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The Financial Risk Determinants in the Nigerian Deposit Money Banks: An Evidence Analysis (2010–2022)

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Abstract

Financial risk management has been an issue of major concern in the Nigerian banking industry especially following the world financial shocks and the changing regulatory environments. The environment in which the Nigerian Deposit Money Banks (NDMBs) operate is very volatile and as such, management of credit, liquidity, market and capital risks is critical to operating stability and profitability in the long term. To enhance banking resilience and effectiveness in enforcement, it is thus required to examine the determinants of financial risk. In the study, ex post facto research design was used to determine the causative factors of financial risk in the banking sector in Nigeria. The secondary data were obtained by accessing the annual financial statements and the Central Bank of Nigeria (CBN) reports on the period 2010 to 2022 on selected NDMBs. The stratified sampling technique was used in order to capture the diversity of NDMBs, and 20 banks were sampled purposively. The year 2010 was selected as the base year because the year was the time when global financial crisis was over and new risk and governance policies were adopted. Descriptive statistics and panel regression with the pooled and random effects model were used to analyse the data. The result of the random effect model indicates that bank size (SIZE) demonstrated positive and significant effect on credit risk (CRR) of the bank with coefficient value of 0.437 which is statistically significant (p-value = 0.016). Results of pooled effect model showed return on asset (ROA) with coefficient value of 0.041 and probability of 0.019, bank leverage (LEV) have a coefficient value of 0.000 with probability of 0.049. Liquidity risk (LQR) have a negative coefficient value of 0.092 and probability of 0.036, return on equity (ROE) (coefficient = 0.012 and probability = 0.035), bank age (AGE) (coefficient = 0.003 and probability = 0.050), while ROE had a significant negative effect on capital adequacy ratios (CAR) with negative coefficient value of 0.015 and probability of 0.048, SIZE (coefficient = 0.806 and probability = 0.023). Both ROA and LEV exhibited significant negative effect on cost-income ratios (CIR) with negative coefficient values of 0.228 and 0.001, probability of 0.047 and 0.05 respectively, also LEV and AGE have significant negative effect on the total regulatory capital (TRC) with negative coefficient values of 0.000 and 0.003 with probability of 0.046 and 0.037 respectively. The study concludes that ROA, ROE, CRR, MKR, LQR, CAR, TRC, CIR, LEV, SIZE, and AGE are capable of impacting risk management efficiency and profitability of banks. The study recommends that NDMBs are encouraged to have sufficient capital base and liquid assets in their balance sheet, this will guarantee

long-term stability, a sound cash management and limit the risk burden arising from economic shocks and other exigencies. Also, DMBs should deploy modern technology and automation tools that will improve cost management efficiencies.

Keywords: Credit Risk, Market Risk, Liquidity Risk, Capital Adequacy Ratio, Total Regulatory Capital, Nigerian Deposit Money Banks

1. INTRODUCTION

The process of managing risks involves multiple essential phases, such as identifying risks, analyzing and assessing risks, continuously monitoring and auditing risks, and putting risk treatment or control measures in place (Yimka, Taofeek, Abimbola & Olusegun, 2015). Therefore, if financial institutions must prosper in a very unpredictable climate, they must effectively manage these risks. Without a doubt, the dynamics of risk management will determine the direction of the banking sector in the future. Long-term survival and success in the market will only be possible for banks with strong risk management systems. Erfani and Vasigh, (2018) pointed out that the global crisis, which rocked the financial system and the economy between 2007 and 2009, made it necessary to reexamine some of the methods the financial industry used to evaluate bank performance. The DMBs are financial organizations that provide a variety of financial services, such as creating credit to improve their financial performance, granting loans, processing transactions, and accepting deposits of money. As guardians of the money that clients entrust them with in the form of deposits, banks are required to distribute dividends to investors and interest to depositors. Meanwhile, these payments are funded by the earnings obtained from the loan facilities provided to borrowers. By enabling the movement of fund through the provision of loans and other financial services, DMBs are essential to the preservation of economic equilibrium (Nwanna & Oguezue, 2017). More importantly, improper management of these risks might compromise their capacity to make money, uphold a good reputation and continued existence (CBN, 2016). According to Kolawole, Osemene, Ijaiya and Ajayi (2019), DMBs frequently come into contact with different financial risks when carrying out their duties as financial intermediaries and pursuing their mandate. According to Ademola and Ismaila, 2022), financial risks include a wide range of risks connected to financial transactions. The degree of presence of these hazards, which often comprise a variety of risk variables, determines the possible financial damage to which banks can be exposed to. These factors have the potential to alter the bank's reserves, costs, and overall value. Studies acknowledge the presence and impact of financial risk on the performance of banks but did not explore how various determinants individually affect banks' operations within the Nigerian context. The complexity of the banking sector in Nigeria demands more finding or examination of these determinants to inform targeted strategies by the banks. Using this body of research as a foundation, the potential determinants of financial risk within the Nigerian banking sector need to be examined, which is the motivation for this study.

