NON-PERFORMING LOANS AND PROFITABILITY OF PRIMARY MORTGAGE BANKS IN NIGERIA 2012-2023

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Abstract
This study examined the effect of non-performing loans (NPL) on the profitability of primary mortgage banks in Nigeria from 2012 to 2023. Utilizing time series data from the Nigeria Deposit Insurance Corporation's annual report for 2023, the research investigated how variables such as NPL, capital adequacy ratio (CAR), and loan-to-deposit ratio (LDR) influence return on assets (ROA). Auto-regressive distributed lag models (ARDL) were applied for the analysis, revealing that while non-performing loans had a negative effect, this effect was statistically insignificant over the study period. The study suggests that primary mortgage banks should focus on enhancing credit risk management, optimizing loan recovery strategies, diversifying their loan portfolios, improving capital adequacy, ensuring regulatory compliance, and investing in technology and data analytics to strengthen their operational and financial resilience.
Keywords: *Non-Performing loans and profitability of primary mortgage banks in Nigeria.*

Introduction

In recent years, the performance of primary mortgage banks (PMBs) in Nigeria has garnered significant attention due to their essential role in housing finance and their broader economic impact. PMBs facilitate homeownership by providing mortgage financing to individuals and institutions, which in turn promotes economic growth and development. The profitability and sustainability of these banks are, however, heavily dependent on their asset quality, financial stability, and operational efficiency (Kamandea, Zablonb & Ariemba, 2016).

One major challenge facing these institutions globally, including in Nigeria, is the issue of non-performing loans (NPLs). NPLs are loans where borrowers have failed to make scheduled payments for an extended period, typically 90 days or more. High NPL levels can significantly erode bank profitability, strain capital reserves, and jeopardize solvency, especially in Nigeria, where economic instability and policy changes frequently affect borrowers' repayment capabilities (Nwosu *et al,*2020).Beyond NPLs, other financial metrics such as the capital adequacy ratio (CAR) and loan-to-deposit ratio (LDR) are vital in assessing the financial health of PMBs(Soares & Yunanto,2018). The CAR, which measures a bank's capital relative to its risk-weighted assets, is a critical indicator of financial stability. A higher CAR signifies a bank's ability to absorb potential losses and maintain solvency (Agbeja,*et al,* 2015). Similarly, the LDR, which compares total loans to total deposits, is crucial

for ensuring liquidity. An optimal LDR helps maintain a balance between lending activities and the availability of liquid assets to meet withdrawal demands (Adenuga, Mohammed, Laniyan, Akintola, & Asuzu,2021).Despite the critical importance of these factors, there is a notable lack of empirical research specifically addressing the effect of NPLs, CAR, and LDR on the profitability of Nigerian PMBs. Existing studies often focus on commercial banks or other financial sectors, leaving a gap in understanding the unique challenges faced by PMBs. This study aims to bridge this gap by analyzing data from 2012 to 2023, a period marked by significant economic and regulatory changes in Nigeria. The profitability of primary mortgage banks in Nigeria has been under considerable pressure due to the rising incidence of non-performing loans. High levels of NPLs threaten the financial stability of these banks by reducing their return on assets (ROA), a key measure of profitability (Nwosu, Okedigba, & Anih, 2020). Moreover, while capital adequacy and loan-to-deposit ratios are critical for maintaining financial health, their interaction with NPLs and their overall impact on profitability remain underexplored within the context of Nigerian PMBs. Addressing these issues is crucial for developing effective strategies to enhance the performance and sustainability of PMBs, thereby ensuring their continued contribution to the housing finance sector and the broader economy.

Literature Review

A loan is non-performing when payments of interest and/or principal are past due by 90 days or more, or interest payments equal to 90 days or more have been capitalized, refinanced, or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons such as a debtor filing for bankruptcy to doubt that payments will be made in full (IMF, 2019). After a loan is classified as non-performing, it (and/or any replacement loans) should remain classified as such until written off or payments of interest and/or principal are received on this or subsequent loans that replace the original (IMF,2005). Okpara (2012) viewed Non-performing loans as default loans, which banks are unable to profit from. Non-performing loans are loans that have not expired, but it is uncertain whether the borrowers would be often to repay their debts. Customers of banks in Nigeria consist of business people, civil servants, contractors, petty traders and the government at large. Each in one way or another contributes to the poor performance of loans in the banking system. Kassim (2009) opined that non-performing assets are credit facilities in respect of which the interest / installment of principal has remained past due for a specific period of time. In simple language, an asset becomes non-performing when it fails to contribute any income to the owners. Barasa and Njuguna (2017) stated "the accumulation of non-performing loans is generally attributable to a number of factors, including economic downturn, macroeconomic volatility, high interest rate, excessive reliance on overly high-priced inter-bank borrowings, insider borrowing and moral hazard. According to Kroszner (2012), a non-performing Loan is a credit facility or advance in which the interest and the principal amount have remained past due for a specific period of time, also known as Non-performing assets. A credit

facility is an asset for a bank as the interest payments and the repayment of the principal create a stream of cash flows. It is from the interest payments that a bank makes its profits. Banks usually treat assets as non-performing if they are not serviced for some time. If payments are late for a short time, a loan is classified as past due and once a payment becomes really late (usually 90 days), the loan is classified as non-performing. A high level of non-performing assets, compared to similar lenders, may be a sign of problems, (Kithinji, 2005).

