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Mathematical Analysis to Measure Corporate Governance Reforms Impact on Earnings Management: Evidence from the Saudi Economy after Vision 2030

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Abstract: The current study investigates the relationship between corporate governance reforms (CG) and earnings management (EM). Additionally, it examines how contextual factors, such as firm size and leverage, affect the relationship between CG and EM in annual reports. To conduct this analysis, the study utilized the annual reports of selected Saudi companies for the years 2020–2024. The final sample comprised a balanced panel dataset of 86 non-financial Saudi-listed companies, resulting in 430 firm-year observations. Using statistical software (SPSS 26; IBM SPSS AMOS 22), the regression results reveal varying effects of governance factors on EM within Saudi firms. There is a negative relationship between EM and the factors of managerial ownership (Man_Own), board independence (BIND), and audit committee size (ACZ). These findings suggest that board independence contributes to reducing EM. Furthermore, the results indicate that larger audit committees enhance oversight and transparency, which consequently helps to curb earnings manipulation. Conversely, a positive correlation was found between board size (BSIZE) and EM in Saudi firms, suggesting that larger boards may suffer from weak oversight and coordination challenges that facilitate earnings manipulation by management.

Keywords: Earning Management, Managerial Ownership, Institutional Ownership, Board Independence, Board Size, and Audit Committee Size.

1 Introduction

Despite having occurred over two decades ago, the Enron scandal is still relevant in discussions about earnings management today because it highlights the severe and pervasive effects of corporate governance failures and earnings manipulation on businesses, their stakeholders, and the overall economy[1, 2] .Earnings management (EM) is the typical measure of an organization's worth that affects the quality of financial reporting. The asymmetry of information between insiders and outsiders may cause EM to reduce shareholder wealth [3] .The practice of managing earnings is one of the most prevalent among businesses. In order to change economic performance or influence contractual outcomes that rely on accounting statistics, earnings management involves making decisions about company reporting and financial transaction structuring[4, 5].

To portray a different picture of the genuine financial situation, EM uses creative accounting procedures such recognizing expected sales as turnover for the current year or lowering the cost of research and development, employing discretionary accruals, and collecting accumulated expenses[6, 7]. health and welfare of Previous investigations into the connection between earnings management and corporate governance indices have shown conflicting findings[4, 8]. Cultural and contextual variations may have as much of an impact on these contradictory findings as other environmental heterogeneity. The majority of the research in the literature are conducted in developed economies, and little is known about the situation in developing economies, particularly in light of recent shifts in the governance space [9].Corporate governance frameworks have been established to address the challenges that occur when individuals act in their own interests rather than the interests of shareholders, drawing on the role that agency theory played in resolving conflicts of interest. [10].

Thus, improved corporate governance procedures will reinforce and lessen the conflict between managers' and shareholders' interests[11, 12]. In Saudi Arabia, the body of research on corporate governance is small but still expanding. [13] revealed that the governance level of the Saudi Stock Exchange was 61.4%, which is high when compared to previous studies. One of the main modifications to Saudi Arabia's corporate laws in 2017 was the required implementation of the International Financial Reporting Standards. As a result, the application of governance rules is the most crucial indicator of successful performance [14].This is essentially due to the fact that businesses that exhibit sound governance procedures would lessen agency conflicts among the many stakeholders, ultimately leading to improved company performance [15]. One important indicator of a strong economy is the ability to draw in stockholders from around the globe. One of the nations that have made an extremely

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encouraging effort to alter many facets of its economy while keeping in mind its Vision 2030 is Saudi Arabia. Diverse findings have emerged from attempts to examine the relationship between corporate governance and earnings management [4, 8, 16-20] .Cultural and contextual differences, along with other variation in the different locations, may have an impact on these contradictory findings. The majority of the research in the literature are conducted in developed economies, and little is known about the circumstances in developing countries, especially in light of recent changes in the governance landscape [6, 9].

Hence, the 2030 Vision allows the Saudi government to foster greater transparency, accountability, and sustainability. As a result, it updated the CGR in 2017 to boost stakeholders' trust in the Saudi business environment and attract more foreign and long-term investments[21] The Vision's three elements provide substantial support for the creation of such a healthy corporate environment. Because of this, CG is a relatively new regime that has been voluntary since it was originally introduced in 2006, the year after the first market crash. Additionally, in 2010, CG principles were made mandatory. The CG codes were first issued by CMA in 2006 and reexamined in 2009 in an effort to attract more financiers to the nation and as a means of identifying organizational issues in Saudi Arabia [22] . The regulation in Saudi Arabia is good since it protects shareholders and prioritizes their rights. Nonetheless, there are several shortcomings in the Saudi Arabian CG guidelines, the majority of which stem from a lack of understanding and training in the implementation and use of CG. Family relationships are so close in Saudi Arabia that the organization is similar to a family business[23].

