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Mathematical Analysis of Ownership and Board Structures on Corporate Risk-Taking Behaviour: Evidence from the Saudi Economy

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Abstract: The current study aims to assess the impact of ownership and board structures on the corporate risk-taking behaviours of Saudi Arabian banks listed. The information was taken from the Mubasher database, Board, ownership structure, risk-taking behaviour, and other financial data were all covered in the eight-year data set, which ran from 2017 to 2024. There were 104 observations for 13 banks in the sample. The results show a moderately strong relationship between ownership structure (managerial, institutional, and family) and risk behaviour (RT), with R values of 0.551, 0.553, and 0.584, respectively. The variation in RT explained by these ownership types and control variables ranged from 30.4% to 34%, all statistically significant (Sig. = 0.000). Furthermore, there is a statistically significant relationship between board structure and risk-taking (RT), with R = 0.55 and R^2 = 30%, indicating moderate explanatory power. Certain board characteristics (BSIZE, BIND, BMeeting, and Dual) showed an inverse relationship with RT, while BGD showed a positive relation.

Keywords: Managerial Ownership, Institutional Ownership, Family Ownership, Board Size, Boards Independent, Board Gender, Dual, Board Meetings, Risk Taking Behaviour

1 Introduction

Firm risk is a crucial factor in determining whether a business succeeds or fails, and different businesses take different amounts of risk [1]. Hence, risk is a part of every business, and in the fast-paced, unpredictable business world of today, the board's role in encouraging firm risk-taking is essential [2]. Therefore, taking unwarranted risks could have negative and unfavorable effects. The most recent financial crisis is attributed to business executives' excessive risk-taking [3]. A decrease in the company's total riskiness would raise the risk-adjusted returns for the shareholders, according to contemporary portfolio theory, even if the company's performance does not improve [4].

Additionally, the impact of agency conflicts on corporate risk-taking and the board's role is explained by agency theory. Contrarily, resource dependency theory suggests that gender diversity in the boardroom produces a range of viewpoints, abilities, and decision-making procedures, which significantly influences corporate risk-taking [5].

Additional recent data indicates that banks with larger boards, a higher proportion of independent members, and a capable CEO who serves as both chair and CEO have lower bankruptcy rates, all of which enhance the banking system's financial stability [3]. The agency theory states that communication and coordination problems arise on larger boards. It might make it more likely that risky endeavors will be rejected because of disagreements and postponed decision-making [5,6]. Independent directors additionally add their expertise, abilities, and experience. More independent directors on the board guarantee better and more objective decision-making [7]. The resource dependence hypothesis states that having a diverse board strengthens the vital link between the company and its surroundings. Additionally, the agency

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theory and upper echelon theory support the idea that having women on boards improves board oversight and decision-making [8,9].

Another crucial factor to consider when examining banks' recent risk-taking is their ownership structure. Theoretical and empirical research has demonstrated a strong correlation between controlling shareholders and a firm's success and risk-taking practices. Ghanaian banks have a variety of ownership arrangements, including government, managerial, and foreign ownership [10]. The degree to which ownership structures can affect Saudi banks' propensity for taking risks has not been determined by the research.

The purpose of current study is to increase knowledge about how ownership and board structure factors affect risk-taking behaviour in developing markets like Saudi Arabia. The banking system is the most vital element of any economy since it serves as a financial intermediary, and the banking sector's operation is essential to economic growth. Previous research indicates that a more stable and successful banking industry contributes significantly to the stability of the financial system.

It enhances the research in a number of ways. First of all, it adds current data from 2017 to 2024 to the growing body of research on ownership structure and risk-taking behaviour. Second, it is unique since it aims to investigate how different ownership structures managerial, institutional, and family affect risk-taking. Thirdly, the size, independence, meetings, gender, and dual CEO of the board are all factors that influence risk-taking behaviour. The study makes multiple contributions to the body of literature. First, the most recent Saudi bank data is analyzed. Second, it investigates how a greater variety of ownership and board structure classes affect risk-taking. This is how the remainder of the paper is organized. The literature review and the formulation of hypotheses are presented in Section 2. Section 3 describes the methods used and the data measurement. While section 4 presents and examines the applicable outcomes and section 5 offers the conclusions.

