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Non-Performing Loans and Economic Growth in Nigeria: Evidence from an ARDL Approach (2007–2023)

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Abstract

This study examined the effect of non-performing loans (NPLs) on economic growth in Nigeria from 2007 to 2023 using the Autoregressive Distributed Lag (ARDL) model. The study was motivated by the persistent rise in non-performing loans in the Nigerian banking sector despite various regulatory interventions by the Central Bank of Nigeria aimed at strengthening credit risk management and ensuring financial stability. The study employed both descriptive statistics and econometric techniques to analyse the short-run and long-run relationships between non-performing loans and selected macroeconomic variables. The empirical results revealed that non-performing loans have a significant negative effect on economic growth in the long run, indicating that rising loan defaults weaken banking sector stability and constrain productive investment. The results further showed that inflation has a positive and significant long-run relationship with economic growth, while government expenditure exhibits a significant negative effect. Interest rate was found to be statistically insignificant in the long run. In the short run, the results indicated mixed effects among the variables, with interest rate and government expenditure showing significant influence, while unemployment and inflation were largely insignificant. The error correction term was negative and statistically significant, confirming the existence of a long-run equilibrium relationship and a moderate speed of adjustment toward equilibrium. The study concludes that non-performing loans remain a key constraint to sustainable economic growth in Nigeria due to their adverse effects on credit availability

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and financial intermediation. The study recommends improved credit risk management, stronger regulatory enforcement, macroeconomic stability policies, and efficient allocation of government expenditure to enhance banking sector performance and stimulate economic growth.

Keywords: non-performing loans (npls), economic growth, ardl model (autoregressive distributed lag, Nigeria, financial stability

Introduction

The stability of a country's financial system is fundamental to sustainable economic growth and development. The banking sector plays a dominant role in this process by mobilizing savings, allocating credit, and facilitating investment in productive sectors of the economy (Polat, 2018). A well-functioning banking system enhances capital formation, promotes entrepreneurship, and supports macroeconomic stability. Conversely, weaknesses in banking sector performance can significantly hinder economic growth. One of the most critical threats to banking sector stability is the rising incidence of non-performing loans (NPLs), which reduce banks' profitability, weaken liquidity positions, and constrain credit expansion. The global financial crisis of 2007–2009 demonstrated the far-reaching consequences of deteriorating asset quality, as widespread loan defaults triggered financial instability and economic recession across many economies (Tsumake, 2016; Bayar, 2019). This experience underscored the strong linkage between banking sector soundness and economic performance.

Non-performing loans represent credit facilities in which borrowers fail to meet repayment obligations for a specified period, usually ninety days or more. An increase in NPLs signals declining asset quality and exposes banks to significant financial risks (IMF, 2021; Mpofo & Nikolaidou, 2019). High NPL ratios reduce banks' willingness and ability to extend new credit, thereby limiting investment, production, and employment creation. In addition, banks experiencing high loan defaults often adopt conservative lending policies, which further restrict credit to the private sector and slow economic activities. As a result, non-performing loans are widely regarded as early warning indicators of financial crises and economic instability (Atoi, 2018; Petkovski et al., 2018).

In Nigeria, the banking sector remains central to economic growth through financial intermediation, credit allocation, and investment financing. However, the sector has been confronted with persistent increases in non-performing loans over the years. Despite regulatory reforms, including banking consolidation, prudential guidelines, and the establishment of the Asset Management Corporation of Nigeria (AMCON), the level of non-performing loans has fluctuated above the regulatory threshold at various periods. The early 2000s witnessed high NPL ratios due to weak credit appraisal systems and macroeconomic instability. Although the

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2004 banking consolidation temporarily improved asset quality, subsequent economic shocks such as the global financial crisis, oil price volatility, and the 2016 economic recession led to renewed increases in loan defaults (Central Bank of Nigeria, 2018; Central Bank of Nigeria, 2021). These developments weakened banks' balance sheets, reduced credit supply, and constrained economic growth.

The persistence of high non-performing loans in Nigeria presents a major policy concern. Rising NPLs reduce bank profitability, limit financial intermediation, and restrict access to credit for businesses and households. This weakens investment and productive activities, thereby slowing economic growth. Furthermore, high levels of loan defaults undermine financial system stability and may trigger banking sector distress if not properly managed. Despite several policy interventions by the Central Bank of Nigeria, including loan restructuring, stricter supervisory frameworks, and credit risk management guidelines, the problem of non-performing loans continues to pose a threat to economic performance. This suggests that existing regulatory measures may not have fully addressed the structural factors linking non-performing loans and economic growth in Nigeria.

Although numerous empirical studies have examined the determinants of non-performing loans and their implications for banking sector performance, most existing studies have focused primarily on macroeconomic and bank-specific determinants of NPLs rather than their direct effect on economic growth. Other studies concentrated on developed economies or cross-country analysis, with limited attention given to the Nigerian economy, particularly in recent years characterized by macroeconomic instability, financial reforms, and post-pandemic recovery. In addition, many previous studies relied on shorter time periods and did not adequately capture recent structural changes in Nigeria's financial system. This creates a gap in empirical literature regarding the extent to which non-performing loans influence economic growth in Nigeria.

The reviewed literature shows that studies have separately examined fiscal deficit, public debt, credit risk governance, non-performing loans, and economic growth, both in Nigeria and other countries (e.g., Onoja & Ofurum, 2026; Dairo et al., 2026; Yahaya, 2026; Olowe, 2026; Polat, 2018). However, important gaps remain. First, most studies analyse fiscal policy and banking sector stability in isolation, with limited integration of fiscal variables and financial sector risk within a single framework. Second, there is a shortage of Nigeria-specific studies that jointly examine fiscal deficit, public debt composition, credit risk governance, and economic growth using recent data. Third, many existing studies rely on limited econometric approaches that fail to fully capture both short-run and long-run interrelationships among variables. This study therefore addresses these gaps by providing an integrated analysis of fiscal and financial dynamics and their combined effect on economic growth in Nigeria.

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Therefore, this study seeks to fill this gap by examining the effect of non-performing loans on economic growth in Nigeria over the period 2007Q1 to 2023Q4. The study specifically investigates how rising loan defaults affect per capita income in Nigeria. By providing empirical evidence on the relationship between non-performing loans and economic growth, the study contributes to policy discussions on strengthening banking sector stability and enhancing the role of financial intermediation in promoting sustainable economic growth in Nigeria.

