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RESEARCH ARTICLE

Macro-Economic Determinant of Non-Performing Loan in Nigeria

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Abstract

The study examined the macro-economic determinant of non-performing loan in Nigeria. The independent variables used are real interest rate (RERAT), inflation (INFLA), rate of exchange (RATE), and unemployment (UNEMP) and the dependent variable is nonperforming loan (NPLs) measured by bank non-performing loans to total gross loans (%). The ex post facto resign design was explored. Secondary time series data obtain from World Bank indicators spanning through 2013 through 2022 was used. Different statistical test was executed with the aid of Econometric Views 9.0. From the analyses, results showed that RERAT and INFLA has positive minor effect on NPLs of banks in Nigeria. While, RATE and UNEMP has a negative trivial effect on NPLs of banks in Nigeria. The study concludes that, the macroeconomic variable of the study is a weak determinant of NPLs of banks in Nigeria. The study recommends that: monetary regulators should look into real interest rate as well as fixing of prices in favour of banks since they have positive impact on NPLs. Also, internal variables of the banks should be evaluated in order to expose what actually endear loan nonperformance in financial service sector.

Keywords: Loan; Non-Performing; Real Interest Rate; Inflation

Introduction

Several countries have had financial crises over the years. The most recent financial crises happened in US as a result of the 2007 and 2008 financial credit crunch, which resulted in financial crises and market instability. Earlier in 1997, developing countries in East Asia experienced financial crisis in the form of a substantial outflow of foreign investment. The expansion of non-performing loans (NPLs) in banking advances is a defining feature of monetary crises (Gambo et al., 2017). These are tied to financial system failures and crises (Ghosh, 2015). Following the worldwide crises, NPLs have received a lot of attention from the government and banks management. This trend is especially important for states that deeply rely on banks to allocate funds across their economies. Banks play essential role in the sustainability of bank and are known as the principal source of funding in banking-centered economies, where capital markets are still developing (Moradi et al., 2016). The rising amount of NPLs has an immediate impact on the country's financial status, followed by commercial banks in elongated terms. NPLs are widely considered to be related to bank failures and monetary crises in both emerging and advanced countries (Caprio and Klingebiel, 2002). Macroeconomic variables include market-influencing dynamics such as GDP, inflation, the rate of economic growth, industrial production, national income, and unemployment rates, among others. Castro (2024) find that economic growth, unemployment, and inflation are the primary macroeconomic variables affecting NPLs. The study accentuates the status of macroeconomic stability in reducing NPL ratios.

While gross domestic product (GDP) is the monetary worth of goods and services generated in a country over a given time period, inflation is the overall rise in commodity prices. The exchange rate is the rate at which one country's currency is converted to another. Any increase in any of these macro variables has an impact on business and commercial activity, and financial institutions (banks) are no exception (Aroghene & Imene, 2023). Crises do not arise by random; the best warning signs of a financial crisis are proxies for banks and commercial sectors' vulnerability. the most obvious indicators that can be used to predict banking crises are loan non-performance. Abid & Naifar (2023) investigate the influence of macroeconomic and bank-specific variables on NPLs in the MENA region. They suggest that GDP progress and inflation are significant determinants, with complex inflation leading to NPLs growth. According to Dumitrescu and Fitz (2023), the number of NPLs has consistently risen. When NPLs are regularly rolled over, assets that could be place in productive segments of the economy are tampered. In reality, there is ample evidence that Central and Eastern Europe, countries' financial/banking crises were preceded by great level of NPLs (Dumitrescu & Fitz, 2023). Despite the obvious link amid bank predicaments and NPLs, the literature on the roots of non-performing loans concentrated on macroeconomic variables rather than the upshot of interest rates (Kumar & Singh, 2023; Castro, 2024). Although, Haneef and Karim (2012) found that the accumulation of NPLs was caused by economic slumps and macroeconomic precariousness, terms of trade ruin, exorbitant interest rates, excessive dependence on unduly high-priced interbank borrowings, insider lending, and ethical hazard. Owing to controversies surrounding what causes bank loans to become volatile, the study investigated macroeconomic determinants of nonperforming loans in Nigeria by means of real interest rate (RERAT), rate of exchange (RATE), inflation (INFLA), and unemployment (UNEMP) as independent variables and nonperforming loan (NPLs) proxy with bank nonperforming loans to total gross loans (%) as dependent variable in order to achieve the study objective.