2 Literature Review & Hypotheses Development

2.1 Ownership Structures

According to [11] institutional investors usually participate actively in a company's governance. They typically have significant voting rights and are major investors. As a result, they have a big impact on management operations both directly through their ownership and indirectly through the trading of their shares. RT may also be impacted by institutional investors [12] According to [6], institutional investors in the UK are more likely to sell shares in order to avoid paying for monitoring, which raises the volatility of the company's stock. They also draw attention to the possibility that management may take risks due to short-termism in investments. Similarly, institutional ownership has been found to have a beneficial effect on RT [11,13,14], where study [11] indicate to institutional investors typically take an active role in a company's governance; they can keep an eye on its tactics to make sure it responds, they have a lot of voting power, and they can significantly reduce risk.

On the other hand, RT and institutional ownership were found to be negatively correlated by [15,16]. [15] using a sample of 12 OECD nations, claim that institutional investors are mostly banks, insurance corporations, and pension funds that favor reduced risk and protect client assets through wise investments. There are conflicting empirical findings in the body of existing literature. Additionally, [16] discuss the connection between innovation and institutional ownership, stating that a rise in institutional ownership boosts corporate managers' and CEOs' incentives to innovate by lowering their career risks (i.e., the risk of being fired by management), which in turn raises firm-specific risk. But generally speaking, institutional investors are thought to possess greater resources and knowledge than individual investors. Corporate risk-taking behaviour can be influenced by institutional investors with substantial voting power [17].

According to agency theory, one of the most effective strategies to lessen agency issues that could influence banks' degree of risk-taking is through director shareholding [10]. Research has demonstrated that directors' ownership stake in companies affects their choices and actions, particularly in light of agency theory [18,19]. According to the study [10], banks with a higher percentage of directors are thought to be less risky. Additionally, Risk-taking is significantly positively impacted by both low and high levels of managerial ownership, while bank risk-taking is negatively impacted by intermediate levels of managerial ownership [20].

Family businesses may refrain from taking risks since their primary purpose is to pass ownership of the company to their heirs. Family owners consider non-financial objectives like identity and reputation in addition to financial ones [11].

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According to research [21], the degree of family control over voting rights or managerial engagement may have an impact on how risk-taking family businesses are. According to their research, family principals are more likely to limit CEO risk behaviour than nonfamily principals. [22] points out those independent and non-independent female directors in family and nonfamily businesses have different incentives for risk attitudes. They also contend that although a family with more ownership aligns their interests with their company's by taking on more value-enhancing risky projects, a family with less ownership takes less risk for their own personal gain. whereas [23] discover that the risk-taking of the studied Chinese family enterprises is lower than that of the nonfamily firms, as indicated by their Z-scores.

Because it is often believed that family firms tend to follow relatively conservative strategies in an effort to ensure their long-term existence, [24] are interested in the influence of ownership concentration in family businesses. The findings indicate that there is a non-linear relationship between risk and the degree of family ownership concentration. Expanding SEW theory has been the focus of recent research in an effort to better understand the risk-taking of family businesses. According to [25], family businesses evaluate profits and losses in terms of their nonfinancial and financial wealth [21]. They also steer clear of projects that make them more vulnerable, even if those ventures have long-term benefits. Nonetheless, family businesses decide to take on more risk when they fall short of expectations and risk losing all of their SEW [23]. There are theoretically conflicting opinions regarding how ownership structures affect taking risks. Hence, current study hypotheses that:

H1: There is significant effect of institutional ownership on risk-taking behaviour
H2: There is significant effect of managerial ownership on risk-taking behaviour
H3: There is significant effect of family ownership on risk-taking behaviour

2.2 Board Structures

The overall effectiveness of the board is significantly impacted by the number and makeup of its members (BSIZE). According to a study by [26], there is no statistically significant correlation between board size and risk in UK financial enterprises. According to the study [6], firm risk was substantially correlated with the board's qualities. The findings indicate that a small board with a high equity ownership among executive board directors and a strong institutional investor ownership is one that can raise business risk. Larger boards are frequently accused of protecting executives' interests [5]. Large boards are linked to lower levels of risk-taking, according to [1]. According to a number of empirical investigations, BSIZE and RT are significantly correlated negatively [13,15,27]. A different body of research, however, shows that BSIZE and RT have a negligible relationship [26,28,29]. [30] contend that rather than the BSIZE, the personal traits of board members influence a company's inclination to take risks. Thus, there have been conflicting empirical results regarding RT behaviour and BSIZE. CEOs can establish powerful connections with a small number of board members, but it is more difficult to influence and control a large board [13].

