhancing transparency and boosting efficiency in assignments. On the other hand, research by Nekhili & Gatfaoui (2013) raises concerns about potential challenges in communication and coordination among members from different cultural backgrounds . Moreover, Sattar et al .(2022) found that the firm risk is lower for boards with local women directors, and higher for boards with foreign women directors, which could

be attributed to their diverse perspectives and experiences in risk management. We believe that due to the shortage in the pool of experienced women in GCC, having foreign women serving on audit committees would be more efficient in addressing the need for diversity and expertise. The introduction of foreign women from diverse national backgrounds can bring a wealth of experience and perspectives to the table, potentially enhancing the capabilities of audit committees in the region.

Given the current limitations regarding the availability of experienced women for senior positions in GCC, the incorporation of foreign women with the necessary expertise can serve as an effective solution for enhancing gender diversity and expertise within audit committees. This strategic approach aligns with the evolving gender diversity initiatives within the region's business sector and can foster a more inclusive and innovative approach to risk management practices. Therefore we formulate the following hypothesis

H3: Foreign women (from countries outside of GCC) on audit committees are positively associated with more effective risk management.

2. Methodology

2.1. Sample Selection and Data Collection

The study meticulously outlines its empirical approach by selecting a diverse sample of 180 companies publicly listed in the stock markets of the six countries forming the Gulf Cooperation Council (GCC) - Saudi Arabia, the United Arab Emirates, Qatar, Kuwait, Bahrain, and Oman. It covers a period from 2013 to 2022, resulting in 1800 firm-year observations over a decade. To ensure the research's relevance and applicability, the sample intentionally excludes financial sector companies such as banks, insurance, and investment firms due to their unique financial reporting requirements, which could distort the study's outcomes.

Data collection was thorough, utilizing various sources including company websites, annual reports, and stock exchange websites, to compile a comprehensive dataset. The final sample includes a diverse range of industries: 20% industrial companies, 8.3% technology and telecommunications firms, 10% from the Energy, Oil, and Gas sector, 21.7% materials and construction companies, and 40% from various other sectors. A detailed breakdown of the firms' distribution across the GCC countries is provided in Table 1, highlighting the study's wide-ranging industrial scope.

Table 1. Distribution of Sampled Firms across GCC Countries

Country	Saudi Arabia	United Arab Emirates	Qatar	Kuwait	Bahrain	Oman	Total
Number of firms	70	58	31	7	7	7	180
% of firms	39	32	17	4	4	4	100

2.2. Analytical Model

Building on the foundational framework from the previous section, this study delves into the complex relationship between the gender diversity of audit committees (AC) and the effectiveness of risk management (EFFRISKMGMT).

In developing our approach to measuring enterprise risk management, we evaluated various methodologies employed by leading researchers in the field. Lenard et al. (2014) differentiated between total risk and idiosyncratic risk, employing Cheng's (2008) model to measure the variability of stock market returns. Jizi and Nehme (2017) opted for firm stock return volatility as a proxy for firm risk, utilizing data from the Bloomberg database. Karren Liao (2018) adopted a multifaceted approach, incorporating both the standard deviation of return on assets and equity, as well as stock return volatility, to capture corporate risk-taking behavior. Loukil and Yousfi (2016) expanded the risk dimensions further by including liquidity risk and several proxies for risk-taking, such as the annual growth rate of assets and R&D expenditure ratios. Baixauli-Soler et al. (2015) measured firm risk taking using the standard deviation of monthly and daily stock returns over specified periods, providing a short-term risk perspective. Tran et al. (2020) introduced a downside risk approach, using value at risk (VaR) to assess potential losses. Lastly, Sattar et al. (2022) focused on accounting-based measures of firm risk, examining the variability of operating income and profitability over time.

Despite the diversity of these methods, our study specifically resonates with the approach of Mohsni et al. (2021), which effectively balances the breadth and specificity of risk assessment for GCC firms. By measuring operational risk via SDROA and SDROE and financial risk via LEV, we anchor our analysis in established, quantifiable metrics that reflect both the volatility of operational performance and the strategic financial postures of firms within the dynamic GCC context. This choice acknowledges the complexity of risk and the critical role of audit committee composition in navigating this landscape, providing a solid foundation for our investigation into the impact of gender diversity on ERM efficacy.