2. Conceptual Review

2.1 Financial Risk

Oudat, (2021) conceptualized risk as the likelihood of encountering unexpected or undesirable outcomes, thereby classifying any action with a potential for financial loss as risky. There are different types of financial risk, but one of the biggest ones is loan repayment defaults, which cause nonperforming loans

(NPL) for banks to arise. There is a wide range of hazards associated with finance, such as credit, liquidity, market and insolvency risks which are inherent to financial transactions (Afriyie, 2022). It is a primary responsibility of Deposit Money Banks (DMBs) to create sustainable approach in managing the financial risks that are inherent in their financial activities. A number of these risks are essentially for the smooth operation of banks, particularly the credit and liquidity risk. Afolabi (2021) delineated risk as the uncertainty surrounding future financial outcomes, which holds the potential to significantly impact the objectives and profitability of an institution. It is therefore imperative that banks give the needed attention to these risks to guarantee their financial stability and lessen the possible negative impact.

Beyond the financial sector, even companies that make investment decisions are subject to a variety of financial risks, which can include both commercial and otherwise, depending on the variety of financial instrument that they trade in (Liyanage, Dewa & Ismail, 2021). Recessions, bankruptcies, spikes in inflation, and market swings are examples of potential financial hazards. Mathuva (2009) emphasizes the interplay between specific risk elements and human variables, emphasizing the need of closely monitoring human behavior in dynamic environments and the driving principles of risk management. This knowledge is essential to understanding how people react to risks and uncertainty in dynamic environments.

2.2 Financial Risk Management

Financial risk management is a topic that looks at both economic growth and performance. In their meta-analysis, Allen, DeLong and Saunders, (2004) emphasized how financial risk management practices influence overall financial risk and how complexity affects management owners' profitability and overall performance with features unique to money deposit banks, considering financial risk to be an important driver. Given the significance of financial risk management, banks are recommended to carefully consider the advantages and disadvantages of carrying out management functions. Financial risk management policies, according to Daianu and Lungu (2008), should take into account variables that acknowledge the different risk profiles of certain companies. The goal is to increase the probability of reaching goals and guarantee sustainability by using a methodical approach to financial risk analysis, evaluation, and management. This procedure helps attract new clients, but it also calls for a thorough comprehension of all pertinent hazards, a determination of how important they are in relation to one another, and the use of a methodical monitoring and control plan. Precautionary measures must be taken when potential risks have been identified, evaluated, and analyzed in order to reduce or eliminate prospective losses. Risk reduction is the main goal of financial risk management. Mbonu and Amahalu, (2022), state that risk management entails a number of actions, such as establishing the background, spotting and evaluating deviations, keeping an eye on things, and warning staff members about potential threats. The process of interaction aids in continuous enhancement of decision-making.

Creating plans to limit risk and preserve the bank's reputation are the main goals of risk management in the financial industry (Dabari & Saidin, 2015). Studies conducted by, Siregar, Nuruddin and Yusuf, (2019) emphasize how crucial risk management is to a bank's total profitability. A crucial component of this risk management process is liquidity risk, which directly affects a bank's capacity to make the required investments for asset expansion or to swiftly satisfy debt obligations (Siregar, et al, 2019). Harmonious alignment between average funding source maturities and fund deployment is necessary for banks to achieve successful gap analysis and management (Ndulue, Okoye & Amahalu, 2021). Nataraja, Chilale and Ganesh, (2018) assert that banks also need to manage credit risk, which is the chance that a borrower's

failure or refusal to fulfill commitments may result in late loan payments. Yimka, Taofeek, Abimbola and Olusegun, (2015) state that a variety of factors can impact credit risk, such as a lack of independent directors on the management team, poor lending practices, a shortage of funding and money, instructed borrowing, profound banking authorization, poor loan coverage selection, careless funding, and insufficient credit evaluation. External risks have the potential to increase banks' overall risk profile. These include issues with the market, inflation, currency rate, and politics.

2.3 Measures of Financial Risk in Banks

Financial risk is measured by a number of indices which are often inherent in the day to day operations of financial institutions. Most common among these measures are Credit Risk, Market risk and Liquidity risk. Studies have also examined other variables like Capital adequacy ratio, Cost-income ratio and total regulatory capital amongst others as viable measures of financial risk. Capital adequacy ratio is the banks' total capital expressed as a percentage of their risk-weighted asset, it measures the capacity of a bank's capital base to cover potential losses and financial shocks that may occur. CAR has a positive influence on credit growth of bank and it is an essential ratio for banks and a country' at large (Gilliam, Chatterjee & Grable, 2010; Wanjohi, 2013).

