



Do level, field, and place of board members' Education impact financial risk disclosure? A Saudi Empirical evidence

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ABSTRACT

This study aims to investigate the effect of board attributes (level, field, and place of education) on corporate financial risk disclosure in the Saudi energy sector. The research focuses on four energy companies listed between 2009 and 2021, resulting in 52 firm-year observations. Panel regressions were implemented to control for heteroscedasticity and autocorrelation. The study's results revealed that education level positively influences financial risk disclosure, whereas the impacts of place and field of education are not well-established. Moreover, the study explored the moderating role of education attributes in financial risk disclosure, indicating that companies with fewer highly educated board members who received their education from foreign universities other than those in Saudi Arabia are more inclined to disclose financial risks transparently. These findings suggest an essential need to diversify the level and place of education among directors, which holds significant implications for corporate governance policy-makers.

1. Introduction

Enterprise Risk Management is a crucial factor that aids board members in decision-making and better management. Its benefits include improving transparency, risk disclosure at the board level, and ensuring better management of the business [1]. Stakeholders and investors require significant information for making informed decisions, which is why risk disclosure serves as a useful tool for gathering risks related information about the company [1–3].

According to recent literature, there are significant deficiencies and inadequacies apparent in the provision of risk and uncertainty disclosures within financial statements [4,5]. The interest in risk reporting has increased due to the instability in financial markets caused by major company scandals, for example, Enron Corp. in 2001 and WorldCom Corp. in 2002, as well as financial crises like the Asian financial crisis of 1997 and global financial crisis of 2007–2008 [4,6,7]. Makhoul et al. [7] refer to the perspective that Acharya and Richardson [8] proposed regarding the financial crises caused by insufficient financial report transparency. According to Hassan and Marston [9], this had made it difficult for investors to evaluate the risks reported by corporations due to the limited information available. Consequently, shareholders and regulators have increased their demands for companies to disclose risk information and provide reliable data about their practices in order to reduce uncertainty [10,11].

As asserted by Cabedo and Tirado [5], firms aim to provide financial information to their users, including lenders and investors, to facilitate their investment decisions. By evaluating the economic and financial position of a company, investors strive to weigh the returns and risks associated with an investment project. In this regard, incorporating information about risks in the disclosed information can better align it with the decision models set out in financial theory. Ultimately, this can assist investors in taking informed

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investment and disinvestment decisions that align with their investment objectives. Researchers [2,3,12,13] argue that risk disclosure is crucial in the sphere of business risks. They suggest that reporting, by offering greater transparency, bolsters investors' confidence, and therefore merits significant attention.

According to Al-Dubai and Abdelhalim [10], risk disclosure entails communicating both quantitative and qualitative details related to uncertainties and risks encountered by the firm. Financial risks like interest rates, exchange rates, and liquidity risks are examples of such risks. Ibrahim et al. [3] have highlighted the significance of risk disclosure, stating that it is one of the most relevant types of disclosure. This is because risk disclosure serves numerous purposes, such as illuminating present and future risks faced by the company during operations. Additionally, risk disclosure could have significant implications for investment, financing, and liquidity by curtailing issues such as agency and information asymmetry.

The guidance and management of corporations are entrusted to a group of appointed individuals known as the Board of Directors. The board's primary responsibility is to safeguard shareholder assets by effectively managing company performance and delivering a favorable return on investment [14]. The significance of the board's oversight function in risk monitoring processes is crucial, as stated in Deloitte's 2018 Audit Committee Resource Guide. In an ever-changing risk environment, the board carries the primary responsibility in risk oversight and must consistently improve practices to establish an efficient and well-defined oversight function. Therefore, risk oversight plays a critical role in the board's ability to manage effectively [15].

The Board of Directors holds a crucial role in ensuring compliance with the Saudi Corporate Governance regulations. One of their topmost priorities is to institute suitable control measures for risk assessment and management. To achieve this, they must be able to anticipate potential risks that the company may face and foster a culture of risk management. Additionally, the board must be transparent in disclosing any risks to stakeholders and other concerned parties [16].

Al-Hadi, Hasan and Habib [17] assert that the effectiveness of the board's risk oversight role can be determined by its quality. Researchers have recently taken an interest in the impact of board education on firms [18]. Specifically, one issue being studied is the role of board of directors' education on the risk disclosure. A board that is composed of individuals with a strong background in accounting and finance can provide a unique and independent perspective on risk assessment which can lead to more accurate reporting on financial risks. This, in turn, promotes transparency and ultimately leads to more effective management of financial risks in a company. According to Call, Campbell, Dhaliwal and Moon [19], there are multiple ways in which firms can benefit from having high-educated employees. One way is by providing executives with superior information as they make reporting decisions. Another way is through the detection and prevention of intentional financial misreporting, which can be caught early on to prevent larger misreporting events.

The role of education is given great significance in the Saudi Corporate Governance regulations. These regulations recommend that a remuneration policy should be implemented which bases the determination of remuneration on multiple factors, including job level, responsibilities, educational qualifications, practical experience, skills, and level of performance. According to Article 18 of these regulations, it is obligatory for a member of the board to possess professional competence, necessary experience, knowledge, skill, and independence which would enable them to perform their duties with efficiency. They should hold academic qualifications and possess relevant professional and personal skills while also having received adequate levels of training and practical experience related to both the present and future business of the company. Furthermore, they should have knowledge about management, economics, accounting, law, or governance and be enthusiastic about learning and receiving training [16]. Nevertheless, there is a dearth of research on the influence of an individual's educational background on board level [18] and how it affects financial risk disclosure.

In recent years, the importance of the board of directors in financial risk disclosure has been the subject of growing interest in the literature. However, the potential impact of certain characteristics of board members on corporate financial risk disclosure has yet to be fully explored. Specifically, there remains a gap in understanding how the level of education, field of education, and place of education of board members may affect the level of financial risk information disclosed by companies. As indicated by Dey, Hossain and Rezaee [20], little research has been conducted in the area of financial risk disclosure, hence justifying the rationale for the study's focus. Several studies [3,7,11,21–23] have explored the relationship between board characteristics and financial risk disclosure in different contexts. Researchers have delved into researching the effect of board education on firms [18]. In developing nations, there is a growing inclination towards exploring the determinants of risk reporting, with financial firms generally receiving the most attention [4]. Studies regarding risk reporting in nonfinancial companies are scant [11]. Hence, there remains a continuous requirement to scrutinize the practices of risk disclosure and its determinants in emerging economies [10]. As a result, the connection between board characteristics and corporate risk disclosure is an interesting topic, warranting extensive investigation [1].

