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Risk management in Nigerian listed commercial banks: The significance of board composition (2013–2023)

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Abstract

Purpose: The study examined the effect of board composition on the risk management of listed commercial banks in Nigeria. The specific objective was to determine the effect of board size, board independence, and board gender diversity on the non-performing loan ratio (NPLR).

Method: *Ex-post facto* research design was chosen for the study. The population of the study comprised all the 13 listed commercial banks in Nigeria. A census sampling approach was used to include all the population elements into the sample. Secondary data was collected from the annual audited reports of the banks covering 2013 to 2023. Aside from descriptive analysis, Pearson correlation, Pesaran Cross-sectional Dependence test, and Panel Heteroskedasticity tests were used to assess the validity of the regression model. Panel Estimated Generalized Least Squares was used to test the hypotheses.

Results: Board size has a significant positive effect on NPLR (β = 0.003935; p-value = 0.0000); board independence has a significant positive effect on NPLR (β = 0.121012; p-value = 0.0000); board gender diversity has a significant negative effect on NPLR (β = -0.102780; p-value = 0.0000).

Conclusions: In conclusion, a well-composed board ensures that banks are resilient to financial shocks while safeguarding the interests of shareholders, customers, and the broader economy.

Limitations: The aspects of board composition covered were limited to board size, board independence, and board gender diversity, but did not cover board final literacy and board risk committee.

Contribution: Thus, the study recommends that listed commercial banks in Nigeria should have a board size that balances adequate expertise and diversity with the ability to make effective decisions in order to ensure that boards reduce bureaucratic delays in risk management.

Keywords: *Board Composition, Risk Management, Board Size, Board Independence, Board Gender Diversity*

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1. Introduction

Over the years, the banking sector remains one of the most critical components of any economy. In particular, the Nigerian banking industry has undergone significant reforms in the past few decades, driven by both local and international financial reforms, technological innovations, and increasing competition (Ugwuanyi, Wade, & Okoh, 2024). The role of commercial banks in Nigeria is vital to the country's economic development, as these institutions serve as intermediaries between savers and borrowers, providing crucial financial services to individuals, businesses, and the government (Gilbert Ogechukwu Nworie & Agwaramgbo, 2023; Gilbert Ogechukwu Nworie & Onochie, 2024). However, the ability of banks to effectively manage risks, particularly credit risk, is a central factor that determines their stability, profitability, and even long-term sustainability (Abiola, 2023). One of the key aspects that influence a bank's ability to manage risk is the composition of its board of directors. The composition of the board, which includes factors such as board size, independence, and gender diversity, has been the subject of growing attention in academic and professional circles as it is believed to significantly impact the effectiveness of risk management practices (Mehmood, Ahmad, Rahman, & Sattar, 2025; Musa, Moses, & Success, 2022).

In recent times, corporate governance has become an essential pillar in the financial industry worldwide, with an increasing focus on ensuring that financial institutions adopt sound governance structures to foster transparency, accountability, and effective risk management. The board of directors plays a central role in this governance framework, tasked with overseeing the bank's risk management processes, ensuring compliance with regulations, and protecting shareholders' interests (Nainggolan, Prahmila, & Syaputri, 2023). The composition of the board can significantly influence the way risks are managed. For instance, a board that is too large may struggle with decision-making and might be less effective in providing strategic oversight, while a smaller board may lack the necessary expertise or diversity of perspectives to handle complex risk scenarios. Similarly, a lack of independence or diversity on the board could limit the ability to objectively assess and mitigate risks, leaving the bank vulnerable to unforeseen financial crises or operational challenges. As such, an understanding of the relationship between board composition and risk management is crucial for improving the overall resilience of Nigerian commercial banks, particularly in managing credit risk, as evidenced by indicators like the non-performing loan (NPL) ratio (Muhammad, Tukur, Dabari, & Hanga, 2023).

The issue of non-performing loans (NPLs) is a critical aspect of risk management in banks, especially in Nigeria, where credit risk has historically been one of the most significant threats to the stability of financial institutions (Chukwu, Muritala, Akande, & Adekunle, 2024). Non-performing loans refer to loans that borrowers have failed to repay according to the terms of the loan agreement, typically after 90 days or more. High NPL ratios often signal that a bank is facing significant credit risk, which can lead to liquidity problems, reduced profitability, and in extreme cases, insolvency (Bob-Manuel, 2024). Managing the NPL ratio is thus a primary concern for commercial banks, as it directly affects their financial health and the stability of the broader financial system. Various factors contribute to a bank's NPL ratio, including economic conditions, the effectiveness of lending practices, and the quality of the bank's risk management strategies (Duruechi, Chigbu, & Ukpong, 2022). One of the most significant internal factors influencing a bank's approach to managing non-performing loans is its board composition. The board of directors, as the highest decision-making body in a bank, is responsible for setting the strategic direction of the bank, overseeing its risk management policies, and ensuring that appropriate measures are taken to minimize credit risks. As such, understanding how different aspects of board composition—such as size, independence, and gender diversity—impact a bank's risk management practices is essential in reducing the NPL ratio and enhancing the overall stability of the banking sector.

The concept of board composition encompasses various elements, including board size, the independence of board members, and board diversity. These elements have become central to discussions about corporate governance (El Mokrani & Alami, 2021), particularly in the context of banking and financial institutions. Board size refers to the number of individuals who sit on the board of directors, which is critical in determining the board's effectiveness (Jenter, Schmid, & Urban, 2023). A larger board may have more resources and expertise, but it could also face challenges in terms of decision-making efficiency and cohesion. On the other hand, a smaller board may benefit from quicker decision-making and clearer accountability, but it could lack the diversity of skills and perspectives needed to manage complex risks. Board independence is another crucial factor, which refers to the degree to which board members are free from conflicts of interest, particularly with regard to the bank's executive management (A. A. Abubakar, Yahaya, & Joshua, 2023). Independent directors are essential in ensuring that decisions are made objectively, without undue influence from the bank's management or major shareholders. Gender diversity on the board is also increasingly recognized as a key element of effective corporate governance. Diverse boards are believed to make more balanced and well-rounded decisions, as a greater variety of perspectives can contribute to more innovative risk management strategies and prevent groupthink.