Literature Review

Conceptual Clarifications

Non-Performing Loans

Non-performing loans (NPLs) are loans in which the borrower is unable to make regular payments of principle or interest. The usual industry definition defines a loan as non-performing when payments are 90 days late; however, this categorisation might vary significantly by nation or regulatory environment (European Central Bank, 2021). According to the International Monetary Fund (IMF), a loan is non-performing when payments of interest and principal are past due by 90 days or more, or at least 90 days of interest payments have been capitalised, refinanced, or delayed by agreement" (IMF, 2019). The World Bank defines a non-performing loan as a loan with payments overdue for more than 90 days and/or when the lender considers that payments will not be made" (World Bank, 2020). While the European Central Bank (ECB) sees a non-performing loan as one regarding which the borrower is unable to meet his payment obligations in full and is unlikely to be able to do so unless there is a change in economic circumstances" (European Central Bank, 2021). In the reports of the Basel Committee on Banking Supervision (2021), a non-performing loan is "a loan for which the borrower is 90 days or more past due on any material credit obligation to the banking group".

The idea of non-performing loans (NPLs) is significant in banking and finance, as it directly effects the liquidity and capital adequacy of financial institutions. NPLs are regarded as a critical measure of the financial health of banks and the quality of their asset portfolios. The International Monetary Fund (IMF) and the World Bank pay special attention to NPLs when assessing the economic stability of a country, given that large levels of NPLs might imply broader economic hardship and potentially exacerbate financial crises (Laeven & Valencia, 2013).

In the context of this study, non-performing loans constitute a substantial risk management area for banks and a crucial statistic for regulatory agencies and economic analysts. The management of NPLs is vital not only for the soundness of individual financial institutions but also for the general health of the financial system and the larger economy.

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History of Non-Performing Loans in Nigeria

The situation of non-performing loans (NPLs) in Nigeria has developed dramatically over the years, driven by different economic, legal, and institutional variables. Understanding this history is vital for understanding present financial stability and making educated policy decisions.

The history of NPLs in Nigeria extends back to the time following the country's independence in 1960, when the government began to nationalise foreign banks and new Nigerian banks arose. Initially, these banks had reasonably strong loan portfolios, but by the late 1970s and 1980s, Nigeria's economic woes, marked by oil price shocks and political instability, led to a rise in NPLs. During this period, the lack of strong regulatory frameworks and weak risk management techniques led to the increase of NPLs, as banks issued loans without proper borrower inspection (Soludo, 2004). The 1990s represented a crucial turning point, with the adoption of substantial financial sector reforms launched by the Central Bank of Nigeria (CBN). These changes included the implementation of prudential standards which put limitations on loan concentrations and exposures and the formation of the Failed Banks Tribunal to address the concerns of moral hazard and financial indiscipline in the banking system (CBN, 1995). The early 2000s witnessed considerable upheaval in the banking industry under the CBN's reform initiative directed by then Governor Charles Soludo. In 2004, the CBN initiated a massive consolidation programme, forcing banks to enhance their capital base from ₦2 billion to ₦25 billion. This action resulted in a drop in the number of banks from 89 to 25 through mergers and acquisitions, which greatly strengthened the financial system and lowered the incidence of NPLs by removing weaker banks with bad lending practices (Soludo, 2007).

The global financial crisis of 2008 had a delayed impact on the Nigerian banking industry. By 2009, the NPL percentage had dramatically grown, mostly owing to exposures to the oil and gas sector and speculative activities in the stock market. In response, the CBN took significant action in 2009 by bailing out many banks and establishing the Asset Management Corporation of Nigeria (AMCON) in 2010. AMCON played a vital role in absorbing NPLs from the banks' balance sheets, thus restoring liquidity and stability to the banking sector (AMCON, 2010). In recent years, the Nigerian banking system has continued to encounter issues with NPLs, notably following the economic slump in 2016 and the COVID-19 outbreak. The CBN has taken several measures, including tougher loan-to-deposit ratios and strengthened risk management frameworks, to regulate and reduce the amounts of NPLs. Despite these improvements, NPLs remain a problem, needing constant monitoring and adaptation in regulatory policies (CBN, 2020).

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Theoretical Literature

Agency Theory

Agency Theory (Jensen & Meckling, 1976) explains the relationship between principals (owners) and agents (managers) and the conflicts that arise due to information asymmetry and divergent interests. These conflicts often result in agency problems such as moral hazard and adverse selection (Eisenhardt, 1989). In the banking sector, managers may engage in excessive or risky lending to meet short-term performance targets, thereby increasing non-performing loans (NPLs). Weak governance structures, poor monitoring, and misaligned incentives, especially where compensation is tied to loan growth rather than loan quality, encourage imprudent credit decisions. In Nigeria, inadequate transparency and weak oversight have been linked to rising NPLs, highlighting the importance of strong corporate governance and regulatory supervision in reducing agency conflicts.

Institutional Theory

Institutional theory explains how regulatory frameworks, rules, and organisational structures influence banking behaviour and outcomes, including NPLs. It emphasises the role of institutions in shaping compliance, risk management, and lending standards. In Nigeria, reforms such as the establishment of AMCON were introduced to address systemic risks associated with bad loans. The theory also identifies internal banking inefficiencies through the bad management, skimping, moral hazard, and bad luck hypotheses, which collectively explain how both managerial practices and external shocks contribute to rising NPLs. Strengthening regulatory enforcement and institutional quality is therefore essential for reducing loan defaults and improving financial stability.

Credit Risk Management Theory

Credit risk management theory focuses on how banks identify, assess, monitor, and control credit risk to minimise loan defaults. It evolved through contributions from scholars such as Keynes (uncertainty and risk), Markowitz (portfolio theory), and Sharpe (risk-return trade-off), as well as regulatory frameworks like the Basel Accords and credit scoring systems developed by FICO. The theory emphasises that effective credit appraisal, continuous monitoring, and proper risk control reduce the incidence of non-performing loans. In Nigeria, weak credit risk management practices have been identified as a major driver of high NPL levels. Therefore, strengthening credit evaluation systems and enforcing prudent lending standards are essential for improving banking sector stability and reducing loan defaults.

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Empirical Literature

Onoja and Ofurum (2026) analysed the correlation between budget deficit and economic development in Nigeria utilising annual data from 1970 to 2024 sourced from the Central Bank of Nigeria and the World Bank. The research employed multiple regression and ARDL methodologies, accompanied by diagnostic assessments, to elucidate both short-term and long-term dynamics. The findings indicated that fiscal deficits exert a positive and significant influence on real GDP, suggesting that deficit financing fosters economic growth in Nigeria. The study determined that, when effectively managed and directed towards productive industries, government borrowing can improve economic performance. It advocated for enhanced efficiency in public expenditure, reinforced fiscal discipline, effective execution of medium-term expenditure plans, regular fiscal audits, and increased transparency in budgeting to maintain manageable fiscal deficits while fostering growth.