To address this gap, this study focuses on the Saudi energy sector and aims to examine the relationship between these education attributes of board members and the disclosure of financial risk information by energy companies. A sample of four energy companies listed between 2009 and 2021 was selected, resulting in a total of 52 firm-year observations. The energy sector was selected for the study due to Saudi Arabia's emphasis on renewable energy development as a crucial aspect of its Vision 2030 plan. Almulhim and Al Yousif [24] argue that renewable energy has been an area of significant investment for Saudi Arabia in their bid for sustainable economic, social, and environmental development.

The results of the study highlight that the education level of board members is an important factor in determining the quality and level of financial risk disclosure. However, the impact of the field and place of education require further research. Moreover, the study explores whether education attributes can act as a moderator and influence the disclosed level of financial risk. Interestingly, results indicate that companies with fewer highly educated board members from foreign universities tend to provide more transparent financial risk information. Overall, these findings have important implications for policymakers in enhancing corporate governance through diversifying the educational background and place of education among directors to improve the effectiveness of the board of directors. The robustness of the study is ensured through the use of various panel regressions, accounting for data heteroscedasticity

and autocorrelation.

I have structured the paper as follows: In Section 2, I present the study's literature review and hypotheses. Our research methodology is discussed in Section 3. In Sections 4 a detailed discussion of the results with accompanying robustness analyses is provided. In Section 5 and 6, the study's discussion and conclusion are presented. In section 7 and 8 theoretical and practical implications are presented respectively. Finally, limitation and suggestion for future studies are provided in section 9.

2. Literature review and research hypotheses development

2.1. 2.1 financial risk disclosure and board of directors

The importance of companies providing risk disclosure has garnered significant attention due to recent corporate scandals and failures companies [25,26]. Greater pressure is now being applied to companies to furnish improved risk-related information [27]. Global pressure and the financial crisis within some European companies during 2007–2008 [28] resulted in heightened public and regulatory scrutiny of risk management practices and associated reporting [28]. Companies are now expected not only to report their activities, but also the risks surrounding them, and their proficiency in managing such risks. Disclosing risk information can reduce information asymmetry between management and shareholders [29]. Shareholders are often the principals, while managers or agents possess more information regarding the company's condition [23]. The delegation of company management to agents with expertise in business operations, as described by Jensen and Meckling [30], is critical for principals. However, this delegation creates an information asymmetry between managers and shareholders [30]. As part of their monitoring function, the Board of Directors plays a crucial role in ensuring the effective stewardship of a firm's resources and protecting the interests of shareholders. In overseeing the identification, management, and disclosure of risks faced by the company, boards further underscore this critical role.

In academic literature, the board of directors is acknowledged to have functions beyond the mere oversight and monitoring of governance, as noted by the resource dependency theory [21]. According to this theory, boards that possess valuable experience, knowledge, and expertise are more effective at monitoring mechanisms and can more successfully attract external resources. Additionally, the board provides consultation, advice to the CEO, and information dissemination [31]. These roles highlight the importance of adequate risk reporting, an issue that has received significant attention from investors and stakeholders following corporate failures [32]. Further research by Hambrick and Mason [33] emphasizes the significance of educational qualifications, suggesting that executives who possess those with superior qualifications are better able to adapt to uncertain circumstances and drive innovation. Ultimately, a quality board can safeguard the interests of all shareholders, including minority shareholders, by keeping a watchful eye on managers and majority shareholders [17].

2.2. 2.2 level of board education and financial risk disclosure

Board diversification is the practice of selecting individuals from a variety of backgrounds, with different education and experience, to serve on a company's board of directors. Wang and Hsu [34]. suggest that, when assessing the effectiveness of the board as a control mechanism, it is important to take board diversification into account. This is because the composition of the board can impact decision-making processes and ultimately affect outcomes.

From an education standpoint, diversifying the board ensures that there are representatives with expertise in various fields, such as accounting, finance, law, engineering, and marketing. According to Dahlin et al. [35], education diversity refers to the varying skills, knowledge, and abilities that team members possess based on their educational backgrounds. This can be beneficial when it comes to decision making, as each member can offer unique insights into different areas of the business.

Martikainen et al. [36] state that the impact of non-executive board members' level of education on risk disclosure has yet to be investigated. This characteristic is an essential aspect of the board's human capital and can positively influence organizations. According to Hashim and Yusof [31], education level reflects an individual's credibility, experience, expertise, and knowledge, which supports the resource dependency theory's argument that highly educated board members can provide useful sources of expertise to organizations. Similarly, Call et al. [19] argued that, there are two main ways in which high-quality (high-educated) employees can enhance their organization's financial reporting environment. Firstly, they can furnish executives with superior quality information, which can act as catalyst for better or more informed reporting choices. On the other hand, high-educated employees can also act as watchdogs and identify any deliberate financial misreporting, even before it escalates into a more significant event.

Furthermore, board members' competence is not solely dependent on their experience with the firm but also their general managerial ability and previous education. Inadequate education of the board of directors can severely hamper their ability to monitor and control the management of a business. Sweiti [37] state that, the role of the board of directors' education is crucial in managing and monitoring the business, and therefore, the absence of this education creates a significant void in business governance and control. Conversely, a well-educated board of directors can enhance the efficiency, effectiveness, and decision-making capabilities of a company's corporate governance [38], and are more capable of perceiving complex issues and presenting risk information more coherently and effectively in risk reports [32]. Education can also help directors in making critical judgments about planned disclosures [36].

Dahlin and Weingart [35] found that MBA teams with diverse educational backgrounds benefit from increased range and depth of information use. Kipngetch et al. [38] conducted a longitudinal study spanning from 2008 to 2017, analyzing 270 total observations across 27 listed firms at the Nairobi Securities Exchange. Their research yielded significant and positive results, concluding that board education plays a crucial role in environmental accounting disclosure. These findings provide validation for the proposition put forth by the human capital theory. Therefore, some studies have suggested that evaluating board potential requires assessing their ability to

monitor an organization, as well as their professional accounting and financial knowledge to facilitate simpler reporting and improve oversight and decision-making [38].

Call et al. [19] study focused on how the education levels of a firm's employees are associated with the quality of both mandatory and voluntary disclosures. They found that firms with highly-educated employees have better mandatory disclosure quality in terms of their accruals and internal control weakness reporting, and have a lower likelihood of restating financial statements. Additionally, higher education levels were also positively associated with the frequency and horizon of management forecasts and negatively associated with forecast errors, forecast bias, and forecast range, indicating that high-quality employees can improve voluntary disclosure quality as well.

