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CORPORATE GOVERNANCE AND RISK MANAGEMENT IN BANKING INDUSTRY 2006-2023

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ABSTRACT
This study examined the relationship between corporate governance and risk management in Nigerian banking industry from 2006-2023, using board size, board composition and board gender diversity as proxies for corporate governance and bank fraud as proxy for risk management. The study made use of secondary data sourced from Bank Annual reports and Financial Statement. The data were analyzed using descriptive statistics, correlation matrix and Hausman test, while Ordinary Least square regression analysis was used to test the hypotheses. The findings of this study revealed that Board Size and Board Composition has significant effect on Bank Fraud while Board Gender Diversity has no significant effect on Bank Fraud. As a result, the study concluded that corporate governance plays a significant role on risk management in Nigeria banking industry. The study recommended that shareholders in Nigeria should actively advocate for a board size that strikes a balance between diversity, expertise, and efficiency.

Key words: *Board Composition, Board Size, Corporate Governance, Risk Management.*

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1. INTRODUCTION

Corporate governance encompasses the practices, rules and procedures that guides how an organization operates and how its systems are directed and controlled. It encompasses the mechanisms through which a company's objectives are set and pursued in the context of the social, regulatory, and market environment (Nkgowe, Bengono, & Okori, 2024). The key elements of corporate governance include the roles of the board of directors, management, shareholders, and other stakeholders. While, risk management involves identifying, assessing, and controlling threats to an organization's capital and earnings, which in the context of banking, may come from a variety of financial, operational, and reputational risks. These concepts are intricately linked, as effective corporate governance can significantly influence the risk management processes within an organization (Abuamsha & Razia, 2023). The banking industry's susceptibility to crises, as seen in the 2018 and 2024 collapse of Skye bank and heritage bank respectively, acquisition of Diamond bank by Access bank in 2019 and the merging of Unity bank and Providus bank in 2024, underscore the need for effective corporate governance and risk management practices to mitigate financial losses and systematic instability (CNBC Africa 2024). Despite regulatory efforts, the persistence of these failures suggests a deeper systemic issue, underscoring the need for a comprehensive examination of the relationship between corporate governance and risk management in Nigerian banks.

The relationship between corporate governance and risk management in the banking industry is complex and multifaceted. While some scholars argue that strong corporate governance reduces risk-taking, others contend that its impact is limited. Thus there are notable disparities in opinion of scholars on the subject of corporate governance and risk management in the banking industry. On the effectiveness of corporate governance, Miah and Shamsuddin (2021), Imam et al (2022) and Ahmed et al (2022) argue that Strong corporate governance reduces risk-taking and ensures effective risk management in banks. In contrast, Khan et al (2022) and Al-Shammari et al (2022) contend that corporate governance has limited impact on risk Management. Imam et al (2022) advocate for independent directors to ensure effective risk management. Alternatively, Ahmed et al (2022) suggest that board diversity is more significant than independent directors in enhancing risk management and ensuring effective corporate governance practices in banks.
The role of board composition particularly independent directors and board diversity in enhancing risk management and ensuring effective corporate governance practices in banks also remains debated.

Objectives

This study seeks to examine the impact of corporate governance on bank fraud with the following specific objectives to:

1. examine the relationship between board size and bank fraud in Nigeria banking industry.
2. investigate the relationship between board composition and bank fraud in Nigeria banking industry.
3. determine the relationship between board gender diversity and bank fraud in Nigeria banking industry.

1.2 Hypotheses

From the formulated objectives, the study hypothesizes

H^{o1}: board size has no significant relationship with bank fraud in Nigeria banking industry;

H^{o2}: board composition has no significant relationship with bank fraud in Nigeria banking industry.

H^{o3}: board gender diversity has no significant relationship with bank fraud in Nigeria banking industry.

2.1 Conceptual Review

2.1.1 Corporate Governance

Corporate governance refers to the system of rules, practices, and processes by which a company is directed and controlled. They are expected to provide strategic guidance, monitor managerial performance, and ensure accountability. One of the primary functions of the board is to appoint and evaluate the CEO and other top executives. This includes setting performance targets, monitoring progress, and making decisions on executive compensation (Jensen & Murphy, 2017).

Shareholders are important in the dynamics of corporate governance by exercising their voting rights to influence significant decisions such as the election of board members, mergers and acquisitions, and major policy changes. Institutional investors, in particular, have the power to influence corporate governance practices due to their substantial shareholdings and active engagement in corporate affairs.

The effectiveness of corporate governance is often assessed through governance ratings and indices, which evaluate a company's governance practices against established benchmarks. These ratings can influence investor decisions and access to capital (Brown & Caylor, 2016). Companies with high governance ratings are perceived as less risky and more likely to deliver sustainable returns (Bear, Rahman, & Post, 2019).