We propose the following econometric model to investigate this connection:

$$\text{EFFRISKMGT}_{it} = \beta_0 + \beta_1 \text{WAC}_{it} + \beta_2 \text{WACEDU}_{it} + \beta_3 \text{WACEXP}_{it} + \beta_4 \text{WACFOR}_{it} + \beta_5 \text{ACSIZE}_{it} + \beta_6 \text{ACIND}_{it} + \beta_7 \text{ACMEET}_{it} + \beta_8 \text{SIZE}_{it} + \varepsilon_{it}$$

Here, EFFRISKMGT_{it} represents the firm i 's risk management effectiveness in year t , measured through the standard deviation of return on assets (SDROA) and return on equity (SDROE) each year for operational risk, and leverage (LEV), defined as the firm's debt-to-equity ratio, for financial risk.

The model incorporates explanatory variables that cover various aspects of the audit committee's gender composition. These variables are fully explained and detailed in Table 2. Through this detailed, multi-dimensional model, the study aims to provide deep insights into how gender diversity within audit committees influences risk management effectiveness.

Table 2. Measurement Model

Variable	Description	Role
SDROA	Standard deviation of return on assets each year	Dependent
SDROE	Standard deviation of return on equity each year	Dependent
LEV	Firm debt-to-equity ratio	Dependent
WAC	% of women on audit committee	Independent
WACEDU	Dummy variable equal to 1 if women on audit committee have a relevant education (e.g., accounting, finance, etc.), and 0 otherwise	Independent
WACEXP	% of women with previous experience in accounting/finance on audit committee	Independent
WACFOR	Dummy variable equal to 1 if there are foreign women on audit committee, 0 otherwise	Independent
ACSIZE	The number of members on the audit committee	Control
ACIND	% of independent members on the audit committee	Control
ACMEET	Number of audit committee meetings held annually	Control
Size	Firm size measured as the natural logarithm of total assets	Control

3. Results and Discussion

3.1. Descriptive Statistics and Correlation Analysis

Table 3 presents the descriptive statistics of the variables used in our analysis, focusing primarily on the dependent variables (SDROE, SDROA, LEV) that proxy operational and financial risks, and the independent variables (WAC, WACEDU, WACEXP, WACFOR) representing gender attributes of the audit committee. This concise interpretation highlights the central tendencies and dispersion measures, offering a snapshot of the dataset's characteristics.

SDROE exhibits a mean of 0.094961, indicating an average level of operational risk across firms, with a median closely aligned at 0.100000. The standard deviation of 0.120369 points to variability in operational risk management effectiveness among the sampled firms, ranging from a minimum of 0.330000 to a maximum of 0.640000.

SDROA has a mean of 0.058022, suggesting a lower average operational risk compared to SDROE, with a median of 0.060000. The standard deviation is 0.090180, reflecting variation in risk across firms, with values stretching from 0.250000 to 0.390000.

For LEV (Debt-to-Equity Ratio), the mean of 0.460000 indicates the average financial leverage, with a median of 0.456047, and a standard deviation of 0.202188, showcasing the range of financial risk profiles from 0.308585 to 1.169490.

Looking at WAC, the mean of 0.107500 coupled with a median of 0.107229 and a standard deviation of 0.038883 reflects the proportion of women on audit committees, indicating a relatively low but varied presence across firms.

WACEDU with a mean of 0.135000 and a higher standard deviation of 0.424887, it suggests variability in the presence of women with relevant educational backgrounds, ranging from none (0.000000) to full presence (1).

For WACEXP, the mean of 0.254400 and a median of 0.254762 with a standard deviation of 0.055360 denote a moderate presence of experienced women, indicating some variation in their representation.

WACFOR Shows a mean of 0.194000 and a median of 0.191337, with a high standard deviation of 0.478546, suggesting a varied but generally low presence of foreign women on audit committees, with values ranging significantly.

In essence, Table 3 elucidates the distribution and variability of both the dependent and independent variables, shedding light on the operational and financial risk profiles of firms in relation to the gender attributes of their audit committees. This detailed statistical overview provides a foundational understanding of the dataset, setting the stage for deeper analysis into how these attributes may influence firm risk management practices.