CRR describes the likely loses that a bank may suffer as a result of its customers failure to repay loans and advances granted to them. CRR remains a major risk confronting banks and their prosperity is dependent on how accurately they measure and manage this risk. If an increase in credit risk is not curtailed, it eventually leads to other problems like liquidity and solvency challenges (Afriyie, 2022). Liquidity risk (LQR) is another essential component of financial risk, it is the possibility that banks may not have enough cash and cash equivalents to settle their immediate term liabilities without default. Liquidity risk arises from bank's inability to accommodate decreases in liabilities or to fund increases in asset and its relevance in financial risk management was further affirmed and brought on the front burner following the 2007-2009 global financial crisis (Chen, Shen, Kao & Yeh, 2018).

MKR are the risk that an entity encounters due to movement in market forces such as interest rate, exchange rate and market prices amongst others. Banks may also face market risk when they trade in financial instruments that are vulnerable to market dynamics and fluctuations. The exposure of banks to market risk and their ability to effectively manage it will determine their financial state, as such increased exposure to market risk reduces bank's profit (Muriithi & Muigai, 2017).

3. REVIEW OF RELATED LITERATURE

Obalade, Lawrence and Akande (2021) examined Political risk and banking sector performance in Nigeria. Using a quantitative research approach that involved analysis of country risk and bank specific risk, the study used a final sample of 12 banks from the 22 registered commercial banks available. In examining the risk factors, the researcher considered credit risk, bank size and political risk while ROA and ROIC (Return on Invested Capital) served as performance metrics. Data were analyzed using the pooled-OLS estimation technique. In its conclusion, the study explored the effects of political risk and other independent variables and maintained that among the Banks' specific factors, CRR was a significant and positive determinant of the risk profile and performance of the banks. Ofeimun and Okeke (2019) examined liquidity risk management as a determinant of the financial performance of listed NDMBs. Their study which covered a five-year period between 2014 and 2018 applied panel regression technique and

descriptive tools for analyses. Findings revealed a significant positive correlation between liquidity risk management and the financial performance of listed banks in Nigeria. Conversely, credit risk showed a negative, albeit insignificant, impact on profitability. Outcome of this study suggested that banks pay attention to liquidity risk management, ensuring adequate liquidity to enhance financial performance in view of the key role that liquidity risk play as a determinant of NDMBs overall financial performance. In a related study by Leung, Taylor, and Evans (2015) aimed at facilitating an improved understanding of the fundamental determinants of bank risk. A panel data of 227 Bank Holding Companies over a six-year period was gathered and estimated using the pooled weighted least squares regression. Bank variables such as loan to asset ratio, loan to deposit ratio, non-performing loan ratio (credit risk) and capital adequacy ratio (Tier 1 capital) were considered. The study found out that credit risk exhibited a positive relationship with market-wide risk, however when the crisis period was put in context, the positive relationship weakens which suggests that credit risk is a major determinant of financial risk notwithstanding the prevailing economic and other factors. A number of other studies affirm this; that an effective credit control is essential for lower risk. While examining "the determinants of banks risk: an evidence from the 2007 – 2009 financial crisis", Leung et al, (2015) equally considered how capital adequacy ratio (CAR) impacts on banks' exposure to total default risk. The result showed that higher Tier 1 capital ratios contributed significantly to lower total risk thereby suggesting that CAR is a key determinant of financial risk in banks. . This also corroborates the findings by Kajola, Adedeji, Olabisi and Babatolu, 2019) that banks with sufficient capital buffer are less prone to shocks even during a general financial crisis period. From a regulatory and monitoring perspective; the paper presents strong evidence that Tier 1 capital is an effective shield for banks against various risks and provides empirical justification for the recent rise in the Basel III regulatory capital requirements. Furthermore, studies were conducted on the connection between risk management practices and manufacturing firms' financial outcomes. The main goal was to examine how market and liquidity risk contribute to total risk factor to influence the post-tax earnings of Nigerian manufacturing companies. Panel data spanning the years 2010 to 2019 and including ten chosen firms were used in the study. For the studies, secondary data from these companies' annual reports was gathered. Correlation analysis and panel-based estimate approaches were used in the methodology. The results showed that, for the tested Nigerian enterprises, market risk, specifically, interest rate risk had an adverse and negligible to the risk factors as it affects their after-tax earnings, but liquidity risk had a positive and considerable impact. The studies came to the conclusion that listed firms in Nigeria can perform better when they use appropriate risk management techniques, especially when it comes to managing internal risks like liquidity risk. It reiterates the essence of having flexible internal control system that can lessen the effect of internal risks and limit the impact of external risks on performance (Obamuyi, 2013; Kajola, et al., 2019). Further studies looked at how enterprise risk management (ERM) and the risk management committee (RMC) together affected Nigerian banks' performance. Four research goals were established using an ex-post facto research approach and secondary data were taken from the annual reports of the nine (9) selected banks over a 20year period covering 2010 to 2019. The results showed positive relationship between performance and the experience of RMC while the committee's gender diversity exhibited negative effect on firms' performance. Additionally, the risk committee's and ERM's combined qualities showed a statistically significant and favorable influence on Nigerian banks' performance. Consequently, the report made several recommendations, including that regulatory bodies enact laws to strengthen and enforce the adoption of ERM procedures by businesses (Odubuasi, Obi & Osuagwu, 2021).