2.1.2 Board Size

Board size is an important component of corporate governance, affecting a firm's decision-making processes, performance, and overall governance quality. The size of a board of directors can influence its efficiency and effectiveness in overseeing management and making strategic decisions (Coles, Daniel, & Naveen, 2014). The debate over the optimal board size is ongoing, with scholars examining the trade-offs between small and large boards.

Smaller boards are often praised for their agility and efficiency. With fewer members, decision-making can be quicker and more cohesive, reducing the time and complexity involved in reaching consensus (Jensen, 2017). Smaller boards may also enhance communication and coordination among members, facilitating more effective oversight and strategic planning (Yermack, 2015). Conversely, larger boards can provide a broader range of expertise and perspectives, which can be beneficial for complex decision-making and addressing diverse stakeholder interests (Adams & Ferreira, 2019). A larger board can draw on a wider array of knowledge and experience, potentially leading to more informed and balanced decisions (Linck, Netter, & Yang, 2015). However, larger boards may also face challenges such as increased potential for conflicts, reduced cohesiveness, and slower decision-making processes (Boone, Field, Karpoff, & Raheja, 2014).

2.1.3 Board Gender Diversity

Board gender diversity is an aspect of corporate governance that reflects broader societal shifts towards gender equality and inclusion. The presence of women on corporate boards has been associated with various positive outcomes, including improved decision-making, enhanced company performance, and better governance practices (Terjesen, Sealy, & Singh, 2015). The importance of gender diversity on boards is underscored by legislative and regulatory initiatives aimed at increasing female representation. Women directors often bring different viewpoints and problem-solving approaches compared to their male counterparts, fostering more comprehensive and innovative solutions (Post & Byron, 2015).

Gender diversity on boards also influences corporate social responsibility (CSR) initiatives. Board gender diversity is also linked to broader diversity and inclusion efforts within companies. Firms that prioritize gender diversity at the board level are more likely to implement inclusive practices throughout the organization, benefiting from a diverse workforce at all levels (Campbell & Mínguez-Vera, 2014).

2.1.4 Board Composition

Board composition refers to the structure and makeup of a company’s board of directors, which includes a mix of executive directors, independent directors, and non-executive directors. Board composition is vital in determining the effectiveness with which a board can fulfill its responsibilities. The composition of the board, particularly the presence of independent and non-executive members, is widely recognized as an important factor in promoting transparency, accountability, and overall governance quality within an organization (Solomon, 2021). Independent directors are those who do not have any material relationship with the company beyond their role as board members. This lack of material connection ensures that they can provide unbiased oversight, making decisions that align with the best interests of shareholders and other stakeholders (Chen et al., 2019). Independent boards and non-executive members are essential components that enhance the board's ability to oversee management and protect shareholders' interests (Zattoni et al., 2017). Effective board composition is characterized by diversity in skills, experiences, and perspectives, which collectively contribute to more robust governance practices (Heemskerk et al., 2017).

According to Arora and Sharma (2021) independent directors are particularly crucial in companies where the potential for management entrenchment is high, as they can provide a necessary counterbalance to the influence of the executive team (Solomon, 2021). Non-executive directors (NEDs) are board members who do not participate in the day-to-day management of the company. Their primary role is to provide an external perspective on the company's strategic direction, governance practices, and overall performance (Petra, 2020).

2.1.5 Risk Management

Risk management in banking refers to the process of planning, organizing, directing, and controlling an organization's resources to minimize the potential for financial loss (Van Greuning and Brajovic-Bratanovic, 2021). This definition underscores the proactive nature of risk management, where banks not only respond to risks but actively anticipate and plan for them. Risk management is a crucial element in the banking industry, as it involves identifying, assessing, and controlling threats to an organization's capital and earnings. For banks, these risks come from a variety of sources, including credit risk, operational risk, market risk, liquidity risk, and regulatory risks (Olowe & Ajayi, 2020). One of the most prominent risks in the Nigerian banking sector is credit risk. Credit risk refers to the possibility that borrowers will default on their obligations, resulting in financial losses for the bank. In Nigeria, credit risk is heightened by the volatility of key sectors, such as oil and gas, and the lack of a diversified economy (Oludimu, 2020).

Operational risk is another significant concern for Nigerian banks. Operational risk arises from failed internal processes, people, or systems. This risk is particularly high in Nigeria, where the banking industry has been plagued by issues such as cybercrime, fraud, and poor internal controls. According to the (CBN Annual Report, 2021), Nigerian banks lost over ₦14 billion to fraud-related incidents in 2020. This demonstrates the importance of strong internal controls and the need for continuous improvement in risk management practices to mitigate operational risks.