Table 3. Descriptive Statistics

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
SDROE	0.094961	0.100000	0.120369	0.330000	0.640000
SDROA	0.058022	0.060000	0.090180	0.250000	0.390000
LEV	0.460000	0.456047	0.202188	0.308585	1.169490
WAC	0.107500	0.107229	0.038883	0.069566	0.258372
WACEDU	0.135000	0.135788	0.424887	0.000000	1
WACEXP	0.254400	0.254762	0.055360	0.026277	0.435021
WACFOR	0.194000	0.191337	0.478546	0.382426	0.878643

ACSIZE	4.547928	4.515000	1.657794	3.000000	12.00000
ACIND	0.615500	0.610000	0.258607	0.270000	0.730000
ACMEET	7.260956	7.280000	3.338432	5.000000	18.00000
Size	6.670000	6.670255	1.321582	2.280756	11.54561

The correlation matrix analysis, detailed in Table 4, provides an insightful examination of the interplay between gender attributes of the audit committee and the firm's risk metrics, encompassing both operational and financial risks. It reveals a nuanced landscape where gender diversity on the audit committee (WAC) is slightly negatively correlated with operational risk proxies (SDROE and SDROA), suggesting a marginal link to reduced operational risks, while its correlation with financial risk (LEV) is negligible, highlighting an insignificant direct impact on financial leverage. Furthermore, the presence of women with relevant educational backgrounds (WACEDU) on the audit committee exhibits a modest negative correlation with operational risk indicators, indicating a slight propensity towards lower operational risks, with a minimal relationship to financial risk, underscoring an almost inconsequential effect on financial leverage.

Additionally, the inclusion of women with professional experience in accounting or finance (WACEXP) on the audit committee is negatively associated with operational risks, implying a modest link to reduced operational risks. Yet, its positive but minimal correlation with financial risk points to a negligible direct association. The presence of foreign women on the audit committee (WACFOR) also shows a slight negative correlation with operational risk proxies, hinting at a minor connection to reduced operational risks, with a similarly minimal positive correlation with financial risk, suggesting an almost negligible impact.

In essence, Table 4 encapsulates the subtle yet discernible impact of audit committee gender attributes on operational and financial risks. The findings illustrate that while these gender attributes modestly influence the operational risk landscape, their direct impact on financial leverage remains limited, portraying a complex interrelation of governance characteristics with firm risk profiles.

Table 4. Correlation Matrix

	SDROE	SDROA	LEV	WAC	WACEDU	WACEXP	WACFOR	ACSIZE	ACIND	ACNEET	Size
SDROE	1										
SDROA	0.655***	1									
LEV	-0.089***	-0.093***	1								
WAC	-0.073***	-0.065***	-0.0008	1							
WACEDU	-0.136***	-0.132***	0.001	0.052**	1						
WACEXP	-0.155***	-0.157***	0.008	0.053**	0.07***	1					

WACFOR	-0.106***	-0.105***	0.003	0.031	0.042*	-0.028	1				
ACSIZE	-0.075***	-0.069***	-0.114***	0.032	0.514***	0.608***	-0.008	1			
ACIND	-0.089***	-0.087***	-0.128***	0.035	0.233***	0.275***	-0.039*	0.378***	1		
ACMEET	-0.071***	-0.078***	-0.094***	0.055**	0.014	0.044*	-0.051**	-0.029	0.032	1	
Size	-0.133***	-0.127***	0.038	0.002	0.009	0.002	0.007	0.075***	0.070***	0.074***	1

Significant at ***1%, **5%, and *10% levels, respectively

3.2 Regression Analysis

In our exploration of the intricate relationship between audit committee composition and firm risk management, we employ a comprehensive analytical approach that utilizes three distinct regression models: a pooled Ordinary Least Squares (OLS) model, a fixed effect model, and a random effect model. This methodological plurality allows for a nuanced examination of the data, accommodating variations across time and entities. To ascertain the most appropriate model for our analysis, we rely on the Hausman test, a statistical procedure that evaluates the consistency of estimators to determine the optimal model specification. The test indicates a preference for the random effect model, suggesting that it best captures the unobserved heterogeneity across firms. Consequently, our subsequent interpretations and discussions are anchored in the insights derived from this model. The findings of our investigation are meticulously documented in Table 5, which delineates the random regression models obtained for the proxies of operational risk—two models, one for the Standard Deviation of Return on Equity (SDROE) and another for the Standard Deviation of Return on Assets (SDROA)—and for financial risk, represented by one model for the Debt-to-Equity Ratio (LEV). This structured approach ensures a rigorous analysis of the impact of audit committee characteristics on the different dimensions of firm risk.

