

## Effectiveness of the board of directors' performance in Jordan: The moderating effect of enterprise risk management

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### CHRONICLE

### ABSTRACT

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This study aims to investigate the moderating effect of enterprise risk management on the relationship between the board of directors' effectiveness on accounting and market performance in Jordan. The current study uses panel data of 684 firm-year observations, employed regression analysis and analysis of annual reports of 76 listed companies on the Amman stock exchange (ASE) from 2009 to 2017 covering 9 years. The findings of the hierarchical regression analysis showed that the enterprise risk management has a significant positive moderating effect on the relationship between the board of directors' effectiveness on accounting and market performance in Jordan. The findings reveal that enterprise risk management positively moderated the relationship between board of directors' effectiveness on Return on Assets, Return on Equity, and Tobin's Q. It also moderated the interaction of board of directors' effectiveness intercept enterprise risk management on Return on Assets and Return on Equity, which were found positive and significant. The findings of this paper can provide crucial conclusions and recommendations that clarify the relationship between the board of directors' effectiveness and the accounting and market performance in Jordan and the moderate impact of the enterprise risk management.

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## 1. Introduction

The board of directors (BoDs) is a nominated team of an entity and the ultimate governing organ that epitomizes stakeholders in a corporation. They play a crucial and huge role in running the business affairs of a firm to set a corporate policy for the management and to oversee their activities to ensure effectiveness (Al-Adeem & Al-Sogair, 2019). In Jordan, similar to other countries, it is mandatory for every financial, industrial, and service company to have a BOD to ensure its effectiveness (Jordanian Corporate Governance Code, 2008). The effectiveness of BOD is one of the most important elements in the internal CG mechanism, which depends on its characteristics such as board independence, board size, non-CEO duality, frequency of board meetings, etc. (Pugliese et al., 2015). An effective board has more ability to enhance performance and mitigate potential expropriation of the minority shareholders' rights in a corporation (Falatifah & Hermawan, 2019). However, BOD ineffectiveness is associated with various corporate scandals, failures, and weak corporate structure (Francis et al., 2012; Matar & Nauimat, 2014). Thus, board effectiveness is central to any meaningful performance. Agency theory plays a crucial role in successfully determining BOD effectiveness in a corporation. Agency theory proposes that BOD is a key corporate component aligning the interest of all stakeholders and investors by minimizing ownership control (Bosse & Phillips, 2016). Studies have shown that ERM adoption affects the effectiveness of BOD (Paape & Speklè, 2012; Muslih, 2019). This is emanating from the fact that ERM is rapidly becoming a major issue in all industrial and service sectors (Shad et al., 2019), because of its

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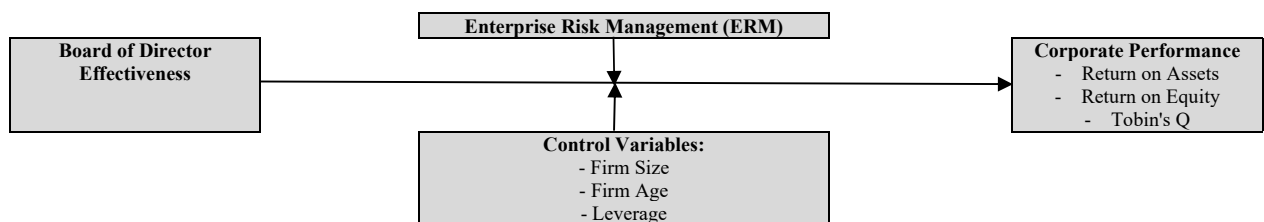
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impact in minimizing conflict between managers and stakeholders in term of risk-taking in business or decision on market involvement or account-based decision (Wu et al., 2015). Moreover, BOD as one of the major mechanisms of CG has been indicated to influence internal risk management in a firm (Ahmed & Manab, 2016; Selamat & Ibrahim, 2018). BOD can influence ERM practice and performance in different public sectors in Jordan (Shatnawi et al., 2020). The board is responsible for maximizing the performance of corporate through monitoring, control, fairness, dependability, and management of risks facing the corporate to avert any form of personal pursuance by the managers (Al-Adeem & Al-Sogair, 2019), thereby improving performance. Enterprise Risk Management (ERM) comprises integrated management of threats including operational, financial, and strategic risks along with the orientation of risk management based on corporate policies. The BOD managing these risks incorporates and has the final decision about the risk management implementation (Dabari & Saidin, 2016). Corporates commonly adopt good ERM strategies in connection with their policies, cost, accounting, guidelines, and long-term projection with aim of regulating assets and interest in an effective manner (Shad et al. 2019; Zou et al. 2019). It is believed that ERM can effectively moderate BOD and performance (Shatnawi et al., 2019a), because of its crucial role in minimizing corporate conflict and in boosting transparency as well as independence in the decision-making processes and performance. Despite all these advantages, the ERM is still a relatively new concept in Jordan, and the country is pacing up to meet up with ERM practical challenges in several of its corporations (Silva et al., 2019). The moderating effect of ERM between BOD on performance in Jordan remains an area that lacks research focus. The direct moderating effect of ERM between the board and performance remains a challenging area in corporate governance, in Jordan.