Market risk, which involves changes in the market conditions such as interest rates, exchange rates, and asset prices, is also relevant for Nigerian banks. Market risks became especially pronounced during periods of exchange rate volatility, such as during the devaluation of the naira in 2016. Nigerian banks, which hold significant foreign exchange assets and liabilities, faced significant foreign exchange losses during this period. As Sanusi (2018) pointed out, the sharp depreciation of the naira in 2016 exposed Nigerian banks to substantial market risks, particularly those related to foreign exchange positions. In response to these risks, Nigerian banks have adopted various risk management frameworks. Many banks have implemented Enterprise Risk Management (ERM) frameworks, which provide a holistic approach to managing risks across the entire organization. ERM frameworks help banks to integrate risk management into their overall strategic objectives, allowing them to better anticipate and respond to risks. The adoption of ERM frameworks in Nigerian banks has helped to improve risk identification and mitigation, especially in the areas of credit and operational risk (Adewale and Adeyemi, 2021).

2.1.7 Bank Fraud

Bank fraud in Nigeria is a persistent challenge that has evolved in complexity and scope over the years, significantly affecting the stability of the banking sector and the economy at large (Onakoya et al., 2022). Bank fraud refers to any deceptive action aimed at obtaining money or assets from banks without authorization, often leading to financial losses (Adegbite & Nakpodia, 2017). Scholarly definitions highlight bank fraud as deliberate manipulation or falsification of financial records to deceive banks for personal gain (Okoye & Gbegi, 2019). The Central Bank of Nigeria (CBN) has continuously highlighted fraud as a major concern within the sector, with billions of Naira lost annually due to fraudulent activities (Owolabi & Obiakor, 2021). Between 2017 and 2023, several reports have documented the alarming rise in bank fraud, exacerbated by technological advancements that fraudsters leverage to exploit vulnerabilities in banking systems. (Oluwafemi et al., 2021). This trend is partly driven by the expansion of digital banking, which, while beneficial, has opened new channels for fraudulent schemes such as phishing, hacking, and social engineering (Ujunwa & Modebe, 2020).

The increasing reliance on digital banking has further complicated the landscape of bank fraud in Nigeria. The rise of mobile banking, internet banking, and electronic payment platforms has led to a corresponding increase in cyber-related fraud, with a significant proportion of fraud cases occurring through online channels (Adetiloye et al., 2022).

2.2 Agency Theory

The study was anchored on Agency Theory. The primary theoretical foundation used in understanding the dynamics between corporate governance and risk management in the banking industry is Agency Theory, propounded by Jensen and Meckling (1976). The theory explores the relationship between principals (shareholders) and agents (managers). In this context, the shareholders delegate control of the organization to the managers, who are expected to act in the shareholders' best interests. However, this delegation introduces an "agency problem" where managers may pursue their own interests at the expense of the shareholders, especially in highly risky industries like banking.

The assumption of agency theory is that managers (agents) do not always act in the best interests of shareholders (principals) due to divergent goals. Managers might prefer short-term gains, riskier investments, or actions that enhance their compensation, while shareholders typically focus on long-term sustainability and value creation. The theory advocates for robust corporate governance mechanisms, such as board independence, transparency, and proper oversight, to minimize these conflicts of interest. Haque, Arun, and Kirkpatrick (2021) argue that agency theory remains relevant to understanding the failures in corporate governance, particularly during crises like the 2008 global financial meltdown, where governance lapses in risk management led to irresponsible financial decisions. Similarly, Adams and Mehran (2019) found that banks with more independent boards tend to adopt stricter risk management practices, aligning with the central tenets of agency theory. This aligns with the findings of Haque et al. (2021), who argued that independent governance structures are essential for reducing agency costs and improving risk management practices.

2.3 Empirical Review

Hettiarachchi and Sameera (2024) examined the impact of corporate governance on insolvency risk of the Licensed Finance Companies (LFCs) listed on the Colombo Stock Exchange (CSE) in Sri Lanka from 2019 to 2023. Using board independence, gender diversity on boards, audit committee independence, and the frequency of board and audit committee meetings as the independent variables and insolvency risk (IR) as the dependent variable. The regressed data revealed that presence of women on boards and the frequency of board meetings exert a significant and inverse influence on insolvency risk, while the active audit committee engagement exhibits a substantial negative impact on insolvency risk.

Greapcă (2024) examined the impact of good corporate governance (independence and existence of the committees), company's performance (return on assets and leverage) and characteristics (company size) on corporate risk management disclosure among European banking sector using secondary data sourced from banks published integrated reports during the years of observation. The regressed results show a positive relationship among risk disclosure, good corporate governance practices and company's performance. Iyamabhor et.al

(2024) examined the relationship between corporate governance, risk exposure and its management in the context of accountability and transparency among the Nigerian banking system. The study showed that many Nigeria banks lack transparency and accountability in managing the banks