The influence of board composition on risk management in Nigerian commercial banks is a topic that has attracted significant attention from both academics and practitioners. The composition of a board can affect the quality of decision-making, the level of scrutiny applied to management's activities, and the overall strategic direction of the bank, all of which are crucial to effective risk management (Adu, 2024). For example, a larger, more independent board may be better equipped to oversee and evaluate the bank's credit risk policies, ensuring that adequate precautions are taken to minimize the likelihood of defaults on loans. A smaller, more cohesive board may be able to respond more swiftly to emerging risks and implement corrective measures more effectively. Similarly, a board with a greater degree of gender diversity may be more likely to consider a wider range of perspectives in its risk assessment, leading to more balanced and comprehensive risk management practices (A. A. Abubakar et al., 2023). There is also evidence to suggest that the presence of independent directors on the board may improve risk oversight, as these directors are less likely to be swayed by personal or professional ties to management, leading to more objective and rigorous decision-making (Adu, 2024).

However, Gasu (2023) argued that many banks in Nigeria continue to face significant governance challenges, particularly concerning the composition of their boards. The size of boards often varies greatly, with some boards being overly large and inefficient, making it difficult to achieve effective decision-making. In some cases, the independence of board members is compromised, leading to potential conflicts of interest (Lincoln, Adedoyin, & Laugharne, 2017) and a lack of objective oversight over risk management practices. Furthermore, gender diversity remains a major concern, as many boards in Nigerian banks still lack adequate representation of women, which limits the diversity of viewpoints in decision-making processes. These structural and governance weaknesses result in a board composition that may not be adequately equipped to provide effective oversight of risk management strategies, particularly in areas like credit risk management and the monitoring of NPLs. As a result, there is a growing concern about whether the current board structures are fit for the purpose of addressing the increasing complexity and volatility in the banking sector (Abiola, 2023).

Thus, poor board structure, lack of independence, and insufficient diversity can lead to ineffective risk oversight, which, in turn, exacerbates issues such as high non-performing loan ratios. The NPL ratio is a critical indicator of a bank's ability to manage credit risk, and a high NPL ratio often points to weak risk management practices, which can threaten the financial stability of the bank (Chukwu et al., 2024). If boards are not adequately equipped to oversee the risk management processes, banks may fail to identify potential risks in a timely manner or fail to take corrective actions before these risks materialize. The resulting increase in NPLs can strain the bank's liquidity, reduce profitability, and erode investor confidence. In the worst-case scenario, it could lead to insolvency or regulatory intervention, undermining public trust in the financial system. Therefore, the composition of the board is critical to the long-term stability and success of Nigerian commercial banks, and any shortcomings in governance could have widespread implications not just for individual banks but for the entire financial system.

1.1 Objective of the study

The main objective of the study is to examine the effect of board composition on the risk management of listed commercial banks in Nigeria. The specific objectives are as follows:

1. To examine the effect of board size on the non-performing loan ratio of listed commercial banks in Nigeria.

2. To ascertain the effect of board independence on the non-performing loan ratio of listed commercial banks in Nigeria.
3. To determine the effect of board gender diversity on the non-performing loan ratio of listed commercial banks in Nigeria.

1.2 Research Questions

1. What is the effect of board size on the non-performing loan ratio of listed commercial banks in Nigeria?
2. What is the effect of board independence on the non-performing loan ratio of listed commercial banks in Nigeria?
3. How does board gender diversity affect the non-performing loan ratio of listed commercial banks in Nigeria?

1.3 Hypotheses

H01) Board size has no significant effect on the non-performing loan ratio of listed commercial banks in Nigeria.
H02) Board independence has no significant effect on the non-performing loan ratio of listed commercial banks in Nigeria.
H03) Board gender diversity has no significant effect on the non-performing loan ratio of listed commercial banks in Nigeria.

2. Literature review

2.1 Conceptual Review

2.1.1 Board Composition

Board composition refers to the structural makeup of the board of directors of an organization, including the selection, qualifications, and diversity of its members (El Idrissi & Alami, 2021; Lincoln et al., 2017). In the context of commercial banks, board composition involves the characteristics and professional backgrounds of the directors who are responsible for the oversight of the bank's strategic direction and risk management processes. The composition of the board plays a crucial role in shaping the decision-making processes of the organization, ensuring that decisions are informed, balanced, and aligned with the bank's long-term goals and risk tolerance. The key aspects of board composition include the board's size, the diversity of skills and expertise among members, and the balance between independent and non-independent directors (Onyekwere & Babangida, 2022).

A well-composed board of directors is expected to bring together a variety of perspectives, experiences, and expertise to guide the organization effectively (Alie, Fitri, Desmon, Nasir, & Meidasari, 2024). For instance, board members should ideally possess expertise in areas such as finance, law, risk management, and governance, ensuring that the board can adequately supervise the bank's operations and strategic objectives. Moreover, the composition of the board should ideally reflect the diversity of the community or market in which the bank operates, allowing for more inclusive and representative decision-making (Lincoln et al., 2017). Board composition also refers to the proportion of diversity among the board members in terms of gender, nationality, et cetera. Independent directors, who do not have ties to the bank's executive management, are critical in ensuring objective oversight and avoiding conflicts of interest (Onuorah, Osuji, & Ozurumba, 2019). In recent years, attention has also been given to gender diversity on the board, with calls for increasing the representation of women in leadership positions to improve the board's decision-making and governance practices. The composition of the board, therefore, plays a fundamental role in shaping the effectiveness of risk oversight, governance quality, and, ultimately, the financial health and performance of the bank.