In line with IMF (Recommendation) Banks are required to classify their assets into four broad categories according to their performance- Standard assets, Sub-Standard assets, Doubtful assets and Loss assets. Out of these four, the first one is considered as performing asset and the other three are known as non-performing assets. Standard loans**:** These are the assets which do not carry more than the normal risks and are regular in all respects. These assets do not disclose any problem for the bank. The arrears of interest and principal amount of loan do not exceed 90 days at the end of the financial year. But if the asset fails to be in the category of standard asset i.e. the amount remains due more than 90 days then it is called as Non-performing asset and Non-performing assets are further classified into sub categories of sub-standard, doubtful and loss assets. Sub-Standard Loans: With effect from March 31, 2005, a sub-standard asset would be one, which has remained Non-performing asset for a period less than or equal to 12 months. In case of such assets, the current net worth of the borrower/guarantor or the current market value of the security charged is not enough to ensure recovery of the dues to the bank in full. Doubtful Loans: An asset classified as doubtful asset, has all the deficiencies that a sub-standard asset has but it also contains the feature that the weaknesses make collection or liquidation in full, on the basis of currently known facts, conditions and values- highly questionable and improbable. An asset is classified as doubtful asset if it remained in sub-standard categories for a period of 12 months. Loss Loans: A Loss asset is a credit facility where the loss has been identified by bank's internal or external auditor but the amount has not been written-off.

The impact of non-performing loans can be largely linked to the following; Profitability: Whenever a bank makes a wrong choice of its clients, its performing assets turn into Non-Performing Assets. Non-performing loans affect not only current profits of the banks but also future stream of profits, which may lead to the loss of some long-term beneficial opportunities. Non-performing loans generate no income for the banks. The higher the cases of non-performing loans, the lower the level of a bank profitability owning largely to provision requirement. Lower Credit Rating**:** High non-performing loans degrade a bank's credit rating, lowering its creditability as well as its ability to raise fresh capital. Today the incidence of high non-performing loans in the Nigeria banking industry points to a deteriorating credit market. Due to non-performing loans, banks also lose their goodwill and brand

image which creates negative impact and depositors deposit their money in some other bank. Liquidity: As the assets of banks are blocked, banks are left with less liquidity in hands and sometimes they are forced to borrow money from other banks leading to additional cost. This shortage of liquidity also creates difficulty in day to day operations of the bank. Additional Operational Cost: This is another indirect cost of high Non-performing loans that a bank has to bear. Time and resources use in handling and managing Non-performing loans would have diverted to some fruitful activities, which would have given good returns. Now a day, banks have special employees that deal with non-performing loans, which is an additional cost to banks.Poor Capital Adequacy Ratio**:** As per Basel Norms, every bank must maintain a Capital Adequacy Ratio, which is the ratio of total capital to risk weighted assets. As non-performing assets go up, so does the aggregate risk weighted assets, forcing the banks to allocate further capital in order to maintain the ratio. Today deposit money banks in Nigeria are struggling to meet the Capital Adequacy norms. Reduction in the GDP**:**Haven understand that the Nigeria banking sector is one of the most viable sector of her economy, the high cases of non-performing loans brings about the decline of the banking sector contributions to the GDP, the higher the non-performing loans the lower the taxable liability of banks.

Capital Adequacy Ratio (CAR) in Primary Mortgage Banks in Nigeria

The Capital Adequacy Ratio (CAR) is a critical metric that measures a bank's capital in relation to its risk-weighted assets, serving as an essential indicator of financial stability and the ability to absorb potential losses. For primary mortgage banks (PMBs) in Nigeria, maintaining an adequate CAR ensures they have enough capital to cover unexpected losses, protect depositors, and maintain confidence in the financial system. This is particularly important in Nigeria due to economic volatility and housing market fluctuations. Regulatory authorities, such as the Central Bank of Nigeria (CBN), enforce minimum CAR requirements to maintain financial stability, with non-compliance leading to penalties, lending restrictions, or even closure. A robust CAR also enhances a bank's ability to raise additional capital, as it signals prudent management and a lower risk of insolvency, attracting both domestic and international investments crucial for expanding mortgage financing operations. While a high CAR may limit a bank's ability to leverage and grow its asset base, it ensures long-term sustainability by minimizing financial distress. Thus, balancing adequate capital with growth aspirations is key for Nigerian PMBs to achieve sustained profitability and effectively contribute to the housing finance sector. In summary, CAR is vital for the financial health, regulatory compliance, investment appeal, and profitability of Nigerian PMBs, playing a crucial role in the stability and growth of the housing finance sector.

Loan to deposit ratio in Primary Mortgage Banks in Nigeria

The loan-to-deposit ratio (LDR) of primary mortgage banks (PMBs) in Nigeria is a key financial metric that measures the liquidity and financial stability of these

institutions. It indicates the proportion of a bank's deposits that are given out as loans. A higher LDR suggests that a bank is utilizing its deposits more for lending, which can enhance profitability but also increase liquidity risk if too many loans default. Conversely, a lower LDR may imply that the bank is conservative, potentially leading to lower returns but higher liquidity. In Nigeria, regulatory authorities like the Central Bank of Nigeria (CBN) set guidelines for acceptable LDR levels to ensure that PMBs maintain a balance between profitability and liquidity. This is particularly important in the Nigerian market, where economic volatility can impact borrowers' ability to repay loans. As a result a result of recent regulations, the CBN often mandates a specific LDR threshold that banks must adhere to, promoting stability within the financial system while encouraging lending to stimulate economic growth. Overall, the LDR in Nigerian PMBs is a critical indicator of their operational health and their role in supporting the housing finance market in the country.