Review of Related Literature

Non-performing loans (NPLs)

NPLs are non-performing loans. NPL is one for which the borrower has fallen behind on monthly principal and interest payments for a set period of time. A loan turns out to be non-performing when close by are indicators that the debtor is likely not to return it, or when the borrower has failed to pay the agreed-upon instalments for 90 days and more. Giving the declaration of IMF, a loan is termed NPL if it does not produce interest or principal payments for 90 days at least. Non-performing loans have greater risk weights, which marks to higher capital requirements. To retain or boost sufficient capital, banks may reduce its debt, which reduces lending supply. This will have sway on profitability; if a bank's NPLs are larger, the earning level will fall, indicating NPLs have a deleterious effect on profitability. This state can be generated by a diversity of causes, including the debtor's loss of his prime source of income, his intentional absence from paying payments, and others. To assess factors influencing NPLs, the study looked into macroeconomic factors of NPLs.

Real Interest Rate (RERAT)

RERAT displays the precise price of money to the debtor likewise the lender's or investor's true yield. RERAT takes inflation into account, providing an additional degree of the borrower's purchasing power when the position is redeemed. Offering credit appears to be the most essential of all banking operations because the fee payable is how banks create cash flow. RERAT is the cost a borrower pays to borrow from a lender/financial institution, or the fee charged on borrowed assets (Ghosh, 2023). It gauges the cost that borrowers are willing to offer capital owners, likewise the price lenders are eager to lend money to businesses in exchange for use. The loan cost includes principal

settlement, and RERAT are determined throughout the loan request procedure. As stated by Azzawi (2023), if lending rates are not restricted, banks can fix higher risk premium and so lend more.

Inflation (INFLA)

Inflation indicates the overall increase in commodity prices as assessed by the consumer price indicator. When price increases drastically drops, banks lose their main basis of revenue, and stability from prolonged price rises results to decline, which is detrimental to the economy (Abid & Naifar, 2023). Inflation is caused by the rapid degradation of commercial banks' equity and, as such, increasing risk in certain African countries' banking sectors (Dumitrescu & Fitz, 2023). Inflationary pressures eventually drive interest rates upward, having a major control on interest rates plus NPLs. Without adequate remedies, the detrimental impact of inflation on banks will erode their long-term success and profitability (Aroghene & Akpoyibo, 2023). It is particularly critical for banks to invest during times of low inflation since consumers have more spending power and demand for bank services and programs.

Rate of Exchange (RATE)

Exchange rate is the price at which one legal tender can be converted for another across countries or economic zones. It calculates the relative worth of different currencies and predicts trade and capital movement dynamics (Aroghene & Imene, 2023). Currency exchange rates volatility affects a bank's prediction of asset worth, burdens, income, and associated costs, besides its assets and liabilities (Aroghene, 2022).

Unemployment (UNEMP)

Unemployment is a scenario in which a person actively seeks work but is incapable. Frictional, cyclical, structural, and institutional unemployment are all possible classifications. Unemployment is perceived as a significant meter of economic health. UNEMP is a crucial economic gauge since it represents employees' capacity (or inability) to obtain job and add to the industrious yield (Imene & Udjo-Onovughakpor, 2023). Extra jobless workers equal less overall economic output. Vast levels of joblessness indicate economic upheaval, but exceptionally low levels may indicate a recession. An upshot in unemployment rate might result to considerable decrease in demand for new loans, causing the proportion of bearing interest assets to bearing interest obligations to deteriorate significantly. An increase in unemployment will reduce households' reimbursing capacity, resulting in rise in level of default.