Anggraini (2024) carried out a study on how Corporate Governance Moderates the Relationship between Company Complexity and Risk Management with Sustainability Performance among the industrial sector companies listed on the IDX for the period 2018-2022. Using panel data regression, it was found that Corporate Governance could not moderate the relationship between capital intensity and tax avoidance, again Corporate Governance weakened the relationship between Thin Capitalisation and Tax Avoidance. Widan et.al (2024) examined the impact of Corporate Governance and Risk Management on the value of banking industries in Indonesia and Malaysia, using 41 Indonesian banks and 10 banks in Malaysia as sample size. The relevant data was sourced from both Indonesia Stock Exchange and the Malaysian Stock Exchange 2019 to 2022. Using a multiple regression analysis the result shows a negative relationship the dependent variable

Nkgowe et.al (2024) examined the relationship between board characteristics, risk management processes, and financial performance of corporations. The regressed results indicate that certain board features substantially and positively influence financial performance metrics such as ROA and ROE. Again, risk management practices positively contribute to better financial outcomes. Of and Ariyo (2023) examine the effect of Corporate governance on financial risk management and sustainability of MFIs. Using 125 MFIs in Jinja Municipal Council as sample size, the findings show that corporate governance and sustainability had a significant positive relationship and that corporate governance. Again Components of corporate governance were also significant in sustainability including; CEO Duality, board independence, board composition and audit. Naibaho and Mayayogini (2023) examined the impact of risk management, especially operational risk, credit risk, and liquidity risk on firm performance with corporate governance as a moderating variable. The result of this study finds that operational risk and credit risk do not affect firm performance, while credit risk has a negative effect on firm performance. This study also found that corporate governance can reduce the negative effect of liquidity risk on firm performance but strengthen the relationship between operational risk and credit risk on firm performance.

Zulfitra (2022) examined the Effect of Risk Management and Profitability on Stock Prices moderated by Good Corporate Governance from 2017-2021. Using descriptive statistical analysis and panel data regression, the results show that Enterprise Risk Management and Gross Profit Margin have a positive and significant effect on stock prices, while Return of Assets has no effect on stock prices.

Musa et.al (2022) addressed the effect of corporate governance on risk management by bank among six randomly selected listed commercial banks in Nigeria over the period of six years. In carrying out the analysis, the panel data regression analysis method was adopted. Using board index and management influence as proxies for corporate governance and capital risk, credit risk and liquidity risk as proxy for risk taking by banks. The result revealed a negative relationship between capital risk and corporate governance which shows that the more the corporate governance disclosure, the less the credit and liquidity risk taking by the banks in Nigeria.

Permatasari (2021) examined the relationship between corporate governance and risk management of Indonesian banks. Bank risk managements are measured by market risk, credit risk, and liquidity risk. The samples used in this study were all banks registered in Indonesia during the 2010–2016 period. The data sources were obtained from the annual reports and bank financial reports and was analyzed using multiple regression analysis. The results show that corporate governance implementation in Indonesia was able to affect credit risk and liquidity risk. There were differences in credit risk and liquidity risk in banks with different governance ratings, but not at market risk.

Husaini and Indah (2021) analyzed the effect of risk management on bank financial performance with corporate governance as a moderating variable. Using credit risk (NPL), liquidity risk (LDR), and operating risk (OEIR) as the independent variables and financial performance (ROA) as the dependent variable, adopting multiple regression, the result of this research showed that NPL and OEIR have a negative and significant impact on financial performance. While, LDR has no significant effect on financial performance. Mohammed et.al (2016) examined the role of corporate governance and risk management on financial performance of bank listed on the Indonesia Stock Exchange (IDX) from 2011-2015. The results of this research showed that improving the implementation of corporate governance can reduced credit risk and operational risk and increased financial performance, whereas, low credit risk and operational risk can increased financial performance.

Maharani and Sutrisno (2023) examined the influence of corporate governance mechanisms on banking performance among banking industry listed on Indonesian Stock Exchange.

Measuring corporate governance mechanisms with institutional ownership, managerial ownership, independent board of commissioners, size of the board of directors and size of the audit committee, and banking performance with Return on Assets (ROA), the result of the study show that institutional ownership and the board of directors have no effect on financial performance, while managerial ownership has a significant effect but with a negative coefficient. Meanwhile, independent commissioners and audit committee size have a positive effect on performance.

Akbarian et.al (2019) investigated the impacts of corporate governance on credit risk in the Iranian banking industry. The results indicate that there is a significant negative relationship between corporate governance quality and the credit risk, which means more effective corporate governance will reduce information asymmetry, increases the clarity and stakeholder confidence, and finally reduces banks' credit risk. Sameera and Wijesena (2018) investigated the impact of board structure on credit risk of banks listed in Colombo Stock Exchange in Sri Lanka. The Board Size, Board Independence and Meeting Frequency were considered as independent variables, whereas, credit risk proxied by Non-Performing Loan ratio was the dependent variable. The overall results and findings statistically confirmed that the board size and board independence have significant and negative impact on the credit risk. Board meeting frequency, firm size and financial leverage have no significant impact on credit risk, corporate governance and risk exposure of banks in Nigeria.