2.1.2 Board Size

Board size refers to the number of directors serving on the board of an organization (Jenter et al., 2023). The size of the board is a significant factor in determining its effectiveness in overseeing the activities and strategic direction of the organization, including risk management and decision-making

processes. In the context of commercial banks, the size of the board can have important implications for the bank's governance structure and overall functionality (Kanene & Francis, 2023). There is no one-size-fits-all answer when it comes to the optimal size of a board, as different organizations, industries, and regulatory environments may require different configurations. However, board size generally needs to strike a balance between having enough directors to ensure a diversity of opinions and perspectives and being small enough to allow for effective communication and decision-making.
Boards that are too large may face challenges in terms of coordination, making it difficult to achieve consensus and efficiently address key issues (Hoppmann, Naegele, & Girod, 2019). The larger the board, the more likely it is that individual members may become passive participants, deferring to the opinion of the majority or to those with more experience. Large boards may also face challenges in establishing strong interpersonal relationships between members, potentially leading to a lack of unity and cohesion in decision-making processes. On the other hand, a board that is too small may lack the necessary diversity of perspectives and expertise, which can limit the quality of decision-making and oversight (Jenter et al., 2023). Moreover, small boards may find it difficult to delegate responsibilities adequately among members, which can hinder the board's ability to address complex issues, including risk management.

2.1.3 Board Independence

Board independence refers to the degree to which board members are free from any conflicts of interest, particularly with respect to the bank's executive management or major shareholders (A. A. Abubakar et al., 2023). Independent directors are those who do not have any direct or indirect relationships with the bank's operations or management that could influence their judgment or decision-making. Board independence is considered a critical component of corporate governance, as it helps ensure that the decisions made by the board are objective, impartial, and in the best interests of the shareholders and other stakeholders (Lincoln et al., 2017). In banking and financial institutions, board independence is particularly important because it enhances the quality of oversight over risk management practices and strategic decision-making processes.

Independent directors are tasked with bringing an external perspective to the board, offering hints that are not influenced by day-to-day operations or personal interests within the bank (Onyekwere & Babangida, 2022). This independence allows them to challenge the views of executive management, raise concerns about risk, and ensure that management actions are aligned with the long-term goals of the bank. In particular, independent directors are essential in overseeing the bank's risk management framework, ensuring that the bank has sound policies in place to address financial risks such as credit, market, and operational risks. By providing objective oversight, independent directors help prevent management from taking overly risky or self-serving actions that could endanger the bank's financial stability (A. A. Abubakar et al., 2023).

2.1.4 Board Gender Diversity

Board gender diversity refers to the representation of both male and female directors on the board of an organization (Onyekwere & Babangida, 2022). Gender diversity has become an increasingly important topic in corporate governance, as research has shown that diverse boards, including those with a higher representation of women, tend to make better decisions and exhibit stronger monitoring (Roy, 2022). In the context of commercial banks, gender diversity on the board can contribute to more inclusive decision-making processes, better risk management, and an improved corporate culture. The inclusion of women in leadership roles brings unique perspectives and experiences that may not be present in homogenous boards, which traditionally have been dominated by male executives (Olufemi, 2021).

Having women on the board can also improve the quality of discussions, as diverse groups are often more likely to challenge each other's assumptions, leading to better decision-making. In addition, gender diversity can enhance a bank's reputation, as a diverse leadership team signals that the bank values equality and is committed to inclusive governance (Onyekwere & Babangida, 2022). The presence of women on the board can also positively influence corporate social responsibility strategies and broader organizational policies, reflecting a more balanced approach to risk, ethics, and stakeholder relations (Olufemi, 2021).

2.1.5 Risk Management

Risk management refers to the process of identifying, assessing, and mitigating potential risks that could negatively impact the operations, financial performance, and reputation of an organization (Kanene & Francis, 2023). In the context of commercial banks, risk management is crucial in safeguarding the bank's assets, ensuring compliance with regulations, and maintaining the stability of the financial system. Banks face a variety of risks, including credit risk, market risk, operational risk, liquidity risk, and reputational risk. Effective risk management allows banks to identify these risks early, develop strategies to mitigate them, and implement controls that prevent or minimize their impact (Tukur, 2023). Risk management is not just about reacting to risks but also about creating a proactive framework that enables the bank to anticipate and manage potential threats in a rapidly changing financial environment (A. H. Abubakar, Ibrahim, Zakaria, & Kassim, 2023; Musa et al., 2022).

For commercial banks, managing risks such as credit risk, which can result in non-performing loans (NPLs), is critical. A well-established risk management framework is designed to assess and monitor the creditworthiness of borrowers, ensuring that only those with a sufficient capacity to repay loans are approved (Kanene & Francis, 2023). It also involves maintaining a diversified portfolio of loans and employing mechanisms like loan loss provisions and collateral management to mitigate the impact of defaulted loans. In addition to credit risk, banks also manage risks related to liquidity, regulatory compliance, operational efficiency, and market fluctuations. Through risk management, banks are better equipped to weather financial crises, remain profitable, and protect the interests of their stakeholders.

2.1.5.1 Non-Performing Loan Ratio

The non-performing loan (NPL) ratio is a key financial metric used by banks to measure the proportion of loans that are not being repaid as per the agreed terms (Chukwu et al., 2024). A loan is typically considered non-performing if the borrower has failed to make payments for a specified period, usually 90 days or more. The NPL ratio is calculated by dividing the total amount of non-performing loans by the total amount of outstanding loans held by the bank. This ratio serves as an important indicator of the bank's credit risk management and overall financial health (Bob-Manuel, 2024). A high NPL ratio suggests that a significant portion of the bank's loan portfolio is at risk of default, which can lead to liquidity problems, reduced profitability, and a decline in investor confidence (Duruechi et al., 2022).

Banks with high NPL ratios may struggle to maintain solvency, as defaulted loans tie up capital that could otherwise be used to fund new loans or business activities. A high NPL ratio can also increase the bank's provisions for loan losses, which further erodes profitability (Duruechi et al., 2022). Managing the NPL ratio is, therefore, a central aspect of risk management, requiring banks to implement effective credit assessment procedures, monitor borrower performance, and take appropriate action when loan repayments are at risk (Chukwu et al., 2024). Regulators closely monitor NPL ratios to ensure the stability of the financial system (Bob-Manuel, 2024), and banks with persistently high NPL ratios may face regulatory scrutiny or intervention.

