MACRO-ECONOMIC FACTORS AND NON-PERFORMING LOANS OF LISTED BANKS IN SELECTED SUB-SAHARAN AFRICAN COUNTRIES

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Abstract
The study investigated the impact of macro-economic factors on non-performing loans of listed banks in six (6) selected Sub-Saharan African Countries. The six SSA are Nigeria, Ghana, South Africa, Botswana, Kenya and Tanzania. The population of the study comprised all banks in the selected SSA, sample of the study comprises thirty-six (36) listed banks in selected SSA.The study employed secondary data extracted from the sampled banks' annual audited financial statements, ranging from (2011 - 2023). In order to present a robust outcome in the relationships, a dynamic estimation procedure was adapted based on 'system GMM' estimation technique, while the dynamic panel data (DPD) approach was adapted as a robustness check. Standard post-estimation diagnostics were used to assess the reliability of the system GMM estimates: the Sargan/Hansen J-statistic test of over-identifying restrictions ($p>0.10$ in all specifications) which confirmed instrument validity, while AR(1)/AR(2) tests supported estimator appropriateness without second-order serial correlation in residuals.The outcomes from the study showed that the pattern of effects of macro-economic factors differ in terms of the factors of measurement used for NPLs indicators. The study found that, Inflation and interest rates do not significantly influence NPLs among SSA banks, while economic growth has a negative impact on non-performing loans. On the other hand, exchange rate has a significant positive impact on non-performing loans among SSA countries. The study recommends that, there is need for financial system to adopt measures that assist in reduction foreign currency denominated loans and providing financing mechanisms that hedge against exchange rate shocks.

Keywords: Financial system, macro-economic factors, non-performing loans, sub-saharan africa.

1.0 Introduction

Non-performing loans have contributed mainly to prior bank failure and envisaged an indicator of the banking crisis (Us, 2017). An increase in non-performing loans reduces asset quality of banks, which trigger banking crisis (Louzis et al., (2012). In addition, increased non-performing loans relate to weaknesses in the financial system, which exposes the bank's vulnerability to credit risk. This has drawn the attention on the determinants of non-performing loans (Abid & Ouertani, 2014; Dimitrios et al., 2016; Ghosh, 2015; Louzis et al., 2012; Maharmah & Saadeh, 2015; Wairimu & Gitundu, 2017). According to Al-Jarrah (2012), the causes of NPL can be

divided into two main categories: systematic and non-systematic risk. The systematic factors have a substantial impact on all financial institutions in the market, and the sources of systematic risk are related to variables that are beyond the bank's control. Non-performing loans refer to the amount of money borrowed by banks' customers from any financial institution, whose principal and interest have not been paid within the period of 90 days or more. On the other hand, non-performing loans (NPLs) are loans that are outstanding both in its principal and interest for a long period of time, contrary to the terms and conditions under the loan contract (CBN, 2017). However, for most failed banks, the real problems are systemic and rooted in a bank's credit culture and management style (Singh, 2005).
Recent evidence has established that the NPL issue is still very pronounced in the SSA banking sector. According to the International Monetary Fund (IMF, 2021), the median NPL ratio in the SSA commodity-exporting countries was as high as 12.4 percent as at 2018, much higher than the average in other emerging market regions, and the COVID-19 pandemic worsened the ability of borrowers to repay loans. These figures underscore the continued importance of studying the impact of macroeconomic conditions on loan quality in the six SSA countries studied here, and not just the cross-regional evidence used in previous studies.

On the other hand, macro-economic policy plays a vital role in economy and bank stability. The bank's stability and credit dynamics are related to banks' internal and external funding problems, for which a significant driver is the business cycle (Bucher et al., 2013). Gaiotti (2013) also argues that credit market distress has its most extreme effects in a business cycle downturn. The credit cycle dynamics are related to the business cycle: the more profound the recession in the economy, the more substantial disincentive lending accelerator effect in banks. In an economic downturn, high default loan rates seriously affect loan collections, and this lessens banks' ability to lend and thus increases the cost of borrowing (Berrios, 2013).