Dairo, Ridwan Oladeji et al. (2026) analysed the correlation between governmental debt and economic development in Nigeria utilising annual data from 1990 to 2023. The research differentiated between domestic and external debt and used the ADF test and ARDL bounds methodology to evaluate both short-term and long-term dynamics. The findings indicated a long-term correlation between governmental debt and GDP. Domestic debt showed a positive and significant impact on economic growth, whereas external debt was statistically negligible. The error correction term was negative and statistically significant, indicating a gradual adjustment towards long-run equilibrium. The research determined that the composition of debt is significant, with domestic borrowing being more conducive to growth when effectively administered.

Yahaya (2026) analysed the correlation between credit risk governance and financial stability in Nigeria utilising annual time series data from 2000 to 2023. The research included essential control factors such as asset quality, GDP growth, regulatory requirements, and credit growth, while financial stability was represented by the non-performing loan ratio, capital adequacy ratio, and banking sector Z-score. The study employed an OLS regression framework with pertinent diagnostic tests and determined that asset quality and regulatory requirements have statistically significant positive impacts on financial stability. Conversely, credit growth and GDP growth yielded varied and context-specific consequences. The study determined that robust credit risk governance and efficient regulatory oversight are essential for sustaining banking sector stability in Nigeria, and it advocated for enhanced prudential regulation and improved credit monitoring techniques.

Olowe (2026) investigated the efficacy of credit bureau data in forecasting repayment behaviour of consumer loans in Nigeria, utilising a dataset of 3,741 borrowers from First Central Credit Bureau and Irorun digital lending platform. The research utilised both

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conventional statistical approaches and machine learning techniques, such as logistic regression, random forests, and gradient boosting. The results indicated that credit bureau data possesses restricted predictive capability owing to discrepancies and inadequate borrower credit histories. Nonetheless, machine learning models, especially gradient boosting, outperformed conventional methods, attaining superior predicted accuracy. The study determined that incorporating alternative data sources, including utility payments and digital transaction records, can enhance credit risk assessment, improve loan payback predictions, and promote financial inclusion in Nigeria.

Polat (2018) investigated whether the determinants of non-performing loans (NPLs) in both countries differ, and the findings indicate that they are indeed distinct and country-specific. In Saudi Arabia, the following variables positively influenced non-performing loans (NPLs): GDP, inflation, debt, market capitalization, and money supply. The characteristics that negatively impacted the situation include unemployment and transparency, while currency rates and oil prices had no effect (Polat, 2018). In Turkey, only publicly traded corporations exerted impact, as the author examined both listed and unlisted enterprises. The variables deemed to exert a positive influence included inflation and market capitalization. It is contended that the explanatory variables for non-performing loans (NPLs) in Turkey may exhibit delays, as current macroeconomic indicators do not adequately elucidate present NPLs.

Kjosevski, Petkovski, and Naumovska (2019) assessed both macroeconomic and bank-specific variables in the Republic of Macedonia. The research utilised panel data from banks covering the years 2005 to 2014. The authors found that during periods of economic expansion, non-performing loans (NPLs) tend to be at their lowest, as many individuals can generate income and so fulfil their loan obligations. The study's results reveal that macroeconomic variables, such as per capita income and inflation, influence non-performing loans (NPLs) in public sector banks, while per capita income affects NPLs in private banks.

Mpofu and Nikolaidou (2019) conducted a study examining macroeconomic and bank-specific variables in Sub-Saharan Africa. The research utilised bank-level data from 2000 to 2017, employing panel data models for 85 banks across 8 Sub-Saharan African countries. The study was particularly intriguing as it examined SSA nations that have previously encountered financial crises. The results indicate that both macroeconomic and bank-specific factors affect non-performing loans (NPLs). The authors argue that an increase in lending interest rates, unemployment rates, inflation, and money supply all lead to a rise in non-performing loans (NPLs). The author advocates for the adoption of policies strategically aimed at enhancing the macroeconomic environment, as this will facilitate the shaping of the banking system and reduce non-performing loans within the sector.

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A study conducted by Berger and DeYoung (1997) on US commercial banks primarily examined bank-specific determinants of non-performing loans (NPLs). Based on their literature review, they formulated hypotheses concerning 'poor management', 'adverse circumstances', 'underinvestment', and 'moral hazard', all of which pertain to the bank's efficiency and capitalisation. Their position regarding inadequate management is that diminished efficiency from the bank results in an increase in non-performing loans (NPLs). Poor management is associated with banks inadequately overseeing their loan portfolios by extending credit to individuals that may lack creditworthiness (Berger & DeYoung, 1997). The concept of adverse luck posits that elevated non-performing loans (NPLs) generally result in heightened operating costs, whereas cost-cutting measures by banks may stem from their lack of awareness regarding high-quality loans, ultimately resulting in substantial NPLs over an extended duration (Berger & DeYoung, 1997). Ultimately, their stance on the moral hazard hypothesis posits that increasing non-performing loans (NPLs) arise from diminished capital levels inside a bank; when banks assume greater risks with insufficient capitalisation, this results in an escalation of NPLs (Berger & DeYoung, 1997). Research conducted by Fernandez, Pagés, and Saurina (2000) examined Spanish banks, elucidating that credit expansion, industry scale, and capitalisation ratios contribute to non-performing loans (NPLs).

Daudert (2021) asserts that many data sources associated with financial sentiment analysis include company reports, news articles, and social media platforms. Daudert (2021) examined the sentiment of financial texts, employing various data modelling techniques through graphical representations. Their proposed methodology utilised extensive textual data, integrating contextual information into a vector representation of financial texts. Their representation method derives significant benefits from information and illustrates the relationships among that information; it employs sentiments from various data sources, aiding the author in modelling sentiment contagion to enhance the quality of sentiment analysis (Daudert, 2021).