Similarly, they are characterized by a more concentrated ownership structure in which family ownership is more common resulting in a weak ERM adoption among the corporate thereby weakening the protection of interest of non-controlling shareholders and investors by exposing the investments or assets to more risks. It is a common practice in corporations to improve their performance to attract investments from diverse investors to expand and grow the firms (Doran & Ryan, 2016). The primary purpose of establishing any firm is to maximize profits, returns, and values, while minimizing conflicts, losses, risks, cruises, and weak structures. Hence, investors need to have confidence that firms are well managed by the boards, and such will continue to make profits for their investments (Cho, 1998; Li et al., 2012). There are two effective forms of performance measures, that is, market-based and accounting-based performance. Market-based performance considers stock prices, which highlight the firm data's economic value. Tobin's Q is the most commonly utilized measure for market-based performance (Makhlouf et al., 2017; Singh et al., 2018). The performance of BOD in a firm has been previously measured using Tobin's Q (El-Faitouri, 2014). In this present study, it is believed that the moderating effect of ERM can be effectively measured using both market-based and accounting-based performance. To the best knowledge of this researcher, there is a lack of study focusing on the moderation role of ERM on the performance in Jordan. This relationship in Jordan has never been examined. Therefore, the purpose of this study is to investigate the moderating effect of ERM on the performance of the board of directors in Jordan. Most of the prior studies in Jordan such as (AlQudah et al., 2019; Qa'dan, & Suwaidan, 2019; Makhlouf et al., 2017; Marshdeh 2014; Alabdullah 2016; Jaafar & El-Shawa, 2009) examined the effect of the BOD on the performance of the firm but these studies focused on the direct relationship between independent and dependent variables. Therefore, to provide a thorough guide on the relationship between BODE and performance of Jordanian companies, Thus, this study would be a contribution to the literature in highlighting the role of the ERM as a moderator on the relationship between BODE and performance measured by (ROA, ROE, and Tobin's Q ).the aim of the present study is to explore the impact of ERM on the relationship between BODE on performance for all Jordanian Industrial and service listed companies. Where the test of the period from 2009 to 2017. It is expected, the good of the ERM would have affected the BODE and performance. Also assessing the Control variables represented by firm size, firm age, and Leverage. Hence with the aforementioned framework, the objective of this research is to examine whether enterprise risk management moderates the relationship between the effectiveness of the board of directors and performance in the Jordanian industry and service listed companies.

## 2. Literature review

Agency theory forms a fundamental framework for this study is examining the relationship between BOD and performance. To achieve the objective of this study, three relationships are examined. The relationship (Fig. 1) examines the ERM as moderating variables. The performance is assigned as the dependent variable (DV), BOD is designated as the independent variables (IV). This affects the relationship between the BOD effectiveness on performance. This relationship is based on agency theory. Fig. 1 illustrates the framework used in investigating the direct moderating effect of ERM on the relationship between the BOD effectiveness on accounting and market performance in Jordan.



**Fig. 1.** The moderating effect of the ERM on the relationship between the BOD effectiveness on accounting and market performance in Jordan

ERM can boost the performance of a corporation by allowing effective managerial decisions, cost regulation, decreased effort duplication, and enhanced consumer satisfaction (Olson and Wu, 2015; Wang et al., 2016). The moderating effect of ERM through board ownership has shown positive results (Ahmed and Manab, 2016). An increase in an ineffective managerial involvement that could jeopardize the risk management decisions and performance (Nguyen, 2011; Wang, 2012; Wang & Shailer, 2015; Dakhallh et al., 2019). Studies are yet to directly establish consistent positive or negative effects of ERM on performance. In Jordan, there are still inadequate studies on the moderating effect of ERM on performance. The hypotheses in this study are developed based on agency theory. The first hypothesis studies the moderating effect of the ERM on the relationship between BODE and performance. Enterprise risk management and board of directors' effectiveness are crucial factors for the performance of any firm. Caldwell (2012) affirmed that one of the major factors leading to effective risk management is the existence of a proper CG initiative of which board oversight is an essential attribute. For a firm to successfully manage risk, the ERM scheme must be viewed as an important board strategic policy in decision-making (COSO, 2004). Besides, existing risk management in a corporation enhances the effectiveness of the board to perform its role of monitoring and oversight especially in aligning the two interests between agent and principal (Wang et al., 2016; Silva et al., 2019; Deng, 2019). An effective board of directors and senior management support are needed to get the right focus, resources, and attention for effective ERM that will result in improved corporate performance. The Jordanian corporate sectors speedily increasing in numbers, growing in technology, and size, they need better monitoring and control in terms of auditing (Shatnawi et al., 2019b). The agency theory has argued that older directors have less time to wait for the fruition of high-risk projects. They prefer investments that deliver a rapid payback, ready to bear more risk, and to undertake significant decisions (Antia et al., 2010). Bosse & Phillips (2016) stated that the level and intensity of the agency problem is less in those firms where the board committee is more effective in terms of decision and function. Effective committees here refer to a high level of independence, which is aligned with Jensen and Meckling (1976) who stated that an independent board is more effective than insiders in terms of managerial monitoring. According to Jensen and Meckling (1976), agency theory is the contractual relationship in which the principal engages the agent to provide services on their behalf. Within this agency relationship, agency problems between shareholders (principal) and management (agent) usually arise from a combination of asymmetric information and differences in sensitivity to firm-specific hazards. In other words, the problem of risk sharing emerges due to the principal and agent having different actions towards risk preference. Guizani (2013) found that the agent is generally assumed to be a risk-avertter and the principal a risk-seeker. Thus, in general, it is expected that the existence of ERM helps the corporation to reduce the agency problems and at the same time reduce the agency cost incurred by the company. Based on these arguments and empirical evidence provided by the prior studies, this study expects that the relationship between the BOD effectiveness and performance can be moderated by ERM in the Jordanian industry and services listed companies. The testable hypothesis is as follow:

**H<sub>a</sub>:** Enterprise risk management moderates the relationship between the board of directors' effectiveness on Return on assets in the Jordanian industry and service listed companies.