Theoretical Review

Portfolio Theory (PT)

Portfolio theory of investing attempts to make the most of estimated return for a given extent of risk within the portfolio, or to curtail risk for a certain level of projected return, by judiciously selecting the extents of numerous assets. PT aim at the goal of selecting venture/assets that is collectively less risky than any one asset. This is immediately obvious since diverse categories of assets frequently change in opposite directions. With mention to the stock market, once the stock market falls, bond market values typically rise, and vice versa. Consequently, combining dual types of assets could minimize total risk compared to using each alone. Although, diversification on reduces risk even when returns are favorable rather than adverse (Markowitz, 1952).

Empirical Review

Makri et al. (2023) conducted practical analysis on the factors of NPLs in Euro, discovering that GDP growth, unemployment, and inflation are the main macroeconomic factors influencing NPLs, with an economic downturn leading to a surge in NPLs. Klein (2023) studies macroeconomic shocks on NPLs in advanced States, revealing that GDP growth, inflation, and exchange rate fluctuations are critical determinants. The study underscores macroeconomic environments in maintaining low NPL ratios. Ghosh (2023) examines effect of macroeconomic factors on NPLs in Indian banks, finding that economic growth, INFLA, and RERAT are significant determinants, with higher INFLA and RERAT leading to NPLs growth. Salas and Saurina (2023) analyze the determinants of NPLs in the Spanish banking sector, identifying GDP growth, unemployment, and real estate prices as significant macroeconomic factors. They highlight housing market in influencing NPL levels. Castro (2024) explore a study on causes of Latin American countries NPLs. He found that economic growth, unemployment, and inflation are the primary macroeconomic variables affecting NPLs. The study accentuates the status of macroeconomic stability in reducing NPL ratios. Abid and Naifar (2023) investigate macroeconomic and bank-specific variables on NPLs in the MENA region. Their findings suggest that GDP growth and inflation are significant determinants, with higher inflation leading to surge in NPLs. El-Masry & Al-Azzawi (2023) explore the macroeconomic determinants of NPLs in the Gulf Cooperation Council (GCC) countries, identifying GDP growth, oil prices, and interest rates as critical factors influencing NPLs, with oil price fluctuations showing significant power. Dumitrescu & Fitz (2023) study inflation and monetary policy in shaping NPLs in Central and Eastern Europe, finding that higher inflation and tight monetary policy are associated with higher NPLs, particularly in periods of economic stress. Kumar & Singh (2023) analyze macroeconomic indicators and NPLs in the BRICS nations, showing that GDP growth, exchange rates, and inflation are significant determinants, with economic downturns leading to higher NPL levels. Carreira and Silva (2024) study in Euro area banking sector, found that economic cycles and credit growth are significant determinants of NPLs, with recessions and rapid credit expansion leading to higher NPL ratios. According to Hue (2015), the loan growth rate increased non-performing loans of banks in Vietnamese between 2009 and 2012. According to Kirui (2014), NPLs had a detrimental influence on viability of Kenyan commercial banks from 2004 to 2013. Kumar and Kishore (2019) considered finance and microeconomic characteristics as potential causes of NPLs in UAE banking system and discovered that ROA had a moderate connection with NPLs.

Gap in Literature

Through the progress of time, most NPL studies concentrated on macroeconomic and banking issues. Each study presents separate results, interpretations, and achievements. Despite this, there exist great need for a detailed grasp of factors that bequeath to bank loan being nonperforming. Base on the aforementioned, the study looked into the macroeconomic indications of NPLs in Nigeria, adopting real interest rates, currency exchange rates, inflation, and unemployment as independent variables and nonperforming loans as proxies for total gross loans (%) as the dependent variable.