Ranjan and Dhal (2003) examined the relationship between non-performing loans and variables such as bank size and lending conditions (including maturity periods, cost fluctuations, and credit orientation), as well as macroeconomic indicators in public sector banks in India. The findings indicated that credit factor conditions significantly affected banks' non-performing loans, influenced by risk preferences associated with bank size and macroeconomic disturbances. The maturity terms of credit significantly negatively impact it, indicating that longer-term loans result in fewer non-performing loans. Variations in the cost of credit, specifically the disparity between current and historical cost conditions, positively affect non-performing loans; the expectation of rising interest rates prompts alterations in cost conditions that exacerbate the increase in non-performing loans. The credit orientation indicator, indicated

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by a bank's credit-to-deposit ratio in relation to the industry average, significantly negatively impacts non-performing loans, suggesting that borrowers place considerable importance on institutions that are relatively more credit-oriented. The size of a bank, measured by the ratio of its assets to the total assets of the banking sector, demonstrated a statistically significant negative impact on non-performing loans, indicating that larger banks tend to have less non-performing loans. The growth variable adversely affects non-performing loans, indicating that heightened economic activity results in less financial distress for borrowers and, subsequently, a decline in non-performing loans for banks.

Hu et al. (2004) examined the correlation between ownership structure and non-performing loans in Taiwan's banking sector from 1996 to 1999. The variables utilised in the analysis included government shareholdings, size, the entropy index for revenues, D1991 (1 if the bank was established post-deregulation; 0 otherwise), and time. The findings revealed the following: (1) the proportion of non-performing loans (NPLs) diminishes as government ownership in a bank escalates (up to 63.51 percent), after which it rises; (2) bank size exhibits a negative correlation with the NPL rate; (3) diversification of revenue sources does not significantly mitigate the NPL rate; (4) NPL rates consistently increased from 1996 to 1999; and (5) banks founded post-deregulation, on average, possess a lower NPL rate compared to those established prior to deregulation.

Boudriga et al. (2010) assessed the impact of bank-specific, business, and institutional environmental factors on non-performing loans, utilising a sample of forty-six banks across twelve countries in the Middle East and North Africa (MENA) area from 2002 to 2006. The findings revealed that, among the bank-specific attributes, foreign participation from developed nations, credit expansion, and return on assets exert a substantial negative effect on non-performing loans, whereas capital adequacy and loan loss provisions demonstrate a positive and significant influence. The results emphasised the significance of the institutional framework in enhancing credit quality. The robust enforcement of the rule of law, high regulatory quality, enhanced corruption control, and the promotion of free expression and responsibility were essential in reducing non-performing loans. The business climate, the quality of information provided by commercial and state credit bureaus, and legal rights were essential in reducing non-performing loans in the MENA countries.

Kastrati (2011) utilised a dynamic panel data model to investigate the determinants of nonperforming loans in fifteen transition economies (Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Bulgaria, Croatia, Macedonia, Moldova, Montenegro, Kosovo, Romania, Serbia, and Ukraine) from 1994 to 2009. The results demonstrated that macroeconomic factors, specifically GDP growth and inflation, exert a substantial negative impact on non-performing loans, whereas competition in the banking sector, represented by

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the number of banks, has a positive and significant effect. The significantly positive coefficient of the lagged non-performing loans variable indicated a persistence in non-performing loans. The dummy variable for the year 2009 significantly positively affects non-performing loans. This result aligned with the patterns characterising 2009, particularly in the first half, due to the onset of the financial crisis in 2008, whose repercussions were predominantly seen during 2009.

Ahmad and Bashir (2013b) examined the impact of macroeconomic factors on non-performing loans in Pakistan from 1990 to 2011. The statistics indicated that GDP growth, interest rates, inflation rates, exports, and industrial production had a significant negative impact, whereas the consumer price index exerted a substantial positive influence on non-performing loans. The residual effects of the unemployment rate, real effective exchange rate, and foreign direct investment were insignificant in elucidating variations in non-performing loans.

Shingjergji (2013a) examined the impact of bank-specific factors on non-performing loans in the Albanian banking sector from 2002 to 2012. The findings indicated that return on equity and loans-to-asset ratio exert a substantial negative effect on non-performing loans, whereas total loans and net interest margin had a positive and significant impact. The capital adequacy ratio demonstrated a negligible impact on non-performing loans within Albanian banks. Shingjergji (2013b) examined the impact of macroeconomic variables (GDP growth, inflation rate, interest rate, and foreign exchange rate) on Albanian banks from 2005 to 2012. The statistics indicated that GDP growth and foreign exchange rates exerted a substantial positive influence on nonperforming loans, whereas inflation had a considerable negative impact. The positive and statistically significant coefficient of the lagged non-performing loans variable indicated persistence in non-performing loans within the banking sector.

Khemraj and Pasha (2009) examined the macroeconomic (GDP growth, inflation rate, and real effective exchange rate) and bank-specific (loans-to-total-assets ratio, credit growth, size, and real interest rate) factors influencing non-performing loans in the Guyanese banking sector from 1994 to 2004, employing a panel dataset and a fixed-effects model. The results indicated that the real effective exchange rate significantly positively impacted non-performing loans, while GDP growth exerted a substantial negative and immediate effect on non-performing loans. Nonetheless, inflation was shown not to be a significant factor influencing non-performing loans in the Guyanese banking industry. Regarding the bank-specific variables, real interest rates (defined as the difference between the weighted average lending rate and the annual inflation rate) and the loans-to-asset ratio significantly positively affect non-performing loans, whereas credit growth has a significant negative impact on non-performing loans. The findings indicated that larger banks were not inherently more proficient

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in screening loan applicants than smaller banks, as reflected by the insignificance of the bank size variable.

Belgrave et al. (2012) contributed to the study of non-performing loans in Barbados. The authors employed a panel vector autoregressive (VAR) model using a dataset of quarterly records from 1996 to 2010 to examine the responsiveness of non-performing loans to disturbances in six economic sectors in Barbados. The sectors encompassed agriculture and fishing; construction, mining, and quarrying; distribution; manufacturing; professional services; and tourism. The results indicated a certain level of variability in the response of non-performing loans to disturbances across the six industries. Positive shocks to aggregate output in the distribution, professional, and tourist sectors resulted in a general decrease in financial system stress, although the timing of responses differs among these sectors. Moreover, a strong correlation was observed between non-performing loans and disturbances in the construction, mining, and quarrying sectors. Conversely, there was no evidence of a direct correlation between non-performing loans and disturbances in the agricultural and manufacturing sectors, which are the two smallest businesses. The authors concluded that the variability in non-performing loans' responses to industry-specific shocks suggests that studies focused on aggregate output shocks for Barbados may obscure heterogeneity in non-performing loan behaviour, potentially resulting in inaccurate findings. They also emphasised that the significance of the immediate implications typically relied on the industry's size relative to GDP and total loans.