Primary Mortgage Institutions

According to the CBN (2019), a Primary Mortgage Institution (PMI) shall be construed as any company that is licensed to carry out mortgage business in Nigeria. PMIs were conceived as retail mortgage institutions operating under regulatory and operational supervision of the Federal Mortgage Bank (FMBN) as the apex institution from which they could also source funds for on-lending. According to Omirin and Nubi (2007), primary mortgage institutions emerged after the federal government's attempts to deregulate the financial sector in the late 1980s and early 1990s. Following the establishment of the National Housing Fund by decree no 53 of 1989 and the announcement of the 1991 national housing policy the Primary Mortgage Institutions Decree was passed in 1993 to facilitate speedy implementation of financial reforms envisaged under the national housing policy. The purpose was to encourage the establishment of financial institutions capable of mobilizing savings and facilitating greater access to loans in order to popularize home ownership of individuals wishing to build or buy their own homes and for large-scale private builders producing houses for sale.

According to CBN (2003), Mortgage business shall include the following: a. granting of loans or advances to any person for the building, improvement or extension of a dwelling/commercial house; b. granting loans and advances to any person for the purchase or construction of a dwelling/commercial house; c. Acceptance of savings and deposits from the public and payment of interest thereon; d. management of pension funds/schemes; e. offering of technical advisory services for the purchase or construction of a dwelling house; f. performing estate management duties; g. offering of project consultancy services for estate development; h. engaging in estate development through loan syndication, subject to the restriction imposed by the shareholders' funds unimpaired by losses; i.

engaging in property trading including land acquisition and disposal; j. Engaging in other activities which the Bank may approve from time to time.

Theoretical Framework

Financial Intermediation Theory

The Financial Intermediation Theory, proposed by Allen and Santomero (1997), posits that financial intermediaries, such as banks and mortgage institutions, play a crucial role in the economy by facilitating the flow of funds between savers and borrowers. According to Allen and Santomero, financial intermediaries collect funds from savers (depositors) and then channel these funds to borrowers (e.g., individuals, businesses) in the form of loans or investments. This process helps to efficiently allocate capital within the economy, as intermediaries are able to pool savings from numerous small depositors and allocate them to borrowers who require larger amounts for productive investments (Allen & Santomero, 1997).

Implication of the theory to the study

The Financial Intermediation Theory emphasizes the pivotal role of primary mortgage banks (PMBs) in Nigeria, acting as intermediaries in deposit collection and mortgage lending. PMBs' profitability and susceptibility to non-performing loans (NPLs) hinge on the quality of their loan portfolios. Effective risk management, including rigorous credit assessments and borrower monitoring, is crucial. PMBs balance profitability with risk by diversifying loan portfolios and maintaining prudent underwriting standards. Economic cycles affect borrower repayment capacities, influencing NPL rates. Regulatory oversight ensures PMBs manage their portfolios to minimize NPLs and sustain profitability, emphasizing customer trust and adherence to market conditions.

Empirical Review

Bob-Manuel (2023) investigated the impact of non-performing loans (NPLs) on deposit money banks' (DMBs) performance in Nigeria, focusing on the role of capital adequacy, net interest income, and loan-to-deposit ratio in determining return on equity (ROE). The research utilizes panel data analysis, encompassing a sample of 5 Nigerian DMBs between 2018 and 2022, to explore the relationships between these variables. The study also incorporates empirical reviews of contemporary literature to provide a comprehensive understanding of the factors affecting bank performance. The findings reveal that capital adequacy has a significant positive effect on ROE, suggesting that well-capitalized banks are more efficient in generating income, leading to higher profitability. Net interest income also exhibits a significant positive relationship with ROE, indicating that banks with higher net interest income are better positioned to manage risks and maintain profitability. Conversely, the loan-to-deposit ratio does not show a significant impact on ROE in the Nigerian context. This outcome could be attributed to several factors, such as the high level of non-performing loans in the Nigerian banking sector, which may dilute

the positive impact of lending activities on profitability. In conclusion, addressing the high NPLs levels and improving capital adequacy and net interest income can enhance the performance of Nigerian DMBs. Ugwuanyi, Obinne and Efanga (2022) investigated the effect of non-performing loans on bank profitability in Nigeria. This study adopts among other techniques the Ordinary Least Squares (OLS) test method. A multiple regression model was formulated to ascertain the relationship between the non-performing loan and banks profitability variables. Our findings establish that Non-performing Loan exhibited negative and insignificant relationship with Return on Capital Employed, and Performing Loan shows a positive and significant relationship with Return on Capital Employed. However, our result with negative coefficients for Non-performing Loan (NPL) indicates that if they are increased, can also decrease Return on Capital Employed (ROCE).