**H<sub>b</sub>:** Enterprise risk management moderates the relationship between the board of directors' effectiveness on Return on Equity in the Jordanian industry and service listed companies.

**H<sub>c</sub>:** Enterprise risk management moderates the relationship between the board of directors' effectiveness on Tobin's Q in the Jordanian industry and service listed companies.

### 3. Methodology

#### 3.1 Sample and Population of the Study

The Amman stock exchange (ASE) consisted of three sectors: financial, industrial, and service sectors. The study depends on a sample consisting of 684 observations for 76 from industrial and service sector companies. Thus, companies in the financial sector were excluded because this sector is governed by a different set of rules and regulations and that will make them incomparable with firms in other sectors (Al-Akra, 2009; Marashdeh, 2014). The sample covers the period from 2009 to 2017. The study period began in 2009 because the Jordanian corporate governance code issued in 2008 and came into effect on January 1st, 2009. (Alkhatib & Al Bzour, 2011). The year 2017 was selected because it is the latest financial year for which all companies published annual reports were available at the time when the data collection started. The data are obtained from annual reports and financial statements that are available on the Amman stock exchange website (ASE) and the firms' website. Not by way of potentially subjective sources, such as questionnaires or interviews. This study follows the quantitative research approach. Studies have shown that the quantitative approach employs different types of statistical analysis, and provides stronger forms of measurement, reliability, and ability to generalize findings (Bryman, 2016; Berg, 2004). Moreover, Berg (2004) indicated that the quantitative methods can deal with long-time with many samples which increases the generalization capacity. To test the hypotheses, in this study, secondary data is used as the main source of data. The main benefits of using secondary data are that less effort is spent in its collection, it is more reliable than primary data, it provides a fast means of gathering data, and it costs less to collect it (Schmidt & Hollensen, 2006). Also, according to, Hair et al. (2009) state that the appropriate method of analysis when the research problem involves a single metric variable presumed to be related to two or more independent variables. Therefore, regression analysis is chosen as the main tool of analysis in this study. The regression model is one of the most common methods of analysis that has been used by many previous researchers (Claessens, 2006; Alkhazaleh, and Marei, 2021; Anderson and Reeb, 2003; Khanna and Palepu, 2000, Sekaran, 2007; Marei, and Iskandar, 2019) to investigate the relationship between CG mechanisms and performance.

### 3.2 Study Variables

#### 3.2.1 Dependent variable

This research uses both accounting-based and market-based performance measures. ROA and ROE were used as the accounting-based performance indicators and Tobin's Q for market-based performance. The return on assets measures the performance by showing the investors to what extent the firm has generated earnings from its invested capital (Eldaia et al., 2020; Erhardt et al., 2003). Agency theorists argue that managers would most probably disseminate profits with less return left for shareholders; a lower return on assets indicates the inability of management to efficiently utilize corporate assets. ROA is regarded as a dominant measure of performance used by studies (Shatnawi et al., 2021; Marashdeh, 2014; Makhoulouf et al., 2017). ROA is taken as a performance proxy, measured as a percentage of net income to total assets. The ROE is a ratio that is used to assess the amount of return a shareholder gets from an investment (Mehran, 1995). It is a reflection of the management's effectiveness to generate additional earnings for the firm and its shareholders. ROE is measured in terms of operating performance (Adjaoud et al., 2007). According to the studies of Ang and Lin, (2000), ROE will be measured as a percentage of net income to total equity. Villalonga and Amit (2006) reported that Tobin's Q reflects expectations about future market perceptions about a firm's value. Moreover, Tobin's Q shows how investors regard the firm and it is a relevant indicator regarding the ability of a company to survive (Ramadan, 2009). In this study, due to the difficulty in computing the replacement cost, Tobin's Q is calculated as the ratio of the market value of the firm to the book value of assets. The market value of the firm is computed as the market value of common stock plus the book value of debt (Sulong & Nor, 2008; Darko et al., 2016; Makhoulouf et al., 2017).