Methodology

Nigeria Banks serve as the population as well as the sample of the study. Base on availability, uniformity and timeframe, the aggregate time series data were obtained from World Bank indicators. Thus, the sample represent the population of the Nigeria banks. The published annual reports and accounts of the World Bank indicators for the financial period of through (10years) spanning from 2013 through 2022 were used. Similarly, the library, the review of different articles, papers and relevant previous studies was consulted. The data used for this study is already existing. That is, they were not collected for the first time by the researchers. The method of data collection

used for this study is the electronic method of data collection. Electronic because the data was obtained from the internet and they existed in soft copy. The statistical software used is econometric views version 9.0. It is one among the statistical packages used in quantitative research in the social sciences. The different estimations used were: descriptive statistics, correlation analysis, multicollinearity and normality test. While ordinary least square was adopted to test the hypotheses. The multiple regression model was adopted for purpose of the study. The work of Abid and Naifar (2023) was modified for the study. This study model is status thus:

$$NPLs = f(RERAT, INFLA, RATE, UNEMP) \quad (1)$$

$$BANKR = \beta 0 + \beta 1RERAT + \beta 2INFLA + \beta 3RATE + \beta 4UNEMP + \varepsilon \quad (2)$$

Where:
β0 = Intercept
NPLs = Non-Performing Loans
RERAT = Real Interest Rate
INFLA = Inflation
RATE = Rate of Exchange
UNEMP = Unemployment
β1–β4 = Coefficient of the Independent Variables.
ε = Error Term
Aprori expectation for the variables is positive or negative sign.

Table 1. Variables and Measurement

S/N	Variables	Acronyms	Measure	Type of Variable	Source
1	Non-Performing Loans	NPLs	Bank non-performing loans to total gross loans (%).	Dependent Variable	World Development Indicators
2	Real Interest Rate	RERAT	Real interest rate (%).	Independent Variable	World Development Indicators
3	Inflation	INFLA	Inflation, consumer prices (annual %).	Independent Variable	World Development Indicators
4	Rate of exchange	RATE	Official exchange rate per US $.	Independent Variable	World Development Indicators
5	Unemployment	UNEMP	Unemployment total (%of total labor force)	Independent Variable	World Development Indicators

Results and Discussion

In Table 2, NPLs has a mean of 7.15000, max. and min. of 14.8000 and 3.0000 whereas the Std. Dev stood at 4.2834. But RERAT has a mean of 6.6800, maximum and minimum of 13.6000 and 0.9000. Whereas the standard deviation stood at 4.2365. In same vein, INFLA has a mean of 3.0200, max. and min. of 18.8000 and 8.0000. Whereas the Std. Dev stood at 3.8562. Similarly, RATE has a mean of 286.6600, max. and min. of 426.0000 and 157.3000. Whereas the Std. Dev stood at 95.4585. Likewise, UNEMP has a mean of 4.89000, max. and min. of 6.0000 and 3.7000. Whereas the Std. Dev stood at 0.833267.

Table 2. Summary of Descriptive Statistics

	NPLS	RERAT	INFLA	RATE	UNEMP
Mean	7.150000	6.680000	13.02000	286.6600	4.890000
Median	5.450000	5.950000	12.65000	305.9500	4.850000
Maximum	14.80000	13.60000	18.80000	426.0000	6.000000
Minimum	3.000000	0.900000	8.000000	157.3000	3.700000
Std. Dev.	4.283366	4.236560	3.856250	95.45857	0.833267
Skewness	0.806219	0.243165	0.058612	-0.071715	0.026819
Kurtosis	2.024517	2.012259	1.611490	1.792693	1.657068
Jarque-Bera	1.479802	0.505062	0.809042	0.615901	0.752643
Probability	0.477161	0.776832	0.667296	0.734952	0.686382

Source: Computed From Data Obtained from World Bank Database Using Econometric Views Version 9.0., (2024)