Abimbola (2020) investigated the impact of non-performing loans on Money deposit banks' performance in Nigeria. Hypotheses were set and data were sourced from secondary data. The study used the confirmed ECM model (via residual and least square method of analyses. The results revealed that non-performing loans have impact Deposit Money Banks performance within the period of study; whereas, the impact of the individually independent variables (net interest margin and deposit to loan.) varied. The study recommends, amongst others that, effective credit policy that is reflected in flexible tenure, restructuring of credit terms and conversion should be adopted in the Deposit Money banks. Afolabi, Obamuyi and Egbetunde (2020) examined the effect of these credit risk variables (non-performing loans and loan-loss provisions) on the financial performance of microfinance banks in Nigeria, using the Granger causality approach. Secondary data covering the periods 2012 to 2018, from six purposively selected microfinance banks, was used for the hypothesized variables in a Vector Autoregressive (VAR) Model.

The unit root test was conducted on the data using the Augmented-Dickey Fuller and Phillip-Perron unit root test, with the aid of the E-VIEW9 statistical software. The results revealed that the variables are stationary which makes them suitable for the VAR model. Furthermore, the Granger causality analysis was carried out and the results established a causal nexus between the credit risk variables and financial performance to include; a unidirectional causality flow from non-performing loans to loan-loss provisions and from loan-loss provisions to returns on assets. Isedu and Erhabor (2020) examine the impact of Non-Performing Loans (NPLs) on banks' loan and advance in Nigeria. Data were collected while the econometric statistical technique was used for preceding the co-integration analysis. The variable capital adequacy and bank loan and advances are positively signed, indicating that there is a direct relationship between bank loan and capital adequacy. The coefficient of the variable capital adequacy is statistically significant.

The result shows that the Gross Domestic Product has a positive sign which, implies that the relationship between banks' loan advances and Gross Domestic Product is positive and statistically significant. The variable Interest Rate has a negative sign which, means that the relationship between Interest Rate and Bank Loan and Advances is inverse, and it is statistically significant. From the result, the variable inflation rate and Bank Loan and Advances are negatively related. The result further shows that total deposit is positive, but has an insignificant statistical effect on bank loan and advances of commercial banks. Nwosu, Okedigba and Anih (2020) examined the extent to which non-performing loans affect commercial bank profitability, and to suggest measures toward mitigating their impact on the banking sector in Nigeria. Data on a sample of 18 commercial banks, covering first quarter of 2014 to fourth quarter of 2018 were analyzed using the panel fixed effect and auto-regressive distributed lag models. Empirical results showed a negative and statistically significant impact of nonperforming loans on banks' profitability. Most of the coefficients of other determinants of bank profitability were in line with apriori expectations. The study showed that lower bank profitability can be explained by higher volume of non-performing loan, increased liquidity ratio and inflation, while higher profitability could be as a result of increase in bank size and capital adequacy ratio. Gabriel, Victor and Vincent (2019) assessed the effect of Non-Performing Loans on the financial performance of commercial banks in Nigeria from 1985 to 2016, using multiple regression techniques. The outcomes of the study revealed that NPLs and Cash Reserve Ratio (CRR) had statistically significant and negative effect on Return on Asset (ROA), thereby reducing the financial performance of the banks. Attoi (2018) examines Non-Performing Loan (NPL) and its effects on the stability of Nigerian banks with national and international operational licenses from 2014:Q2 to 2017:Q2. A \restricted" dynamic GMM is employed to estimate the macroeconomic and bank specific drivers of NPL for each licensed category. Z-Score is constructed to proxy banking stability, and its response to shocks NPLs is examined in a panel vector autoregressive framework. The results reveal that drivers of NPLs vary across the two categories of banks, but, weighted average lending rate is a vital macroeconomic driver of NPLs for both.

Adebisi and Matthew (2015) considered the impact of non-performing loans on firms' profitability of banks in Nigeria. The increased incidence of non-performing loans (NPL) in Nigerian bank generated the current literature on quality of banks profitability. Though there have been reforms in the banking industry to ensure effective financial institutions, the banks shareholders' funds are affected by the non-performing loans. This study made use of secondary data obtained from the Annual Report and Statement of Accounts of the NDIC for a period of seven (7) years (2006-2012). Data were analyzed using the regression statistical tools. The first result revealed that there is no relationship between the Non-performing Loans (NPL) and Return on Assets (ROA) of Nigerian Banks. This means that the asset values of the firms are not affected by the level of NPL. The shareholders wealth maximization is

affected as second result showed that there is a relationship between the Non-performing Loan (NPL) and Return on Equity (ROE) of Nigerian Banks. Wangai, Bosire and Gathogo (2012) studied the effect of non-performing loans on financial performance of microfinance banks (MFBs) in Kenya. The study was conducted in microfinance banks in Nakuru town, Kenya. A descriptive research design was adopted. The target population constituted the 66 credit and management staff of the aforementioned microfinance banks. A census survey was employed which implies that there was no sampling. The collected data was analyzed both descriptively and inferentially. The research findings were presented in form of descriptive and inferential statistical tables. It was established that, credit risk significantly affected financial performance of microfinance banks (MFBs) in Nakuru town. The credit risk negated the microfinance banks (MFBs) financial performance. It was deduced that, increase in credit risk would significantly reduce the microfinance banks (MFBs) financial performance. The study deduced that credit risk is caused by size, net interest margin, and capital ratio of microfinance banks (MFBs) among other variables. Credit risk controls adopted by microfinance banks (MFBs) were also concluded to affect microfinance banks (MFBs) financial performance. It was concluded that credit risk negates the profitability of MFBs due to increment in NPLs and as such reduces the microfinance banks (MFBs) financial performance.