#### 3.2.2 Independent variable

Board of directors' effectiveness (BoDE) is measured by a composite measure of the Board of Directors' Effectiveness (BODE). The study adopts five characteristics for the board of directors to measure its effectiveness (Board size (BS), Board Independence (BI), Board meeting (BM), Women in the Board (WITB), and Muslim directors in the Board (MDITB)). To calculate BoDE, following some of the prior studies such Aldamen et al. (2012); Johl et al., (2013); Ishak & Al-Ebel, (2013); Amrah et al. (2015); Siam and Khairi (2014); Al Qadasi & Abidin, 2018; and Makhoulouf et al., (2017), each of the non-binary variables is converted into a binary form by assigning the value of '1' if the variable is greater than or equal to the median for the entire sample and '0' otherwise (i.e. if it is below the sample's median). These values are then summed to obtain a composite score ranging between "0 and 5", with a higher score indicating the higher effectiveness of the board. A value of five indicates strong corporate governance and a value of zero indicates weak corporate governance. In other words, firms with a composite value of '0' are presumed to have the weakest compliance with the governance system, and conversely, firms with a value of '5' are presumed to have the strongest compliance with the governance system. Ward and Mendoza (1996) have argued that investigating the mechanisms of CG as a group rather than an individual should be more in future studies. Hence, the uses of a composite measure of board effectiveness instead of BoD characteristics have some benefits. Firstly, each individual governance mechanism has its limitations, which may not meet the requirements of the changing environment. Therefore, it should comprehensively evaluate corporate governance, by using an aggregate measure (Guo, 2011). Secondly, the effectiveness of one mechanism of BoD characteristics depends on the effectiveness of other mechanisms. Hence, the composite measure of these mechanisms can be considered better in reducing the agency cost and protecting the interests of all shareholders. (Hashim & Amrah, 2016). Thirdly, individual corporate governance mechanisms may give contradictory effects and mixed results (Agrawal & Knoeber, 1996). So, the composite measure gives a more accurate measurement of corporate governance's effectiveness (Dogan et al., 2013).

#### 3.2.3 Moderating Variables

Moderating variables provide useful information about how, why, or when a phenomenon occurs, and it is the third variable that affects the association between the explanatory variables and the dependent variable and it may increase or reduce the relationship power or change the direction of the relationship (Bennett, 2000). The two moderating variables of interest in this study are ERM and OC. Many studies have used a chief risk officer (CRO) and risk committee (RC) appointment (Lechner and Gatzert, 2018) or based on COSO (2004) framework to study ERM. Studies have used the presence of CRO as a benchmark for the implementation of ERM (Beasley et al., 2005). These studies have proven that the presence of CRO is positively associated with the implementation of ERM. Similarly, the presence of RC is also a good indicator of the implementation of ERM (Sabato, 2010). The ERM is used as a moderator in this study. Since RC is comparable to CRO, thus RC is included in the present research. Both CRO and RC are scored 1 when one or both of them are present, and 0 if none is disclosed.

To increase the confidence of the present results, this study includes control variables, performance as a dependent variable might be influenced by other factors other than the aforementioned independent variables. A set of these control variables are generally included in the regressions. The current study has three control variables: firm size, firm age, and leverage.

**Table 1**  
Summary of the Measurements of the Variables

Variables	Acronym	Definitions
<b>Dependent variable</b>		
Return on assets	ROA	Net income to total assets.
Return on Equity	ROE	Net income to total equity.
Tobin's Q	TQ	The market value of <i>stock</i> plus book value of <i>debt</i> divided by book value of assets.
<b>Independent variables</b>		
Board Size	BS	The total number of BOD members.
Board independence	BI	The proportion of independent Directors at BOD.
Board meetings	BM	The total number of BOD meetings over the year.
Women on the Board	WITB	The proportion of Women on the board to total number of BOD members.
Muslim directors in the Board	MDB	The proportion of Muslim directors on the board to total number of BOD members.
Composite measure of Board of directors' Effectiveness	BODE	A composite score of the firm's board effectiveness ranges between '0' and '5' with '0' representing lowest effectiveness and '5' highest effectiveness. The board of directors' effectiveness score is obtained by assigning a value of '1' to scores equal or above the median and '0' otherwise for (BS), (BI), (BM), (WITB) and (MDB) and then summing them together.
<b>Moderating variables</b>		
Enterprise Risk Management	ERM	ERM which takes the value 1 if the firm applied an ERM, and 0 otherwise.
<b>Control variables</b>		
Firm Size	FS	Natural logarithm of total assets.
Firm Age	FA	The number of years since the company was established.
Lever	LG	The ratio of total liabilities to total assets.

#### 4. Research Model and the Procedures of Panel Data Approximation

##### 4.1 Panel Data

The current study is based on 76 sampled companies over the nine years. Therefore, it is appropriate to use panel data methodology for the sake of examining the impact of the independent variables on the performance practice. Moreover, prior studies in the field of accounting and finance adopted panel data methodology (Ming & Gee, 2008; Yunos et al., 2011). This study deploys the STATA software. Using this software, some procedures were carried out before proceeding to further analysis. The first step is to classify the data as panel data. Data are grouped according to companies and year. The data are grouped based on the number of companies (from 1 to 76 companies) and the time series from 2009 to 2017 making nine years (T). Accordingly, the number of observations for the nine years from 76 companies is  $(76 \times 9 = 684)$  684. In this study, the data is strongly balanced and the software showed that there are 684 observations with  $T=9$  and  $N=76$ . Hair et al. (2009) pointed out that the moderating effect or interaction effect occurs when the moderator variable changes the form or the strength of the relationship between two or more variables. Gani and Jermias (2006) explained that the regression model is a statistical method that is utilized in studies that focus on the impact of moderator variables on the relationship between the dependent variable and independent variables. Hartmann and Moers (2003) pointed out that regression analysis is more suitable for testing a hypothesis that contains moderating variables (Baltagi, 2008). The moderating relationship consists of three types of variables: the dependent variable, the independent variable, and the moderator variable. In a moderating relationship, the dependent variable is influenced by the independent variable and a moderating relationship exists when the influence of the independent variable on the dependent variable is different depending on the value of the moderator variable (Ren, 2014).