According to earlier research, independent boards (BIND) are superior at overseeing management. The percentage of independent directors on the board who have no commercial ties to the company is typically used to gauge board independence [13]. According to a number of research, BIND and RT are inversely related [15,27,31]. According to [32], independent directors should establish policies that encourage business risk-taking. They also clarify that having more independent directors makes the board less hazardous, as companies take greater risks ex ante for the benefit of their shareholders. Evidence supporting the claims of agency and resource dependency theories was presented by [26]. According to their research, the chance of bankruptcy dramatically drops as businesses improve BIND. The impact of BIND on excessive RT in US and German businesses from 2004 and 2015 was examined by [31]. The results show that in both nations, a decrease in firm risk-taking is associated with an increase in the proportion of independent directors. Additionally, [33] clarify that independent directors are more inclined to back less hazardous projects in order to prevent losses and preserve the company's reputation since they wish to safeguard their own. The monitoring hypothesis, which holds that independent board members aid in lowering business risk-taking, is supported by this reasoning. [5] support their findings with the widely accepted agency theory. In order to protect their reputation, they contend that independent directors keep a careful eye on things and favor low firm risk.

Conversely, BIND has a beneficial impact on RT since independent directors may push the company to embark on riskier projects [34,35,36]. Furthermore, the independent directors lack sufficient inside knowledge. As a result, they can't stop management from taking too many risks. The unfavorable association between risk-taking and board independence is supported by empirical data. For example, the claim that independent board members limit the firm's risk-taking activity is supported by [26]. Additionally, [24] discovered a negligible negative correlation between risk-taking and board independence. Therefore, the study anticipates a negative correlation between risk-taking and board independence.

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The possible influence on risk-taking behaviour has sparked interest in board composition, particularly with reference to gender diversity (BGD) [8]. According to research and development intensity, there is a negative correlation between BGD and FRT in a sample of 12 OECD nations [15]. [8] also discover a negative correlation for a sizable sample of businesses from 45 different nations. They also point out that women are more inclined to seek professional advice in order to lower firm risk. According to [29], in the Spanish context, having more women on board results in lower RT, which encourages women's conservative behaviour. [2,13,37] have reported similar results. According to research by [2], having women on board lowers the volatility of private company performance. These findings hold up well when endogeneity corrections and alternative risk measures are applied. Also clarified the effect of the nationality of female directors and discovered that boards with local (foreign) female directors have a lower (higher) business risk. Additionally, women's representation on corporate boards is crucial for the board's ability to take risks [5,38]. Women on company boards are therefore an important risk-reduction measure that stakeholders and investors should take into account. However, some research shows that BGD has no effect on RT [4,30,39,40]. For example, [4] finds that the risk outcomes of the company and the risk-adjusted return earned by the shareholders are unrelated to the presence of female directors on the board. Furthermore, the main conclusion stated by [39] is simple. There is no difference in the level of risk-taking between a board with a higher percentage of female directors and one with a greater male majority.

According to [41,42], the CEO's multiple functions disregard the board's authority and duty to supervise management. CEOs are more powerful and influential and have a greater chance of influencing investment decisions when they also hold the position of chair of the board [13]. Additionally, CEOs can allocate resources safely and effectively without juggling two jobs. Research shows that having the CEO and chairman positions combined in an organization has a detrimental impact on RTB. Examples of these studies are those conducted by [7,26,43,44], according to stewardship theory, CEOs prioritize the interests of shareholders and operate as responsible stewards. There may be a greater alignment of interests when CEOD takes place and the CEO also serves as the board chair. It is possible that this alignment will encourage a more responsible attitude to taking risks, which will eventually help the banks and its stakeholders create long-term value.