Grosvenor and Guy (2013) examined non-performing loans in Barbados with a Markov Switching approach with quarterly data from 1996 to 2011. The variables employed in the study were inflation, average loan growth, and GDP. The analysis revealed an inverse relationship between nonperforming loans and GDP. The influence of GDP is more pronounced during periods of low non-performing loans (Regime 0) than in times of high non-performing loans (Regime 1). This indicates that the pace of fall of non-performing loans during economic booms surpasses the rate of increase of non-performing loans during recessions. Additionally, divergent results were observed regarding inflation and loan growth. In Regime 0, inflation exhibits an inverse relationship with non-performing loans, while in Regime 1, a positive link is indicated, with both impacts being significant. Loan growth exhibited a positively insignificant correlation with non-performing loans in regime 0, whereas the relationship is negative in regime 1. The authors justified their finding by asserting that during periods of low non-performing loans, banks may adopt less stringent lending practices and extend credit to riskier borrowers; hence, leading to an increase in both the entire loan portfolio and non-performing loans.

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Research Methodology

Research Design

The study used a mixed-methods approach, integrating quantitative econometric analysis with qualitative case studies to comprehensively identify the determinants of non-performing loans (NPLs). To achieve its intended objectives, the research employed a quantitative (ex post facto research design) analysis as the methodological framework utilised by the investigator. The quantitative technique was the most suggested option, as it eliminated the possibility of subjective outcomes in contrast to the qualitative approach. The study employed an econometric model to assess the relationship between the model's endogenous variable and its explanatory components. This model addresses the determinants of non-performing loans in Nigeria.

Model Specification

This study adopted the modified version of Adeyemi's (2018) estimation of determinants of NPL ratio using a cross-county analysis from the sample of 25 emerging countries as expressed below:

$$\text{NPL}_{i,t} = \beta_1 + \beta_2 \text{GDP}_{i,t} + \beta_3 \text{UNR}_{i,t} + \beta_4 \text{INF}_{i,t} + \beta_5 \text{ENNR}_{i,t} + \beta_6 \text{HIP}_{i,t} + \beta_7 \text{ROA}_{i,t} + \beta_8 \text{ROE}_{i,t} + \beta_9 \text{CAR} + \beta_{10} \text{LLP}_{i,t} + \beta_{11} \text{NIMR}_{i,t} + \beta_{12} \text{NIMR}_{i,t-1} + \beta_{13} \text{NIMR}_{i,t-2} + \epsilon_{i,t} \quad (3.1)$$

Where;

NPL = Aggregate of non-performing loans to total gross loan,

GDP = Gross domestic product,

UNR = Unemployment rate,

INF = Inflation rate,

ENNR = Nominal effective exchange rate,

HIP = House price index,

ROA = Return on assets,

ROE = Return on equity,

CAR = Capital to assets ratio,

LLP = Loan loss provision,

NIMR = Net interest margin ratio,

Subscript 't' denotes the analysed era, while subscript 'i' signifies the examined country. This study designates non-performing loans as the dependent variable, with independent variables comprising macroeconomic factors (including GDP growth, inflation, interest rates, and unemployment rates) and bank-specific elements (such as capital adequacy, return on

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assets, return on equity, and domestic loan growth). Government effectiveness is incorporated as a moderating variable, facilitating a concentrated analysis of the pivotal factors affecting loan performance in Nigeria.

$$PCI_t = \beta_0 + \beta_1 NPL_t + \beta_2 UNP_t + \beta_3 INF_t + \beta_4 INT_t + \beta_5 GOE_t + \varepsilon_t \quad (3.2)$$

Where:

PCI_t = Gross Domestic Product at time t .

NPL_t = Non-Performing Loans at time t .

UNP_t = Unemployment Rate at time t ,

INF_t = Inflation Rate at time t .

INT = Interest Rate at time t .

GOE = Government Effectiveness at time t .

β_0 = Constant while β_1 to β_5 are the parameters to be estimated

Description of Variables in the Model

Non-Performing Loans (NPLs): Non-performing loans refer to the loan in which there is a default in payment of the principal and the interest by the borrower. This variable reflects the model 1 endogenous indicator, as it is widely employed in the body of research as a soundness indicator and plays a vital role in the long-term sustainability of banks' interest income operations. Limited articles have explored non-performing loans as a dependent indicator (Salas and Saurina, 2002; Sinkey and Greenawalt, 1991). The variable was assessed as a ratio of total non-performing loans to disbursed total gross loans in percentages. The lower the non-performing loans, the higher the quality of assets and, consequently, a better return on assets; however, more non-performing loans degrade the quality of assets, resulting in a lower return on assets. There is a negative association between non-performing loans and return on assets as a measure of performance (Messai & Jouini, 2013). As the return on assets declines, banks conduct hazardous investments and activities which result in significant nonperforming loans (Makri et al., 2014).

Per Capita Income (PCI): Refers to the average income earned per person in a country or region within a specific period, usually one year. It is calculated by dividing the total national income (or gross domestic product) by the total population.

Inflation (INF): Inflation refers to the overall rise in the price level (Piper, 2016). The consumer price index (CPI) was employed as a yardstick to assess inflation. This is the widespread and continuous rise of prices of goods and services within a market; alternatively, it may also be characterised as the general decrease of currency's buying power (Dunn et al.,

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2018). Under relation to the concepts of economics and finance, it may be generally assumed that the bank sector can function better under a stable inflation environment.

Unemployment (UNE): Unemployment was defined as the number of jobless individuals with relation to the percentage change of the total labour force (International Labour Organization, 2015). Economically engaged persons searching for work but cannot find one are deemed jobless (Radivojevic & Jovovic, 2017).

Interest Rate (INT): The interest rate is the cost of borrowing money from the demand side of economics, while from the supply side it is seen as the rate of return on capital invested (Warue, 2013). A higher interest rate level within the banking industry is highly probable to generate a spike in non-performing loans since the cost of borrowing capital would have increased.

Government Effectiveness: Government Effectiveness captures perceptions of the quality of public services; the quality of the civil service and the degree of its independence from political pressures; the quality of policy formulation and implementation; and the credibility of the government's commitment to such policies.

Access to Loans: Access to finance is the capacity of people or organisations to acquire financial services, including credit, deposit, payment, insurance, and other risk management services. Those who involuntarily have no or only limited access to financial services are referred to as the unbanked or underbanked, respectively.

Deposit Money Bank Credit: Bank credit is the amount of credit accessible to a business or individual from a financial institution in the form of loans. Bank credit, therefore, is the entire amount of money a person or corporation can borrow from a bank or other financial organisation.