Bello (2022) examined the relationship between corporate governance and risk exposure in Nigerian banks. The empirical results obtained show that among corporate governance mechanisms studied; Board Composition, Audit Quality and Capitalization have significant inverse relationship with risk. Ayoola et.al (2024) examined the determinants of corporate governance quality in the Nigerian banking industry between 2006 and 2021 using panel secondary data obtained from the annual audited financial statements of 11 publicly quoted deposit money banks (commercial banks) on the Nigerian Exchange Group with complete financial information during the period under review. Analyzing the data using fuzzy-set qualitative comparative analysis the result reveals that corporate governance quality cannot be achieved by a single factor but by a complex combination of factors within the context of life cycle phases. Gulzar et.al (2021) evaluated the impact of corporate governance on bank risks that are capital risk, credit risk, and liquidity risk of twenty commercial banks that are listed on the Pakistan Stock Exchange throughout 2009-2018. Data was collected from Annual reports and accounts of the sampled banks. Random-effect GLS regression technique used to analyze data. The empirical results found that different CG dimensions impact differently on bank risks. In the context of Pakistan, the results reveal that board independence, gender diversity on board and audit committee have a significant effect on bank risks, while board size and CEO turnover have an insignificant effect.

Anjum and Anasri (2022) conducted an empirical study on how corporate governance affects risk management of 7 New Generation Private Banks of India from 2011to 2020. The findings indicate that board size has a substantial impact on Market risk but a negligible impact on Credit risk and Operational risk. Abuamsha and Razia (2023) examined the role of corporate governance in dealing with systematic and unsystematic risks. This study includes 44 companies listed in the Palestinian stock market distributed in 5 sectors. The panel research method was used for data collection and analysis. Results show that corporate governance plays a significant role in dealing with systematic and unsystematic risks in companies listed in the Palestine stock market.

3. MATERIALS AND METHOD

The study utilizes only secondary data sourced from banks annual reports, financial statements, academic journals and papers. The data was analyzed using descriptive statistics, while the hypotheses were tested with correlation analysis and regression estimation analysis The study adapted the model of Kafidipe et.al (2021) which is stated as:

ERM= f (CG) ……Eqn 1.

$BRCSit = \beta0 + \beta_1BSit + \beta_2BINit + \beta_3BCit + \beta_4DOHit + \beta_5BIit + \beta_sBMit + \mu it$ ……Eqn 2.

$BRCMit = \beta0 + \beta_1BSit + \beta_2BINit + \beta_3BCit + \beta_4DOHit + \beta_5BIit + \beta_sBMit + \mu it$ ……Eqn 3.

$BRCIit = \beta0 + \beta_1BSit + \beta_2BINit + \beta_3BCit + \beta_4DOHit + \beta_5BIit + \beta_sBMit + \mu it$ ……Eqn 4.

Where;

ERM= Enterprise Risk Management (CG= Corporate Governance, BRCS= Board Risk Committee Size, BRCM= Board Risk Committee Meetings and BRCI= Board Risk Committee Independence)

CG-= (S= Board Size, BIN= Board Independence, BC= Board Composition, DOH= Directors' Shareholdings, BI= Board Insider, BM= Board Meetings)

β_{1-4}= Intercept or constant μit= Coefficient of the independent-variables β_0= Error term, t = year & i = firm

The model was modified based on the objectives of the study as:

$BF_{it} = \beta_0 + \beta_1BS + \beta_2BGD + \beta_3BCI + \mu_{it}$ ………Eqn 5.

By log linearizing, the model becomes;

$Log(BF)_{it} = \beta0 + \beta1log(BS)_{it} + \beta2log(BGD)_{it} + \beta3log(BC)_{it} + \mu_{it}$ ………Eqn 6.

Where;

BF= Bank Fraud, BS = Board size, BGD = Board gender diversity, BC = Board composition

log = Natural logarithm

μ = Stochastic Disturbance (Error Term)

β_0 = Intercept of relationship in the model/constant

$\beta_1 - \beta_3$ = coefficients of each of the independent variables

t = year & i = firm

4. RESULT AND DISCUSSIONS

4.1 Descriptive Statistics

Table1: Descriptive statistics of the model variables

	BSIZE	BGEND	BCOMP	FSIZE	FRAUD
Mean	17.34722	5.104167	6.659722	19.32320	-2.627367
Median	17.00000	5.000000	7.000000	19.51929	-2.612740
Maximum	26.00000	12.00000	12.00000	20.06934	-2.155982
Minimum	9.000000	1.000000	3.000000	17.72753	-3.218876
Std. Dev.	3.892470	2.304507	1.925766	0.562500	0.200424
Skewness	0.035108	0.557047	0.265343	-0.989728	-0.532669
Kurtosis	2.188404	2.746132	2.662539	2.981689	3.089383
Jarque-Bera	3.981714	7.833924	2.373048	23.51147	6.857598
Probability	0.136578	0.019901	0.305281	0.000008	0.032426
Sum	2498.000	735.0000	959.0000	2782.540	-378.3409
Sum Sq. Dev.	2166.639	759.4375	530.3264	45.24610	5.744288
Observations	144	144	144	144	144

Source: E-Views 11

Key: BSIZE-Board Size; BGEND-Board Gender Diversity; BCOMP-Board Composition; FSIZE-Log. of Total Assets; FRAUD- Log. of (Loan Loss Provision/Cash flow from Operations).