To illuminate how governance frameworks can mitigate manipulative tactics, this study will look at the relationship between corporate governance reforms, specifically (managerial structure, institutional structure, board size, board independence, and audit committee size) and earnings management. Additionally, the research seeks to examine how contextual factors such as firm size and leverage impact the relationship between corporate governance (CG) and earnings management (EM) in Saudi firms. A key aspect of this study involves analyzing how these factors influence the effectiveness of specific governance practices. Through this analysis, the study aspires to provide a more nuanced assessment of the conditions under which corporate governance is most successful in curbing profit manipulation. Finally, by presenting applied data from Saudi companies, this research aims to contribute to the broader academic discourse on corporate governance and earnings management. The remainder of the paper is organized as follows: Section 2 includes a literature review and the proposed hypotheses; Section 3 outlines the methodology employed and details how the data were measured; Section 4 presents and discusses the relevant findings; and Section 5 concludes the study.

2 Theoretical study & Hypotheses Development

Owing to the variety of CG mechanisms, more and more research is examining the effects of individual mechanisms or a small number of them on profits management. For example, [9] discovered that while corporate governance lessens E more in non-concentrated markets, firms in concentrated markets employ accrual and real earnings management more frequently. According to studies by[24, 25] , the more independent commissioners there are, the more closely and impartially financial reports will be supervised, reducing the likelihood of managers manipulating profits through fraud and preventing earnings management. According to [26] , Senior volunteers within an organization possess a certain amount of the company's shares, which is known as management ownership. The impact of managerial ownership characteristics on EM indicates a strong positive link between managerial ownership and earnings management[27] .Managerial ownership has a major detrimental impact on management, according to[28] .The more shares a manager owns, the more likely it is that he will act to control earnings since he will feel like he owns the business, which will lessen the effect of agency theory on the business [24] . [29]Make the case that an appropriate ownership structure can aid in avoiding earnings management. Managerial ownership and earnings management are favourably correlated, per[30] . On the other hand, other research indicates that the internal ownership structure may lessen managerial opportunism[31] . Given Jordan's urgent need for sound corporate governance, it is especially pertinent to this assignment to look into the relationship between managerial ownership and earnings management[32] . Because it gives shareholders enough transparency and responsibility, corporate governance is crucial[33] . By seeing the connection between managerial holdings and profits management, they also understand how corporate administration can lessen agency conflicts and increase investor trust[34] .Thus, the first hypothesis is as follows:

H_1: *There is significant effect of managerial ownership on earning management*

The largest shareholders of publicly traded companies in recent decades are now institutional investors. The research claims that different types of shareholders have different agency issues and risk-taking behaviours. The type of business risk-taking activity can be influenced by institutional investors who have a substantial amount of voting power[35] . As a means of holding stakeholders accountable, institutional investors' oversight will push management of the company to release financial information more openly[24] . Therefore, management is more motivated to report earnings carefully when institutional investors possess a larger portion of the company's shares. The reason for this is that management feels compelled to satisfy the higher standards and expectations of institutional investors by providing accurate and comprehensive reporting. The quality of business financial reporting can be enhanced by the participation of institutional investors, who often demand greater

accountability and clarity[24, 25] . In this regard, [36] propose that by increasing monitoring effectiveness and motivating institutions to internalize the detrimental externality of a firm's earnings management on peer companies' investments, shared institutional ownership lessens aggressive EM procedures within the company [37, 38] . The second hypothesis is so as follows:

H_2: *There is significant effect of institutional ownership on earning management*

One of the most important aspects of corporate governance systems is the size of the corporate board, which is also connected to how companies manage their profits[39] . In the academic literature, there is continuous discussion and examination of the alleged dependent relationship between board size and earnings management [32] . According to the agency hypothesis, it is reasonable to suppose that a larger board could lead to coordination issues and a decrease in the board's ability to monitor managerial decisions and stop executives from acting opportunistically [27].