The available empirical literature pays much attention to the overall impact of financial risk on the performance of banks, and often financial risk is considered to be a single composite measure or only one or two risk measures are analysed separately. As an example, the previous literature focuses on either credit risk or liquidity risk as the causes of performance (Ofeimun & Okeke, 2019; Obalade et al., 2021), whereas others consider capital adequacy mostly in terms of regulatory compliance (Leung et al., 2015; Kajola et al., 2019). This incomplete methodology restricts the total knowledge of the joint and individual impacts of various financial risk determinants on the level of risk exposure in a bank, especially in the emerging economies. Second, a significant part of the available literature is performance-oriented and uses the measures of profitability like the returns on assets (ROA) and returns on invested capital (ROIC) as the dependent variable. As helpful as these measures are, they fail to capture financial risk as an outcome variable in a comprehensive way, particularly in banking systems, which are much more concerned with stability and risk containment than with profitability. This means that the empirical data on the factors behind the financial risk per se and not performance outcomes thereof within the Nigerian banking sector is inadequate. Third, in spite of the recognition of the capital adequacy, credit risk, liquidity risk and market risk by studies, a limited number of studies are able to theoretically integrate the risk measures at the level of the banks and connect them to their portfolio decisions and intermediation roles. The majority of available literature implicitly presupposes that the banking system is developed, and thus it is not applicable to Nigeria, where banks have to act in the context of increased macroeconomic volatility, changes in regulation, credit concentration, and liquidity constraints. This contextual incompatibility introduces a gap in the comprehension of the financial risk determinant behaviour in less strong and more volatile financial institutions. Also, the limited attention to the dynamic interplay between the determinants of financial risks has been given to the previous research on this topic in Nigeria, especially how the ineffective implementation of credit risk management can cause liquidity stress and increase market risk exposure. Such deficiency of integrated analysis inhibits the devising of specific and proactive risk management strategies which are indicative of interrelatedness of the bank risks in the real practise. Lastly, despite the adoption of theoretical frameworks, e.g. Modern Portfolio Theory, risk-based regulation and financial intermediation theories, which are commonly suggested, they are hardly applied in empirical model to explain financial risk behaviour at the bank level. This leads to lack of connection between theory and empirical results, thus undermining explanatory power and policy relevance of the current research. This paper is an empirical analysis of the bank-specific factors of financial risk in the Nigerian Deposit Money Banks, especially credit risk, liquidity risk, market risk and capital adequacy. This research unlike the previous ones considers financial risk as the dependent variable as opposed to an explanatory variable to profitability.

4. THEORETICAL FRAMEWORK

This analysis will be based on the modern Portfolio Theory (MPT) and Financial Intermediation Theory with the aid of Risk-Based Regulation Theory to give a solid theoretical justification of financial risk determinants in Deposit Money Banks (DMBs). The modern Portfolio Theory (MPT), which was first introduced by Markowitz offers a background concept on the trade-off existing between risk and returns as a basis of diversification and optimal choice on assets. MPT is especially applicable in the banking context since banks are a risk-transforming institution and they package a diversified portfolio of assets as a form of mostly loans and financial instruments with deposits and other liabilities as the primary sources of funding. The tendency of the theory to focus on portfolio risk as opposed to asset risk is in line

with how banks are considered to be exposed to credit risk, market risk, and liquidity risk in a combined manner. Therefore, MPT provides a handy approach to studying the relationship existing between the composition and management of bank asset portfolios, and their overall financial risk exposure (Beyhaghi & Hawley, 2013).

Yet, in contrast to individual investors assumed in the classical MPT, banks are operating financial intermediaries, with regulatory constraints and moral hazard problems, and systemic risk aspects. In order to overcome this shortcoming, the research incorporates the Financial Intermediation Theory that clarifies the essence of banks as intermediaries in mobilising deposits, providing credit, managing risk asymmetry, and absorbing risk on behalf of economic agents. The theory has a better conceptual basis of explaining credit risk and liquidity risk as this risk arises because of intermediation services offered by banks, the screening of loans, transformation of maturity and the creation of liquidity (Allen & Santomero, 1997).

Moreover, Risk-Based Regulation Theory is used to complement MPT to clarify the contribution of regulatory capital and prudential guidelines to the development of risk-taking behaviour of banks. The capital adequacy requirements as given prominence by Basel II and Basel III models are meant to make sure that banks have enough buffers to absorb losses that come as a result of credit, market and liquidity risks. This theoretical approach has the direct support of the introduction of capital adequacy ratio (CAR) as one of the determinants of financial risk, which makes the case of well-capitalised banks being more resilient to financial shocks and systemic stress more balanced (Tanda, 2015).