##### 4.2 Model Specification for the Moderating Effect of ERM

###### Model (1): Variable with Moderating Variable (Enterprise Risk Management)

To investigate the first set of hypotheses that are related to the moderating effect of ERM on the relationship between the composite variable of BoDE on performance.

$$\begin{aligned} \text{ROA} &= \alpha + \beta_1 \text{BoDE\_SCORE}_{it} + \beta_2 \text{ERM}_{it} + \beta_3 \text{BoDE\_SCORE}_{it} * \text{ERM}_{it} + B_4 \text{FS} + B_5 \text{FA} + B_6 \text{LG} + u_{it} \\ \text{ROE} &= \alpha + \beta_1 \text{BoDE\_SCORE}_{it} + \beta_2 \text{ERM}_{it} + \beta_3 \text{BoDE\_SCORE}_{it} * \text{ERM}_{it} + B_4 \text{FS} + B_5 \text{FA} + B_6 \text{LG} + u_{it} \\ \text{Tobin's Q} &= \alpha + \beta_1 \text{BoDE\_SCORE}_{it} + \beta_2 \text{ERM}_{it} + \beta_3 \text{BoDE\_SCORE}_{it} * \text{ERM}_{it} + B_4 \text{FS} + B_5 \text{FA} + B_6 \text{LG} + u_{it} \end{aligned}$$

Where the performance, which represents the dependent variable and measured by ROA, ROE, and Tobin's Q. Score for the effectiveness of (BoDE\_Score) is an independent variable. Model specification (1) refers to the moderating effect of ERM, Control variables represented by firm size (FS), Firm Age (FA), and Leverage (LG).

where:

- $\text{BODE\_Score} * \text{ERM}$  = Interaction between the board of directors' effectiveness and enterprise risk management.

#### 5. Findings

##### 5.1 Descriptive Analysis

The descriptive result of performance is in Table 2. The table displays the mean, median, standard deviation (STD), minimum, and maximum values of the variables. In terms of ROA, the table displays the 684 observations from 76 companies; the mean

score is 2.8925, while the median is 3.13. The STD is 7.98 and is higher than the accepted value of absolute 1.96. This is mainly due to the use of ratio scale, which allows the variation in responses and results in high standard deviation. The minimum value of ROA is -43.80%, while the maximum value is 38.67% indicating that there is a high variation in the ROA of industrial and services companies in Jordan for the period of 2009 to 2017 is 2.89. Similarly, ROE has an overall mean of 3.26% and a median of 4.10%. The STD is high at 12.66 due to the use of ratio scales. The values of ROE ranged between -51.70 (minimum) and 50.85% (maximum) indicating that there is a high variation in the performance of Jordanian companies in terms of the ROE. For Tobin's Q, Table 5.1 displays that the mean value is .8899, while the median is .6103. The standard deviation of 1.24 is within acceptable values. The highest value of Tobin's Q is 14.85, while the lowest value is 0.00 indicates that the performance is varied and tends to be low because Tobin's Q is less than 1 which indicates that the market value of the company is lower than the value of the assets. These results are similar to those reported by Makhoulf et al. (2018) who found 1.75 mean with a minimum of -44 and a maximum of 84 for ROA for companies in Jordan. Besides, the value of Tobin's Q was reported to range between 0 and 5 with a mean of 1.21.

**Table 2**  
Descriptive Statistics for study variables

		ROA	ROE	TQ	BoDE	ERM
<b>Sample</b>	<b>Company</b>	76	76	76	76	76
	<b>Time</b>	9	9	9	9	9
	<b>Observation</b>	684	684	684	684	684
	<b>Missing</b>	0	0	0	0	0
<b>Mean</b>		2.8925	3.2633	.8899	2.2792	.1199
<b>Median</b>		3.1316	4.1059	.6103	2.0000	.0000
<b>Std. Deviation</b>		7.98340	12.66511	1.24445	.94788	.32506
<b>Minimum</b>		-43.80	-51.70	.00	.00	.00
<b>Maximum</b>		38.67	50.85	14.85	5.00	1.00

The descriptive results of BoDE are presented in Table 2. It shows that the mean of the composite measures of the BoDE is 2.2792 and the median is two. The STD is 0.94788 while the minimum value is zero and the maximum value is five. This finding is in agreement with (Al-Adeem & Al-Sogair, 2019; Makhoulf et al., 2018) who found that the composite measure of the BODE ranged between zero and five with a mean score value of 2.75 in Jordan. The descriptive results of ERM are presented in Table 2. The mean score value is 0.1199 equivalent to 12% of the corporations that implemented ERM frameworks, while 88% did not implement ERM frameworks in Jordan. The median value is 0.00, while the standard deviation is 0.32506, which is an indicator of less variation among the sample of this study. Matar & Nauimat (2014) showed that most of the Jordanian public shareholding companies are implementing the ERM. However, the authors mentioned that there is a weak implementation of this framework among other sectors such as the industry sector because implementing ERM is not mandatory by any regulation in Jordan. This could be the reason for the low implementation of ERM among industrial and service companies in Jordan.

This study deployed firm size, leverage, and firm age as control variables.