A continuous rise in non-performing loan has posed liquidity challenges, militating against banks performance in Sub-Saharan African countries (Basel Committee on banking supervision, 2017)). The proportion of non-performing loans to total loans and advances in banking system was believed to be the significant caused of the financial crisis experienced in both developing and developed countries in 1990s and 2000s, which eventually led to banks' distress and loss of confidence of many banks in SSA (Badar & Javid, 2013). There is certainty that the negative impact of Covid-19 contributed to heavy NPLs, which affected the activities of the economy, thereby making it difficult for borrowers to pay back their loans. In the light of the above, there is therefore the need to ascertain the relationship between macro-economic factors and non-performing loans of listed banks in SSA.

Focusing on studies in Sub-Saharan Africa, several studies have examined the impact of macro-economic factors on non-performing loans, and their results have different conclusions that were contradictory and country specific. For example, studies such as Wairimu & Gintundu (2017) studied for macroeconomic determinants of NPLs in Kenya, and the study adopted linear regression. Johannes (2020) investigated the impact of macro-economic determinants on non-performing loans in Namibia, and co-integration technique was deployed. Amuakwa-Mensah & Boakye-Adjei (2015) analyzed the detrimental impact of non-performing loans on banks' income and the economy in Ghana, using simple regression. Adeola & Fredric (2017) studied macro-economic factors and NPLs in Nigeria, the research employed regression analysis. Mutemi & Makori (2019) researched on interest rate capping and financial performance of commercial banks in Kenya, and the study applied OLS, on the other hand, Wambari, 2017) examined the

impact of interest rates on financial performance of commercial banks in Kenya, using multiple regression. While Ntabanyane (2021) empirical looked at Non-performing loans: evidence from the South African banking system, the study analyzed data with the use of regression analysis. In this research work, this study adopted 'System Generalized Methods of Moments' as a method of technique, due to the advantage it has over unobserved effects, measurement errors, omitted variables and simultaneity, compare to when OLS or other technique is used.

These previous country-specific studies vary in the macroeconomic determinants studied, in estimation method (linear regression, co-integration, simple OLS), in country context, and in sample period, which makes it difficult to draw comparisons between the results of the studies and accounts for the conflicting results found in the literature. The determinants of NPLs can be evaluated on a common empirical base by using a pooled cross-country panel of thirty-six listed banks in six SSA economies estimated with a single technique that is robust against endogeneity (system GMM). This does not aim to reconcile all the country-specific findings, as there are differences in institutions and regulations between countries, but it does offer more generalisable evidence on the macroeconomic drivers of NPLs in the region than can any single-country study.

The objectives of the study were to:

i. Ascertain the effect of inflation rate on NPLs in Sub-Sahara Africa;
ii. Investigate the impact of interest rate on NLs in Sub-Sahara Africa;
iii. Evaluate the influence of economic growth on NPLs in Sub-Sahara Africa;
iv. Ascertain the extent to which exchange rate influences NPLs in Sub-Sahara Africa, and

The four macroeconomic determinants mentioned above are the only ones considered in this study; other bank-internal (firm-specific) factors are not included in the stated objectives of this study and are therefore not modelled or discussed as determinants of NPLs in this study.

2.0 Literature Review

Non-Performing Loans

Non-performing loan occurs when borrowers fail to abide by the conditions contained in a loan contract, and the interest and principal are not paid as they fall due. This is because, going by the description of non-performing loans, it follows that any loan facility that is not up to date in terms of payment of both principal and interest and at the same time contrary to the terms of the loan agreement, is non-performing loan (Labbe, 2016). That is, the principal and/or interest on these loans have been left unpaid for at least 90 days (Fofack, 2005). Following the 2007–2010 Global Financial Crisis (GFC), several countries like European, United States and a host of others were faced with crises as a result of non-performing loans (EBA (2016), IMF (2015) and ECB (2017a). Thus, the amount of non-performing loan represents the quality of bank assets (Tseganesh, 2012). Non-Performing Loans (NPL) are known as loans overdue which decrease the value of banks' loan portfolios (Labbé, 2016).

Prudential Guidelines and Non-Performing Loans in Nigeria

According to the CBN (2018), prudential guidelines on Non-performing loans stated that, banks shall review their credit portfolio continuously (at least once in a quarter) with a view to recognizing deterioration in credit quality. Such reviews shall classify banks' credit exposures based on the risk of default. In order to facilitate comparability of banks' classification of their credit portfolios, the assessment of risk of default shall be based on criteria which shall include, but are not limited to repayment performance and borrower's repayment capacity on the basis of current financial condition (CBN, 2018).