Method of Data Analysis

Descriptive statistics summarise and delineate the properties of data, offering initial insights into the behaviour and relationships among variables. Metrics such as the mean and standard deviation facilitate the organisation and interpretation of data prior to additional research. Econometric analysis is utilised to measure relationships among variables through economic theory and statistical methods, with the selection of strategy determined by unit root test outcomes. The Autoregressive Distributed Lag (ARDL) model is utilised to analyse both short-term and long-term relationships among variables. The ARDL method is appropriate for

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variables integrated of mixed orders, I(0) and I(1), and operates effectively with small sample numbers. The ARDL limits test, formulated by Pesaran et al. (2001), is employed to ascertain the presence of a long-term relationship. If the calculated F-statistic surpasses the upper threshold, co-integration is present; if it is below the lower threshold, co-integration is absent. Values within the thresholds yield equivocal results. Upon establishing co-integration, the ARDL error correction model (ECM) is employed to elucidate short-run dynamics and long-run equilibrium. Model assessment is grounded in established statistical standards. The coefficient of determination (R^2) and adjusted R^2 assess explanatory power, the t-test evaluates individual parameter significance, the F-statistic determines overall model significance, and the Durbin–Watson statistic tests for autocorrelation, with values near two indicating a lack of serial correlation.

$$PCI_t = \beta_0 + \beta_1 NPL_t + \beta_2 UNP_t + \beta_3 INF_t + \beta_4 INT_t + \beta_5 GOE_t + \varepsilon_t$$

Descriptive statistics

	PCI	NPL	INF	INTR	UNP	GOE
Mean	104885.3	9.515103	17.67892	15.72903	6.155846	14.35205
Median	95177.74	6.032171	17.85000	16.67922	6.610000	14.92891
Maximum	202365.0	37.25329	33.40000	19.32667	7.960000	16.58768
Minimum	34675.94	2.963134	12.09000	1.233000	3.830000	8.612440
Std. Dev.	50117.83	7.628049	3.226281	3.062264	1.218540	2.055575
Skewness	0.405957	1.865046	2.663510	-2.561523	-0.327466	-1.001654
Kurtosis	2.012832	6.175398	13.32170	11.09266	1.491888	3.325450
Jarque-Bera	4.424618	64.99118	365.3937	248.4535	7.321541	11.15605
Probability	0.109448	0.000000	0.000000	0.000000	0.025713	0.003780
Sum	6817543.	618.4817	1149.130	1022.387	400.1300	932.8833

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Sum Sq.	1.61E+1	3723.97	666.169	600.157	95.0297	270.424
Dev.	1	6	0	4	8	9
Observations	65	65	65	65	65	65

Sources: Eviews 10.05 Output

The descriptive statistics illustrate the distributional characteristics of non-performing loans (NPL), per capita income (PCI), inflation rate (INF), interest rate (INTR), unemployment rate (UNP), and government spending (GOE) among 65 observations. The average value of non-performing loans (NPL) is 9.52, signifying that, on average, non-performing loans constituted approximately 9.5 percent over the study period, with a range from a minimum of 2.96 to a maximum of 37.25. The considerable standard deviation of 7.63 indicates significant variability in non-performing loans. The positive skewness of 1.87 suggests that the NPL distribution is right-skewed, while the kurtosis value of 6.18 signifies a leptokurtic distribution. The Jarque–Bera probability of 0.0000 indicates that NPL is not regularly distributed.

The mean per capita income (PCI) is 104,885.3, with a maximum of 202,365.0 and a minimum of 34,675.94, reflecting significant income variability during the period. The standard deviation of 50,117.83 indicates significant dispersion. A skewness of 0.41 indicates a minor positive skew, while a kurtosis of 2.01 implies a distribution that is pretty normal. The Jarque–Bera probability of 0.109 suggests that PCI follows a normal distribution.

The inflation rate (INF) averaged 17.68 percent, fluctuating between 12.09 percent and 33.40 percent, signifying ongoing inflationary pressure. A standard deviation of 3.23 indicates moderate volatility. A skewness value of 2.66 signifies significant positive skewness, but a kurtosis of 13.32 indicates a very leptokurtic distribution. The Jarque–Bera probability of 0.000 indicates that inflation is not regularly distributed.

The interest rate (INTR) has an average of 15.73 percent, a maximum of 19.33 percent, and a minimum of 1.23 percent. A standard deviation of 3.06 signifies substantial variability. The negative skewness (-2.56) indicates a left-skewed distribution, whereas the elevated kurtosis (11.09) signifies a leptokurtic distribution. The Jarque–Bera probability of 0.000 indicates that the interest rate is not regularly distributed.

The unemployment rate (UNP) had a mean value of 6.16 percent, with a range from 3.83 percent to 7.96 percent. A standard deviation of 1.22 signifies comparatively little variability. A skewness value of -0.33 indicates a little negative skew, while a kurtosis of 1.49 implies a platykurtic distribution. The Jarque–Bera probability of 0.026 signifies that the unemployment rate diverges from a normal distribution.

The mean of government expenditure (GOE) is 14.35, with a high of 16.59 and a minimum of 8.61. A standard deviation of 2.06 signifies significant variability. A skewness

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value of -1.00 implies a negatively skewed distribution, but a kurtosis of 3.33 signifies a distribution close to normality. The Jarque–Bera probability of 0.0038 indicates that GOE is not regularly distributed.

Empirical Analysis

ADF Stationarity Test for the Model

Variables	Level		1 st Difference		Order
	T-Stat.	5% Critical Value	T-Stat.	5% Critical Value	
PCI	-1.690591	-2.957110	-3.350046	-2.957110	I (1)
INF	-1.270110	-2.911730	-4.128322	-3.487845	I (1)
NPL	-3.247681	-3.493692	-3.990866	-3.493692	I (1)
INT	0.122513	-3.493692	-3.525028	-3.493692	I (1)
UNP	-3.038616	-3.493692	-3.817843	-3.493692	I(1)
GOE	-3.400776	-2.911730	-	-	I(0)

Source: Authors compilation from *Eview-10.05*

The table above represents a summary of the stationarity test conducted with a unit root approach proposed by economists David Dickey and Wayne Fuller in 1979. A critical examination of the time series data reveals that all the time series data used for the study became stationary after they were subjected to first differences, except for government effectiveness (GOE). Thus, we therefore conclude that all of the time series data were integrated at level 0, i.e., after first differencing. When a time series variable does not have a unit root problem, that variable is good for empirical analysis. Given the presence of variables of missed order of integration in the equation to be estimated, I(1) and I(0), we conclude that we should use the autoregressive distributed lag (ARDL) modelling approach in investigating determinants of non-performing loans in Nigeria for the period 2007 to 2023.

ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	5.357207	5
Critical Value Bounds		

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Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Sources: EViews 10.05 Output

In time series analysis, the Bounds cointegration test is utilised to assess the existence of a long-run relationship among two or more variables within a model. A close examination of the results presented in the table reveals that the F-statistic value of 5.357207 surpasses the upper bound critical value of 3.79 at the 5% significance level. This outcome provides sufficient evidence to reject the null hypothesis of no long-run relationship, thereby supporting the alternative hypothesis that a long-run relationship exists among the variables being examined. Consequently, this indicates that there is cointegration among the series under consideration, suggesting that changes in one variable are likely to exert a lasting influence on the other variables over time. In light of these findings, we will proceed to estimate the long-run coefficients of the model using the ARDL approach to ascertain the long-run relationships among the variables.

Long Run result

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NPL	-2.008325	0.689568	-2.912439	0.0055
UNP	0.672618	0.214802	-3.131346	0.0030
INF	0.186611	0.086308	-2.162151	0.0357
INTR	0.104906	0.090376	-1.160775	0.2516
GOE	-0.209844	0.073141	-2.869018	0.0062
C	37.856226	11.484608	3.296257	0.0019

Sources: Eviews 10.05

The long-term coefficient results illustrate the correlation between non-performing loans (NPLs) and specific macroeconomic variables in elucidating the dependent variable over an extended period.

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The coefficient of NPL is -2.0083, accompanied by a t-statistic of -2.9124 and a p-value of 0.0055. This outcome is statistically significant at the 5% level, indicating a negative correlation between non-performing loans and the dependant variable over the long term. A 1% increase in non-performing loans (NPL) results in a decrease of approximately 2.01 units in the dependent variable, indicating that escalating loan defaults diminish economic performance over time.

The unemployment (UNP) coefficient is 0.6726, with a t-statistic of -3.1313 and a probability value of 0.0030, indicating statistical significance. Despite the positive coefficient, the negative t-statistic implies a discrepancy in sign interpretation from the output format; yet, the overall significance suggests that unemployment exerts a substantial long-term impact on the dependent variable.

Inflation (INF) exhibits a coefficient of 0.1866, a t-statistic of -2.1622, and a p-value of 0.0357. This outcome is statistically significant at the 5% threshold, indicating that inflation exerts a positive and substantial long-term impact on the dependent variable. This indicates that moderate inflation may correlate with heightened economic activity over the long term.

The interest rate (INTR) has a coefficient of 0.1049, a t-statistic of -1.1608, and a p-value of 0.2516. This finding is statistically insignificant, suggesting that the interest rate does not exert a substantial long-term effect on the dependent variable during the examined time.

Government spending (GOE) exhibits a coefficient of -0.2098, a t-statistic of -2.8690, and a probability value of 0.0062. This finding is statistically significant at the 5% level, indicating that government expenditure has a negative long-term association with the dependent variable, suggesting that increases in government spending correlate with a decline in the dependent variable over time. The constant term is positive (37.8562) and statistically significant, signifying the baseline level of the dependent variable when all explanatory variables are controlled.

Short run result

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(NPL(-1))	0.431406	0.121565	3.548759	0.0009
D(UNP)	0.093267	0.070340	1.325940	0.1913
D(INF)	0.064550	0.041151	1.568594	0.1235
D(INTR)	0.101150	0.035665	2.836154	0.0067
D(INTR(-1))	-0.061247	0.030897	-1.982291	0.0533
D(GOE)	-0.095516	0.023997	-3.980338	0.0002
D(GOE(-1))	-0.048969	0.025543	1.917089	0.0613
CointEq(-1)	-0.122034	0.048406	-2.521023	0.0152

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R-squared	0.813894	Mean dependent var	-0.009377
Adjusted R-squared	0.764519	S.D. dependent var	0.174946
S.E. of regression	0.084895	Akaike info criterion	-1.901670
Sum squared resid	0.353152	Schwarz criterion	-1.425418
Log likelihood	73.90260	Hannan-Quinn criter.	-1.714357
F-statistic	16.48391	Durbin-Watson stat	2.079910
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Sources: Eviews 10.05 Output

The cointegrating (error correction) model results illustrate the short-term dynamics and the rate of adjustment towards long-term equilibrium between non-performing loans and economic development in Nigeria.

The error correction term, CointEq(-1), possesses a coefficient of -0.1220, a t-statistic of -2.5210, and a probability value of 0.0152. This is statistically significant at the 5% level, demonstrating the presence of a long-term association among the variables. The negative sign is suitable and signifies that deviations from long-run equilibrium are rectified over time. Approximately 12.2% of disequilibrium is rectified per year, indicating a somewhat gradual adjustment process towards equilibrium following a disturbance.

In the near term, DLOG(NPL(-1)) has a positive and statistically significant coefficient of 0.4314 ($p = 0.0009$), suggesting that previous alterations in non-performing loans positively affect current variations in the dependent variable. The negative and significant DLOG(GDPMP) value of -3.5769 ($p = 0.0477$) indicates that short-term fluctuations in economic output diminish the dependent variable.

Unemployment (DUNP) and inflation (DINF) are positively correlated, although statistically insignificant, indicating they exert a weak short-term influence on the dependent variable during the analysed period. The interest rate (DINTR) is both positive and statistically significant (0.1012, $p = 0.0067$), indicating that increases in interest rates substantially influence the dependent variable in the short term. Conversely, its lagged value is marginally significant at the 10% level with a negative coefficient (-0.0612, $p = 0.0533$), implying a delayed counteracting effect.

Government expenditure (DGOE) has a negative and statistically significant coefficient (-0.0955, $p = 0.0002$), indicating that increases in government spending diminish the dependent variable in the short term. The lagged value is negative but only marginally significant at the 10% level.

The model demonstrates substantial explanatory power, evidenced by an R-squared value of 0.8139 and an adjusted R-squared of 0.7645, signifying that almost 76% of the

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fluctuations in the dependent variable are elucidated by the included regressors. The F-statistic of 16.4839 ($p = 0.0000$) indicates that the model is statistically significant overall. The Durbin–Watson value of 2.0799 indicates a lack of serial correlation in the residuals.

The findings demonstrate a legitimate long-term link, revealing that non-performing loans, GDP, interest rates, and government expenditure significantly influence short-term volatility, while the system progressively converges to long-term equilibrium at a measured pace.