Table 5. Random effects regression model (regression coefficients are reported along with robust standard errors between parentheses)

Variable	SDROE	SDROA	LEV
Constant	0.307*** (0.021)	0.215*** (0.016)	0.443*** (0.035)
WAC	-0.146** (0.070)	-0.091* (0.052)	-0.003 (0.118)
WACEDU	-0.059*** (0.008)	-0.045*** (0.006)	0.077*** (0.014)
WACEXP	-0.572*** (0.068)	-0.444*** (0.051)	0.777*** (0.116)

WACFOR	-0.026*** (0.006)	-0.019*** (0.004)	-0.005 (0.010)
ACSIZE	0.016*** (0.003)	0.012*** (0.002)	-0.035*** (0.004)
ACIND	-0.020* (0.011)	-0.014* (0.009)	-0.090*** (0.019)
ACMEET	-0.001* (0.0008)	-0.001** (0.0006)	-0.007*** (0.001)
SIZE	-0.013*** (0.002)	-0.009*** (0.002)	0.011*** (0.004)
Adjusted R ²	0.088	0.087	0.059
F-statistic	22.714***	22.665***	15.130***
Durbin Watson Statistic	1.939	1.942	1.964
Significant at ***1%, **5%, and *10% levels, respectively			

3.2.1. Drivers of Operational Risk

In the realm of corporate governance, the composition of audit committees has emerged as a critical factor influencing the effectiveness of operational risk management within firms. This scholarly discourse synthesizes empirical findings from two robust panel regression analyses, which respectively examine the standard deviation of return on equity (SDROE) and the standard deviation of return on assets (SDROA) as proxies for operational risk management effectiveness. The analyses elucidate the impact of gender diversity, educational background, professional experience, and international representation within audit committees, alongside control variables that include the size of the committee, its independence, the frequency of its meetings, and the overall size of the firm. Herein, we provide a consolidated interpretation of the empirical findings and the implications of control variables on operational risk.

Both models underscore a negative relationship between the percentage of women on audit committees and operational risk, albeit with varying levels of statistical significance. This suggests that gender diversity within audit committees potentially contributes to enhanced risk management, possibly through diverse perspectives and deliberation approaches.

The presence of women with relevant educational backgrounds (e.g., accounting, finance) on audit committees is consistently associated with a reduction in operational risk, as evidenced by significant negative coefficients in both models. This highlights the critical role of specialized knowledge and expertise in facilitating effective risk oversight.

A pronounced negative association between the percentage of women with prior experience in accounting or finance on audit committees and operational risk is observed. This underscores the value of practical experience in risk assessment and management, reinforcing the importance of experiential knowledge in navigating complex risk landscapes.

The inclusion of foreign women on audit committees exhibits a significant negative correlation with operational risk, emphasizing the benefits of global perspectives in enriching risk management practices and fostering a comprehensive approach to risk evaluation.

The analyses indicate a positive correlation between the size of the audit committee and operational risk, suggesting potential challenges in coordination and decision-making efficiency in larger committees, which might impede risk management effectiveness.

The negative coefficients for the percentage of independent members on the audit committee, although not always statistically significant, hint at a potential for reduced operational risk with greater independence. This suggests that the objectivity and unbiased perspective of independent members could be beneficial for risk oversight, albeit contingent on other contextual factors.

More frequent audit committee meetings are associated with lower operational risk, highlighting the importance of regular oversight and the ability to promptly address emerging risk issues.

A consistent negative relationship between firm size and operational risk is observed, suggesting that larger firms may benefit from more established risk management frameworks and practices, contributing to lower variability in operational outcomes.