BSIZE reveals a mean value of approximately 17.35 directors. The median board size is slightly lower at 17 directors, suggesting that while most DMBs have a similar number of directors, there are some that feature larger boards. The maximum observed board size is 26, whereas the minimum is 9. The standard deviation of 3.89 reflects a moderate variability in board sizes across the sample. Furthermore, the skewness of 0.035 suggests a symmetrical

distribution, while the kurtosis of 2.19 indicates a relatively flat distribution, suggesting that extreme values are not overly prevalent.
The Jarque-Bera test shows a probability of 0.136, implying that the board size variable does not significantly deviate from normality.

The average BGEND showed a figure of 5.10, with a median of 5, i.e., on average, banks have about five women on their boards. The maximum value of 12 indicates that some banks have made substantial efforts toward gender diversity, whereas the minimum of 1 suggests that a few banks have minimal female representation. The standard deviation of 2.30 signifies some variability in gender diversity across the banks. The positive skewness of 0.557 indicates that there are more banks with lower gender diversity, while the kurtosis of 2.75 suggests a distribution with lighter tails, which may imply that extreme values are somewhat rare. The Jarque-Bera test shows a significant probability of 0.019, indicating that this variable may not follow a normal distribution.

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BCOMP, with a mean of 6.66 and a median of 7, suggests that the banks have a substantial proportion of independent or non-executive directors on their boards. The maximum of 12 indicates a few banks have particularly strong independent board representation, while the minimum of 3 shows that some may have a less balanced composition. The standard deviation of 1.93 indicates moderate variability in board composition across the institutions. The positive skewness of 0.265 indicates a slight tendency toward more boards having a higher number of independent directors. The kurtosis value of 2.66 points to a distribution that is fairly normal. The Jarque-Bera test indicates a probability of 0.305, suggesting that board composition is likely to be normally distributed.

The logarithm of total assets has a mean value of 19.32, with a median of 19.52. The maximum of 20.07 indicates that some banks are significantly larger than others, while the minimum value of 17.73 points to smaller banks within the sample. The standard deviation of 0.56 signifies low variability, suggesting that most banks have assets that are relatively similar in size. The skewness of -0.99 indicates a leftward skew, meaning that a greater number of banks fall toward the higher end of asset size. The kurtosis of 2.98 implies a distribution that is close to normal with some light tails.

The Jarque-Bera test shows a highly significant probability of 0.000008, indicating that the log of total assets does not conform to a normal distribution. The mean value for the log of the ratio of loan loss provision to cash flow from operations (FRAUD) is -2.63, which signifies that, on average, banks are managing their loan loss provisions relative to their operational cash flow in a positive manner. The median is slightly higher at -2.61, while the maximum of -2.16 indicates some banks may be facing challenges with higher loan loss provisions. The minimum value of -3.22 suggests that there are banks with very low provisions relative to their cash flows. The standard deviation of 0.20 reflects a modest variability in this ratio. The negative skewness of -0.53 indicates that more banks fall at the lower end of this metric, while the kurtosis of 3.09 suggests a distribution with heavier tails, which may indicate a presence of outliers.

The Jarque-Bera test results in a probability of 0.032, indicating that this variable deviate from a normal distribution.

4.1.2 Correlation Matrix

To examine the association among the variables, the Pearson correlation coefficient (i.e., correlation matrix) is utilized and the results are presented below.

Table 2: Correlation analysis of the model variables

	BSIZE	BGEND	BCOMP	FSIZE	FRAUD
BSIZE	1.0000	0.9408	0.9031	0.5738	0.5159
BGEND	0.9408	1.0000	0.9488	0.6709	0.4962
BCOMP	0.9031	0.9488	1.0000	0.7400	0.4685
FSIZE	0.5738	0.6709	0.7400	1.0000	0.2589
FRAUD	0.5159	0.4962	0.4685	0.2589	1.0000

Key: BSIZE-Board Size; BGEND-Board Gender Diversity; BCOMP-Board Composition; FSIZE-Log. of Total Assets; FRAUD- Log. of (Loan Loss Provision/Cash flow from Operations).