On other hand, Pohjanen and Bengtsson [39] argue that excessive education diversity could be detrimental to a firm's performance. Similarly, Bathula [40] noted that the performance of a company is affected by education diversity, particularly between PhD and non-PhD holders. Moreover, Mahadeo et al. [41] reported a negative correlation between education diversity and the performance of companies listed on the Mauritius Stock Exchange.

Linsley et al. [32] highlight that, due to self-interest, some directors may conceal negative news or information. However, the costs of damaging a director's reputation and relationships with external parties and incurring legal costs if negative earnings surprises occur may incline directors to disclose pertinent information.

The previous discussion leads to the formation of the first hypothesis.

H1. Highly-educated board impacts financial risk disclosure.

2.3. Field of education and financial risk disclosure

Viola et al. [1] defined the educational background of the board as the percentage of board members whose academic qualifications are in finance and accounting. A board education in accounting and finance can positively impact the disclosure of financial risks in a number of ways. Firstly, being accountable for disclosure procedures [42], board members who are educated in accounting and finance possess a better understanding of financial statements and can more easily detect inconsistencies or unusual patterns that indicate risks. They are also more likely to question the accuracy and completeness of financial data before it is disclosed to stakeholders [42], recognizing that proper disclosure of data is essential for evaluating investment potentials and risks.

Secondly, as corporate accounting reporting often depicts good business practices that ensure business sustainability and contribute to maximizing shareholder value [38], board members who are knowledgeable in accounting and finance are equipped to make informed decisions regarding risk management strategies and assess the potential impact of risks on the organization's financial health. This enables them to make decisions concerning investments, capital expenditures, and other financial matters that may affect the organization's risk profile.

Lastly, board members with a background in accounting and finance can more effectively communicate financial risks to stakeholders by presenting complex financial information in a clear and concise manner [32]. This allows stakeholders to make informed decisions about their involvement with the organization.

The definition of financial expert outlined in the Sarbanes-Oxley Act in the USA was criticized by the Securities and Exchange Commission due to its limited scope. According to Bilal, Chen and Komal [43], the initial definition confined audit committee members to those holding accounting financial expertise and possessing credentials as Chartered Professional Accountants (CPAs) or Chartered Financial Analysts (CFAs). However, the definition was later expanded to encompass a wider range of financial experts, including non-accounting professionals such as investment bankers, financial analysts, supervisory experts (like CEOs), and company presidents. It should be noted that different countries impose their own specific requirements for these types of experts.

The regulations for corporate governance in Saudi Arabia outline the necessary qualifications for board members and committees. For instance, board members are expected to possess professional skills, experience, independence, and knowledge in management, economics, accounting, law, or governance. Likewise, an audit committee formed by the Board should include at least one member with expertise in finance and accounting. The Board is also responsible for defining the qualifications required for the secretary, such as holding a bachelor's degree in law, finance, accounting, administration or its equivalent [16].

Despite extensive research that has scrutinized the impact of board characteristics, little attention has been given to the value of accounting and financial knowledge held by the board, as highlighted by Dionne, Maalaoui and Triki [44]. Moreover, there is a dearth of research in the area of disclosure [45], specifically investigating the influence of board education background on risk disclosure [1]. Dionne et al. [44] noted that while only a few studies have explored the role of financial expertise in a board, these studies support the idea that having financial directors can add value to a firm. According to previous literature, a higher level of education among board members can result in improved monitoring and effectiveness [21]. This, in turn, is likely to enhance the disclosure of risks associated with an organization, as suggested by Viola et al. [1]. Due to this scarcity, researchers have investigated the effectiveness of financial experts in supervising the financial reporting of public companies [43].

The presence of accounting experts in the audit committee can lead to the implementation of an active system of internal controls, which, in turn, enhances the quality of financial reporting [21]. According to Alshirah et al. [21], previous studies that align with agency and resource dependence theories have reaffirmed the crucial role played by audit committee members with accounting and financial expertise in ensuring high-quality financial reports. Dionne et al. [44] suggested that managing a company's risk requires individuals with a finance and accounting background, stating that education in these fields can lead to more effective risk management.

Viola et al. [1] conducted a study aimed at determining the influence of board education on corporate risk disclosure. The study

sample consisted of 40 mining firms that were listed on the Indonesia Stock Exchange over four years, from 2017 to 2020, resulting in a total of 160 firm-year observations. Their regression analysis yielded a number of interesting results. Specifically, the researchers discovered that board education, as measured via board members holding backgrounds in accounting and finance, had a significant, negative impact on the quantity of corporate risk disclosure. However, it did not have any effect on the coverage of corporate risk disclosure. The study used two methods to measure the level of corporate risk disclosure, one of which involved counting the number of "risk" associated words in a given firm's annual report, while the other measured the weighted score of the firm's corporate risk disclosure index via reference to items in the COSO Framework.

In Saudi context, Sweiti [37] conducted a research on a panel of 60 Saudi based companies from diverse sectors during the period of 2011–2015 in order to analyze the impact of board financial education on voluntary disclosure. The research unveiled that the board financial education plays a crucial role in determining the extent of voluntary disclosure in Saudi Arabia. The results highlight that it has a positive relationship with voluntary disclosure and can be considered as a robust determinant of the same in Saudi Arabia.

The previous discussion leads to the formation of the second hypothesis.

H2. Educated board in accounting and finance positively impacts financial risk disclosure.

2.4. Place of education and financial risk disclosure

Educational qualifications may also be perceived as a crucial institutional asset with the potential to influence accounting values and practices [46]. It is argued that board members possess specific skills and knowledge acquired through their educational backgrounds. However, Post, Rahman and Rubow [47], point out that cultural diversity, location, and varying experiences result in differing perceptions, values and behavior among directors. Directors' experience, values and characteristics have an influence on their perceptions and hence their decisions; this is the main premise of the upper echelons theory [48]. This phenomenon blurs decision-making processes among board members, as their experiences, values and characteristics influence their views and decision-making. Top executives with strong academic backgrounds tend to possess superior technical knowledge, as well as a broader, more open-minded attitude towards risk disclosure decisions, which could help to reduce information asymmetry.

Additionally, Matten and Moon [49] suggest that models and techniques taught in Western business schools may affect individuals' behavior from other countries. These models and techniques incorporate various theories and principles that are considered best practices in the Western business world. However, these models and techniques may have limitations when applied to board members from other countries with different cultural backgrounds and business practices. Consequently, education systems of foreign countries may impact the degree of corporate voluntary disclosure [50], as professional qualified accountants from abroad receive diverse exposure and training, which may lead to more extensive disclosure of information [51].