### 5.2 Normality

There are several procedures to check for normality for the data. One widely used procedure is to examine the skewness and kurtosis of the distribution as well as the shape of the histograms. Researchers suggested that a value of skewness less than absolute 1.96 or kurtosis less than absolute 3 are indicators of the normal distribution of data. For the histogram, it must have a bell-shaped to be described as normally distributed. For this purpose, the analysis of skewness and kurtosis was conducted on all variables. Findings indicate that some of the variables (firm size, board meeting, firm age, and board size) have violated the assumptions of normality with skewness greater than 1.96 or kurtosis greater than 3. Nevertheless, the literature is flexible in this point and the method of transforming the data is acceptable procedures for normalizing the data. Among the methods, there are Blom, Tukey, Van der Waerden, and Rankin. Researchers compared the methods for accuracy and found that Van der Waerden outperformed other methods of data transformation (Lüpsen, 2018; Sheskin, 2007). Accordingly, this study uses the method of Van der Waerden for transforming the data. After conducting the transformation, the skewness and kurtosis of the variables were computed. Table 4 shows that the values of Skewness and Kurtosis were within the accepted range of less than absolute 1.96 and 3, respectively.

**Table 4**  
Normality Analysis

Variable	Skewness< ±1.96	Kurtosis<±3	Variable	Skewness< ±1.96	Kurtosis<±3
BoDE	-0.16	-0.36	Tobin's Q	1.035	.847
Enterprise Risk Management	1.381	-.094	Firm Size	.879	-.170
Return on Assets	-.338	.914	Leverage	.893	.459
Return on Equity	-.568	1.290	Firm Age	1.068	.187

N=76, Time=9, Observation=684

### 5.3 Heteroscedasticity

To examine heteroscedasticity, researchers suggest using the method of the Breusch-Pagan/ Cook-Weisberg test. According to this method, there is a null hypothesis predicting that there is constant variance in the data meaning that the data are homoscedastic and there is no issue of heteroscedasticity in the data. The role of thumb indicates rejecting the null hypothesis if the p-value (Prob>chi2) is less than 0.05 while accepting the null hypothesis if the p-value is greater than 0.05. Using Stata, the analysis was conducted after creating the log values for all the variables. Table 9 shows the results. The p-value in all analyses is greater than 0.05 supporting the acceptance of the null hypothesis and indicating that the variance is constant, and the data of this study are free from heteroscedasticity issues.

**Table 6**  
Heteroscedasticity Results

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity		
Ho: Constant variance		
Variables: fitted values of logROA	chi2(1)	.18
	Prob > chi2	0.6740
Variables: fitted values of logROE	chi2(1)	1.06
	Prob > chi2	0.3022
Variables: fitted values of logT, Q	chi2(1)	0.13
	Prob > chi2	0.7231

Chi2: Chi-square, Prob>chi2: p-value, ROA: Return on assets, ROE: Return on equity, TQ: Tobin's Q.

### 5.4 Choosing between Random Effect Model and Fixed Effect Model

The suitable regression model to be implemented on the data is chosen. There are two models: the random effect model and the fixed-effect model. To determine the suitable model, the Hausman test is deployed. First, the fixed-effect model is executed and followed by the random effect model. The null hypothesis stated "H0: random effect model is appropriate for the panel data" while the alternative hypothesis stated "Ha: fixed effect model is appropriate for the panel data". The comparisons between the two models were conducted for the three dependent variables in this study. The results of the Hausman test are displayed in Table 7. In all the regression models, the random effect is not appropriate, and the null hypothesis was rejected because the p-value is significantly less than 0.05 (P-value<0.05). It can be concluded that the fixed effect model is appropriate for the panel data of this study.

**Table 7**  
Hausman Test

Dependent variable	Chi2 (7)	Prob>chi2	Conclusion
Return on Assets	38.93	0.0002	Fixed effect model is appropriate
Return on Equity	37.16	0.0004	Fixed effect model is appropriate
Tobin's Q	52.23	0.0000	Fixed effect model is appropriate

### 5.5 Moderating Effect

Using hierarchical regression, first, the direct effect model is tested which is labeled as Model 1. Next, the moderating variables ERM are included in Model 1 to form the Model 2. The third model (Model 3) includes all the independent variables (IVs), control variables, the moderating variables, and the interaction effect. The interaction effect is a result of multiplying the IVs with the moderating variables to create new variables, for example, BDE is multiplied with the ERM to create the interaction or the moderating effect (BDE\*ERM). The creation of the composite measurement of BoDE is a common practice in previous studies (Ren, 2014; Amrah et al., 2015). This is because using this composite measurement is preferable since the use of individual measures could have contradicted results on performance. Thus, using the composite measures is more accurate than using the individual measure and the composite measures provide a comprehensive measurement of the BoDE (Yunos, 2011; Ren, 2014; Makhoul et al., 2018). Composite measures are more preferred when the model involves intervening (moderating) variables such as in this study where the ERM are examined as moderating variables. To conduct this analysis, hierarchical regression is the best method. Hierarchical regression is a procedure that is commonly used when examining the impact of moderating variables (Al-Matari et al., 2014; Amrah et al., 2015). Furthermore, Aguinis et al., (2007) argued that hierarchical regression is an appropriate way to determine the moderating impact of a quantitative variable on the relationship between other quantitative variables. Because of these reasons, this study is deploying hierarchical regression. Hair et al. (2010, 2016) suggested that testing one moderating variable in the model gives more accurate results. Following this suggestion, this study handles each moderating variable separately.