Stated differently, in this instance, having a larger board is detrimental to the organizations; additionally, it may encourage certain forms of executive self-dealing, such as the establishment of arbitrary accruals in order to satisfy the earnings' results quotas [40] .An enlarged board, on the other hand, can improve the oversight of managerial operations, which will lessen the propensity to exaggerate or understate arbitrary accruals and coordinate the application of financial reporting rules[41] . On the other hand, a larger board might be able to better coordinate parts of the organization's operations that might be negatively impacted by such a tiny board[42] . Furthermore, it may be argued that a larger board enables management to swiftly coordinate the strategy and get more input from more members [16] . Additionally, [43] demonstrates that there are signs that a board's decision-making and operations appear to be influenced by the number of directors on the board. However, the findings of the empirical research that has been done on the effect of board size on earnings management vary widely [44]. For instance, a number of studies based on the experience of smaller boards suggest that they may be more likely to fail; therefore, it is necessary to determine the ideal board size that strikes a compromise between the capacity to guarantee appropriate supervision and the effectiveness of coordination[45]. On the other hand, some other studies makes the assumption that a board shouldn't include more than eight or nine directors because doing so would make collaboration more difficult and less successful in maintaining oversight[46]. Thus, the third hypothesis is as follows:

H_3: *There is significant effect of board size on earning management*

Furthermore, board independence is a key component of corporate governance; its significance stems from its ability to increase the board's effectiveness and capability in the supervision process as well as corporate governance processes[27] . Therefore, when it comes to internal governance processes, the board of directors can be extremely important in monitoring management actions and protecting the interests of shareholders. Conflicts have arisen as a result of previous academic investigations into the intricate relationship between non-executive directors' autonomy and the application of earnings management techniques [47]. The idea that earnings management activities will decrease with the number of NEDs on the board stems from the majority of previous studies that identified negative connections between board composition and earnings management activities. Nevertheless, there is evidence that, after everything is said and done, the board composition element yields a variety of outcomes. Furthermore, [48] backed the idea that IBDs can boost stakeholders' trust by improving the disclosers' consistency and transparency. [48] maintained that a higher percentage of IBD is more effective in reducing managers' opportunistic behaviour. Independent directors are essential in preventing some manipulative management techniques, preserving investor confidence, and protecting against abuses of power by managers[49] . The apparent gap in previous research is that there are significant differences in how board independence affects the application of profits management techniques[31] .Thus, the fourth hypothesis is as follows:

H_4: *There is significant effect of independent boards on earning management*

The audit committee (AC) is primarily responsible for monitoring the financial reporting process within the corporate governance framework, guaranteeing the accuracy of disclosures, and assisting in maintaining stakeholder trust. AC's primary responsibilities include keeping an eye on financial reports, controlling risk, maintaining internal controls, and tending to both internal and external auditors [20]. The composition, expertise, independence, and understanding of the audit committee are closely related to corporate governance procedures [50] .Nonetheless, [51] contend that the ACZ is a crucial tool for fostering openness in the financial reporting quality . In order to reduce information asymmetry between businesses and stakeholders, the committee certifies the sufficiency and openness of the data that managers provide to investors in annual reports. The AC needs to be strong enough and have enough resources to fulfill its duties in order to keep an eye on managers' behaviour[52, 53] . For example, [54] looked at the negative correlation between information asymmetry and audit committee size (ACZ). It means that the information asymmetry between stakeholders and management is reduced by ACZ. [55] offered the factual proof that ACZ encourages more voluntary disclosures. Generally speaking, it can be assumed that AC looks out for the interests of its stakeholders by keeping an eye on financial reports and sharing clear information with them. Since the audit committee is an internal control of the business, its number can be used as a proxy to reduce earnings management activities. [24, 25] clarify that the audit committee has no influence over the management of earnings. This occurs because the company's sole purpose in

establishing an audit committee is to comply with legal requirements. Thus, the fifth hypothesis is as follows:

H5: *There is significant effect of audit committee size on earning management*

3 Research Design

3.1 Data & sample

In order to gather secondary data for this study, the annual reports of the sampled companies for the years 2020–2024 were used. To make sure the data was reliable and pertinent, a methodical filtering procedure was used[56] . Due to their unique reporting structures and regulatory requirements, which are very different from those of non-financial enterprises, financial firms were not included in the sample. The corporate governance and earnings management information was taken straight from the chosen companies' annual reports, which were obtained from the official website of the Saudi Stock Exchange (Tadawul). A balanced panel dataset including 86 non-financial Saudi-listed companies (430 firm-year observations) made up the final sample. Driven by the Vision 2030 framework, the selected sample size and time range were intended to capture trends and insights during a pivotal stage in Saudi economic development[21].