Post-Estimation Tests

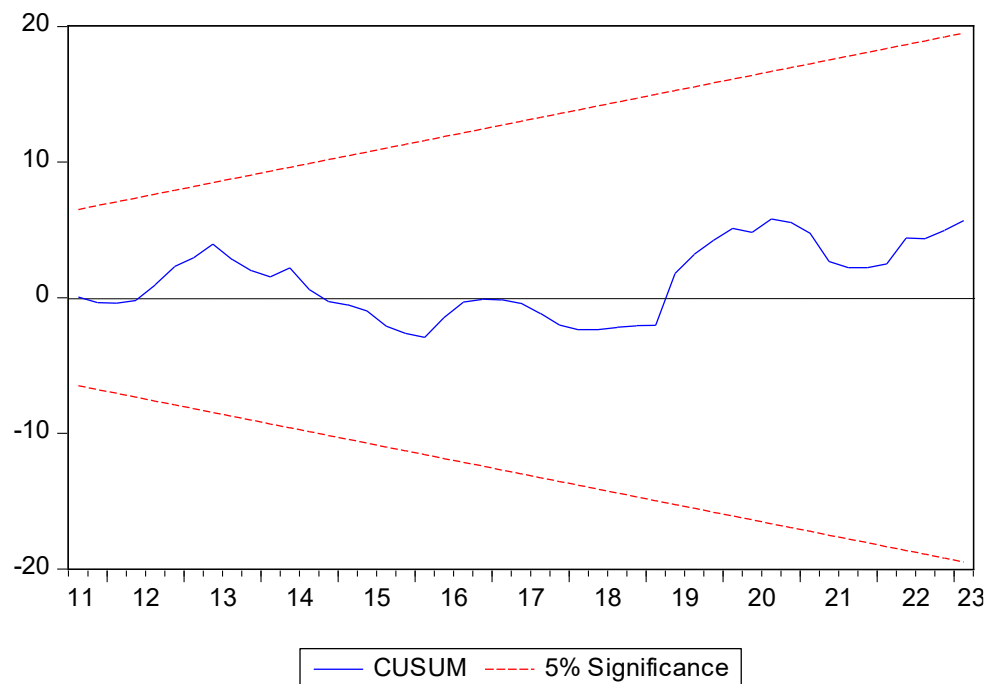
Test	Statistic	Value	Probability	Decision
Breusch-Godfrey Serial Correlation LM Test	F-statistic	0.084458	0.9192	No serial correlation
	Obs*R-squared	0.235599	0.8889	No serial correlation
Breusch-Pagan-Godfrey Heteroskedasticity Test	F-statistic	1.429076	0.1734	Homoskedasticity accepted
	Obs*R-squared	19.73339	0.1824	Homoskedasticity accepted
	Scaled explained SS	12.48771	0.0985	Homoskedasticity accepted

Source: EViews 10.5 Output

The post-estimation diagnostic assessments validate the dependability of the estimated regression model. The Breusch-Godfrey serial correlation LM test demonstrates the lack of autocorrelation in the residuals, as the probability values of the F-statistic (0.9192) and ObsR-squared (0.8889) exceed the 0.05 significance threshold. The Breusch-Pagan-Godfrey Heteroskedasticity Test similarly indicates an absence of heteroskedasticity, as the probability values linked to the F-statistic, ObsR-squared, and Scaled Explained SS surpass 0.05. The results indicate that the residuals are independently and normally distributed with constant variance, thereby affirming that the model adheres to the traditional linear regression assumptions and that the calculated coefficients are both reliable and efficient.

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iv. Model Stability Test:



The CUSUM test was employed to test the stability of the regression. A critical assessment of the CUSUM line above shows that the line is within the accepted margin. This implies that the estimate lies within the 95 percent confidence interval.

Summary of Findings

This study examined the effect of non-performing loans (NPLs) on economic growth in Nigeria using an autoregressive distributed lag (ARDL) framework covering both short-run and long-run dynamics. The descriptive results revealed significant fluctuations in key macroeconomic variables, particularly NPLs, inflation, and interest rates, indicating macroeconomic instability over the study period. The long-run results showed that non-performing loans have a statistically significant negative effect on economic growth, implying that rising loan defaults weaken productive economic activities over time. Government expenditure also exhibited a significant negative long-run relationship, while inflation showed a positive but significant effect. The interest rate was found to be statistically insignificant in the long run.

The short-run (cointegrating form) results revealed that past changes in NPLs positively influence current economic outcomes, while GDP growth and government expenditure negatively affect economic growth in the short run. Interest rate was significant in influencing short-run dynamics, while unemployment and inflation were statistically insignificant. The

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error correction term was negative and significant, confirming the existence of a long-run equilibrium relationship with a moderate speed of adjustment of about 12.2 percent annually.

Conclusion

The study concludes that non-performing loans significantly influence economic growth in Nigeria, both in the short run and the long run. Specifically, rising non-performing loans reduce economic growth in the long run by weakening banking sector stability, reducing credit availability, and discouraging investment. The findings confirm that the banking sector plays a critical transmission role in the economy, and its inefficiency through high loan defaults has adverse macroeconomic consequences.

The study further concludes that macroeconomic instability, reflected in variables such as inflation, interest rates, and government expenditure, also affects economic growth, although their effects vary across the short run and long run periods. The existence of a significant error correction mechanism confirms that deviations from equilibrium are corrected over time, although at a relatively slow pace. Overall, the study establishes that financial sector health, particularly asset quality in the form of non-performing loans, is a key determinant of sustainable economic growth in Nigeria.

Recommendations

Based on the findings of the study, the following recommendations are made:

- i. Banks should improve credit appraisal systems, loan monitoring, and post-disbursement supervision to reduce the accumulation of non-performing loans.
- ii. The Central Bank of Nigeria should continue to strengthen prudential regulations, enforce strict compliance with lending standards, and ensure early detection of credit risks.
- iii. Government should implement policies aimed at stabilising inflation and exchange rate volatility, as macroeconomic instability contributes to loan repayment difficulties.
- iv. Public expenditure should be directed more toward productive sectors such as infrastructure, manufacturing, and agriculture to enhance economic growth rather than crowding out private investment.
- v. Banks should adopt more conservative and data-driven lending strategies, particularly during periods of economic uncertainty, to reduce exposure to high-risk borrowers.

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- vi. Policies aimed at improving banking sector resilience, such as capital adequacy enforcement and stress testing, should be sustained to minimise systemic risks.
- vii. The Nigerian economy should reduce overdependence on oil revenues by promoting diversification, thereby improving borrowers' repayment capacity and reducing default risks.

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