The matrix reveals a strong positive relationship between board size (BSIZE) and board gender diversity (BGEND), with a correlation coefficient of 0.9408. This indicates that banks with larger boards tend to have a higher representation of women. Similarly, board size is also positively correlated with BCOMP at 0.9031, suggesting that larger boards are associated with a greater proportion of independent or non-executive directors. The correlation with total assets (FSIZE) is moderate at 0.5738, indicating that as the size of the bank increases, so does the board size, although the relationship is not as strong as with gender diversity or composition. Finally, there is a moderate positive correlation with the log of the ratio of loan loss provision to cash flow from operations (FRAUD) at 0.5159, suggesting that larger boards may be linked to better management of loan losses in relation to operational cash flows. BGEND shows very strong correlations with both board size (BSIZE) and BCOMP, with coefficients of 0.9408 and 0.9488, respectively. This indicates a trend where banks that prioritize gender diversity on their boards also tend to have larger boards and better overall composition. BGEND has a significant positive correlation with FSIZE of 0.6709, suggesting that banks with more gender-diverse boards are likely to be larger in terms of assets. The correlation with the FRAUD variable is somewhat weaker at 0.4962, indicating that while there is a positive relationship between gender diversity and the management of loan loss provisions relative to cash flow, it is not as strong as other correlations. The correlation between board composition (BCOMP) and both BSIZE and BGEND is notably high, at 0.9031 and 0.9488, respectively. This reinforces the idea that banks with a greater proportion of independent directors also tend to have larger and more gender-diverse boards. The correlation with total assets (FSIZE) is moderately strong at 0.7400, indicating that banks with better board composition are generally larger. The relationship with FRAUD is positive but weaker at 0.4685, suggesting that improved board composition may have a modest impact on the effective management of loan loss provisions. The variable representing the logarithm of total assets (FSIZE) exhibits moderate positive correlations with BSIZE (0.5738), BGEND (0.6709), and BCOMP (0.7400). These correlations imply that larger banks are more likely to have larger boards, greater gender diversity, and improved board composition. However, the correlation with FRAUD is comparatively low at 0.2589, indicating that the size of the bank has a limited association with its management of loan loss provisions in relation to operational cash flow. Finally, the FRAUD variable, which measures the log of the ratio of loan loss provision to cash flow from operations, shows moderate positive correlations with BSIZE (0.5159), BGEND (0.4962), and BCOMP (0.4685). These correlations suggest that banks with larger boards and better gender diversity and composition may be better positioned to manage their loan loss provisions relative to cash flow. The correlation with FSIZE is the weakest at 0.2589, indicating that bank size has a lesser impact on the efficiency of managing loan loss provision.

4.1.3 Hausman Test

The data were subjected to panel Hausman test; to check for the suitability of the Fixed *vs.* Random Effect Model. The null hypothesis for this test is that the random disturbance term is not correlated with the regressors. In other words, if we reject the null hypothesis, fixed effects is the preferred method, otherwise random effects indicate better estimators. The result as depicted in Table 3 below.

Null Hypothesis (H_o): REM is more appropriate

Alternate Hypothesis (H_1): FEM is more appropriate

Table 3: Hausman specification test for model variables

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	62.359830	4	0.0000

Source: E-Views 11

Table 3 presents the results of the Hausman test designed to evaluate the appropriateness of using REM versus FEM in the model estimation. The Chi-Square Statistic showed a value of 62.359830; with 4 as the Degrees of Freedom (d.f.); we conclude that since the corresponding p-value is 0.0000 (< 0.01 or 0.05). This indicates that we reject the null hypothesis of the Hausman test, which posits that the random effects model is appropriate. Thus, it would be more appropriate to use FEM for this analysis to account for these correlations and obtain unbiased estimates. This is crucial for ensuring the reliability and validity of the regression results in the context of the study.

4.2 Test of Hypotheses

To test the hypotheses regression was estimated since correlation analysis does not imply a cause-effect relationship.

Table 4: OLS output for test of formulated hypothesis

Dependent Variable: FRAUD

Method: Panel Least Squares

Date: 10/25/24 Time: 20:08

Sample: 1 144

Periods included: 12

Cross-sections included: 12

Total panel (balanced) observations: 144

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-3.584517	0.757212	-4.733838	0.0000
BSIZE	-0.054134	0.011083	-4.884292	0.0000
BGEND	0.531621	0.415468	1.279572	0.2030
BCOMP	0.935679	0.426195	2.195424	0.0299
FSIZE	0.071954	0.049130	1.464575	0.1455
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.530122	Mean dependent var	-2.627367	
Adjusted R-squared	0.475059	S.D. dependent var	0.200424	
S.E. of regression	0.145213	Akaike info criterion	-0.916791	
Sum squared resid	2.699113	Schwarz criterion	-0.586812	
Log likelihood	82.00895	Hannan-Quinn criter.	-0.782706	
F-statistic	9.627422	Durbin-Watson stat	1.798725	
Prob(F-statistic)	0.000000			

Source: E-Views 11

The output in Table 4 presents the Ordinary Least Squares (OLS) regression results for testing the hypotheses. The R-squared is 0.530122, i.e., approximately 53.01% of the variation in FRAUD is accounted for by the explanatory variables (BSIZE, BGEND, BCOMP and FSIZE) in the model. This indicates a moderate level of explanatory power for the model. The Adjusted R-squared is lower at 0.475059, i.e., 47.51% to account for the number of variables in the model. The model is significant as the F-statistic value showed 9.627422; and, Prob(F-statistic)=0.000000(<.05).