### 5.6 Moderating Effect of Enterprise Risk Management

The results of the tested moderating effect of ERM between BDE with return on assets are shown in Table 8. The BoDE is found significant (P-value<0.05) in model 1 and model 2, but not significant in model 3 in terms of moderating effect of ERM on ROA. The ERM is only significant (P-value<0.05) in model 2. However, the interaction effect (BoDE\*ERM) on ROA is

found to be highly significant for model 3. This suggests that the implementation of the ERM framework depends on BDE in Jordanian corporates listed in the ASE during this period.

**Table 8**

Results of the moderating effect of ERM between BoDE and ROA

ROA	Model 1			Model 2			Model 3		
	Coef.	t	P>t	Coef.	t	P>t	Coef.	t	P>t
C	1.17	12.4	0.000	1.06	10.7	0.000	.77	7.67	0.000
BoDE	.099	2.55	0.011	.088	2.29	0.022	0.061	1.66	0.098
ERM				.181	3.32	0.001	0.063	1.14	0.254
BoDE*ERM							0.289	6.52	0.000
FS	.980	10.8	0.000	.926	10.1	0.000	.90	10.5	0.000
LG	-.156	-3.34	0.001	-.132	-2.86	0.004	-.11	-2.51	0.012
FA	-1.09	12.4	0.000	-.967	-6.69	0.000	-.957	-6.97	0.000
R-square		.414			.428			0.507	
F statistic		32.88***			29.70***			33.36***	

\*\*\* significant at 0.001, \*\* significant at 0.05, \*significant at 0.10

ROA: return on assets, C: constant, BDE: Board of director effectiveness, ERM, enterprise risk management, FS: Firm size, LG: Leverage, FA: firm age.

Table 8 demonstrates the results of the tested moderating effect of ERM between BoDE with ROA. The outcomes the R-square has changed in model 1 from .414 to .507 in model 3 indicating that there is an increase in the explanatory power of the model in explaining the variation in return on assets. In Model 1, the effect of BoDE on ROA is significant at a level of 0.05. Similarly, the effect of the control variables is significant. The moderating variable ERM in model 2 has a significant positive relationship with ROA. The third model (Model3) included the interaction effects and it showed that the relationship of BoDE\*ERM on ROA is positive and significant. This indicates that there is a positive interaction effect between BoD effectiveness and enterprise risk management supporting the hypothesis of a positive relationship. The positive interaction indicates that the increase in ERM practices and implementation in the context of industrial and services companies in Jordan lead to an increase in the positive relationship between BoD effectiveness and ROA. Therefore, H1a, which predicted that ERM positively impacts the association between BoDE and ROA, was Accepted.

**Table 9**

The result of the moderating effect of ERM between BoDE and ROE

ROE	Model 1			Model 2			Model 3		
	Coef.	t	P>t	Coef.	t	P>t	Coef.	t	P>t
C	.589	5.87	0.000	.368	3.59	0.000	.290	2.65	0.008
BoDE	.092	2.24	0.025	.071	1.78	0.075	.064	1.60	0.110
ERM				.369	6.55	0.000	.339	5.59	0.000
ERM*BoDE							.097	1.99	0.012
FS	.177	1.84	0.066	.117	1.26	0.209	.106	1.14	0.254
LG	.195	3.93	0.000	.222	4.61	0.000	.230	4.75	0.000
FA	-.203	-1.32	0.187	-.175	-1.18	0.240	-.142	-0.95	0.341
R-square		.393			.447			.453	
F statistic		28.93			32.94			25.29	

\*\*\* significant at 0.001, \*\* significant at 0.05, \*significant at 0.10

ROE: return on equity, C: constant, BDE: Board of director effectiveness, ERM, enterprise risk management, FS: Firm size, LG: Leverage, FA: firm age.

Table 9 demonstrates the results of the tested moderating effect of ERM between BoDE with ROE. The outcomes the R-square has changed in model 1 from .393 to .453 in the model indicating that there is an increase in the explanatory power of the model by adding the moderating variable and the effect of the interaction. In model (1) shows the effect of BoDE on ROE and it shows that the effect is positive and significant. In Model (2), the effect of ERM on ROE is given and it shows that ERM affects positively ROE. Model (3) presents the interaction effect of ERM with BoDE on ROE (ERM\*BoDE). It shows there is positive interaction between ERM and BoDE on ROE. This positive interaction indicates that the increase in ERM practices and implementation in the context of industrial and services companies in Jordan lead to an increase in the positive relationship between BoD effectiveness and ROE. Therefore, H1b, which predicted that ERM positively impacts the association between BoDE and ROE, was Accepted.