The performance of a board can be impacted by the frequency of board meetings, especially when directors make strategic decisions and debate the challenges facing the company while also improving procedures and plans for the upcoming year [45]. Therefore, by providing board members with more chances to debate corporate strategy and risks, it is reasonable to assume that holding more board meetings will result in increased managerial monitoring, which could ultimately improve a company's performance [24]. [28] it is reasonable to predict that more directors will attend board meetings. On the one hand, reducing agency conflicts through open communication between management and agents can help increase the frequency of board meetings [15]. According to a counterargument, shareholders do not gain anything from board meetings since their objectives will not be met. Since there is little genuine interaction among board members that is pertinent to shareholders, the frequency of board meetings does not accomplish much [46]. There are theoretically conflicting opinions regarding how board structures affect taking risks. Hence, current study hypotheses that:

H4: There is significant effect of board size on risk-taking behaviour
H5: There is significant effect of board independent on risk-taking behaviour
H6: There is significant effect of gender diversity on risk-taking behaviour
H7: There is significant effect of CEO's dual on risk-taking behaviour
H8: There is significant effect of board meetings on risk-taking behaviour

3 Research Design

3.1 Data and sample

The purpose of the current study is to evaluate how ownership and board structures affect the corporate risk-taking practices of Saudi Arabian banks that are listed on the Saudi Exchange, or Tadawul. The Capital Market Authority oversees the 2007-founded Saudi Stock Exchange (Tadawul) [47]. The data came from the Mubasher database, which is used by professionals, practitioners, and academics all over the world [48]. The information was created during an eight-year period, from 2017 to 2024, and covered board, ownership structure, risk-taking behaviour, and other financial data. The sample included 104 observations for 13 banks with some missing values for the components because it was hard to find data for the Saudi market [49,50].

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3.2 Variables Measurement

The measurement tools can be defined as follows in Table 1:

Table 1: Variable definitions

Type	Variables	Code	Explanation	Measurements	References
Independent Variable	Ownership Structure	Man_Own	Managerial Ownership	The proportion of shares that executive directors own	[51,52]
		Ins_Own	Institutional Ownership	The percentage of the business's stock that institutions own serves.	
		Fam_Own	Family Ownership	Percentage of family-owned shares in relation to all company shares.	
	Board Structures	BSIZE	Board Size	The total number of directors on a company board, expressed as a natural log	[15,27,31]
		BIND	Boards Independent	Proportion to the total number of corporate board directors	
		BGD	Gender Diversity	Percentage of female board members	
		CEOD	CEO's Dual	If the CEO and chairperson is the same individual, the dummy variable is equal to one; if not, it is equal to zero.	
		B Meetings	Board Meetings	Number of board directors meetings	
Dependent Variable	Risk-Taking behaviour	RT	z-score	Z-score for commercial banks is calculated by dividing the standard deviation of the return on assets by the sum of the return on assets and the capital assets ratio of the bank.	[9,40]
Control Variables	Board size	SIZE	——	LOG total asset value	[38,53]
	Return on Assets	ROA	——	Net profit over total assets	
	Cash flow	CFO	——	Dividing operating cash flow by total assets	
	Company's leverage	Lev	——	Total debt over total assets	
	LOSS	Loss	——	The dummy variables, 1 when a firm has negative earnings and 0 otherwise	
	Revenue growth	Rev	——	Change percentage in the annual revenue	

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3.3 Empirical models

Testing the primary hypotheses of this research necessitates developing empirical models for each hypothesis separately. In this regard, testing the relationship between Ownership Structures and Risk-Taking Behaviour require running the following empirical models from (1) to (3):

$$RT\_Behaviour = \alpha + \beta_1 Man\_Own + \beta_2 SIZE + \beta_3 ROA + \beta_4 CFO + \beta_5 Lev + \beta_6 Loss + \beta_7 Rev + \varepsilon \quad (1)$$

$$RT\_Behaviour = \alpha + \beta_1 Ins\_Own + \beta_2 SIZE + \beta_3 ROA + \beta_4 CFO + \beta_5 Lev + \beta_6 Loss + \beta_7 Rev + \varepsilon \quad (2)$$

$$RT\_Behaviour = \alpha + \beta_1 Fam\_Own + \beta_2 SIZE + \beta_3 ROA + \beta_4 CFO + \beta_5 Lev + \beta_6 Loss + \beta_7 Rev + \varepsilon \quad (3)$$