5. METHODOLOGY

This study takes a stringent empirical design so that the validity, reliability and strength of its results are found concerning the bank-specific determinants of financial risk in Nigerian Deposit Money Banks (DMBs). Since financial risk is multidimensional and the possibility of endogeneity of banking data, the methodology is well directed to overcome conceptual, econometric and inferential problems that are usually related to the studies of panel data in financial economics. The research design used is ex-post facto research design that is suitable in case of empirical studies based on the past financial records where the researcher does not have control over the explanation variables. The dataset to be analysed is a balanced panel dataset based on thirteen years of data (20102022) that would allow capturing not only cross-sectional heterogeneity among banks but also intertemporal dynamics in banks. Longitudinal nature of the data enhances the efficiency of estimation and minimises omitted variable prejudice in contrast to the pure cross-sectional techniques. The population will include every twenty-five (25) Nigerian Deposit Money Bank that will be in operation in the period of the study. The sampling method used is a purposive method, which is used to select twenty (20) of the DMBs, in terms of continuous operational, availability of data, regulatory relevance, and longevity. By using this sampling technique, it is guaranteed that the sample of the study is limited to banks that have a record of stable reporting thus improving the integrity and comparability of the data. Since the structure of the banking industry in Nigeria is relatively concentrated, the sample is representative of the industry and it is in line with the previous empirical studies on banking. The conceptualization of financial risk as a multidimensional construct and disaggregated by three main risk indicators, which include credit risk, liquidity risk, and market risk, is studied. Such a strategy will not fall into a methodological trap of operationalizing financial risk as one composite index and will permit a subtle appreciation of the way various channels of risk work in banks. Capital adequacy is also taken as a variable of regulatory buffer used and bank size, leverage and age are also taken as control variables to meet the structural and operations variations among banks. In line with

this, each of the risk dimensions is estimated using separate econometric models based on the interdependent nature of bank risks but individual in character. Such a model design is consistent with Modern Portfolio Theory, Financial Intermediation Theory, and Risk-Based Regulation Theory, hence providing consistency between the theoretical basis and empirical specification.

The study uses the panel regression models, namely Fixed Effects (FE) and Random Effects (RE) estimators, to explain unobserved bank-specific heterogeneity. It is the Hausman specification test that identifies the most suitable estimator in each of the models that are applicable in order to provide consistency and efficiency in parameter estimates. Using panel estimators also enables the study to regulate time-invariant factors like managerial culture, risk appetite and governance structure that would otherwise bias the outcomes. Following the possibility of simultaneous and reverse causality of banking data especially between risk indicators and bank level features, the research specifically omits profitability measures (ROA and ROE) of the main risk models, in order to eliminate the endogeneity bias. Lagged explanatory variables are used as a measure of robustness where the risk variable interactions have the potential to cause contemporaneous correlation. The approach improves the interpretation of causes and is in line with the empirical banking research practises.

In order to make the estimated models reliable, there are a number of diagnostic tests carried out. Variance Inflation Factors (VIFs) are used to test multicollinearity, whereas the presence of heteroskedasticity and serial correlation is tested with the help of relevant panel diagnostics. Heteroskedasticity-robust standard errors are used where the violation is identified, in order to be able to make valid statistical inference. Also, other model specifications are estimated to test the sensitivity of the results thus strengthening the findings. The research is based solely on secondary literature such as authoritative sources such as Central Bank of Nigeria (CBN), Nigerian Exchange Group (NGX) Fact Books as well as audited annual reports of the sampled banks. The validity and reliability of measurements are increased due to these sources. Although the results may be specific to the Nigerian setting, the methodology and the analytical procedure are generalizable enough to be applied to other developing economies where the banking systems are also similar and the regulatory framework is not substantially different.

6. Model Specifications

$CRR_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 LQR_{it} + \beta_3 LEV_{it} + \beta_4 SIZE_{it} + \beta_5 AGE_{it} + \varepsilon_{it}$……..(6.1)

$LQR_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 CRR_{it} + \beta_3 LEV_{it} + \beta_4 SIZE_{it} + \beta_5 AGE_{it} + \varepsilon_{it}$…… (6.2)

$MKR_{it} = \gamma_0 + \gamma_1 CAR_{it} + \gamma_2 CRR_{it} + \gamma_3 LQR_{it} + \gamma_4 SIZE_{it} + \gamma_5 AGE_{it} + \varepsilon_{it}$……,,,(6.3)

Financial Risk (FR) = (CRR, MKR, LQR, CAR, CIR, TRC)

CRR: represents credit risk, bad & Doubtful loan Provisions divide by total loans and multiply by 100 (Gadzo, Kportorgbi & Gatsi, 2019).

MKR: stands for market risk, VARx = Vx (dv/dp) ΔPt

dv/dP= price movement per Naira market value

Vx= Market Value of Portfolio x

VAR = the Value-at-Risk (Al-Janabi, 2021).

LQR: represents liquidity risk, short-term security divide by total deposit (Yahaya, Mahat, Yahya & Matemilola, 2022).