Methodology

The study utilized data from the 2023 annual report of the Nigeria Deposit Insurance Corporation (NDIC), covering the period from 2012 to 2023. The base year of 2012 was selected due to significant regulatory and structural changes in Nigeria's mortgage banking sector, led by the Central Bank of Nigeria (CBN) and the Nigerian Mortgage Refinance Company (NMRC). The research employed an ex-post facto design.The study adapted and modified the model byUgwuanyi, Obinne&Efanga, 2022, who modeled Return on Capital Employed (RCE) as a function of Non-Performing Loan(NPL) and Performing Loan(PLN)on the study Effect of non-performing loans on bank profitability in Nigeria.The model of Ugwuanyi, Obinne &Efanga, (2022) is expressed as follows;

ROCE = f(NPL, PLN)……eq.1

The model for this study will be

$ROA_t=f(NPL_t, CAR_t,LDR_t)+\epsilon_t$…….eq.2

In equation 2, we re-specify equation 1 as

$ROA_t= \alpha_0 + \alpha_1 NPL_t + \alpha_2 CAR_t+\alpha_3 LDR_t + \mu_t$…… eq .3

μ_t is the error term. The a priori expectation is such that α_1; α_3; α_4; >0and α_2<0

Where: ROA =Return on Assets of Primary Mortgage Banks in Nigeria
NPL = Non-performing loans of Primary Mortgage Banks in Nigeria
CAR= Capital Adequacy Ratio of Primary Mortgage Banks in Nigeria

LDR= Loan to Deposit Ratio of Primary Mortgage Banks in Nigeria

Results and Discussion

Table 1: Descriptive statistics results

Table 1:Descriptive statistics results

Variables	Obs	Mean	Standard Dev	Min	Max	Skewness	Kurtosis
ROA	12	0.540833	3.092450	-7.140000	6.120000	-0.899392	4.858688
NPL	12	38.43750	26.85566	5.760000	91.50000	0.830094	2.445763
LDR	12	138.0367	33.08125	70.27000	178.8600	-0.957730	2.886984
CAR	12	39.38250	25.58820	9.950000	66.56000	-0.204253	1.179373

Source: Computer analysis using E-views 12.0

Table 1 displays the descriptive statistics results for the entire study sample. For the entire sample, the mean (or standard deviation) values for Return on Assets of Primary Mortgage Banks in Nigeria(ROA),Non-performing loans of Primary Mortgage Banks in Nigeria (NPL),Capital Adequacy Ratio of Primary Mortgage Banks in Nigeria (CAR),Loan to Deposit Ratio of Primary Mortgage Banks in Nigeria are 0.540833, 38.43750, 138.0367 and 39.38250(or 3.092450, 26.85566, 33.08125, and 25.58820, respectively). The maximum and minimum values for the four variables are 178.8600and -7.140000, respectively. The skewness has both negative and positive values, indicating that the distribution is both negatively and positively skewed. The attainment of stationarity by variable(s) is necessary in model estimation due to the influence of non-stationarity on regression output. To this effect, the Augmented Dickey-Fuller (ADF) unit root test was used to prove that the data were stationary.

Augmented Dickey-Fuller (ADF) unit root text was used to determine the stationarity of the variables. Table 2 ,3 and 4 shows that some of variables were stationary at level, 1st diff and 2nd diff meaning there is mixed integration hence the need to use ARDL as method of data analysis.

Table 2: Result of ADF Unit Root Test at Level

Variables	**ADF Test Statistic**	**Test Critical Value at 1%**	**Test Critical Value at 5%**	**Remark**
ROA	-3.816244(0.0182) **	-4.200056	-3.175352	Stationary
NPL	-4.333142(0.0082) **	-4.200056	-3.175352	Stationary
LDR	-2.050762(0.2643)	-4.200056	-3.175352	Not Stationary
CAR	-0.395227(0.8783)	-4.200056	-3.175352	Not Stationary

Source: *Author's Computation*

Table 3: Result of ADF Unit Root Test at 1ST DIFF

Variables	ADF Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Remark
ROA	-7.173409(0.0003) **	-4.297073	-3.212696	Stationary
NPL	-6.097185(0.0009) **	-4.297073	-3.212696	Stationary
LDR	-2.851147(0.0857)	-4.297073	-3.212696	Not Stationary
CAR	-2.704786(0.1065)	-4.297073	-3.212696	Not Stationary

Source: *Author's Computation*

Table 4: Result of ADF Unit Root Test at 2ndDIFF

Variables	ADF Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Remark
ROA	-7.823371(0.0002)**	-4.420595	-3.259808	Stationary
NPL	-7.058025(0.0004)**	-4.420595	-3.259808	Stationary
LDR	-4.687392(0.0070) **	-4.420595	-3.259808	Stationary
CAR	-3.613670(0.0000) **	-4.420595	-3.259808	Stationary