Equally, Table 2 revealed that apart from RATE that is negatively skewed, NPLs, RERAT, INFLA and UNEMP were positively skewed. The Jarque-Bera Probability showed that the data set are normally distribute

Table 3. Correlation Analysis

	NPLS	RERAT	INFLA	RATE	UNEMP
NPLS	1.000000				
RERAT	-0.164401	1.000000			
INFLA	0.396207	-0.859223	1.000000		
RATE	0.128610	-0.945049	0.847507	1.000000	
UNEMP	0.006070	-0.869391	0.701670	0.958295	1.000000

Source: Computed From Data Obtained from World Bank Database Using Econometric Views Version 9.0., (2024)

Table 3 showed the correlation analysis for NPLs, RERAT, INFLA, RATE and UNEMP. RERAT has a weak negative correlation with NPLs. INFLA has a moderate positive relationship with NPLs. RATE has a weak positive correlation with NPLs likewise UNEMP. From the correlation coefficient there is absence of perfect correlation among the variable of study.

Table 4. Multi collinearity Test

Variance Inflation Factors

Date: 01/27/24 Time: 17:25

Sample: 2013 2022, Included observations: 10

	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
C	1082.454	477.4643	NA
RERAT	1.556819	41.73510	11.09274
INFLA	1.290043	104.0779	7.615674
RATE	0.017559	699.9861	63.52039
UNEMP	99.53548	1077.285	27.43593

Source: Computed From Data Obtained from World Bank Database Using Econometric Views Version 9.0., (2024)

Table 4 showed the Variance Inflation Factors for the studied variables. The centered VIF of the variables are greater than one but less than ten which connotes the absence of multi collinearity among the variables.

Table 5. Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.588927	Prob. F(4,5)	0.1625
Obs*R-squared	6.743881	Prob. Chi-Square (4)	0.1501
Scaled explained SS	0.889606	Prob. Chi-Square (4)	0.9260

Source: Computed From Data Obtained from World Bank Database Using Econometric Views Version 9.0., (2024).

Table 5 Showed Heteroskedasticity Test: Breusch-Pagan-Godfrey for the variables of study. The Prob. Chi-square (2) value of 0.1501 greater than 0.05 indicated that the variables of the study is homoscedastic.

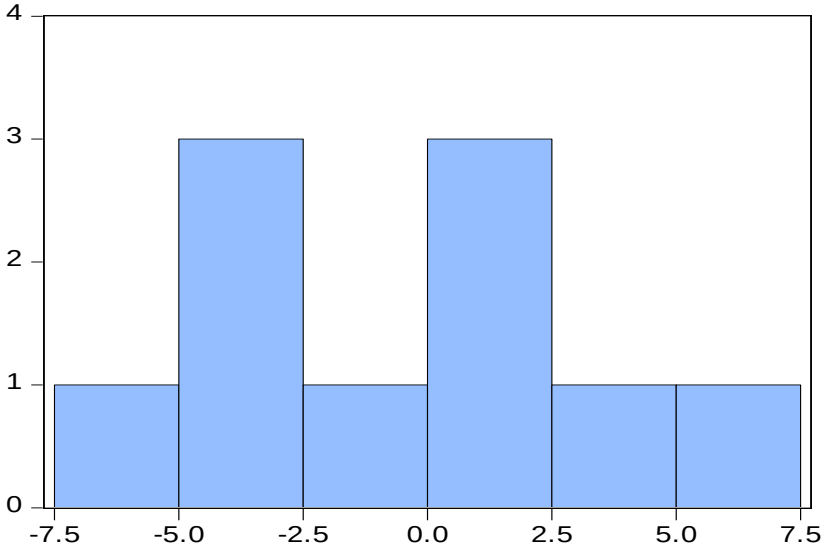

Figure 1: Normality Test

Source: Computed from Data Obtained from World Bank Database Using Econometric Views Version 9.0., (2024)

Figure 1 showed normality test for the variables of study. Thus, the Jarque-Bera Prob. of 0.7899, is an indication that the data are normally distributed and suitable for regression analysis.