The educational backgrounds of board members may impede their perception, which can distort their analysis and interpretation of information and lead to biased strategic decision making. Additionally, evidence indicates that values adopted by Western-educated management can shape the disclosure practices and behaviors of corporations [50,52]. Given this, it is essential to consider cultural differences that may influence how these techniques, commonly taught at Western business schools, are understood and implemented by board members outside of the Western context. Therefore, adjusting these techniques and models to suit the local cultural context and business practices of foreign board members is critical. As such, I predict that board members with foreign educational backgrounds will disclose a greater level of financial risk than those with national educational backgrounds. Hence, I formulate the third hypothesis as follows.

H3. Foreign-educated board members positively impacts financial risk disclosure.

3. Data and methodology

3.1. Research model and measurements

The research model is discussed as follows:

$$FRD = \alpha_0 + \beta_1(lvledu)_{it} + \beta_2(fieldedu)_{it} + \beta_3(placedu)_{it} + \beta_4(bodsize)_{it} + \beta_5(bodindep)_{it} + \beta_6(bodmeeting)_{it} + \beta_7(Logasst)_{it} + \beta_8(Roa)_{it} + \mu_i + \varepsilon_{it}$$

Where, *FRD* = Financial risk disclosure, *lvledu* = level of board education, *fieldedu* = field of education, *placedu* = place of education, *bodsize* = Board size, *bodmeeting* = Board meetings, *Bodindep* = Board independence, *Logasst* = natural logarithm of total assets, *Roa* = Company profitability measured by return on assets.

Different approaches have been adopted to identify the nature of risk information and understand the variables affecting risk disclosure in the field [53]. Content analysis and regression analysis are among the methods used.

One commonly used technique for researching the topic is the codification of firms' risk disclosures. This involves the use of a codification tool to categorize the risks and determine their semantic characteristics. Qualitative segments of annual reports are then analyzed to assess the comprehensiveness of the exposure based on assigned indices of risk disclosures. This approach has been adopted by scholars in different contexts [53].

Recent research by Dey et al. [20] found that there are multiple interpretations of the concept of risk, and various definitions and

contexts of risk disclosure exist. To focus on financial risks, I followed the methods of Dey et al. [20] and Lombardi et al. [54], while previous research has tended to address corporate overall risk. In our analysis, I reviewed the "Risk Management" section of the Financial Statements and any notes on Financial Instruments.

The Financial Risk Disclosure Index (FRDI), which was adopted by our study, is presented in Table 1 below. Following [20,54], the index comprises thirty items that are categorized based on credit risks, liquidity risk, currency risk, interest rate risks, capital structure risk, and general items. The number of items in each category is inconsistent, with seven items under credit risks, six items for liquidity risk, four items for currency risk, four items for interest rate risks, six items for capital structure risk, and three items for general items. The financial risk disclosure index takes into account all five types of financial risks, ensuring a comprehensive coverage of each category. Should a company encounter any form of financial risk, such risk is included in the computation of the financial risk disclosure index (FRDI). The index features the most crucial items for each category of risk, indicating the information that companies must specify to provide comprehensive information on that particular risk [20].

To evaluate how listed companies disclose financial risks, annual reports of various companies within the study period have reviewed and compared the disclosed information with the FRDI items. The examination included assigning scores for completeness and clarity of disclosed information, with a score of 1 indicating a clear and systematic expression and 0 indicating an absence of qualitative or quantitative information. For risk assessment, individual scores were allocated to each separate element under examination and compiled to provide an overall total that was then measured against the maximum possible score representing all the items that comprise the risk assessment. The disclosure index of each financial risk was calculated using the following formula [20]:

$$FRDI_j = (\text{Score obtained from the } j\text{th company}) / (\text{Maximum possible score}), \text{ where } 0 \leq FRDI_j \leq 1.$$

3.2. Variables definitions and measurements

Table 2 presents a comprehensive breakdown of the measurement details of the independent and control variables employed in this study. The independent variables were categorized into three: Level of board education, Field of education, and Place of education. On the other hand, the control variables were composed of Board meetings, Company Size, Company Debts, and Company Profitability.

To mitigate model misrepresentation by eliminating the effects of confounding variables and ensuring that the true relationship between the independent and dependent variables is accurately represented, previous research has included and examined numerous factors including company size [23,32,55], profitability [23,55,56], board size, board independence and board meetings [55,57]. Regarding company size, some studies have found a positive correlation between size and risk disclosure [32], likely due to agency theory and higher stakeholder concerns [23]. Profitability's relationship to risk disclosure has been inconclusive, with some studies suggesting a positive effect [23,55], while others show a negative association [56]. Higher levels of debt in a company's capital

Table 1
Financial risk disclosure index.

1	General	1 Financial risk management policy 2 Information on responsibility for establishment and oversight of the risk management framework 3 Review of risk management policies, procedures and systems To reflect changes in market conditions and the company's activities
2	Credit Risk	1 Definition or motivation 2 Quantitative or qualitative data on exposure to credit risk 3 Classification of customers' obligations in terms of their creditworthiness (rating) 4 Aging schedule of accounts receivable 5 Comparison with previous years 6 Alternative credit classification (by activity, geographical area, others) 7 Notes on the concentration of credit
3	Liquidity Risk	1 Definition or motivation 2 Classification of debts by type and maturity 3 Comparison with previous years 4 Quantitative data on available cash or cash equivalents 5 Company's approach toward managing liquidity 6 Current ratio and quick ratio
4	Currency Risk	1 Definition or motivation 2 Detail of items in foreign currencies 3 Comparison with previous years 4 Sensitivity analysis
5	Interest Rate Risk	1 Definition or motivation 2 Classification of debt by interest rate (fixed/variable) 3 Sensitivity analysis 4 Information on derivative hedging instruments
6	Capital Structure Risk	1 Company's ability to continue as a going concern 2 Leverage ratios 3 Capital expenditure forecast (quantitative and qualitative) 4 Forecast of growth capacity (both qualitative and quantitative) 5 Capital expenditure commitment 6 Long term credit rating

Table 2
Variables definitions and measurements.