Source: Author's Computation

The Augmented Dickey-Fuller (ADF) unit root text in tables 2, 3, and 4 indicates that ROA and NPL were stationary at level implying that the variables should be differentiated further. Again, only ROA and NPLwere stationary at the first difference, according to Table 3. Table 4 shows that at the second difference, all the variables were stationary. This is due to the fact that their ADF test statistic value is greater than the Mackinnon critical value of 5% in absolute terms. As a result, Auto Regressive Distributed lag models (ARDL) as method of data analysis was required. With the determination of ARDL as method of data analysis especially short run relationship there is need to determine the long run relationship using ARDL Co-Integration Relationship**.**

ARDL Co-integration Relationship

The confirmation of the stationarity of the data through the unit root test of ADF allows for the determination of the co-integration relationship between the dependent and explanatory variables in the models. The ARDL was chosen as against the traditional Johansen co-integration because it is structured in such a way that it takes into account the different order of integration of financial time series data. **Co-integration test For Long-run Effect**

ARDL Co-Integration Test

The confirmation of data stationarity through the Augmented Dickey-Fuller (ADF) unit root test allows for assessing the co-integration relationship between the dependent and explanatory variables in the models. The autoregressive distributed lag (ARDL) model was chosen over the traditional Johansen co-integration test because ARDL can handle financial time series data with different orders of integration. The ARDL bounds test follows the critical values at the lower and upper bounds for decision-making at the significance levels of 1%, 2.5%, 5%, and 10%.

With a computed F-statistic value of 13.20780, which exceeds the critical bounds at 2.5%, 5%, and 10%, this indicates a long-run equilibrium relationship among the variables. This suggests that the selected variables are co-integrated with the profitability of primary mortgage banks.

Table 5. ARDL bounds tests for cointegration

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	13.20780	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	13.15	4.08
		1%	3.65	4.66

Source: Author's Calculation employing E-Views 12 Software

Given that the computed F-statistic value of 13.20780 surpasses the lower and upper critical bounds at the significance levels of 1%, 2.5%, 5%, and 10%, we infer a stable long-run relationship among the variables. This implies that the selected variables significantly affect the profitability of primary mortgage banks in Nigeria over the long term.

Decision Rule: We reject the null hypothesis of no co-integration and accept the alternative hypothesis that there is co-integration. Thus, we conclude that non-performing loans (NPL), capital adequacy ratio (CAR), and loan-to-deposit ratio (LDR) have a long-term effect on the profitability of primary mortgage banks in Nigeria during the study period.

Nature of Long Run Relationship/ARDL Error Correction Model

The ARDL result has proven that Return on Assets, non-performing loans (NPL), capital adequacy ratio (CAR), and loan-to-deposit ratio (LDR) are co-integrated/related in the long run. Consequently, the determination of the nature of the long run relationship becomes necessary as well as the speed of the adjustment to equilibrium.

Table 6: ARDL Co-integrating and Long Run Form for ROA→NPL +LDR+CAR

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROA(-1) *	-1.463478	0.196729	-7.439063	0.0000
NPL**	-0.000605	0.025713	-0.023517	0.9820
LDR**	0.149605	0.036807	4.064597	0.0066
CAR**	0.088690	0.032617	2.719147	0.0347
CointEq(-1)*	-1.463478	0.139496	-10.49119	0.0000
Long Run Coefficients				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NPL	-0.000413	0.017557	-0.023534	0.9820
LDR	0.10226	0.027278	3.747586	0.0095
CAR	0.060602	0.023052	2.628943	0.0391
C	-16.62797	5.025885	-3.308466	0.0162

Computer Output Data using E-views 12.0

The ARDL results indicate that return on assets (ROA), non-performing loans (NPL), capital adequacy ratio (CAR), and loan-to-deposit ratio (LDR) exhibit a long-term co-integrated relationship. Consequently, it is essential to determine the nature of this long-term relationship and the speed at which deviations from equilibrium are corrected. Table 6 reveals that the significant coefficients for LDR (0.10226, p = 0.0095) and CAR (0.060602, p = 0.0391) in the long-run equation suggest these variables positively influence the ROA of primary mortgage banks in Nigeria over the long term. Specifically, higher loan-to-deposit and capital adequacy ratios are associated with increased profitability. In contrast, the NPL variable shows an insignificant coefficient (-0.000413, p = 0.9820), indicating no significant long-term effect on ROA. The error correction term (CointEq(-1)) has a coefficient of -1.463478 (p = 0.0000), which is significantly negative, implying a strong speed of adjustment toward long-run equilibrium. Specifically, approximately 146% of any deviation from the long-run equilibrium is corrected in the next period, indicating a rapid return to equilibrium after short-term shocks.

Diagnostic Test

Table 7 Test for heteroskedasticity and serial correlation LM test

	F-statistics	**Probability**
Serial Correlation LM Test:	2.554199	0.1929
Heteroskedasticity Test	0.589153	0.6833

Source: Author's Calculation employing E-Views 12 Software

The serial correlation LM (Lagrange multiplier) test examines autocorrelation in the model's residuals, with the null hypothesis being no serial correlation. Given a probability value of 0.1929, which is above typical significance levels (0.01, 0.05, and 0.10), we fail to reject the null hypothesis, indicating no significant autocorrelation in the residuals. This suggests the model does not suffer from serial correlation issues.The heteroskedasticity test checks whether the variance of the residuals is constant (homoskedasticity) or varies across observations (heteroskedasticity). The null hypothesis for this test is constant variance. With a probability value of 0.6833, which is also above common significance levels, we fail to reject the null hypothesis, indicating that the residuals have constant variance and the model does not suffer from heteroskedasticity.