Also In this regard, testing the relationship between Board Structures and Risk-Taking Behaviour require running the following empirical models from (4) to (8):

$$RT\_Behaviour = \alpha + \beta_1 BSIZE + \beta_2 SIZE + \beta_3 ROA + \beta_4 CFO + \beta_5 Lev + \beta_6 Loss + \beta_7 Rev + \varepsilon \quad (4)$$

$$RT\_Behaviour = \alpha + \beta_1 BIND + \beta_2 SIZE + \beta_3 ROA + \beta_4 CFO + \beta_5 Lev + \beta_6 Loss + \beta_7 Rev + \varepsilon \quad (5)$$

$$RT\_Behaviour = \alpha + \beta_1 BGD + \beta_2 SIZE + \beta_3 ROA + \beta_4 CFO + \beta_5 Lev + \beta_6 Loss + \beta_7 Rev + \varepsilon \quad (6)$$

$$RT\_Behaviour = \alpha + \beta_1 CEOD + \beta_2 SIZE + \beta_3 ROA + \beta_4 CFO + \beta_5 Lev + \beta_6 Loss + \beta_7 Rev + \varepsilon \quad (7)$$

$$RT\_Behaviour = \alpha + \beta_1 B\_Meetings + \beta_2 SIZE + \beta_3 ROA + \beta_4 CFO + \beta_5 Lev + \beta_6 Loss + \beta_7 Rev + \varepsilon \quad (8)$$

4 Data Analysis & Results

4.1 Descriptive statistics

Table 2 shows the descriptive statistics of all variables. It illustrates the average value for the ownership structure are (Man_Own; Ins_Own; Fam_Own) reached 10.0140; 25.240; 19.947 with a standard deviation of (2.7239; 2.912; 5.8412), It is an indicator of the average variation in the ownership structure and board of directors in the sample banks. Moreover the mean of board structure (BSIZE; BIND; BGD; CEOD; B Meetings) (11.53; 59.391; 12.901; 0.56; 4.81) with S.D(1.238; 10.996; 4.4884; 0.499; 1.330). Moreover the mean risk taking behaviour is 4.6908 with S.D 1.04761.

Table 2: Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation
Man_Own	104	5.0295	14.656	10.0140	2.7239
Ins_Own	104	20.092	29.957	25.240	2.912
Fam_Own	104	10.1240	29.913	19.947	5.8412
BSIZE	104	6	15	11.53	1.238
BIND	104	40.352	79.1588	59.391	10.996
BGD	104	5.1414	19.9846	12.901	4.4884
CEOD	104	0	1	.56	.499
B Meetings	104	2	8	4.81	1.330
RT	104	1.7383	8.0499	4.6908	1.04761
SIZE	104	12.206	13.120	12.7886	.25271
ROA	104	.5121	1.5024	1.0057	.2926
CFO	104	.01023	.0996	.0546	.0277
Lev	104	.1068	.9979	.56095	.273
LOSS	104	0	1	.45	.500
Rev	104	-.09780	.19887	.05265	.0843

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4.2 Correlation analysis

Table 3 shows the correlation matrix to measure the relationship between ownership structure and risk-taking behaviour, as the study relied on institutional, administrative and family ownership. The table shows the presence of a significant correlation between the ownership structure variables and risk-taking behaviour.

Table 3: Correlations Matrix - Ownership Structure

	Man_Own	Ins_Own	Fam_Own	RT	SIZE	ROA	CFO	Lev	LOSS	Rev
Man_Own	1									
Ins_Own	.007	1								
Fam_Own	.032	.030	1							
RT	.127*	.220*	.538**	1						
SIZE	.060	.202*	.028	.129	1					
ROA	.032	.031	1.000**	.537**	.035	1				
CFO	.069	.000	.019	.053	.296**	.021	1			
Lev	.007	.207*	.155	.112	.076	.154	.010	1		
LOSS	.153	.034	.094	.066	.085	.095	.015	.229*	1	
Rev	.100	.193*	.152	.072	.139	.151	.032	.029	.010	1

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Also, Table 4 shows the correlation matrix to measure the relationship between board structure and risk-taking behaviour, as the study relied on size, independent, gender, dual and meeting board. Also, the table shows the presence of a significant correlation between the board structure variables and risk-taking behaviour.