Table 6: Summary of Regression Result
Dependent Variable: NPLS
Method: Least Squares
Date: 01/27/24 Time: 17:04
Sample: 2013 2022
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.590656	32.90067	0.017953	0.9864
RERAT	0.203524	1.247725	0.163116	0.8768
INFLA	1.096444	1.135800	0.965349	0.3787
RATE	-0.015121	0.132512	-0.114109	0.9136
UNEMP	-0.969608	9.976747	-0.097187	0.9264
R-squared	0.313523	Mean dependent var		7.150000
Adjusted R-squared	-0.235658	S.D. dependent var		4.283366
S.E. of regression	4.761397	Akaike info criterion		6.265812
Sum squared resid	113.3545	Schwarz criterion		6.417104
Log likelihood	-26.32906	Hannan-Quinn criter.		6.099844
F-statistic	0.570892	Durbin-Watson stat		0.544305
Prob(F-statistic)	0.696487			

Source: Computed from Data Obtained from World Bank Database Using Econometric Views Version 9.0., (2024).

Discussion

Real interest rate (RERAT) and Non-performing loan (NPLs)

RERAT has a coefficient value of 0.20352, t- Statistics value of 0.16311and associated prob. value of 0.8768. This value illustrated that RERAT has a positive insignificant influence on NPLs of banks in Nigeria. This finding agreed with the findings of Ghosh (2023) but contradicts that of Azzawi (2023).

Inflation (INFLA) and Non-performing loan (NPLs)

INFLA has a coefficient value of 1.0964, t- Statistics value of 0.965349 and associated prob. value of 0.3787. This value illustrated that INFLA has a positive insignificant influence on NPLs of banks in Nigeria. This finding agreed with the findings of Abid and Naifar (2023); Dumitrescu & Fitz (2023).

Rate of exchange (RATE) and Non-performing loan (NPLs)

RATE has a coefficient value of -0.015121, t- Statistics value of -0.114109 and associated prob. value of 0.9136. This value illustrated that RATE has a negative insignificant influence on NPLs of banks in Nigeria. This finding agreed with the findings of Kumar and Singh (2023); Makri et al. (2023) contrary to Kumar and Singh (2023).

Unemployment (UNEMP) and Non-performing loan (NPLs)

UNEMP has a coefficient value of -0.969608, t- Statistics value of -0.097187 and associated prob. value of 0.9264. This value illustrated that UNEMP has a negative insignificant influence on NPLs of banks in Nigeria. This finding agreed with the findings of Castro (2024) but contradicts that of Salas and Saurina (2023).

Equally, the coefficient of determination (R-squared) stood at 0.3135 while the Durbin-Watson stat 0.5443. The R-squared showed that 31% of the study regressors are responsible for variation in NPLs of banks in Nigeria. The remainder of 69% is held accounted for by the error term. The F statistics showed that the model is insignificant.

Conclusion

The study examined macroeconomic determinant of non-performing loan in Nigeria with the used of real interest rate (RERAT), inflation (INFLA), rate of exchange (RATE) and unemployment (UNEMP) as independent variable. Non-performing loan (NPLs) stood as the dependent variable. From the analyses carried out, RERAT shows positive not significant coefficient, INFLA shows positive not significant value, same as RATE and UNEMP. Only that RATE and UNEMP shows inverse coefficient. it's safe to conclude that the macroeconomic variable of the study is a weak determinant of NPLs of banks in Nigeria. Due to the weak coefficient of determination. The study recommends that: monetary regulators should look into real interest rate as well as fixing of prices since they have positive impact on NPLs. Also, internal variables of the banks should be evaluated in order to exposed what actually endear loan nonperformance. Hence future study can modify the study variables by looking at bank specific factors.

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Authors contribution: The authors declare that they both contributed meaningfully to the preparation of the manuscript.

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