Implications: The absence of serial correlation means that error terms from one period are not correlated with those from another, avoiding inefficient estimates and invalid standard errors. The absence of heteroskedasticity means that the variability of the residuals is consistent across all levels of the independent variables, ensuring reliable statistical tests. Therefore, the model is well-specified, and the estimated coefficients and standard errors are reliable, making inferences about the relationship between return on assets (ROA), non-performing loans (NPL), capital adequacy ratio (CAR), and loan-to-deposit ratio (LDR) with respect to primary mortgage banks in Nigeria robust.

CUSUM and CUSUM of squares tests of stability

The stability test results are shown in figure 2 and 3.The CUSUM (Cumulative Sum) test assesses the stability of model coefficients over time by detecting structural changes. The test statistic is plotted against time, and the model is considered stable if the CUSUM line remains within the 5% critical bounds. The CUSUM of Squares test, more sensitive to variance changes, plots the cumulative sum of squared residuals over time. The CUSUM and CUSUM of Squares tests are used to check model stability. The results indicate the model's stability, as the blue lines in the figures remain within the critical red dotted lines at the 5% significance level. This confirms that the model performs well. Since the CUSUM and CUSUM of Squares lines in Figs. 1 and 2 stay within their critical bounds, we conclude that the model is stable in terms of both coefficients and variance over the examined period. This stability suggests that the relationship between the variables (ROA, NPL, CAR, and LDR) and the model's predictive power is consistent over time, reinforcing the reliability of the model's inferences. If either line crossed the critical bounds, it would suggest the need for further investigation into potential structural breaks or changes in the data generation process.

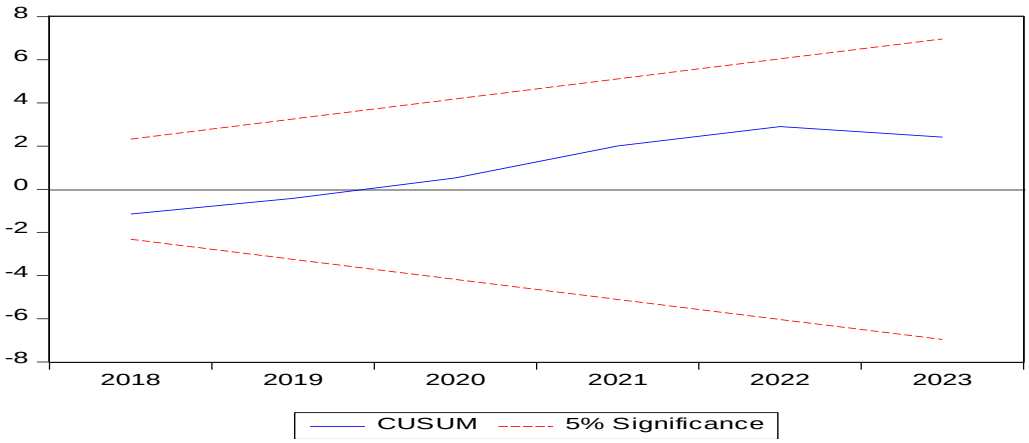

Fig. 1: *CUSUM Text*
Source: E-views 12.0 version data output

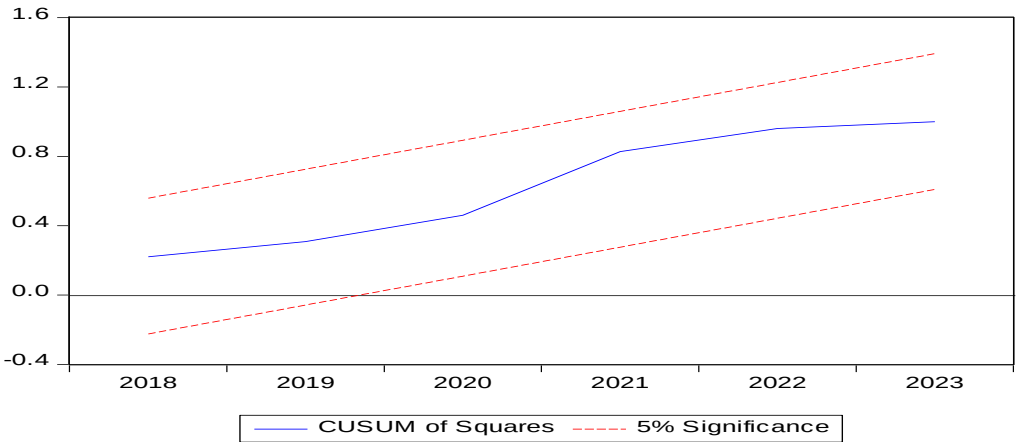

Fig. 2: *CUSUM of Squares Text*
Source: E-views 12.0 version data output

Short Run OLS Relationship

In analysing the Non-Performing loans and profitability of primary mortgage banks in Nigeria, the OLS regression was applied and the result shown in Tables 9. The outputs were interpreted using the coefficients of the individual variables, Adjusted R-square,f-statistic and Durbin Watson.