Table 4: Correlations Matrix - Board Structure

	BSIZE	BIND	BGD	CEOD	B Meetings	RT	SIZE	ROA	CFO	Lev	LOSS	Rev
BSIZE	1											
BIND	.073	1										
BGD	.080	.004	1									
CEOD	.011	.281**	.087	1								
B Meetings	.073	.010	.081	.149	1							
RT	.141*	.249*	.234*	.243*	.109*	1						
SIZE	.150	.025	.114	.123	.145	.129	1					
ROA	.019	.028	.035	.267**	.042	.537**	.035	1				
CFO	.123	.100	.039	.323**	.060	.053	.296**	.021	1			
Lev	.104	.087	.010	.050	.130	.112	.076	.154	.010	1		
LOSS	.155	.041	.071	.031	.176	.066	.085	.095	.015	.229*	1	
Rev	.000	.012	.007	.031	.041	.072	.139	.151	.032	.029	.010	1

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

4.3 Multicollinearity

To determine whether multicollinearity was present, the variance inflation factor (VIF) was utilized, as shown in Table 5. The results show that multicollinearity has no effect on the variables. According to the tables, the acceptable variance (tolerance) for each model variable is less than one. Additionally, all of the model variables' (VIF) values are less than 10, suggesting that multicollinearity problems are not present in these models.

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Table 5: Collinearity Statistics

Model	Model (1)		Model (2)		Model (3)		Model (4)	
	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF
Man_Own	.959	1.043	–	–	–	–		
Ins_Own	–	–	.889	1.125	–	–		
Fam_Own	–	–	–	–	.915	1.097		
BSIZE							.911	1.098
SIZE	.872	1.146	.849	1.178	.626	1.597	.834	1.199
ROA	.945	1.058	.945	1.058	.907	1.105	.943	1.060
CFO	.904	1.106	.904	1.106	.906	1.104	.876	1.142
Lev	.919	1.088	.883	1.132	.907	1.102	.916	1.091
LOSS	.911	1.098	.928	1.077	.916	1.092	.909	1.101
Rev	.939	1.065	.922	1.084	.947	1.056	.947	1.056

4.4 Hypothesis Test Results

4.4.1 Testing the Relationship between Ownership structure and Risk Behavior

Table 6 shows the results of measuring the relationship between ownership structure and risk behaviour, where the results of model (1) indicates a positive relationship between managerial ownership and (RT) behaviour. The value of (R) was 0.551, indicating a moderately strong relationship between the managerial ownership and (RT), so (R Square) was 30.4%, which means that approximately 30% of the variation in RT can be explained by managerial ownership and other control variables, at a significance level of (Sig. = 0.000) this results according with [15,16] where observed a positive relationship between institutional ownership and RT. Furthermore the results of model (2) illustrate the value of (R) was 0.553, indicating a moderately strong relationship between the institutional ownership and (RT), also (R Square) was 30.6%, which means that approximately 30% of the variation in RT can be explained by institutional ownership and other control variables, at a significance level of (Sig. = 0.000) by according with [18,19]. in this line model (3) illustrate the value of (R) was 0.584, indicating a moderately strong relationship between the family ownership and (RT), also (R Square) was 34%, which means that approximately 34% of the variation in RT can be explained by family ownership and other control variables, at a significance level of (Sig. = 0.000), hence the statistic results consist with [22]. Hence these results support all alternative hypotheses.

Table 6: Regression models results between ownership structure & RT

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics F	df1	df2	Sig.	Durbin-Watson Coefficients	
1	.551[a]	.304	.253	.905282	5.991	7	96	.000[b]	+	1.630
2	.553[a]	.306	.255	.90424	6.036	7	96	.000[b]	+	1.671
3	.584[a]	.341	.293	.88066	7.108	7	96	.000[b]	-	1.520

a.Predictors: (Constant), Man_Own, Ins_Own, Fam_Own, Rev, LOSS, CFO, ROA, Lev, SIZE
b.Dependent Variable: RT

Figure 1 shows models analysis by using AMOS.22 software. The results showed that managerial ownership (Man_Own) had a positive effect on RT with a coefficient of 0.25, while institutional ownership (Ins_Own) had a weak positive effect of 0.13, and family ownership (Fam_Own) had a negative effect of -0.10 on RT. This indicates that increased managerial and institutional ownership enhances RT, while family ownership has a negative effect. This additional testing of the robustness of the regression analysis results.