2.2 Theoretical Framework

2.2.1 Upper Echelons Theory

The Upper Echelons Theory was first introduced by Hambrick and Mason in 1984 (Cannella Jr, 2001). The theory emerged as a response to the growing recognition that the behaviors and decisions of top executives significantly influence organizational outcomes. Hambrick and Mason argued that the experiences, values, and cognitive biases of top management teams—particularly the board of directors—shape strategic decisions and organizational performance (Carpenter, Geletkanycz, & Sanders, 2004). The key postulations of the Upper Echelons Theory are based on the idea that the experiences, values, and cognitive bases of top management teams (including board members) influence the strategic choices they make. Specifically, the theory argues that these leaders' past experiences, age, education, social background, and other personal characteristics help form their cognitive frames, which guide decision-making. These personal characteristics act as filters through which executives interpret information and assess the risks and opportunities in their external environment (Liu, 2023). The theory suggests that the collective background of the top management team shapes the direction and strategic decisions of an organization, which includes financial policies, risk management strategies, and the overall governance structure (Carpenter et al., 2004). Therefore, the theory underscores the importance of top management teams as the key drivers of organizational behavior and outcomes.

The Upper Echelons Theory is highly relevant to the study of board composition and risk management in Nigerian commercial banks, particularly regarding the non-performing loan (NPL) ratio. Since the board of directors holds the highest decision-making authority in a bank, its characteristics and decision-making processes are critical in shaping the bank's governance and risk management strategies. The theory suggests that the personal experiences and cognitive biases of board members influence how they assess and respond to risks, including credit risk. For instance, a board with directors who have extensive experience in risk management and financial oversight may approach risk assessment more cautiously and implement stronger risk controls, which could lead to a lower NPL ratio. On the other hand, a board composed of individuals with limited experience in financial risk management might overlook certain risks, leading to higher NPLs.

2.3 Empirical Review

Adu (2024) examined the impact of board attributes on bank risk-taking in Sub-Saharan Africa. Using a sample of 220 banks in 16 sub-Saharan African countries for the years 2007–2018, the findings were based on regression analysis. First, the study found that independent directors who are financial experts reduce bank risk-taking. Second, it revealed that the number of board meetings negatively impacts bank risk-taking.

Essien and Akpan (2024) investigated the effect of board diversity on the earnings quality of deposit money banks listed on the Nigerian Exchange Group from 2014 to 2023. The ordinary least squares regression conducted showed that board age diversity has a non-significant negative effect on discretionary loan loss provisions, while experience diversity and board financial expertise have significant negative effects on discretionary loan loss provisions.

Edeh and Iwedi (2024) studied the impact of corporate governance on the stability of domestically significant banks in Nigeria over a thirteen-year period (2010–2022). Panel random effect regression revealed a significant relationship between corporate governance variables (Board Representation, Board Size, Audit Committee Independence, Board Activism, and Audit Committee Meetings) and the capital adequacy of Nigerian banking firms.

Abiola (2023) explored the relationship between corporate governance practices and credit risk in banking using a desk research methodology. This approach involved collecting secondary data from existing studies and reports. The findings indicated a significant correlation between effective corporate governance practices and lower levels of credit risk exposure in banks.

Muhammad et al. (2023) examined the moderating effect of Risk Committee Size on the relationship between board attributes and credit risk exposure in listed deposit money banks in Nigeria. Using panel regression analysis, the study revealed that board size significantly affects credit risk exposure before and after moderation.

Kanene and Francis (2023) analyzed the effect of board size on corporate risk management in Nigeria. Panel data regression analysis showed a positive but insignificant relationship between board size and corporate risk management.

Tukur (2023) assessed the impact of corporate governance mechanisms on risk management in listed deposit money banks on the Nigerian Stock Exchange for the period 2011–2021. Using the Random-effects GLS regression method, the results showed that board independence positively impacts credit and liquidity risk while negatively affecting capital risk. Gender diversity was positively significant in relation to capital, credit, and liquidity risks.

Musa et al. (2022) explored the effect of corporate governance on risk management in selected deposit money banks. Using panel data regression analysis, the findings revealed a negative relationship between capital risk and corporate governance disclosure, indicating that higher disclosure reduces credit and liquidity risk.

Agubata, Igbru, and Udezo (2021) investigated the effect of corporate governance on financial risk disclosure in banks listed on the Nigerian Exchange Limited from 2010 to 2019. The ordinary least squares regression showed that board size and board expertise are key drivers of financial risk disclosure, while board independence and firm size had no significant effect.

2.4 Gap in Literature

While numerous studies have examined the effect of board composition on bank risk management in Nigeria, there is a notable gap in addressing the methodological challenges of cross-sectional dependence and heteroskedasticity in panel data studies. While previous research, such as the studies by Adu (2024), Essien and Akpan (2024), and Tukur (2023), have employed various regression techniques to assess the relationship between corporate governance and bank risk, none have explicitly corrected for cross-sectional dependence and heteroskedasticity using advanced methods like the Period Seemingly Unrelated Regression (SUR) method with White diagonal standard errors and covariance. Additionally, the majority of existing studies, including those by Kanene and Francis (2023), and Muhammad et al. (2023), have often relied on a smaller sample of banks or have focused on specific subsets of the banking sector. In contrast, the current study employs a census sampling approach, including all 13 listed commercial banks on the Nigerian Exchange Group from 2013 to 2023. This approach offers a more comprehensive view of the Nigerian banking sector. This study therefore, contributes to the literature by using robust econometric techniques to address these common methodological limitations, as well as by expanding the sample size to encompass the entire population of listed commercial banks.

3. Research Methodology

Ex-post facto research design was chosen for the study. The choice of an *ex-post facto* research design for this study is justified as it aligns with the aim of examining the effect of board composition on risk management in Nigerian commercial banks, where the key variables—such as board size, board independence, and board gender diversity—have already occurred or been established in the past. *Ex-post facto* design is particularly appropriate when it is not possible to manipulate the independent variables (Gilbert O Nworie, Okafor, & John-Akamelu, 2022), as in the case of board composition, which is determined by organizational decisions that have already been made.

The study targets the Nigerian commercial banking sector, focusing specifically on listed commercial banks. These institutions are crucial for economic stability and growth, making them ideal for exploring the impact of board composition on risk management. The population comprises all the thirteen (13) listed commercial banks on the Nigerian Exchange Group, as detailed in Table 1.