Table 9: OLS Regression: NPL and profitability of primary mortgage banks

Dependent Variable: ROA
Method: ARDL
Date: 07/01/24 Time: 15:39
Sample (adjusted): 2013 2023
Included observations: 11 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (0 lag, automatic): NPL LDR CAR
Fixed regressors: C
Number of models evalulated: 2
Selected Model: ARDL(1, 0, 0, 0)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
ROA(-1)	-0.463478	0.196729	-2.355925	0.0566
NPL	-0.000605	0.025713	-0.023517	0.9820
LDR	0.149605	0.036807	4.064597	0.0066
CAR	0.088690	0.032617	2.719147	0.0347
C	-24.33468	6.777174	-3.590682	0.0115
R-squared	0.793974	Mean dependent var		0.418182
Adjusted R-squared	0.656623	S.D. dependent var		3.212631

S.E. of regression	1.882550	Akaike info criterion	4.406087
Sum squared resid	21.26398	Schwarz criterion	4.586949
Log likelihood	-19.23348	Hannan-Quinn criter.	4.292079
F-statistic	5.780620	Durbin-Watson stat	1.746119
Prob(F-statistic)	0.029575		
*Note: p-values and any subsequent tests do not account for model selection.			

Source: Author's E-view 12 computations

Text of Probability

The coefficient for NPL is negative and not statistically significant (p-value = 0.9820), suggesting that NPL has no significant effect on ROA in the sample period.The coefficient for LDR is positive and statistically significant (p-value = 0.0066), indicating that a higher LDR is associated with a higher ROA. This suggests that increasing the proportion of loans to deposits positively affects profitability.The coefficient for CAR is positive and statistically significant (p-value = 0.0347), suggesting that a higher CAR leads to a higher ROA. This implies that better capitalization improves profitability.The constant term is negative and statistically significant (p-value = 0.0115), indicating that, in the absence of the explanatory variables, the expected ROA is significantly below zero.R-squared (0.793974): Indicates that approximately 79.4% of the variance in ROA is explained by the model.Adjusted R-squared (0.656623): Adjusts the R-squared value for the number of predictors in the model, indicating that 65.7% of the variance in ROA is explained, accounting for the degrees of freedom.F-statistic (5.780620) and prob(F-statistic) (0.029575): The F-statistic is statistically significant, indicating that the model provides a better fit than a model with no predictors.Durbin-Watson stat (1.746119): Close to 2, suggesting that there is no significant autocorrelation in the residuals.

The ARDL model indicates that LDR and CAR positively influence ROA in the long run, while NPL does not have a significant effect on ROA. The model's high R-squared and significant F-statistic suggest a good overall fit. the diagnostics suggest no issues with autocorrelation in the residuals. Therefore, the model provides reliable insights into the factors affecting the profitability of primary mortgage banks in Nigeria.

Summary, Conclusion and Policy Implication

Primary mortgage banks enable individuals to access higher-quality housing, leading to enhanced living standards and overall life quality. Improved housing conditions have been associated with better health outcomes, educational achievements, and social well-being. Additionally, by providing mortgage financing, primary mortgage banks stimulate growth in the construction industry and related sectors. This activity generates job opportunities, stimulates economic activity, and contributes substantially to a country's economic development. In

Nigeria, for example, the expansion of the housing sector can significantly influence GDP growth and foster economic diversification. However, empirical studies have produced conflicting findings on this matter. Therefore, this study seeks to investigate the effect of non-performing loans on primary mortgage banks in Nigeria between 2012 and 2023.

The analysis started by testing the stationarity of the variables, revealing different integration orders: stationary at I(0), first-order integrated at I(1), and second-order integrated at I(2). Subsequently, auto-regressive distributed lag (ARDL) models were employed. The results indicate that although non-performing loans negatively affect the return on assets of primary mortgage banks in Nigeria, this effect lacks statistical significance. This underscores the primary challenge for these banks in effectively managing their loan portfolios to mitigate the potential impact of defaults. Based on these findings, the study proposes the following recommendations: Strengthening credit risk assessment frameworks and procedures to help mitigate the potential impact of non-performing loans. This includes improving the evaluation of borrower creditworthiness, implementing early warning systems for loan defaults, and enhancing monitoring mechanisms throughout the loan lifecycle.Developing effective strategies for loan recovery and debt restructuring can improve the recovery rate of non-performing loans. This might involve establishing specialized units or outsourcing collection activities to third-party agencies with expertise in loan recovery. Diversifying the loan portfolio by offering a variety of mortgage products tailored to different segments of the market can spread risk and reduce dependence on any single category of loans. This strategy can help mitigate the impact of economic downturns or fluctuations in specific sectors. Maintaining adequate capital reserves is essential for absorbing losses from non-performing loans without compromising financial stability. Primary mortgage banks should continually assess their capital adequacy ratios and consider strategies to bolster capital levels when necessary. Ensuring compliance with regulatory requirements, particularly regarding loan classification, provisioning, and reporting of non-performing loans, is critical. Adhering to regulatory standards promotes transparency and trust among stakeholders, including depositors, investors, and regulatory authorities. Leveraging technology and data analytics can enhance operational efficiency in credit risk management and loan servicing. Implementing advanced analytics for predictive modeling and monitoring can improve decision-making processes related to loan origination and portfolio management.

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