3.2 Variables Measurement:

The measurement tools can be defined as follow in table (1):

Table 1: Variable definitions

Type	Variables	Code	Explanation	Measurements	References
Independent Variable	Corporate Governance Reforms	Man_Own	Managerial Ownership	Executive directors' shareholding percentage.	[50]
		Ins_Own	Institutional Ownership	The percentage of corporate shares owned by institutions matters.	
		ACA	Audit committee size	The number of audit committee members.	
		BSIZE	*Board Size*	log of the total number of directors	
		BIND	*Boards Independent*	total number of directors on corporate board	
Dependent Variable	Earning management	EM	In accounting research, the modified Jones accrual model is used to evaluate annual variations in operating revenues (ΔREV), accounts receivable (ΔAR), and property, plant, and equipment (PPE) $\frac{TACC_{i,t}}{A_{i,t-1}} = \beta 1 \frac{1}{A_{i,t-1}} + \beta 2 \left[\frac{\Delta Rev - \Delta AR}{A_{i,t-1}}\right] + \beta 1 \frac{PPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}$ $+\beta 1 \frac{PPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}$ (1)		[31, 57]
Control Variables	Board size	SIZE	-----	log of the total asset value	[20, 58, 59]
	Return on Assets	ROA	-----	net profit over total assets	
	Return on Equity	ROE	-------	The proportion of net income to equity held by shareholders	
	company's leverage	Lev	-----	ratio of debt to assets	
	LOSS	Loss	-----	1 when a firm has negative earnings and 0 otherwise	
	Market-To-Book Ratio	MB	------	Market value / book value of the firm	

3.3Regression specification for testing hypotheses:

Testing the principal hypotheses of this research requires the development of empirical models for each hypothesis individually. In this context, examining the relationship between Corporate Governance Reforms and Earnings Management necessitates the implementation of the following empirical models from (1) to (5):

$$EM = \alpha + \beta_1 \text{ Man\_Own} + \beta_2 \text{ SIZE} + \beta_3 \text{ ROA} + \beta_4 \text{ ROE} + \beta_5 \text{LEV} + \beta_6 \text{Loss} + \beta_7 \text{ MB} + \varepsilon \quad (1)$$

$$EM = \alpha + \beta_1 \text{ Ins\_Own} + \beta_2 \text{ SIZE} + \beta_3 \text{ ROA} + \beta_4 \text{ ROE} + \beta_5 \text{LEV} + \beta_6 \text{Loss} + \beta_7 \text{ MB} + \varepsilon \quad (2)$$

$$EM = \alpha + \beta_1 \text{ IBD} + \beta_2 \text{ SIZE} + \beta_3 \text{ ROA} + \beta_4 \text{ ROE} + \beta_5 \text{LEV} + \beta_6 \text{Loss} + \beta_7 \text{ MB} + \varepsilon \quad (3)$$

$$EM = \alpha + \beta_1 \text{ BSIZE} + \beta_2 \text{ SIZE} + \beta_3 \text{ ROA} + \beta_4 \text{ ROE} + \beta_5 \text{LEV} + \beta_6 \text{Loss} + \beta_7 \text{ MB} + \varepsilon \quad (4)$$

$$EM = \alpha + \beta_1 \text{ ACZ} + \beta_2 \text{ SIZE} + \beta_3 \text{ ROA} + \beta_4 \text{ ROE} + \beta_5 \text{LEV} + \beta_6 \text{Loss} + \beta_7 \text{ MB} + \varepsilon \quad (5)$$

4 Data analysis & results

4.1 Descriptive statistics

Table (2) shows the descriptive statistics of all variables; it indicates that the mean for earnings management (EM) is 1.95 with an S.D. of 0.28, reflecting significant variation across firms. Governance-related variables such as management ownership (Man_Own = 0.60), institutional ownership (Ins_Own = 0.65), board independence (BIND = 0.60), and audit committee size (ACZ = 4.95) may contribute to reducing EM by strengthening oversight. Conversely, variables such as financial leverage (LEV = 0.51), loss-making (LOSS = 0.48), and high market valuation (MB = 2.53) may increase the propensity for earnings management. Furthermore, average financial performance (ROA = 0.15, ROE = 0.20) may not be sufficient to prevent management from manipulating results.

Table 2: Descriptive Statistics

	N	Min	Max	Mean	S.D
Man_Own	430	.40056	.799753	.59953	.116347
Ins_Own	430	.400347	.89935	.65238	.14986
BSIZE	430	4	12	8.01	2.498
ACZ	430	4	6	4.95	.824
BIND	430	.40076	.79751	.598762	.11477
EM	430	1.27368	2.6315	1.94536	.28000
SIZE	430	5.01880	11.9994	8.28317	2.11426
ROA	430	.0015736	.2996837	.14879	.086250
ROE	430	.0019025	.398959	.20249	.111463
Lev	430	.20079	.79922	.509159	.170787
MB	430	.605881	4.49669	2.53444	1.1221
LOSS	430	0	1	.48	.500
Valid N (listwise)	430				

4.2 Correlation analysis

Table 3 shows that EM was negative and significantly correlated with Man_Own ($r = -0.219$, $p < 0.01$), BSIZE ($r = -0.892$, $p < 0.01$), ACZ ($r = -0.326$, $p < 0.01$), BIND ($r = -0.123$, $p < 0.05$), and SIZE ($r = 0.134$, $p < 0.01$). The correlation between EM and Ins_Own was negative but weak and insignificant ($r = -0.081$), indicating that there is no statistically significant linear relationship between EM and Ins_Own. Conversely, we found no significant relationships between EM and ROA, ROE, Lev, MB, or Loss.