Variables	Acronym	Measurement	Expected Sign
Dependent Variable			
Financial Risk Disclosure	FRD	When assessing financial risks, a score of 1 is assigned to items that are expressed clearly and systematically. On the other hand, items that lack qualitative or quantitative information are given a score of 0. Clear and systematic expression in financial risk disclosure refers to the presence of either qualitative or quantitative information that allows for a comprehensive understanding of the associated risks. To arrive at the disclosure index for the analyzed risk, the sum of scores assigned to each item is compared to the maximum possible score, which is equivalent to the total number of items making up the risk. Using the following formula, the disclosure index for each evaluated financial risk is estimated: $FRD_{ij} = (\text{Score obtained from the } j\text{th company}) / (\text{Maximum possible score})$, where $0 \leq FRD_{ij} \leq 1$.	
Independent Variables			
Level of board education	Lvledu	Total number of directors who possess either a Master's degree or a PhD.	(+/-)
Field of education	fieldedu	Total number of directors who have received education in either Accounting or Finance.	(+)
Place of education	placedu	Total number of directors who obtained their degree from an overseas (Non-Saudi) university.	(+)
Control Variables			
Board size	bodsize	Total number of directors on the board of a firm	
Board independence	bodindep	percentage of independent non-executive directors to the total number of directors on the board of a firm	
Board meetings	bodmeeting	Number of board meetings per annum.	
Company Size	Logasst	Natural logarithm of total assets.	
Company Profitability	Roa	Return on assets which are the percentage of net income to total assets.	

structure have been found to increase agency costs [30], but companies can mitigate this by providing more disclosure [58]. Finally, the frequency of board meetings plays a vital role [57] in safeguarding shareholder interests [59] and ensuring optimal information sharing, better communication and collaboration among board members, and a more robust decision-making process [60].

3.3. Data and sample

This study's data is obtained from four energy companies' annual reports over 13 years, resulting in 52 firm-year observations. The study used secondary data sources such as the Tadawul, Argaam, and Tradingview websites, with a focus on companies listed continuously between 2009 and 2021. The energy sector was chosen due to its importance in Saudi Arabia's Vision 2030, which aims to achieve sustainable economic, social, and environmental development, and the country's strategic geographic location, which has made it a hub for energy product development and manufacturing [61]. Almulhim and Al Yousif [24] note that significant investments have been made in renewable energy in line with this vision.

4. Results and analysis

4.1. Descriptive results

The descriptive statistics for all the variables of this study are shown in Table 3; dependent, independent and control variables. Table 3 shows the descriptive statistics for the independent and dependent variables (average, standard deviation, minimum, maximum, Variance Inflation Factor VIF and tolerance factor 1/VIF). With respect to the level of financial risk disclosure (FRD), the statistics reported that the mean value is 37 % in Saudi energy companies with minimum of 0 and maximum of 63 %. This average is lower than the average of 59 % reported by Lombardi et al. [54]. These findings also provide evidence on the big differences in board behaviours toward financial risk disclosure. The mean number of directors who possess either a Master's degree or a PhD is 3, ranging from 1 to 7. In relation to the number of directors who have received education in either Accounting or Finance, the average number is

Table 3
Descriptive Statistics for independent and dependent variables.

Variable	Mean	Std. Dev.	Min.	Max.	VIF	1/VIF
FRD	0.3698077	0.2023052	0	0.63	2.92	0.342952
Lvledu	3.115385	1.83275	1	7	2.9	0.344926
fieldedu	1.153846	1.348705	0	5	9.19	0.108861
placedu	2.019231	2.56286	0	9	4.36	0.229484
bodsize	8.192308	0.8174197	7	9	1.7	0.588588
bodmeeting	5.884615	2.228636	2	13	2.92	0.342462
bodindep	0.4955769	0.1783301	0.25	1	2.47	0.405163
Logasst	8.511984	1.953925	5.736521	11.21222	2.68	0.37346
Roa	0.0371185	0.0374594	-0.0534858	0.1144113	2.92	0.342952
Mean VIF					3.64	

1, ranging from 0 to 5. The results also shows that average number of directors who obtained their degree from an overseas (non-Saudi) university is 2, ranging from 0 to 9. The study results indicate that some companies in the sample have exaggerated in appointing members with high university qualifications, as well as appointing members who graduated from non-Saudi foreign universities. This may shed light on the belief of these companies in the importance of the role played by these members by transferring the unique experience and expertise they received in those foreign universities.

Table 4 shows results of the pairwise correlations between financial risk disclosure as dependent variable and three independent board-related variables: Level of board education, place of education, and board independence. A Pearson pairwise correlation coefficient was calculated to determine the relationships among the variables. The results of the pairwise correlation analysis indicate that financial risk disclosure has a positive correlation with level of board education ($r = 0.66$) and place of education ($r = 0.55$), both at 1 % significance level. This shows that as the level of education of the board members and the number of board members educated overseas increases, firms tend to disclose financial risks more transparently. Nevertheless, it is important to note that the observed correlation between the level of education and place of education of board members with financial risk disclosure does not inherently indicate a causal relationship or a direct impact between these variables. Correlation merely denotes the statistical association, strength, and direction between two variables; it does not, however, establish causality.

The fact that the positive relationship persists even when the board member's education is from an overseas (non-Saudi) university, suggests that the quality of the education received is what matters, regardless of the country of origin. Additionally, financial risk disclosure has a negative correlation with board independence ($r = -0.67$), again at 1 % significance level. This suggests that as the number of independent non-executive directors on the board increases, firms tend to disclose financial risks less transparently. This indicates that firms with a higher percentage of independent non-executive directors tend to disclose less information regarding financial risks. The negative relationship suggests that firms with a higher percentage of independent non-executive directors may face more information asymmetry issues or concerns regarding the confidentiality of sensitive information.

Overall, the results suggest that companies with boards that have higher levels of education, are educated in prestigious institutions, and have less independent members are more likely to disclose more financial risk information. Therefore, companies should focus on improving the levels of education of their board members and appointing fewer independent directors to promote financial transparency.

4.2. Diagnostic Tests

To ensure accurate results from regression analysis, it is important to detect and address the problem of multicollinearity. This occurs when there is high correlation between one or more regressors, leading to skewed results [62]. The most commonly used method for detecting multicollinearity is the Variance Inflation Factor (VIF) [63]. While there is no agreed cut-off point to indicate the presence of collinear independent variables, a VIF greater than 10 is generally considered a cause for concern [62,64]. Alternatively, the tolerance factor ($1/VIF$) can be used to determine the level of multicollinearity, with a value less than 0.10 suggesting a problem [63]. According to the Table, it can be asserted that there is no reason to worry about multi-collinearity issues in this study. This is because, as per the values presented in the table, the variance inflation index (VIF) and tolerance factor ($1/VIF$) are both considerably lower than the threshold values of 10 and 0.10, respectively. These thresholds, recommended by researchers Hair et al. [62] and Pallant [63], are typically considered as indicators of multi-collinearity problems in statistical analyses.