CAR: represents the capital adequacy ratio; (Tier 1 Capital + Tier 2 Capital) divide by risk weighted assets (Lenyie, 2025).
TRC: represents the total regulatory capital, equal to Tier 1 Capital + Tier 2 Capital (Jegede, Soyebo, Fakunmoju & OkunbanJjo, 2021).
CIR: represents the cost income ratio; measured by divide operating expenses by operating income and multiply by 100 (Olalere, Aminul, Yusoff & Shamsuddin, 2018).
LEV: stands for bank leverage, ratio of total debt to total assets (Muritala & Arowolo, 2025).
SIZE: for bank size, the natural logarithms of total assets (Aryal & Singh 2024).
AGE: for the age of the banks. Banks total age from the year of establishment (Aryal & Singh 2024).

7. Pre-estimation Test Results

7.1 Panel Unit Roots Test

The order of integration of the study variables were determined using panel unit root tests to establish whether the econometric techniques used were suitable. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) panel unit root tests were used both of which test the null hypothesis of having unit root against the alternative that is unit root is stationary.
According to the results presented in Table 1, all variables, i.e. Return on Equity (ROE), Return on Assets (ROA), Leverage (LEV), Firm Size (SIZE), Credit Risk (CRR), Market risk (MKR), Liquidity Risk (LQR), Capital Adequacy Ratio (CAR), Cost-Income Ratio (CIR), and total regulatory capital (TRC) are stationary at level, i.e. integrated of order 0, I(0), and significant level of 5. Thus, the null hypothesis of non-stationarity was rejected in all variables when both of the test specifications were considered. What this means is that the panel series are not stochastic and can be modelled in their level form, without the danger of obtaining spurious regression results. Accordingly, it will be suitable to utilise the fixed effects (FE), random effects (RE), and pooled ordinary least squares (POLS) models as the methods of the simplest type of the panel estimation in the further analysis.

Table 1: Unit Root Test for Variables

Variables	ADF			PP		
	t-stat	Prob	Los	t-stat	Prob	Los
ROE	85.8051	0.0000**	I(0)	148.023	0.0000**	I(0)
ROA	106.845	0.0000**	I(0)	197.901	0.0000**	I(0)
LEV	92.8770	0.0000**	I(0)	124.881	0.0000**	I(0)
SIZE	52.3227	0.0417**	I(0)	229.407	0.0000**	I(0)
CRR	90.0654	0.0000**	I(0)	158.949	0.0000**	I(0)
MKR	109.597	0.0019**	I(0)	222.020	0.0000**	I(0)
LQR	87.7609	0.0000**	I(0)	177.082	0.0000**	I(0)
CAR	57.0852	0.0389**	I(0)	149.349	0.0000**	I(0)
CIR	101.955	0.0000**	I(0)	197.086	0.0000**	I(0)
TRC	79.7251	0.0002**	I(0)	209.059	0.0000**	I(0)

Source: Researchers Computation, 2025
Note: ** means 5% Level of Significant

7. 2 Multicollinearity Test

In order to analyse the existence of multicollinearity between the explanatory variables, a pairwise correlation matrix was first calculated and shown in Table 2. The correlation coefficients between the regressors are low to moderate in nature with none of the coefficient being greater than the traditional standard of 0.80 indicating the lack of extreme linear dependences between the variables. As an example, ROA correlates with ROE (0.0165), LEV (0.0824), SIZE (−0.0494) and AGE (−0.0342) weakly. On the same note, ROE and LEV exhibit a nearly non-existent correlation (0.0003), which implies that they have less overlap when it comes to the explanatory power. SIZE and LEV (-0.4411) exhibit the strongest correlation, which is by no means close to critical values indicating severe multicollinearity.

Table 2: Pairwise Correlation Matrix for Financial Risks' Determinants Model

Correlation Probability	ROA	ROE	LEV	SIZE	AGE
ROA	1.000000 -----				
ROE	0.016549 0.7906	1.000000 -----			
LEV	0.082360 0.1855	0.000332 0.9957	1.000000 -----		
SIZE	-0.049399 0.4277	0.022279 0.7207	-0.441145 0.0000	1.000000 -----	
AGE	-0.034166 0.5834	0.020779 0.7388	-0.210109 0.0007	0.239552 0.0001	1.000000 -----

Source: Researchers Compilations, 2025

7. 4 Redundancy Fixed Test and Hausman Test

Since the data is in a panel format, the model selection tests were therefore performed to identify the best estimation method to use on each of the financial risk models. Particularly, Redundant Fixed Effects Test and Hausman Specification Test were used.