**Table 10**

The result of the moderating effect of ERM between BoDE and TQ

TQ	Model 1			Model 2			Model 3		
	Coef.	t	P>t	Coef.	t	P>t	Coef.	t	P>t
C	-.198	-1.73	0.084*	-.276	-2.29	0.022**	-.303	-2.35	0.019**
BoDE	.152	3.23	0.001**	.144	3.07	0.002**	.142	3.00	0.003**
ERM				.131	1.99	0.047**	.103	1.45	0.148
ERM*BoDE							.096	1.91	0.055
FS	.419	3.82	0.000***	.398	3.62	0.000***	.394	3.59	0.000***
LG	-.164	-2.91	0.004**	-.155	-2.73	0.006**	-.147	-2.58	0.010**
FA	-.290	-1.66	0.098*	-.280	-1.60	0.110	-.261	-1.48	0.139
R-square		.381			.366			.415	
F statistic		21.3***			17.5***			14.75***	

\*\*\* significant at 0.001, \*\* significant at 0.05, \*significant at 0.10

TQ: Tobin's Q, C: constant, BDE: Board of director effectiveness, ERM, enterprise risk management, FS: Firm size, LG: Leverage, FA: firm age.



Table 10 demonstrates the results of the tested moderating effect of ERM between BoDE with Tobin's Q. The outcomes the R-square has changed in model 1 from .381 to .415 in model 3 indicating that a small percentage was added to the explanatory power of the models by adding the moderating variable and the effect of the interaction. In model (1) shows the effect of BoDE on Tobin's Q and it shows that the effect is positive and significant. In Model (2), the effect of ERM on Tobin's Q is positive and significant. Model (3) presents the interaction effect of ERM with BoDE on Tobin's Q (ERM\*BoDE). It shows there is positive and significant. This indicates that positive interaction indicates that the increase in ERM practices and implementation in the context of industrial and services companies in Jordan lead to an increase in the positive relationship between BoD effectiveness with Tobin's Q. Therefore, H1c, which predicted that ERM positively impacts the association between BoDE and Tobin's Q, was Accepted. The findings of this study indicated that when the ERM increases, the positive effect of BoDE on performance increases as well. This finding could be because, when the ERM exists in a company, a more accurate decision regarding the financial risk can be made and better performance can be achieved. This finding is similar to [John et al. \(2008\)](#) who found that when companies adopt a risk-taking approach, it increases the quality of investor protection and stakeholders reduce the pressures on the companies. Research also indicated that having an ERM can significantly increase risk awareness and improve the decision-making process, and this ultimately led to better performance ([Razali et al., 2011](#)). Further, [Abdullah and Shukor \(2017\)](#) pointed out that ERM can moderate the relationship between voluntary risk management disclosure and performance. ERM enhances the competitive advantage of companies and increases corporate performance ([Aziz & Samad, 2016](#)). ERM can improve BOD and long-term performance ([Soliman et al., 2017](#)). Generally, hypothesis H1 is accepted as ERM positively and significantly moderates the relationship between ROA, BoDE on ROE, and BoDE on Tobin's Q. The interaction relationship of BoDE\*ERM on ROA is also positive and significant. The reason for this is when the ERM is effectively implemented in a Jordanian company, more accurate decisions regarding the financial risk can be made and better performance can be achieved.

## 6. Conclusion

This study highlights the moderation effects of ERM between the relationship of BoDE and performance. We extend the scope of previous studies concerning corporate governance and performance by considering the Jordan environment. To the best of our knowledge, this is the first study that examines the moderating effect of ERM in the relationship between the BoDE and performance. Moreover, we contribute to the literature by using a composite measure of BoDE to capture the combined effect of these characteristics and performance measures, namely, market-based measurement such as Tobin's Q. The study is motivated by the gap in the existing literature and the limited evidence concerning the developing countries, based on the previous studies, there is a paucity of existing literature that examined the association between ERM and performance in emerging countries like the Middle East, specifically, in Jordan.

Generally, hypothesis H is accepted as ERM positively and significantly moderates the relationship between BoDE on ROA, ROE, and Tobin's Q. It also moderated the interaction of BoDE\*ERM on ROA, which was found positive and significant. The hypothesis H2 is accepted in terms of ROA and Tobin's Q but rejected in terms of ROE. Also, the results are consistent with the previous studies.

The current research contains some limitations and future studies. First, this research focuses only on industrial and service listed firms on ASE and ignores any other types of listed firms, thus, the findings of the study may not apply to other sectors. Thus, companies in the financial sector were excluded because they have different CG rules issued by the Insurance Authority and the Central Bank of Jordan. However, future studies could focus on the financial sector, which is playing an increasingly important role in developing economies, particularly Jordan. Secondly, this study focused on the effect of ERM as a moderator useful for future studies to use another moderator.

Finally, the results of this study should be of interest to shareholders, regulators, and policymakers, especially issues relative to the relationship between corporate governance mechanisms and performance practices. The results may help policymakers and regulators to make any changes deemed necessary to improve good governance practices and attempt to constrain the incidence of performance in Jordan.

## 7. Limitation and future studies

This study provides a clear vision of how the corporate governance characteristics in Jordan influence corporate performance. there would always be limitations to any studies being conducted. First, the study only focused on non-financial companies, that is, industrial and service sectors, because financial companies are subject to a different set of guidelines and rules. Second, another limitation about the study is the sample, which is limited to listed companies. Third, this research collected all the relevant data from the annual reports based on the accessibility from companies listed on the ASE webpage. Some companies were omitted due to insufficient information. Also, some of the companies do not disclose some of the information required for this study. Additionally, future studies addressing the model used in the current study can be substantiated by investigating its components under different periods and sample sizes in a country with a similar context. Future research should examine the effect of some other variables such as the purchase committee, executive committee, ownership structure, remuneration committee, and other committees' relevance in assessing the performance of a company in Jordan.

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