The application of the Hausman test was an important part of this study. One benefit of employing this method is its ability to compare the efficiency of two models - the more efficient random-effect model and the less efficient, yet consistent fixed-effect model. Its purpose is to determine whether the former is also capable of producing consistent results [65]. As per the Hausman test results, a significant p-value was obtained ($\chi^2(3) = 27.44$, $\text{prob} > \chi^2 [2] = 0.0000$), thus rejecting the null hypothesis and indicating that the fixed effect (FE) model should be chosen. To determine whether time fixed effects are required when running an FE model, the command *testparm* was utilized. Through this joint F-test, it was determined that all years are not jointly equal to 0 ($F(3, 3) = 1.72$, $\text{Prob} > F = 0.3339$), and as such, time fixed effects were deemed unnecessary. Thus, a random-effects regression model was chosen over the fixed-effects model.

Table 4
Pairwise correlations Among Variables (n52 = firm-year observations).

	FRD	Lvledu	fieldedu	placedu	bodsize	bodmeeting	bodindep	Logasst	Roa
FRD	1								
Lvledu	0.6569***	1							
fieldedu	0.0763	0.548***	1						
placedu	0.5521***	0.634***	0.4359***	1					
bodsize	0.3097	0.1812	0.026	0.7095***	1				
bodmeeting	-0.0675	-0.0783	0.006	0.0931	0.1416	1			
bodindep	-0.6668***	-0.4832***	0.0966	-0.4421***	-0.1595	0.3006	1		
Logasst	-0.166	-0.224	-0.2838	-0.2089	0.085	-0.5298***	-0.1627	1	
Roa	-0.1559	0.0153	0.1267	-0.462***	-0.6585***	0.1065	0.1899	-0.3886***	1

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (two-tailed significance).

FRD = Financial risk disclosure, Lvledu = Level of board education, fieldedu = Field of education, placedu = Place of education, bodsize = Board size, bodmeeting = Board meetings, Bodindep = Board independence, Logasst = Company size, Roa = Company Profitability.

The fixed effect regression model was used to evaluate heteroskedasticity and a Modified Wald test for groupwise heteroskedasticity was employed. The null hypothesis of the test is homoskedasticity or constant variance. When the chi-squared value is significant and the p-value is less than the predetermined threshold (e.g. $p < 0.05$), the null hypothesis of homoskedasticity is rejected and heteroskedasticity is assumed. In this study, the probability was found to be significant ($\chi^2(4) = 39.23$, p -value 0.0000), indicating the presence of heteroskedasticity in the model.

For autocorrelation issue, the Wooldridge test for autocorrelation in panel data was employed to evaluate autocorrelation. This test is used to test the null hypothesis that there is no serial correlation. Autocorrelation is assumed if the p-value is significant and below the desired threshold (e.g., $p < 0.05$). In this study, the null hypothesis of no serial correlation was rejected as the probability was significant ($F(1,3) = 15.020$, $p = 0.0304$), indicating the presence of first-order autocorrelation in the data.

4.3. Random-Effects GLS regression analysis results

Table 5 shows the results of the main model of this study that aims to investigate the impact of three independent variables, including Level of board education, Field of education, and Place of education, on financial risk disclosure. Four different models have been constructed and analyzed to examine the individual and joint impacts of these variables on financial risk disclosure. As can be seen from Model (1): The first model examined the impact of level of board education on financial risk disclosure. The results indicate that Level of board education has a positive impact on financial risk disclosure. However, this impact is significant at the 1 % level. This suggests that an increase in the number of directors with either a Master's degree or a PhD. on the board leads to an increase in financial risk disclosure. The second and third models Model (2) and (3) examined the impact of field of education and place of education on financial risk disclosure, respectively. The results show that both variables have a positive impact on financial risk disclosure. However, this impact is not significant at any level of significance. This suggests that the field of education of directors (either accounting or finance) and the location of the university where the directors obtained their degree (either Saudi or non-Saudi) does not have a significant impact on financial risk disclosure. However, the final model Model (4) examined the joint impact of all three variables on financial risk disclosure.

The findings emphasize the crucial role of high educated directors in financial risk reporting [37], where they are capable of perceiving complex issues and presenting risk information more effectively [32]. The results support the argument made by Call et al. [19] and their findings regarding the enhancing role of high-educated board members in financial reporting environments. Also, the results support the findings of Kipnetich et al. [38] who find that board education diversity positively impact environmental accounting disclosure. However, the study also found that field of education has a significant negative impact on financial risk disclosure at the 10 % level of significance. Furthermore, the results of Model (4) revealed that the variable associated with place of education maintained a consistently insignificant influence. The results go against the notion that board members educated in accounting and finance possess a better understanding of financial statements and are more likely to question the accuracy and completeness of financial data before it is disclosed to stakeholders [42].

Despite the regulations for corporate governance in Saudi Arabia that outlined the necessary qualifications for board members and committees, the presence of accounting experts in the board has been found to be detrimental to the quality of financial reporting and does not guarantee high-quality financial risk disclosure. These findings are similar to those of Viola et al. [1] and contradict those of [37], who assert that board financial education plays a crucial role in determining the extent of voluntary disclosure in Saudi companies.

Table 5
Random-effects GLS regressions (Heteroskedasticity-robust standard errors).

	Model (1)		Model (2)		Model (3)		Model (4)	
	Coef.	z	Coef.	z	Coef.	z	Coef.	z
Lvledu	0.0373***	3.29					0.0598***	7.37
fieldedu			0.00645	0.51			-0.0260*	-1.96
placedu					0.00771	0.41	-0.0147	-1.14
bodsize	0.0411	1.04	0.0615	0.91	0.0490	0.52	0.0631	1.45
bodmeeting	-0.00213	-0.14	-0.00656	-0.44	-0.00678	-0.44	-0.0047	-0.25
bodindep	-0.565***	-2.67	-0.753***	-3.77	-0.707**	-2.43	-0.505*	-1.75
Logasst	-0.022	-0.77	-0.0327	-1.07	-0.0301	-0.90	-0.0296	-0.95
Roa	-0.202	-0.21	0.0711	0.06	0.178	0.16	-0.437	-0.49
Cons	0.404	0.67	0.546	0.73	0.593	0.78	0.272	0.68
Number of obs	52		52		52		52	
Number of groups	4		4		4		4	
Obs per group	13		13		13		13	
R2 within	0.3942		0.2685		0.2543		0.3983	
R2 between	0.9323		0.8979		0.9025		0.9677	
R2 overall	0.6476		0.5779		0.5789		0.6794	
Prob > chi2	0.0000		0.0000		0.0000		0.0000	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (two-tailed significance).