The Redundant Fixed Effects Test tests the existence of statistically significant unobserved heterogeneity among the banks, whereas the Hausman test tests the existence of an unobserved heterogeneity which correlates with the regressors hence good choice of either fixed or random effects. In the case of credit risk equation, the Redundant Fixed Effects Test gave a statistically significant value ($p < 0.05$), which means that the effects of the banks are not being observed. A Hausman test was therefore done to distinguish between the fixed and random effects estimators. The Hausman test value was not statistically significant ($p > 0.05$) which means that the random effects estimator is consistent and efficient. Thus, CRR equation was adopted by the Random Effects Model. In the case of MKR, LQR, CAR, CIR and TRC equations, the Redundant Fixed Effects Test statistics were not found to be significant implying that the

unobservable cross-sectional heterogeneity cannot have a material impact on these equations. In this line the Pooled Ordinary Least Squares (POLS) estimator was considered to be a suitable estimator in these equations.

8. Regression Analysis Results and Discussion of Findings

8.1 Determinants of Credit Risk (CRR)

The Random Effects Model indicates that the size of the bank (SIZE) has a positive and statistically t-test significant influence on the credit risk ($t = 2.417$, $p < 0.05$). This implies that bigger banks would be more inclined to make greater exposure to credit risks. This observation is institutionally indicative of the Nigerian banking structure with the big banks, in most cases, having more loans on their books, doing large-ticket lending and being more vulnerable to corporate and sectoral concentration risks. This finding is consistent with so-called too-big-to-fail hypothesis that posits that larger banks can take bigger risks because of implicit regulatory shielding and increased market confidence. This finding is empirically supported by other researchers like Athanasoglou et al. (2008) and Berger and DeYoung (1997), who record that big banks tend to branch out enthusiastically into corporate lending and sector-concentrated lending, and thus subject themselves to higher degrees of default risk. Large banks control lending to oil and gas, manufacturing and government related projects in the Nigerian context- industries that traditionally have been linked to high credit risk. The R 2 of the model is 0.285, which implies that although firm-specific factors are crucial, macroeconomic factors and regulation factors also play a role in the dynamics of credit risk..

8.2 Determinants of Market Risk (MKR)

In the case of market risk, both the pooled regression outputs indicate that the returns on assets (ROA) and leverage (LEV) have positive and statistically significant impacts ($p < 0.05$). The fact that there exists a positive correlation between ROA and market risk indicates that the more profitable banks are the more they are actively involved in trading activities as well as foreign exchange operations and interest rate sensitive assets thus exposing them more to market volatility. The increased profitability might be as a result of more exposure to trading, foreign exchange dealings and interest rate sensitive assets, thus exposing it to fluctuations in the market. The leverage positive effect is in support of the financial fragility hypothesis, which claims that highly leveraged banks tend to be more susceptible to the modification in the asset prices and interest rates. This is more so applicable to Nigeria where exchange rate volatility and monetary tightening often relay shocks to the balance sheets of banks. Demirguc-Kunt and Huizinga (2010) also report similar findings.

8.3 Determinants of Liquidity Risk (LQR)

The findings show that AGE, ROE, and ROA play a significant role in liquidity risk. In particular, the impact of ROA is negative, which implies that, the more profitable banks are, the higher the chances of fulfilling the short-term commitments in a way that is possible through a robust internal cash flow. Conversely, ROE exhibits a significant and positive impact meaning that a higher shareholder payoff by the banks might result in aggressive asset-liability policies that increase the liquidity pressure. The age of the bank also has a positive effect on the liquidity risk as it is a measure of structural inflexibility among older banks, which could depend on traditional funding frameworks and be more sluggish to implement new liquidity management techniques. Regarding the age of the bank, Vodová (2011) points out that the old age of banks could be characterised by structural constraints and slower adjustments towards the new

liquidity management devices. Such high explanatory power of the model ($R^2 = 0.51$) demonstrates that such firm-specific factors are strongly relevant in explaining liquidity risk among NDMBs.

8.4 Determinants of Capital Adequacy Ratio (CAR)

The regression analysis of the pooled results indicates that ROE has a negative impact on capital adequacy whereas bank size affects it positively. The negative relationship between ROE and CAR is the conventional capital-profitability trade-off, as banks maximise capital structures to maximise shareholder returns, and in some cases, they run nearer to regulatory minimums. The beneficial impact of size on CAR indicates that larger banks have stronger capital buffers, which may be explained by the fact that bigger banks face more regulatory pressure and have an improved access to capital markets. The result is in line with the regulatory pressure hypothesis and empirical data by Gropp and Heider (2010). This relationship can be explained by the fact that systemically important banks in Nigeria are prone to stricter capital requirements.

8.5 Determinants of Cost–Income Ratio (CIR)

The findings suggest that ROA and leverage minimise the cost inefficiency, whereas ROE increases the cost-income ratio. The correlation between ROA and CIR is negative, which supports the hypothesis, which is based on the efficiency structure, according to which banks that are more profitable work more efficiently because of better management and use of technology. Nevertheless, the beneficial impact of ROE indicates that banks that strive to achieve elevated equity returns might experience an elevated operating expense, which could be as a result of branch growth, online platforms, or advertising. This brings out strategic trade-off of profitability and cost containment, which is in line with Berger and Mester (1997) findings.