Table 3: Correlations Matrix

	Man_Own	Ins_Own	BSIZE	ACA	BIND	EM	SIZE	ROA	ROE	Lev	MB	LOSS
Man_Own	1											
Ins_Own	.014	1										
BSIZE	.043-	.034-	1									
ACZ	.037	.030	.038	1								
BIND	.042	.088-	.102*	.117-*	1							
EM	.219-**	.081	.892**	.326-**	.123-*	1						
SIZE	.007-	.102*	.095*	.127**	.052-	.134**	1					
ROA	.003	.047-	.050-	.070	.074	.021-	.029	1				
ROE	.015-	.028	.028-	.015	.054-	.032-	.011-	.044-	1			
Lev	.031	.065-	.068-	.053-	.033-	.070-	.089-	.014-	.026-	1		
MB	.037-	.050-	.034-	.005	.085	.042-	.089-	.010-	.015	.026	1	
Loss	.093-	.036	.059	.064-	.121*	.035	.015-	.027	.034-	.009-	.058	1
**. * 0.01, 0.05												

4.3 Hypothesis test results

4.3.1 Model (1): Testing the effect of Man_Own *on EM*

Table (4) shows the result of regression model (1), where the (Man_Own) has a negative significant effect on EM (Beta = -0.226, $t = 4.802$, $p < 0.001$), and SIZE also has a positive and significant effect (Beta = 0.129, $t = 2.738$, $p = 0.006$). This result is consistent with [28] . Also, control variables (ROA, ROE, Lev, MB, LOSS) did not show significant effects on EM ($p > 0.05$),

and the model explains approximately 7.6% of the variance in EM ($R^2 = 0.076$), which is significant ($F = 4.955$, $p < 0.001$) with a Durbin-Watson test of 1.96, indicating no significant independence problem. VIF values for all variables are < 2, indicating no variance inflation problem (multicollinearity). This results in consistency with the importance of governance[32, 33] . Based on this, there is a negative relationship between Man_own and EM in Saudi firms.

Table 4: Man_Own &EM

Model		Standardized Coefficients			Collinearity Statistics	
		Beta	t	Sig.	Tolerance	VIF
(1)	(Constant)		14.232	.000		
	Man_Own	.226-	4.802	.000	.989	1.011
	SIZE	.129	2.738	.006	.984	1.017
	ROA	.029-	.618-	.537	.996	1.004
	ROE	.028-	.590-	.555	.996	1.004
	Lev	.066-	1.400-	.162	.990	1.010
	MB	.024-	.502-	.616	.987	1.013
	LOSS	.059	1.254	.211	.986	1.014
	N	430				
	R	.276[a]				
	R2	.076				
	Adj(R2)	.061				
	F	4.955				
	Sig	.000[b]				
	Durbin-Watson	1.956				
a. Dependent Variable: EM						
b. Predictors: (Constant), Loss, Lev, ROA, ROE, MB, Man_Own, SIZE						

4.3.2 Model (2): Testing the effect of Ins_Own on EM

Furthermore, table (5) indicates the results of testing Model (2), where there is no significant effect of the Ins_Own variable on EM (Beta = 0.062, t = 1.286, p = 0.199), indicating that institutional ownership is not clearly related to EM. This is in contrast to studies that have shown a relationship between Ins_Own and EM. However, there is a significant effect of the control variable SIZE, as its effect was positive and weak (Beta = 0.121, t = 2.493, p = 0.013). There was no significant effect of the control variables (ROA, ROE, Lev, MB, Loss), as $p > 0.05$. The model as a whole is insignificant ($F = 1.817$, $p = 0.082$), and the variance in EM is ($R^2 = 0.029$), with no problems of independence or variance inflation. Based on this, there is no effect of Ins-Own on EM in Saudi firms.

Table 5: Ins_Own &EM

Model		Standardized Coefficients			Collinearity Statistics	
		Beta	t	Sig.	Tolerance	VIF
(2)	(Constant)		17.499	.000		
	Ins_Own	.062	1.286	.199	.980	1.021
	SIZE	.121	2.493	.013	.975	1.026
	ROA	.025-	.511-	.609	.994	1.006
	ROE	.033-	.692-	.489	.995	1.005
	Lev	.056-	1.156-	.248	.988	1.012
	MB	.028-	.588-	.557	.986	1.014
	LOSS	.036	.741	.459	.993	1.007
	N	430				
	R	.171[a]				
	R2	.029				
	Adj(R2)	.013				
	F	1.817				
	Sig	.082[b]				
	Durbin-Watson	1.928				
a. Dependent Variable: EM						
b. Predictors: (Constant), Ins_Own Loss, Lev, ROA, ROE, MB, SIZE						

Fig (1) shows a P-P plot of standardized residuals in a regression analysis, where the fit of the points to a straight line indicates a normal distribution of the residuals.