FRD = Financial risk disclosure, Lvledu = Level of board education, fieldedu = Field of education, placedu = Place of education, bodsize = Board size, bodmeeting = Board meetings, Bodindep = Board independence, Logasst = Company size, Roa = Company Profitability.

In relation to control variables, only board independence has been found to have a negative impact on financial risk disclosure among control variables. This finding contradicts the results of previous studies [2,23,55,66–69] and the idea that independent directors bring balance to the board and promote transparency according to Abraham and Cox [2]. The results in line with what found in Prais-Winsten regression Model (4) in Table 7. However, this points to the need to consider the moderating role of board education in the relationship between board independence and financial risk disclosure, which will be explored in the robustness analysis section.

Overall, the results support the idea that the education level of board members is a crucial factor in promoting financial risk disclosure. However, the impact of other variables, such as place of education, is not well-established.

4.4. Robustness analysis results

To test the robustness of the results, this study employs two different types of regressions. Cross-sectional time-series FGLS regressions are utilized in Table 6, while Prais-Winsten regressions are utilized in Table 7. The findings of Model (1), (2), and (3) in Table 6 confirmed the significant positive impact of all three independent variables when examined separately at a level of 1 %. However, when examined jointly, as shown in Model (4), none of the independent variables are significant and their collective positive impact is diminished. The findings are similar to those of individual models in Table 7. Nevertheless, the joint model (Model 4) findings support the results of Model (4) in Table 5 (the main model) which suggests that board members with higher education levels, such as a Master or Ph.D., play a pivotal role in promoting financial risk disclosure. Additionally, the place of education variable is found to have a positive impact on financial risk disclosure but is not significant.

In order to investigate the moderating effect of board education levels on the relationships between field of education, place of education, board independence, and financial risk disclosure, three models were examined, as presented in Table 8. The outcomes demonstrated that the presence of highly educated board members had a significant negative impact on the relationship between place of education or board independence and financial risk disclosure in Models 2 and 3, respectively. However, when both interaction terms were considered simultaneously in Model 4, the study revealed that high-educated board members only moderated the relationship between place of education and financial risk disclosure, suggesting that companies with fewer highly educated board members who received their degrees from foreign universities other than those in Saudi Arabia are more inclined to disclose financial risks transparently. In other words, boards with fewer directors who obtained their foreign education degrees from prestigious institutions are more likely to disclose a higher level of financial risk than their counterparts.

5. Discussion

The findings of this study revealed that a higher number of directors with either a Master degree or a PhD lead to an increase in financial risk disclosure. This suggests that directors with advanced degrees possess a higher level of ability and are more capable of providing complex information to stakeholders. The positive impact of education on financial risk disclosure was also found to exist when analyzed with the two other independent variables. The study also found a significant negative impact of the field of education on financial risk disclosure. Surprisingly, the results show that board members educated in accounting and finance were less likely to question the accuracy and completeness of financial data before it is disclosed to stakeholders. The reduced scrutiny of financial information by board members with an accounting and finance background may be due to their specialized education, focusing on evaluating and interpreting numerical figures rather than considering broader organizational implications. This narrow focus limits their understanding of how financial data can signal latent risks and issues throughout the organization, potentially causing them to overlook crucial non-financial indicators. Furthermore, their training may prioritize detecting numerical deviations rather than exploring the root causes behind those variances, hindering their ability to fully comprehend the risks associated with the financial

Table 6
Cross-sectional time-series FGLS regressions (Heteroskedasticity-robust standard errors).

	Model (1)		Model (2)		Model (3)		Model (4)	
	Coef.	z	Coef.	z	Coef.	z	Coef.	z
Lvledu	0.0356***	3.50					1.57	1.69
fieldedu			0.0299***	2.70			-0.00156	-0.09
placedu					0.0335***	3.34	0.00897	0.48
bodsize	0.0291	0.82	0.0445	1.23	-0.0221	-0.53	0.0210	0.45
bodmeeting	0.000523	0.11	-0.000493	-0.10	0.000508	0.11	-0.000341	-0.07
bodindep	-0.0983	-1.14	-0.220**	-2.55	-0.104	-1.20	-0.142	-1.35
Logasst	-0.0122	-0.81	-0.0163	-1.03	-0.00841	-0.52	-0.0102	-0.71
Roa	-0.130	-0.31	0.0659	0.15	0.0370	0.09	-0.0693	-0.15
Cons	0.184	0.51	0.229	0.62	0.598	1.57	0.257	0.66
Number of obs	52		52		52		52	
Number of groups	4		4		4		4	
Obs per group	13		13		13		13	
Prob > chi2	0.0003		0.0036		0.0005		0.0002	

*p < 0.1, **p < 0.05, ***p < 0.01. (two-tailed significance).

FRD = Financial risk disclosure, Lvledu = Level of board education, fieldedu = Field of education, placedu = Place of education, bodsize = Board size, bodmeeting = Board meetings, Bodindep = Board independence, Logasst = Company size, Roa = Company Profitability.

Table 7
Prais-Winsten regressions, heteroskedastic panels corrected standard errors.

	Model (1)		Model (2)		Model (3)		Model (4)	
	Coef.	z	Coef.	z	Coef.	z	Coef.	z
Lvledu	0.0313**	2.51					0.0308*	1.70
fieldedu			0.0231*	1.81			-0.00388	-0.19
placedu					0.0294**	2.46	0.00986	0.49
bodsize	0.0454	1.25	0.0614*	1.66	0.0102	0.22	0.0309	0.63
bodmeeting	-0.000616	-0.11	-0.000189	-0.03	-0.000124	-0.02	-0.00197	-0.34
bodindep	-0.240**	-2.22	-0.349***	-3.45	-0.236**	-2.22	-0.272**	-2.21
Logasst	-0.0219	-1.39	-0.0261	-1.58	-0.0190	-1.09	-0.0198	-1.30
Roa	0.0149	0.03	0.0747	0.16	0.170	0.37	0.00972	0.02
Cons	0.218	0.59	0.244	0.65	0.508	1.29	0.327	0.82
Number of obs	52		52		52		52	
Number of groups	4		4		4		4	
Obs per group	13		13		13		13	
R2	0.179		0.137		0.150		0.281	
Prob > chi2	0.0003		0.0005		0.0001		0.0000	

*p < 0.1, **p < 0.05, ***p < 0.01. (two-tailed significance).