Table 1. Study Population

No.	Bank Name
1	Access Bank Nigeria Plc.
2	Ecobank Transnational Incorporated Bank Nigeria Plc.

3	Fidelity Bank Nigeria Plc.
4	First Bank Nigeria
5	First City Monument Bank Nigeria
6	Guaranty Trust Bank
7	Stanbic IBTC
8	Sterling Bank
9	United Bank for Africa Plc.
10	Unity Bank
11	Wema Bank Plc.
12	Zenith Bank Nigeria Plc.
13	Jaiz Bank

Source: Nigerian Exchange Group (2024)

The study adopted a census sampling technique, including all thirteen (13) listed commercial banks in the population. This approach ensures that every bank's board composition is accounted for, providing a comprehensive view of how these characteristics influence risk management. The study utilized secondary data collected from the annual audited financial reports of the listed commercial banks covering the period from 2013 to 2023. These reports, filed with the Nigerian Exchange Group, are publicly available and provide reliable data for assessing the board composition and non-performing loan ratio. However, a major limitation we encountered in the usage of this secondary data was that some banks restated their figures for some accounting periods, which did not tally with the previous year's financial statements.

The collected data underwent descriptive analysis to identify patterns and trends in board characteristics and their effect on risk management. Preliminary tests such as Pearson Correlation, Pesaran Cross-sectional Dependence test, and Panel Heteroskedasticity tests were used to assess the validity of the regression model. To test the study's hypotheses, the Panel Estimated Generalized Least Squares (Panel EGLS) method was applied at a 5% significance level. This method ensures robust results by correcting the observed panel data challenges. To address potential issues of cross-sectional dependence and heteroskedasticity in the panel data, this study employed the Period Seemingly Unrelated Regression (SUR) method along with White diagonal standard errors and covariance. The Period SUR approach is particularly useful in panel data analysis when there is a correlation between error terms across different entities over time, while White diagonal standard errors help correct for heteroskedasticity, which refers to unequal variance in the error terms. By applying these techniques, the study ensures more robust and reliable estimations of the regression coefficients, accounting for both the time-series and cross-sectional variations in the data, thereby improving the accuracy of the results.

A multiple regression model was used to analyze the effect of board composition on the risk management of listed commercial banks. Risk management was represented by its proxy: non-performing loan ratio. The model is as specified below:

$$NPLRit = \beta_0 + \beta_1 BSZ_{it} + \beta_2 BIN_{it} + \beta_3 BGD_{it} + \varepsilon_{it} \text{ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ eqi}$$

Where:

NPLR	= Non-performing loan ratio, measured as the ratio of non-performing loan to gross loans
BSZ	= Board size, measured as the number of board members
BIN	= Board independence, measured as the ratio of non-executive directors to total size
BGD	= Board gender diversity, measured as the ratio of female executive directors to total size
$\beta 0$	= Intercept
$\beta 1\text{-}3$	= Coefficients of independent variables
ε	= Error term
it	= Bank i at time t

4. Results and discussions

4.1 Descriptive Analysis and Model Diagnoses

Table 2. Descriptive Analysis

	NPLR	BSZ	BGD	BIN
Mean	0.073684	13.09790	0.237718	0.672333
Median	0.045360	13.00000	0.250000	0.625000
Maximum	0.764197	19.00000	0.500000	0.933333
Minimum	0.000000	6.000000	0.000000	0.500000
Std. Dev.	0.109903	2.910193	0.112877	0.131880
Skewness	4.301677	-0.148913	-0.362801	0.637559
Kurtosis	23.09064	2.835070	2.862861	2.011563
Jarque-Bera	2846.007	0.690586	3.249112	15.50916
Probability	0.000000	0.708013	0.196999	0.000429
Sum	10.53685	1873.000	33.99361	96.14360
Sum Sq. Dev.	1.715172	1202.629	1.809259	2.469709
Observations	143	143	143	143

Source: Eviews 10 Output (2024)

Table 2 shows that the **Non-performing Loan Ratio (NPLR)** has a mean of 0.0737, indicating that, on average, about 7.37% of loans in the sample are non-performing. The maximum NPLR is 0.7642, suggesting that at least one bank had as high as 76.42% of its loans classified as non-performing, while the minimum is 0, indicating at least one bank had no non-performing loans. The standard deviation of 0.1099 indicates considerable variation in the NPLR across the banks. The high skewness value of 4.3017 reveals a highly right-skewed distribution, meaning most banks have low NPLRs, but a few banks have very high NPLRs. The kurtosis of 23.0906 suggests a leptokurtic distribution with extreme values and outliers. The Jarque-Bera test's p-value of 0.0000 confirms that the NPLR distribution deviates significantly from normality.

The **Board Size (BSZ)** has a mean of 13.098, implying that, on average, the banks have approximately 13 members on their boards. The maximum board size is 19, while the minimum is 6, suggesting some variation in board composition. With a standard deviation of 2.910, the board sizes show moderate variability. The skewness of -0.1489 suggests a slight leftward skew, meaning most banks tend to have larger boards, but a few have smaller ones. The kurtosis of 2.8350 indicates a fairly normal distribution of board sizes with a slight tendency towards flatness. The Jarque-Bera p-value of 0.7080 indicates no significant departure from normality in the distribution of board sizes.

The **Board Gender Diversity (BGD)** has a mean of 0.2377, implying that, on average, around 23.77% of the board members in the sample are female executives. The maximum value is 0.5, showing that in some banks, half of the board members are female, while the minimum is 0, indicating no female executives on the board in certain banks. With a standard deviation of 0.1129, the gender diversity levels vary moderately across the banks. The negative skewness of -0.3628 indicates that more banks tend to have a lower proportion of female directors, with a few having a higher proportion. The kurtosis of 2.8629 suggests a distribution that is slightly peaked around the mean but not overly extreme. The Jarque-Bera p-value of 0.1970 indicates that the distribution of board gender diversity is approximately normal.