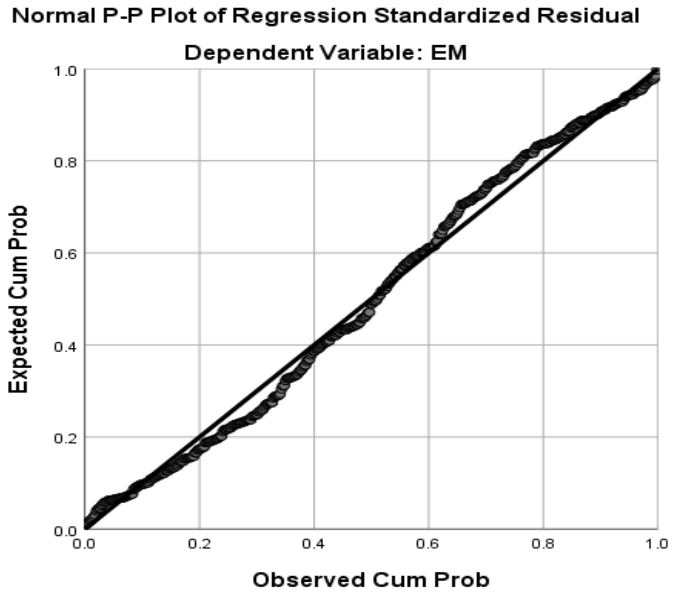


Fig. 1: P-P plot of standardized residuals

4.3.3 Model (3): Testing the effect of BSIZE on EM

In this line, table (6) illustrates the result of test model (3), where BSIZE has a significant effect on EM (Beta = 0.889, t = 40.412, $p < 0.001$). Moreover, the control variable (SIZE) has a significant effect (Beta = 0.048, t = 2.157, p = 0.032). The effects of the other control variables, such as ROA, ROE, Lev, MB, and Loss, are negligible ($p > 0.05$). Hence, the model explains approximately 80% of the variance in EM ($R^2 = 0.800$) and is significant ($F = 240.977$, $p < 0.001$), with no independence issues (Durbin-Watson = 1.88) or variance inflation (VIF < 2). This result aligns with previous studies [27, 32, 40] , which indicate that large boards experience weak oversight and coordination problems that enable management to manipulate earnings. Based on this, there is a positive relationship between BSIZE and EM in Saudi firms.

Table 6: BSIZE & EM

Model		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		Beta			Tolerance	VIF
(3)	(Constant)		25.002	.000		
	BSIZE	.889	40.412	.000	.979	1.021
	SIZE	.048	2.157	.032	.976	1.025
	ROA	.023	1.034	.302	.993	1.007
	ROE	.006-	.262-	.793	.995	1.005
	Lev	.006-	.269-	.788	.987	1.013
	MB	.006-	.291-	.771	.987	1.013
	LOSS	.017-	.765-	.445	.991	1.009
	N					
	R	.894[a]				
	R2	.800				
	Adj (R2)	.797				
	F	240.977				
	Sig	.000[b]				
	Durbin-Watson	1.880				
a. Dependent Variable: EM						
b. Predictors: (Constant), BSIZE ,Loss, Lev, ROA, ROE, MB, SIZE						

The figure (2) represents a P-value test for the standardized residuals of a regression model with the dependent variable EM.

The uniform centering of the scores indicates that the residuals follow an approximately normal distribution.