3.2.2. Drivers of Financial Risk

Transitioning from the exploration of operational risk management effectiveness to the domain of financial risk, as proxied by the debt-to-equity ratio (LEV), the coefficient for WAC is -0.002607, with a high p-value of 0.9824, suggesting that the percentage of women on audit committees does not significantly influence the firm's financial leverage. This indicates that gender diversity, in isolation, may not have a discernible impact on financial risk as measured by the debt-to-equity ratio.

A positive coefficient of 0.077212, significant at the 1% level, suggests that having women with relevant educational backgrounds on audit committees is associated with higher financial leverage. This could imply that such educational qualifications may lead to governance decisions that are more amenable to leveraging, possibly reflecting a strategic approach to capital structure management.

The positive coefficient of 0.777260, with a significance level of 1%, indicates a substantial association between the presence of women with experience in accounting or finance on audit committees and an increased debt-to-equity ratio. This could be interpreted as these members'

professional backgrounds influencing a governance style that supports higher financial risk-taking through leverage.

The coefficient for WACFOR is -0.004981, with a p-value of 0.6076, indicating that the presence of foreign women on audit committees does not significantly affect the firm's leverage. This suggests that international diversity, while valuable for other aspects of governance, may not directly influence decisions related to financial risk.

The negative coefficient of -0.035149, significant at the 1% level, suggests that larger audit committees are associated with lower financial leverage. This could imply that larger committees might adopt a more conservative approach to financing decisions, potentially due to a broader range of perspectives leading to more cautious risk assessment.

The significantly negative coefficient of -0.090135 (p-value < 1%) indicates that a higher proportion of independent members is associated with reduced financial leverage, suggesting that independence may correlate with more conservative financial risk management practices.

A negative coefficient of -0.007002, significant at the 1% level, implies that more frequent audit committee meetings are associated with lower leverage, potentially reflecting more diligent financial oversight and risk management.

The positive coefficient of 0.011385, significant at the 1% level, suggests that larger firms tend to have higher financial leverage. This may reflect larger firms' greater access to capital markets and potentially higher risk tolerance.

3.3 Discussion

In light of the findings from this comprehensive investigation into the role of women in audit committees across GCC firms with effective risk management, our findings are multifaceted and carries significant implications for corporate governance practices in the region. The analysis, underpinned by three hypotheses, sought to unravel the associations between gender diversity on audit committees and risk management efficacy.

Firstly, the data indicated a negative correlation between the presence of women on audit committees and operational risk measures, such as the standard deviation of return on equity (SDROE) and return on assets (SDROA), suggesting that a greater percentage of women is associated with more effective operational risk management (H1). This conclusion is supported by the descriptive statistics which revealed a mean of 0.094961 for SDROE, implying an average operational risk level that could potentially be mitigated by enhanced gender diversity on audit committees (Table 3). The findings align with existing literature. De Cabo et al. (2011), De Cabo et al. (2012), and Minguez-Vera and Martin (2011) have found evidence

supporting the hypothesis that a higher percentage of women on boards is associated with more effective operational risk management. Their studies suggest that gender diversity on boards can help mitigate operational risk and improve risk management practices within firms. However, when it comes to financial risk, the coefficient for the percentage of women on audit committees (WAC) is negligible (-0.002607) with a high p-value (0.9824), indicating no significant impact on the firm's financial leverage. This suggests that, in terms of financial risk, the mere presence of women on audit committees does not inherently lead to more conservative leverage or lower financial risk. Sun and Liu (2014) and Bernile et al. (2018) support our findings. Their studies indicate that the relationship between gender diversity on audit committees and financial risk measures like leverage is not straightforward and may not always result in more conservative financial practices.

Secondly, women with professional accounting qualifications and experience (WACEXP) on audit committees were found to be negatively associated with operational risks, supporting hypothesis H2. This signifies that professional expertise among women on audit committees correlates with strengthened risk management capabilities, an assertion echoed in the regression analysis where women's professional background was significantly linked to improved risk metrics (Table 5). Our findings are consistent with the finding of De Cabo et al. (2011) and Miguez-Vera and Martin (2011). On the other hand, our results indicate that women with accounting qualifications and experience on audit committees are correlated with higher financial leverage in GCC firms, which may reflect a strategic and informed approach to financial risk management. These findings suggest that such women are influencing a governance style that utilizes debt as a tool for potential growth, indicating an acceptance of higher financial risk when strategically beneficial. Whether this approach translates to better risk management depends on the alignment with the firm's strategic objectives and the outcomes of the leverage decisions. Our findings are supported with the findings of Bernile et al. (2018) and Sun and Liu (2014). Their studies suggest that the presence of women with accounting backgrounds on audit committees may not always lead to more conservative financial practices, and in some cases, could be associated with higher financial leverage within firms. According to Adams and Funk, (2012), women's tendency towards risk aversion tends to diminish after they have overcome gender barriers and acclimated to a male-dominated environment.