FRD = Financial risk disclosure, Lvledu = Level of board education, fieldedu = Field of education, placedu = Place of education, bodsize = Board size, bodmeeting = Board meetings, Bodindep = Board independence, Logasst = Company size, Roa = Company Profitability.

Table 8
Examination of Moderating Role of Level of Board Education (Random-effects GLS regressions-Heteroskedasticity-robust standard errors).

	Model (1)		Model (2)		Model (3)		Model (4)	
	Coef.	z	Coef.	z	Coef.	Z	Coef.	z
Lvledu	0.0600***	9.70	0.113***	5.18	0.148***	7.49	0.135***	3.30
fieldedu	-0.0171	-0.24						
placedu			0.0886***	3.24			0.0788*	1.65
bodsize	0.0426	1.21	0.0297	0.69	0.000687	0.02	0.0175	0.37
bodmeeting	-0.00358	-0.25	0.00116	0.07	-0.00380	-0.23	0.000301	0.02
bodindep	-0.455	-1.52	-0.204	-0.76	-0.161	-1.15	-0.129	-0.92
Logasst	-0.0269	-0.78	-0.0164	-0.62	-0.0280	-1.02	-0.0184	-0.59
Roa	-0.314	-0.33	-0.0808	-0.12	-0.435	-0.60	-0.144	-0.21
Lvledu X fieldedu	-0.00353	-0.27						
Lvledu X placedu			-0.0183***	-3.98			-0.0160*	-1.74
Lvledu X bodindep					-0.271***	-4.65	-0.0785	-0.40
Cons	0.359	0.82	0.00157	0.00	0.637	1.17	0.129	0.19
Number of obs	52		52		52		52	
Number of groups	4		4		4		4	
Obs per group	13		13		13		13	
R2 within	0.3850		0.3935		0.4144		0.3986	
R2 between	0.9669		0.9814		0.9606		0.9813	
R2 overall	0.6771		0.7085		0.6833		0.7102	
Prob > chi2	0.0000		0.0000		0.0000		0.0000	

*p < 0.1, **p < 0.05, ***p < 0.01. (two-tailed significance).

FRD = Financial risk disclosure, Lvledu = Level of board education, fieldedu = Field of education, placedu = Place of education, bodsize = Board size, bodmeeting = Board meetings, Bodindep = Board independence, Logasst = Company size, Roa = Company Profitability, Lvledu X fieldedu = Interaction term of Level of board education and Field of education, Lvledu X placedu = Interaction term of Level of board education and Place of education, Lvledu X bodindep = Interaction term of Level of board education and Board independence.

data they are responsible for disclosing. Additionally, board members with such backgrounds often have demanding schedules, limiting their time to conduct comprehensive reviews. Consequently, they may lack skepticism and complacently trust the financial information.

Interestingly, the significance of the location of education appears once all three variables are examined together. The findings pointed towards the crucial role of high-educated directors in financial risk reporting, emphasizing their ability to perceive complex issues and present risk information more effectively. In conclusion, the results of this study provide insight into the role of education and its impact on financial risk disclosure. The findings support the idea that having a diverse and highly educated board can enhance the quality and transparency of financial reporting.

6. Theoretical implications

The theoretical implications of this study provide crucial insights into the role of education in financial risk disclosure. Specifically, the study highlights the importance of high-educated directors in perceiving complex issues and presenting risk information more

effectively. The findings support the notion that an increase in the number of directors with either a Master degree or a PhD on the board leads to an increase in financial risk disclosure. Additionally, while the field of education and the location of the university where board members obtained their degree did not have any significant impact on financial risk disclosure independently, they do become more relevant when considered in combination with the level of education of the board members. It is also worth noting that the study challenges some prevailing assumptions about the impact of education on financial risk disclosure. The negative impact of the field of education on financial risk disclosure is an unexpected finding that warrants further investigation. In particular, this study reveals that board members educated in accounting and finance have a negative impact on financial risk disclosure, while the location of the university is significant only when considered with the other variables. These findings highlight the importance of board education diversity in enhancing financial reporting environments.

7. Practical implications

This study indicates that companies would benefit from having highly educated board members to improve the level of financial risk disclosure. Specifically, an increase in directors with either a Master degree or a PhD on the board can lead to an increase in financial risk disclosure. Furthermore, companies with fewer highly educated board members, who received their degrees from foreign universities other than those in Saudi Arabia, are more capable of disclosing more financial risk information. These findings suggest that companies should consider the education level and background of their board members in improving financial risk reporting environments. However, companies should also be aware of the negative impact of having board members educated in accounting and finance fields on financial risk disclosure, indicating that diversity in education fields is crucial.

Overall, this study provides useful information to companies and policymakers, guiding the importance of education in the boardroom, and the potential benefits of board education diversity. Board education diversity can contribute to the design of future policies and guidelines aimed at improving the quality of financial risk disclosures.

8. Limitation and future studies

This study has certain limitations that open new avenues for future research. Firstly, it only investigates the factors that may affect the level of financial risk disclosure, and further research could fruitfully explore the consequences of non-financial risk disclosure. Secondly, the study focuses on the impact of three independent variables, namely level of board education, field of education, and place of education, on financial risk disclosure in a single sector and country. Therefore, future studies could extend the analysis at an international level, across multiple sectors and different ownership structures. Finally, the study primarily focuses on the education characteristics of the board of directors, and future studies could explore the education characteristics of other board committees such as the audit committee that has a direct relationship with financial disclosure.

9. Conclusion

In conclusion, the objective of this study was to explore how education attributes affect financial risk disclosure. The study considered level of board education, field of education, and place of education as the key education attributes. The research focuses on Saudi energy companies listed between 2009 and 2021. The findings reveal that education level plays a crucial role in determining financial risk disclosure, while the impacts of place and field of education need further investigation. Moreover, the study explored the moderating role of education attributes in financial risk disclosure, indicating that companies with fewer highly educated board members who received their education from foreign universities other than those in Saudi Arabia are more inclined to disclose financial risks transparently. Hence, the study highlights the need for corporate governance policy-makers to promote board diversity and to encourage directors to receive education from diverse sources to enhance their understanding of financial risks and increase transparency. Overall, these findings contribute to the ongoing discourse on corporate governance and provide valuable insights for professionals and policymakers seeking to improve risk disclosure practices.

Data availability statement

Data will be made available on request.

CRediT authorship contribution statement

Shehabaddin Abdullah A. AL-Dubai: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

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