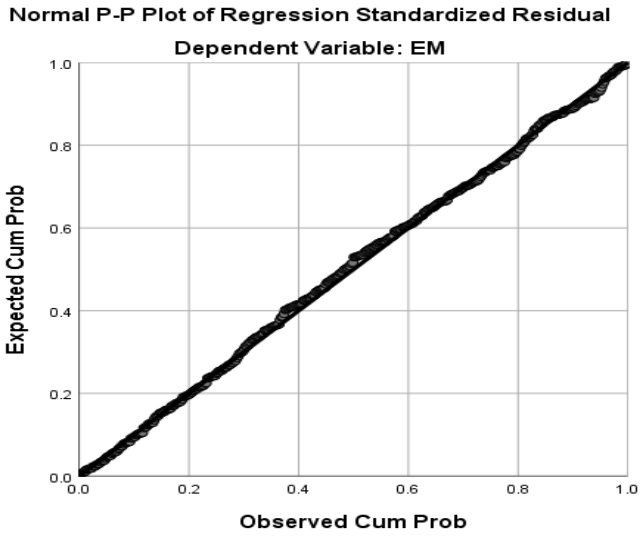


Fig. 2: P-P plot of standardized residuals

4.3.4 Model (4): Testing the effect of BIND *on EM*

In this line, table (7) illustrates the results of model (4), where the variable of BIND has a significant negative relationship with EM (Beta = -0.130, t = 2.691, p = 0.007), suggesting that the presence of a BIND can reduce EM. On the other hand, other variables such as ROA, ROE, Lev, MB, and Loss did not show a statistically significant effect on EM. Hence, [27] confirmed that BIND plays a vital role in improving oversight and reducing EM, which is consistent with the finding that BIND negatively impacts EM. Also, [48] indicated that board independence enhances transparency and reduces manipulation of financial reporting. These findings thus demonstrate the value of board independence in reducing earnings management and enhancing corporate governance. Based on this, there is a negative relationship between BIND and EM in Saudi firms.

Table 7: BIND & EM

Model		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		Beta			Tolerance	VIF
(4)	(Constant)		15.291	.000		
	BIND	.130-	2.691	.007	.968	1.033
	SIZE	.134	2.777	.006	.981	1.019
	ROA	.037-	.771-	.441	.991	1.009
	ROE	.025-	.522-	.602	.993	1.007
	Lev	.054-	1.131-	.259	.989	1.011
	MB	.041-	.855-	.393	.982	1.018
	Loss	.024	.493	.622	.982	1.018
	N	430				
	R	.205[a]				
	R Square	.042				
	Adj(R2)	.026				
	F	2.636				
	Sig	.011[b]				
	Durbin-Watson	1.958				
a. Dependent Variable: EM						
b. Predictors: (Constant), BIND Loss, Lev, ROA, ROE, MB, SIZE.						

4.3.5 Model (5): Testing the effect of ACZ on EM

Finally, table (8) illustrates the regression analysis results for Model (5) show that ACZ has a negative significant effect on EM (Beta = -0.320, p = 0.000); hence, the model explains 12.5% of the variance in EM ($R^2 = 0.125$), and the independent variables contribute to explaining a small portion of the variance in earnings management, at an F value of 8.640 with p = 0.000. These

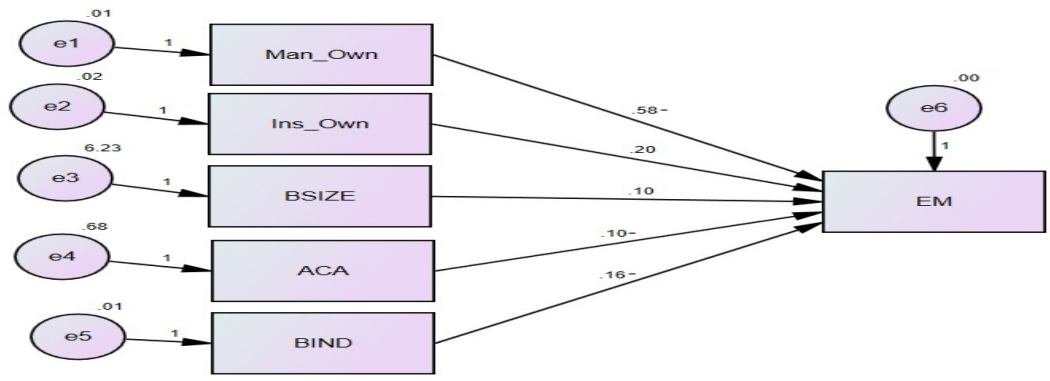
results are consistent with several studies, with[60] indicating that ACZ contributes to reducing earnings manipulation. The results are also consistent with[51] , which showed that ACZ reduces information asymmetry between management and shareholders, thereby enhancing transparency. Based on this, there is a negative correlation between ACZ and EM in Saudi firms.

Table 8: ACZ & EM

Model		Standardized Coefficients			Collinearity Statistics	
		Beta	t	Sig.	Tolerance	VIF
(5)	(Constant)		12.823	.000		
	ACZ	.320-	6.943	.000	.973	1.028
	SIZE	.088	1.903	.058	.969	1.032
	ROA	.050-	1.087-	.277	.992	1.008
	ROE	.037-	.801-	.423	.996	1.004
	Lev	.046-	.997-	.319	.989	1.011
	MB	.038-	.824-	.411	.988	1.012
	LOSS	.059	1.293	.197	.990	1.010
	N	430				
	R	.354[a]				
	R Square	.125				
	Adj(R2)	.111				
	F	8.640				
	Sig	.000[b]				
	Durbin-Watson	1.879				
a. Dependent Variable: EM						
b. Predictors: (Constant), ACZ, Loss, Lev, ROA, ROE, MB, SIZE						