The **Board Independence (BIN)** has a mean of 0.6723, indicating that on average, about 67.23% of the board members are non-executive directors. The maximum value is 0.9333, implying some banks have boards that are nearly fully independent, while the minimum value is 0.5, indicating the least independent boards have equal numbers of executive and non-executive directors. The standard deviation of 0.1319 shows a relatively low variation in board independence across the banks. The skewness of 0.6376 indicates a slight rightward skew, meaning that more banks have higher proportions of independent directors. The kurtosis value of 2.0116 suggests a distribution close to normal, with no extreme outliers. The Jarque-Bera p-value of 0.0004 indicates a significant deviation from normality in the distribution of board independence.

Table 3. Correlational Analysis
Correlational Analysis: Ordinary
Date: 11/09/24 Time: 20:12
Sample: 2013 2023
Included observations: 143

Correlation Probability	NPLR	BSZ	BGD	BIN
NPLR	1.000000 -----			
BSZ	0.102450 0.2234	1.000000 -----		
BGD	-0.231882 0.0053	-0.155318 0.0640	1.000000 -----	
BIN	0.212869 0.0107	-0.280363 0.0007	-0.325777 0.0001	1.000000 -----

Source: Eviews 10 Output (2024)

The correlation analysis in Table 3 reveals the relationships between the Non-performing Loan Ratio (NPLR) and the three board composition variables. Board Size (BSZ) shows a weak positive correlation of 0.1025 with NPLR, but this is not statistically significant at the 5% level (p = 0.2234), indicating that board size has little effect on NPLR. Board Gender Diversity (BGD) exhibits a negative correlation of -0.2319 with NPLR, which is statistically significant at the 5% level (p = 0.0053), suggesting that a higher proportion of female directors is associated with lower NPLRs. Board Independence (BIN) shows a positive correlation of 0.2129 with NPLR, significant at the 5% level (p = 0.0107), implying that higher board independence is linked to higher NPLRs.

Table 4. Cross-sectional Dependence Test
Residual Cross-Section Dependence Test
Null hypothesis: No cross-section dependence (correlation) in residuals
Equation: Untitled
Periods included: 11
Cross-sections included: 13
Total panel observations: 143
Note: non-zero cross-section means detected in data
Cross-section means were removed during the computation of correlations

Test	Statistic	d.f.	Prob.

Pesaran CD	5.002635	0.0000

Source: Eviews 10 Output (2024)

The **Pesaran Cross-Section Dependence Test** in Table 4 tests whether there is any correlation or dependence among the residuals across different cross-sectional units (banks, in this case). The null hypothesis suggests that there is no cross-sectional dependence, meaning that the residuals from the different banks should be independent of each other. The test statistic's p-value of 0.0000 indicates strong evidence to reject the null hypothesis, implying that there is significant cross-sectional dependence in the residuals. This suggests that the banks' risk behaviors (such as NPLR) are likely interrelated, and the residuals from one bank could be influenced by the performance of others. This test is necessary because, in the presence of cross-sectional dependence, traditional panel data methods like fixed or random effects regression may yield biased or inconsistent results. Therefore, adjusting for this dependence is crucial to obtaining reliable and valid conclusions from the model.

Table 5. Panel Heteroskedasticity Test
Panel Cross-section Heteroskedasticity LR Test
Null hypothesis: Residuals are homoskedastic
Equation: UNTITLED
Specification: NPLR BSZ BGD BIN C

	Value	df	Probability
Likelihood ratio	338.3509	13	0.0000

Panel Period Heteroskedasticity LR Test
Null hypothesis: Residuals are homoskedastic
Equation: UNTITLED
Specification: NPLR BSZ BGD BIN C

	Value	df	Probability
Likelihood ratio	208.0225	13	0.0000

Source: Eviews 10 Output (2024)

The **Panel Heteroskedasticity LR Test** results in Table 5 show the outcomes of two tests for heteroskedasticity in the panel data model. The **Panel Cross-section Heteroskedasticity LR Test** has a p-value of 0.0000, and the **Panel Period Heteroskedasticity LR Test** also has a p-value of 0.0000. Both tests reject the null hypothesis of homoscedasticity, indicating that there is significant heteroskedasticity in both the cross-sectional and time-period dimensions of the data. In other words, the variability in the residuals differs across the banks (cross-section) and over time (period), which could affect the accuracy of the model's estimations. These tests are necessary because heteroskedasticity violates one of the key assumptions of standard panel data regression models, which can lead to inefficient estimates and biased standard errors, making statistical inference unreliable. By detecting and correcting for heteroskedasticity, the analysis ensures more robust and trustworthy results.

4.2 Test of Hypotheses

The study applied the Panel Estimated Generalized Least Squares (Panel EGLS) method at a 5% significance level to test its hypotheses, ensuring robust results by addressing panel data issues. To manage cross-sectional dependence and heteroskedasticity, the Period Seemingly Unrelated Regression (SUR) method was used alongside White diagonal standard errors. The Period SUR method is effective in handling correlations between error terms across entities over time, while White standard errors correct for heteroskedasticity. Table 4.5 below shows the result of the test:

Table 6. Regression Output
Dependent Variable: NPLR
Method: Panel EGLS (Period SUR)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BSZ	0.003935	0.000413	9.534597	0.0000
BIN	0.121012	0.012752	9.489772	0.0000
BGD	-0.102780	0.014283	-7.195746	0.0000
C	-0.041701	0.012001	-3.474717	0.0007
Weighted Statistics				
R-squared	0.592928	Mean dependent var		0.669300
Adjusted R-squared	0.584142	S.D. dependent var		1.919382
S.E. of regression	0.924158	Sum squared resid		118.7154
F-statistic	67.48760	Durbin-Watson stat		1.983782
Prob(F-statistic)	0.000000			

Source: Eviews 10 Output (2024)

The regression model in Table 6 examines the effect of board composition on the risk management, represented by the Non-Performing Loan Ratio (NPLR) of listed commercial banks. The Panel EGLS (Estimated Generalized Least Squares) method was used, which accounts for panel data characteristics such as potential heteroskedasticity and autocorrelation across cross-sectional units (banks). The Adjusted R-squared value of 0.584142 indicates that approximately 58.41% of the variation in the Non-Performing Loan Ratio (NPLR) can be explained by the model, which includes board size, board independence, and board gender diversity as independent variables. This suggests a moderate to good explanatory power for the model, meaning that these three board composition variables account for a significant portion of the variation in NPLR across the sampled banks. While there is room for improvement (as no model can explain all the variance in complex economic phenomena like risk management), this value indicates that the model is reasonably effective in capturing the key influences on NPLR.