The coefficient for the constant term is -3.584517, with a highly significant p-value of 0.0000. This is the baseline level of FRAUD when all other variables (BSIZE, BGEND, BCOMP, and FSIZE) are held constant.

4.2.1 Hypothesis One

H_0: Board size has no significant relationship with bank fraud in Nigeria banking industry.
H_1: Board size has a significant relationship with bank fraud in Nigeria banking industry.

The coefficient for board size (BSIZE) is -0.054134, which is negative and significant at the 5% level (p-value = 0.0000). This indicates that board size has a significant negative effect on FRAUD. Specifically, a one-unit increase in BSIZE is associated with a 0.054-unit decrease in FRAUD, all other things being equal. This result suggests that increasing board size, in this model, negatively impacts fraud.

Decision:

The null hypothesis (Ho) is rejected and the alternate hypothesis (Hi) accepted; thus, the alternate is “Board size has a significant relationship with bank fraud in Nigeria banking industry”.

4.2.2 Hypothesis Two

H_0: Board composition has no significant relationship with bank fraud in Nigeria banking industry.

H_1: Board composition has a significant relationship with bank fraud in Nigeria banking industry.

The coefficient for board composition (BCOMP) is 0.935679, which is positive and significant at the 5% level (p-value = 0.0299). This indicates that board composition has a significant positive effect on FRAUD. Specifically, a one-unit increase in BCOMP is associated with a 0.936-unit increase in FRAUD, all else being equal. This result suggests that increasing board composition, in this model, positively affects fraud.

Decision:

The null hypothesis (Ho) is rejected and the alternate hypothesis (Hi) accepted; thus, the alternate is “Board composition has a significant relationship with bank fraud in Nigeria banking industry”.

4.2.3 Hypothesis Three

H_0: Board gender diversity has no significant relationship with bank fraud in Nigeria banking industry.

H_1: Board gender diversity has a significant relationship with bank fraud in Nigeria bankingindustry.

The coefficient for board gender diversity (BGEND) is 0.531621, which is positive and not significant at the 5% level (p-value = 0.2030). This indicates that board gender diversity has a positive effect on FRAUD. Specifically, a one-unit increase in BGEND is associated with a 0.531-unit increase in FRAUD, all else being equal. This result suggests that increasing board gender, in this model, positively affects fraud.

Decision:

The null hypothesis (Ho) is accepted and the alternate hypothesis (Hi) rejected; thus, the alternate is “Board gender diversity has no significant relationship with bank fraud in Nigeria banking industry”.

4. CONCLUSION AND RECOMMENDATIONS

The study concludes that corporate governance plays a significant role on risk management in the Nigerian banking industry. The empirical evidence supports the fact that the quality and characteristics of board members play a pivotal role in safeguarding against fraudulent practices. The empirical analysis using the Ordinary Least Squares (OLS) method, revealed that board size significantly influences the incidence of bank fraud, suggesting that larger boards may be more effective in mitigating fraudulent activities. This relationship emphasizes the importance of having a well-structured board that can enhance oversight and accountability. Additionally, board composition was found to be significantly related to bank fraud. The presence of diverse perspectives and expertise within the boardroom is crucial for effective governance, which can lead to better decision-making and a reduction in fraud risk. In contrast, lack of a significant relationship between board gender diversity and bank fraud indicates that simply increasing female representation on boards may not directly impact fraud prevention efforts.

Based on the findings, the study recommend:

1. Optimal Board Size: Shareholders in Nigeria should actively advocate for a board size that strikes a balance between diversity, expertise, and efficiency. An appropriately sized board can effectively perform its oversight functions, fostering robust discussions and ensuring that a range of perspectives is considered in decision-making
2. Independence and Experience: Shareholders should prioritize appointing board members who possess relevant expertise and experience in the banking sector. A diverse board enriches decision-making processes by bringing varied perspectives, which can lead to more innovative solutions and enhance the ability to detect and address risks. Again, independent directors promote accountability and transparency within the board.
3. Gender Inclusion and Diversity: Shareholders should actively advocate for increased gender diversity on corporate boards by supporting the nomination and appointment of more women directors. This is because women directors often bring collaborative, empathetic, and inclusive leadership traits that can significantly enhance board effectiveness.

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