8.6 Determinants of Total Regulatory Capital (TRC)

The regression findings obtained by pooling the regressions indicate that leverage and bank age negatively influence total regulatory capital significantly. The adverse impact of leverage confirms the risk-shifting hypothesis where banks with large leverage have less capital buffer. The adverse role of age implies that older banks might stick to the traditional capital framework and will be less adaptive to the changing regulatory capital frameworks in accordance with the institutional inertia theory. The model captures about 53 percent of the variability in regulatory capital which means that it is a strong explanatory variable.

Based on the above results, some of the coefficients like the insignificance of ROE on credit risk and the various dimensions of profitability indicators on risk types reveal the nonlinear and multidimensional nature of bank risk-taking behaviour. The implications of these results are that profitability in itself is not a predictive of increased or decreased risk, but is a factor that interacts with institutional constraints, regulatory expectations and market conditions. Notably, the results indicate that financial risks are not explained by one measure of performance and the necessity of variable regulatory and managerial actions along risk lines.

Table 3. Redundancy Fixed Test, Hausman Test and Regression Output Results

MODEL	Random			Pooled			Pooled			Pooled			Pooled			Pooled		
Dependent / Independent Variable	CRR			MKR			LQR			CAR			CIR			TRC		
	Coff.	t-stat.	Prob.	Coff.	t-stat.	Prob.	Coff.	t-stat.	Prob.	Coff.	t-stat.	Prob.	Coff.	t-stat.	Prob.	Coff.	t-stat.	Prob.
ROA	-0.0073	-1.4774	0.0988	0.0411	2.3111	0.0199	-0.0922	-2.5540	0.0366	0.0061	1.9925	0.0799	-0.2288	-1.9984	0.0477	0.0488	0.7707	0.4881
ROE	-0.0001	-0.0007	0.9955	-0.0188	-1.8668	0.0788	0.0122	2.5773	0.0355	-0.0015	-1.9778	0.0488	0.0355	1.9778	0.0477	-0.0311	-1.8447	0.0666
LEV	0.0002	1.9947	0.0588	0.0000	2.0242	0.0499	-3.9970	-0.1130	0.8997	9.7660	0.2440	0.8111	-0.0001	-1.9770	0.0500	-0.0000	-2.2771	0.0466
SIZE	0.4377	2.4117	0.0166	-0.006	-0.7336	0.4662	-0.0111	-0.2246	0.8066	0.0079	2.6779	0.0233	-0.0047	-0.4224	0.6672	0.0144	0.3334	0.7399
AGE	0.0007	0.3221	0.7499	-0.0002	-0.2289	0.7733	0.0003	2.0224	0.0500	0.0000	0.0034	0.9733	-0.0001	-0.1223	0.9022	-0.0003	-2.4110	0.0377
R-Squared	0.284959			0.455778			0.509873			0.503249			0.381490			0.526817		
Redundancy / Hausman	t-stat	Prob.		t-stat	Prob		t-stat	Prob		t-stat	Prob		t-stat	Prob		t-stat	Prob	
	3.380510	0.6415		23.2945	0.2246		20.785812	0.3488		14.888391	0.7297		25.642185	0.1405		19.739328	0.4104	

Source: Researchers Compilations, 2025

5% Level of Significance

9. Conclusion and Recommendations

This study looked at the determinants of the main financial risks, which include credit, market, liquidity, capital adequacy, cost efficiency, and regulatory capital among the Nigerian Deposit Money Banks. The results validate that the asymmetric effects of bank-specific characteristics and performance indicators are shared among the risk dimensions, and the relationship between risk management and financial performance is a complicated one. The researchers urge the regulators to work harder on credit portfolio oversight of large banks especially in concentrated lending in the sectors. The combined impact of ROA and ROE is that the targets of profitability need to be aligned with the risk limit that would avoid an over-exposure to risk, particularly in the liquidity and capital management. The adverse effect of leverage on regulatory capital also highlights the necessity of tightening leverage regulations and adopting countercyclical capital buffers, particularly when the macroeconomic environment is volatile and banks are required to increase the investment in digital banking and automation without undermining the risk management. The study is also restricted by the fact that its research is restricted on the NDMBs alone and limits the extrapolation to the wider financial industry. Macroeconomic variables (inflation, exchange rates, and interest rates) and comparative study of the public and the private banks should be included in the future research to understand the effects of ownership better on the risk behaviour.

Abbreviations

NDMBs:	Deposit Money Banks
ROA:	Return on Assets
ROE:	Return on Equity
LEV:	Leverage
TRC:	Total Regulatory Capital
CIR:	Cost Income Ratios
SIZE:	Bank Size
AGE:	Bank Age
CRR:	Credit Risk
MKR:	Market Risk
LQR:	Liquidity Risk
CAR:	Capital Adequacy Ratios
ERM:	Enterprise Risk Management
RMC:	Risk Management Committee
MPT:	Modern Portfolio Theory

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