The Prob(F-statistic) of 0.000000 indicates that the overall model is statistically significant at the 1% significance level. This result confirms that at least one of the independent variables—board size, board independence, or board gender diversity—has a statistically significant effect on the dependent variable, NPLR. The F-statistic tests the null hypothesis that all regression coefficients (except the intercept) are equal to zero, and since the p-value is extremely small (essentially 0), we reject the null hypothesis. This suggests that the model as a whole has predictive power, and the independent variables collectively have a significant influence on the non-performing loan ratio.

The Durbin-Watson statistic of 1.983782 falls within the acceptable range for indicating that there is no significant autocorrelation in the residuals of the regression model. A value close to 2 suggests that there is little to no serial correlation among the error terms, meaning that the errors from one time period or cross-sectional unit (bank) are not correlated with errors from another.

4.2.1 Test of Hypothesis I
H01) Board size has no significant effect on the non-performing loan ratio of listed commercial banks in Nigeria.

The coefficient for Board Size (BSZ) is 0.003935, with a p-value of 0.0000. This suggests that for each additional board member, the Non-performing Loan Ratio (NPLR) increases by 0.003935 on average, holding other variables constant. The positive sign indicates a positive marginal effect, meaning that as the size of the board increases, the NPLR tends to increase, suggesting that larger boards may be associated with higher levels of non-performing loans. Since the p-value is 0.0000, which is well below the 5% significance level, this effect is statistically significant. Therefore, the alternate hypothesis was accepted. We conclude that Board Size has a significant positive effect on the Non-Performing Loan Ratio of listed commercial banks in Nigeria (β = 0.003935; p-value = 0.0000).

4.2.2 Test of Hypothesis II

H02) Board independence has no significant effect on the non-performing loan ratio of listed commercial banks in Nigeria.

The coefficient for Board Independence (BIN) is 0.121012, with a p-value of 0.0000. This implies that for each 1% increase in the proportion of non-executive directors on the board, the Non-performing Loan Ratio (NPLR) increases by 0.121012 on average, holding other variables constant. The positive sign indicates a positive marginal effect, meaning higher board independence is associated with higher levels of non-performing loans. The effect is statistically significant at the 5% level, as the p-value is 0.0000. This leads to the acceptance of the alternate hypothesis. Therefore, Board Independence has a significant positive effect on the Non-Performing Loan Ratio of listed commercial banks in Nigeria (β = 0.121012; p-value = 0.0000).

4.2.3 Test of Hypothesis III

H03) Board gender diversity has no significant effect on the non-performing loan ratio of listed commercial banks in Nigeria.

The coefficient for Board Gender Diversity (BGD) is -0.102780, with a p-value of 0.0000. This indicates that for each 1% increase in the proportion of female executive directors on the board, the Non-performing Loan Ratio (NPLR) decreases by 0.102780 on average, holding other variables constant. The negative sign indicates a negative marginal effect, suggesting that greater gender diversity on the board is associated with a reduction in the level of non-performing loans. Since the p-value is 0.0000, which is below the 5% significance threshold, this effect is statistically significant. Therefore, the alternate hypothesis was accepted that Board gender diversity has a significant negative effect on the Non-Performing Loan Ratio of listed commercial banks in Nigeria (β = -0.102780; p-value = 0.0000).

4.3 Discussion of Findings

The positive effect of board size on NPLR indicates that as the size of the board increases, the NPLR also tends to increase. This could be due to a number of factors. Larger boards often face challenges in coordination and communication, which may lead to inefficiencies in decision-making processes. In larger boards, responsibilities can become more diffused, reducing the board's ability to effectively monitor and manage risks, including credit risks. Furthermore, larger boards might struggle to maintain alignment on key governance and risk management decisions, which can result in weaker oversight of lending practices and ultimately contribute to higher levels of non-performing loans. This effect aligns with the idea that while a larger board brings diverse perspectives, it can also lead to a fragmented decision-making process that hinders effective risk management. The findings from Kanene and Francis (2023) show a positive but insignificant relationship between board size and corporate risk management, which partially supports the idea that larger boards might not always be effective in managing risk. Similarly, Muhammad et al. (2023) found that board size significantly affects credit risk exposure, although the nature of the effect varies. The general consensus across these studies suggests that larger boards may face challenges in overseeing risk management effectively, aligning with the finding that increased board size is linked to higher NPLs. The study contributes to existing literature by affirming and extending the findings of prior studies, such as those by Kanene and Francis (2023) and Muhammad et al. (2023), which highlight the complexities of larger board sizes in managing corporate risks. While previous studies observed a mixed or insignificant relationship, this study distinctly emphasizes the significant positive link between board size and NPLR, underscoring the inefficiencies and oversight challenges inherent in larger boards that exacerbate credit risks.

The positive effect of board independence on NPLR suggests that a higher proportion of independent directors might be linked to an increase in non-performing loans. Independent directors are often viewed as crucial for ensuring objective decision-making and robust oversight. However, their effectiveness may be compromised if they lack sufficient expertise in the specific operational aspects of banking, including credit risk management. Independent directors, while able to offer an unbiased perspective, may not always be equipped to understand the complex lending decisions that contribute to non-performing loans. This can result in boards that are more detached from day-to-day operations, leading to weaker risk oversight. Additionally, independent directors might not always challenge management decisions effectively, which could exacerbate risk-taking behaviors and increase the likelihood of loan defaults. The positive relationship between board independence and NPLR is supported by the study of Tukur (2023), which found that board independence positively impacts credit and liquidity risk but negatively affects capital risk. This suggests that independent directors might contribute to higher risk exposure, similar to the finding that more independent directors are associated with higher NPLs. In contrast, Adu (2024) and Abiola (2023) argue that independent directors, particularly those with financial expertise, help reduce bank risk-taking and improve governance, which contradicts the current finding. The study builds on existing research by highlighting a significant positive relationship between board independence and NPLR, aligning with Tukur (2023) findings that board independence can elevate credit and liquidity risks. While studies like Adu (2024) and Abiola (2023) emphasize the risk-reducing benefits of financially skilled independent directors, this study underscores the potential limitations of independent directors lacking industry-specific expertise, contributing to increased non-performing loans.