Furthermore, figure 2 presents a scatterplot illustrating the relationship between the Regression Standardized Predicted Value and the Regression Standardized Residual. There is random variation observed between the residuals and predicted values, lacking a distinct pattern. This suggests that the statistical model adequately fits the data and that there is no noticeable bias or nonlinearity.

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4.4.2 Testing the Relationship between Board Structure and Risk Behaviour

Table 7 shows the results of the regression model analysis to measure the relationship between board structure and risk-taking behaviour. The statistical results indicate a strong statistically significant relationship between them, with the correlation coefficient (R) is 0.55 in all models, while board structure explained approximately 30% of the variance in RT (R Square = 0.30), reflecting the model's moderate explanatory power. The results showed that some board structure characteristics, such as board size (BSIZE), director independence (BIND), (CEO) dual, and board meetings (B Meetings), have an inverse relationship with RT, indicating that improving these aspects may enhance RT firms. Conversely, a positive relationship emerged for some variables, such as the (BGD). Moreover Durbin-Watson values ranged between 1.56 and 1.68, which is within the statistically acceptable limits, indicating the absence of a significant autocorrelation problem in the model's residuals and enhancing the reliability of the results. The results of this study are consistent with many previous studies, where several studies document an inverse association between (BSIZE; BIND; BMeeting; Dual) and RT [15,27,31,33]. Hence these results support alternative hypotheses of this research.

Table 7: Regression models to measurement relation between Board Structure and RT

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Durbin-Watson	
					F	df1	df2	Sig.	Coefficients	
1	.550[a]	.303	.252	.906238	5.949	7	96	.000[b]	-	1.668
2	.550[a]	.302	.251	.90636	5.943	7	96	.000[b]	-	1.560
3	.550[a]	.303	.252	.905949	5.962	7	96	.000[b]	+	1.655
4	.558[a]	.311	.261	.900836	6.186	7	96	.000[b]	-	1.576
5	.555[a]	.308	.257	.902835	6.098	7	96	.000[b]	-	1.679

a.Predictors: (Constant), BSIZE, BIND, BGD, CEOD, B Meetings, Rev, LOSS, CFO, ROA, Lev, SIZE
b.Dependent Variable: RT

Also, figure 3 shows models analysis by using AMOS software. The results showed that (BSIZE; BIND; CEOD; BMeeting) have a negative effect on RT with a coefficient of (-0.25, -0.26, -0.51, -0.16) while BGD had a positive effect of 0.31. This additional testing of the robustness of the regression analysis results.

Also, the figure 4 shows the distribution of standardized residuals plotted against standardized predicted values in a regression analysis. The points appear to be randomly scattered around the zero line, which suggests that the model does not display any bias or significant nonlinearity. This finding indicates that the model fits the data well.

5 Conclusion & Future Researches

This study aims to deepen our understanding of how ownership and board structure factors impact RT behaviour in developing markets like Saudi Arabia. Current research contributes in a number of ways. With revised data spanning the years 2017–2024, it first broadens the burgeoning market literature on ownership structure and RT behaviour. Additionally, it aims to investigate the effects of different ownership structures (family, institutional, and managerial) on risk-taking. Thirdly, the size, independence, meetings, gender, and CEO dual of the board are shown to have an impact on RT behaviour. In a number of areas, the study contributes to the literature. An analysis of recent Saudi bank data is carried out. The effect of a broader range of ownership and board structure classes on risk-taking is also examined.

The results of measuring the relationship between ownership structure and RT indicates an inverse relationship between managerial ownership and (RT). Furthermore the results indicating a moderately strong relationship between the institutional and family ownership on (RT) in Saudi banks, hence the statistic results consist with prior study. Also, the results of the regression model analysis to measure the relationship between board structure and RT show a strong statistically significant relationship between them, where the results showed that some board structure characteristics, such as board size (BSIZE), director independence (BIND), gender (BGD), and board meetings (B Meetings), have an inverse relationship with RT, indicating that improving these aspects may enhance RT firms. Conversely, a positive relationship emerged for some variables, such as the BGD. The results of this study are consistent with many previous studies, where several studies document an inverse association between (BSIZE; BIND; BMeeting; Dual) and RT in Saudi banks. The current study suggests further research on the relationship between foreign and government ownership of foreign banks in Saudi Arabia.

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