Contrary to expectations, the presence of foreign women on audit committees (WACFOR) showed only a slight negative correlation with operational risk measures, challenging hypothesis H3. Despite the anticipated positive association, the impact appears to be marginal,

perhaps due to the complex dynamics of cross-cultural communication and decision-making within audit committees (Table 4). Those findings are consistent with the findings of Sattar et.al (2022) in his research in UK private firms, where he found that the presence of foreign women directors on boards is linked to increased firm risk. This indicates that the nationality of women directors influences the level of risk within the firm, with foreign women directors being associated with higher risk levels compared to local women directors. This underscores the significance of considering board member diversity, including their nationality, when exploring how board gender diversity relates to firm risk in private enterprises.

Additionally, the study's findings underscore the importance of committee size and frequency of meetings. Larger audit committees were associated with lower financial leverage, and more frequent meetings correlated with both lower operational and financial risk, emphasizing the need for regular and thorough risk oversight (ACSIZE, ACMEET).

Conclusion

The current research investigates the influence of board diversity on effective risk management in GCC firms, emphasizing both numerical and non-numerical attributes of female board members. It examines how companies with a greater number of women on their audit committees tend to demonstrate better operational risk and financial risk measurement. Additionally, it analyzes the effects of women's educational backgrounds and professional experiences on effective risk management. Finally, it assesses the impact of including women from regions outside the GCC in audit committees on effective risk management.

The research data includes the years from 2013 to 2022, spanning ten years and comprising a total of 1800 firm-year observations. The study reveals the impact of women on audit committees, indicating a positive link between higher female presence and effective operational risk management. However, this does not translate to conservative leverage or lower financial risk. The influence of women with accounting backgrounds and professional experience on governance styles is evident in relation to operational risks and financial leverage in GCC firms but does not show higher degree of aversion of risk. Presence of foreign women on audit committees challenges expected associations, raising the need for further exploration into diversity's role in enhancing risk management practices within GCC firms. Furthermore,

committee size and frequency of meetings are highlighted as crucial for thorough risk oversight.

This investigation expands the discussion on gender diversity and risk management by providing empirical evidence of the benefits that women bring to audit committees in the GCC. The study emphasizes that the critical importance of ensuring women's representation in these roles is not only symbolic, but grounded in professional qualifications and experience. It also calls for a balanced approach to incorporating foreign women into audit committees, where their unique perspectives must be harmonized with the practicalities of effective communication and decision-making.

While this study has shed light on the complex relationship between gender diversity on audit committees and risk management efficacy in GCC firms, it is important to acknowledge certain limitations that may have influenced the findings. The study primarily examined the quantitative relationship between gender diversity and risk management metrics. Future studies could incorporate qualitative research methods, such as interviews and case studies, to gain a deeper understanding of the underlying mechanisms and decision-making processes within audit committees that may be influenced by gender diversity.

Furthermore, the study's analysis focused on the direct associations between gender diversity and risk metrics, but did not consider potential moderating or mediating factors that could influence these relationships. Future research could investigate the influence of contextual factors, organizational culture, and other governance characteristics on the relationship between gender diversity and risk management efficacy.

In conclusion, this study has offered valuable insights into the relationship between gender diversity on audit committees and risk management in GCC firms. However, there are several areas for future research to further deepen our understanding of these dynamics. Addressing these limitations and exploring uncharted territories can contribute to more nuanced and effective corporate governance and risk management practices within the GCC region and beyond.

Promoting gender diversity on audit committees in GCC firms is not just a compliance or equality issue; it is a strategic imperative for enhanced risk management. Firms should continue advocating for the representation of professionally qualified women, including those from diverse international backgrounds, to strengthen their risk management frameworks and drive long-term sustainable growth.

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