4.4: Additional Test

Fig. 3 illustrates the Sequential Equation Model (SEM) employing Path Analysis to examine the influence of corporate governance reforms 'on earnings management utilizing AMOS. The results indicate that the model fits the data well. The CMIN P-value is 0.055, indicating that the model fits the data well. The RFI (0.980), NFI (0.987), and IFI (0.994) indices demonstrate a strong fit, reflecting a significant improvement in fit compared to the independence model. The RMSEA (0.043) and RMR (0.019) values also indicate that the model explains the data accurately, demonstrating its strong fit. The GFI (0.987) and CFI (0.994) also reflect an excellent fit between the model and the data.



P-value of CMIN =0.055

Relative fit index (RFI) = .980

Normed Fit Index (NFI) = .987

Incremental Fit Indices (IFI) = .994
RMSEA= .0043
Goodness of fit Index (GFI) = .987
Comparative Fit Index (CFI)= .994
Root Mean Square Residual (RMR) = .019

Fig. 3: Sequential Equation Model (SEM)

Also, the results of path analysis indicate the regression model's significance; hence, Table 9 illustrates that all independent variables have a significant effect on the dependent variable EM, where Man_Own has an impact on E_M with a standardized coefficient of -0.582, while Ins_Own and BSIZE have a positive effect on E_M with standardized coefficients of 0.196 and 0.100, respectively. The standardized coefficients of -0.098 and -0.160 indicate a negative impact of ACZ and BIND on E_M. All results are strongly statistically significant (P-value = ***), confirming that these variables significantly influence EM. These results are consistent with the results of statistical hypothesis testing models, except for the result of Ins_Own, where the results of this analysis indicate the existence of a relationship between Ins_Own and EM.

Table 9: path analysis results

Dep. Variable	Indep.variable	Standardized Coefficient (Beta)	S.E.	C.R.	P-value	Significance
EM	Man_Own	.582-	.024	24.074	***	Significant
	Ins_Own	.196	.019	10.456	***	significant
	BSIZE	.100	.001	88.521	***	Significant
	ACZ	.098-	.003	28.709	***	Significant
	BIND	.160-	.024	6.552	***	Significant

5 Conclusion & Future Researches

The current study aims to investigate the connection between corporate governance and earnings management. Furthermore, the study intends to investigate how contextual elements like firm size and leverage influence the connection between CG and EM. To gather secondary data for this study, the annual reports of the sampled companies for the years 2020–2024 were used. A balanced panel dataset including 86 non-financial Saudi-listed companies (430 firm-year observations) made up the final sample. The regression results indicate varying effects of governance factors on earnings management (EM) in Saudi firms. There is a significant negative effect of managerial ownership (Man_Own) on EM.

On the other hand, institutional ownership (Ins_Own) has no significant effect on EM, with SIZE having a weak positive effect. Furthermore, board size (BSIZE) has a significant positive effect on EM, with SIZE also showing a positive impact. The model (3) explains approximately 80% of the variance in EM, implying that larger boards may encounter coordination challenges that facilitate earnings manipulation. Also, the results show that board independence (BIND) has a significant negative effect on EM, indicating that independent boards help reduce earnings manipulation. Finally, the audit committee size (ACZ) has a significant negative effect on EM, indicating that larger audit committees contribute to better oversight and transparency, thereby reducing earnings manipulation. According to several studies, there is a significant relationship between managerial ownership and EM. The findings of the study align with the regression results, where a negative association was found between managerial ownership and earnings management, supporting the idea that higher managerial ownership can reduce agency conflicts and limit earnings manipulation. Additionally, the study suggests that board independence (BIND) and audit committee size (ACZ) play important roles in controlling earnings management. The study links reduced earnings manipulation to board independence and larger audit committees, underscoring the significance of these governance features in enhancing transparency and oversight.

On the other hand, the relationship between institutional ownership and EM, as discussed in the study, contrasts with the regression results, which found insignificant effect of institutional ownership on earnings management. This suggests that, unlike in some previous studies where institutional ownership was found to reduce earnings manipulation, in this case, it does not have a clear impact on EM. Similarly, the study mentions that board size could have varying effects on EM, but the regression results show a positive relationship between board size and EM, which contrasts with the study's suggestion that larger boards may face coordination issues that encourage earnings manipulation. The current study suggests that further research is needed on how other governance mechanisms impact accounting earnings quality in emerging markets.

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The data presented in this study are available on request from the corresponding author.

Conflicts of Interest:

The authors declare no conflict of interest.

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