The negative effect of board gender diversity on NPLR suggests that greater female representation on the board may lead to better risk management and lower non-performing loans. Gender-diverse boards are often associated with a broader range of viewpoints, better decision-making processes, and more cautious approaches to risk. This diversity can enhance the board's ability to evaluate and mitigate risks, including credit risk, by considering a wider variety of perspectives. Female directors are also known to adopt more conservative and risk-averse strategies, which may contribute to better loan monitoring and reduced exposure to non-performing loans. In the context of Nigerian commercial banks, gender diversity could promote more balanced and prudent risk management practices, potentially resulting in lower NPLs. The negative effect of board gender diversity on NPLR aligns with the findings of Tukur (2023), who noted that gender diversity positively impacts capital, credit, and liquidity risks, supporting the notion that female directors bring risk-averse and more cautious approaches to decision-making. Essien and Akpan (2024) also found that diversity in board attributes (though not specifically gender) has a significant negative effect on discretionary loan loss provisions, which supports the argument that diverse boards may lead to better management of loan portfolios and risk exposure. Conversely, Musa et al. (2022) observed a negative relationship between corporate governance and capital risk, which could suggest that governance practices, including diversity, may reduce risk levels, reinforcing the positive impact of gender diversity on loan performance. The study contributes to the literature by affirming the negative relationship between board gender diversity and NPLR, consistent with Tukur (2023) findings that gender-diverse boards enhance risk management practices through more cautious decision-making. While studies like Essien and Akpan (2024) and Musa et al. (2022) highlight the broader benefits of diversity on risk reduction and governance, this study specifically emphasizes the role of female directors in fostering conservative strategies, which mitigate credit risks and lower non-performing loans.

5. Conclusion

Ideally, commercial banks, particularly in emerging economies like Nigeria, ought to operate in a highly structured and well-governed environment where risk management practices are robust, efficient, and proactive. The positive effect of board size on the Non-Performing Loan Ratio (NPLR) suggests that as banks increase the number of board members, they tend to experience higher levels of non-performing loans. This could reflect a variety of factors, including potential challenges in coordination and decision-making within larger boards. Larger boards may face difficulties in maintaining effective communication and oversight, which could result in weaker monitoring of lending practices, potentially leading to higher credit risk and, consequently, higher NPLRs. This finding challenges the common belief that larger boards provide better oversight and governance. The positive effect of board independence on the NPLR implies that an increase in the proportion of non-executive directors (independent directors) on the board is associated with a higher NPLR. While independent directors are often seen as bringing objectivity and unbiased judgment to board decisions, the findings suggest that their presence may not necessarily lead to improved risk management in Nigerian commercial banks. Independent directors might lack the in-depth knowledge of day-to-day operations, which could hinder their ability to effectively monitor loan quality or challenge management on high-risk lending strategies. This finding raises questions about the effectiveness of board independence in enhancing risk management in the context of Nigerian banks.

On the other hand, the negative effect of board gender diversity on the NPLR indicates that banks with higher female representation on their boards tend to have lower levels of non-performing loans. This suggests that gender-diverse boards may bring unique perspectives to risk management decisions. Diverse boards may encourage a broader set of opinions and more thorough evaluations of credit risk, which could result in more cautious and prudent lending practices. The negative relationship between gender diversity and NPLR underscores the potential benefits of having a more balanced board in terms of gender, particularly when it comes to overseeing high-stakes decisions such as lending and credit risk assessment. In conclusion, a well-composed board ensures that banks are resilient to financial shocks while safeguarding the interests of shareholders, customers, and the broader economy.

In line with the findings above, the study recommends that:

1. Listed commercial banks in Nigeria should have a board size that balances adequate expertise and diversity with the ability to make effective decisions in order to ensure that boards reduce bureaucratic delays in risk management.
2. Bank management and shareholders should ensure that independent directors possess not only independence but also significant expertise in banking operations and risk management. Independent directors should be equipped with the knowledge required to understand the bank's risk profile and provide effective oversight, ensuring their independence does not inadvertently lead to poor risk management.
3. Bank boards should be proactive in increasing female representation at the executive level, as this is associated with lower levels of non-performing loans. Boards should set clear diversity targets and prioritize gender inclusion as a core element of their governance policies, considering its contribution towards risk mitigation.

The recommendations provide practical guidelines for Nigerian commercial banks to enhance governance and risk management by optimizing board size, equipping independent directors with specialized expertise, and increasing female representation.

5.1 Implication of Findings

The study’s findings suggest that board size and independence increase the non-performing loan ratio (NPLR), while board gender diversity has a mitigating effect on NPLR. These insights could inform global governance practices by encouraging the adoption of policies that balance board composition, particularly fostering greater gender diversity. By implementing these findings, banks could potentially improve their risk management strategies, thereby reducing the likelihood of financial instability caused by non-performing loans.

5.2 Limitation of the Study

The study is limited by its reliance on secondary data from audited financial reports, which may not capture the real-time decision-making dynamics of board members. Additionally, the focus on listed commercial banks excludes unlisted banks and other financial institutions, potentially limiting the generalizability of the findings. The study's time frame, 2013 to 2023, may not account for recent regulatory or economic changes. Lastly, the ex-post facto design limits the ability to establish causal relationships, focusing instead on associations between board composition and risk management outcomes.

5.3 Suggestion for Further Studies

Future research could explore the impact of board composition on risk management in unlisted banks and other financial institutions to enhance generalizability. Longitudinal studies that incorporate real-time board decisions and dynamic market changes could provide deeper hints. Additionally, experimental or mixed-method designs could help establish causal links between board attributes and risk outcomes. Further studies could also examine the role of regulatory frameworks and economic conditions in moderating the relationship between board composition and risk management. Lastly, expanding the scope to other industries or regions could offer comparative hints.

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