Macroeconomic Factors

The following macroeconomic factors are discussed below:

Interest Rate

Money as a store of value and medium of exchange creates different types of claims. Essentially, those who lend money, expect to be compensated for handing over their liquidity for a stated period of time to users of money (Obim et al., 2018). This compensation constitutes interest rates, which is often expressed as a rate per cent per annum (Nzotta, 2004). Thus, interest represents payments made by an individual, a firm or organization for money used or borrowed (Obim et al., 2018). According to Utile, Okwori & Ikpambese (2018), interest rates are the costs a borrower has to pay when obtaining a loan in any economy. This definition implies that; interest rates are the determinants of the cost of credits in an economy. The impact of high cost of interest rates in the society is not unconnected to the fact that borrowers may hesitate to borrow when they should (Utile et al., 2018).

Inflation Rate

The maintenance of price stability is one of the macroeconomic challenges facing the Nigerian government in our economic history. This elusive factor is known and referred to as inflation in our economic history and this is defined by economists as a continuous rise in prices (Bayo, 2014). In the context of definition, inflation is a persistent and appreciable rise in the general level of prices (Jhingan, 2002). It is important to note that, not every rise in the price level is termed inflation. Therefore, for a rise in the general price level to be considered inflation, such a rise must be constant, enduring and sustained (Jhingan, 2002). it is difficult for a country's currency to be used as medium of exchange and a store of value without having an adverse effect on income distribution, output and employment (CBN, 2020).

Exchange Rate

Exchange rate indicates the value of one currency in terms of another. It is the price of one foreign currency in terms of the length of another country's currency (Mejekomi, 2000). Exchange rate has traditionally played a crucial role in Nigerian monetary policy because of its crucial impact on the country's trade relation with other countries, first, as a mono-product (oil) export dependent economy and second, as an import dependent (developing) nation; besides the country's competitiveness and overall economic growth (Ajao, 2015). However, in line with major industrial economies, greater flexibility of the exchange rate is much needed to allow the real exchange rate to converge easily with its equilibrium level and to contain the real shocks associated with the transition to a market economy and the depletion of oil production, which is considered to be the main source of external and government revenues (Ajao, 2015).

Economic Growth (Gross Domestic Product)

Gross Domestic Product could be defined as the market value of all officially recognized final goods and services produced within a country in a given period of time (Onuoha et al., 2015). This implies that Gross Domestic Product takes into account the market value of each good or service rather than adding up the quantities of the goods and services directly. Gross Domestic Product is important in an economy because it is used to determine if an economy is growing or not (Onuoha et al., 2015). According to Fofack (2005), if expansion is associated with rapid credit growth, large increase in asset prices, a high level of investment, export growth and excessive capital accumulation, the level of credit risk is higher because risk is built up in a boom but materializes in the downturn.

The theoretical review of this study anchored on anticipated income theory and adverse selection Theory.

Anticipating Income Theory

This theory was propounded in 1949 by Herbert V. Prochnow.The theory states that, irrespective of the character and the nature of the business of the borrower, the lender planned the liquidation of such loans from the anticipated earnings of the borrower (Afrivie & Akotey, 2011). The liquidation does not necessary involves the sales of borrowers' assets as in traditional theory of liquidity, or shifting the so called term loans to another lender as in the case of shiftability theory, but it is just the anticipation income that comes from borrower. One striking thing about this theory is that, it is a future-oriented approach to advances as well as loans banks may have granted to its customers (Okolapo et al., 2012). This theory also posits that, the management of banks can carefully plan its liquidity on the basis of the expected income of borrower, and this propels banks to lend on both medium and long-term, apart from short-term, as long as that payment of the loans are linked to the periodic and regular premium paid by borrower (Nwosi & Greatness, 2020).

Adverse Selection Theory

The adverse selection theory describes the situation where the probability of loan default increases with rising interest rate and the quality of borrowers worsens as the cost of borrowing rises (Musara & Olawale, 2012). The theory is founded on the assumption that banks are not certain in selecting credit-worthy borrowers from a pool of loan seekers with different credit risk exposures ex-ante. Thus, financial intermediaries are more likely to lend to high-risk borrowers who are not concerned about the harsh lending conditions and are prone to loan default (Ezeoha, 2011). Pagano & Jappelli (1993) argue that information sharing reduces adverse selection problems by enhancing information on loan applicants. More so, Padilla & Pagano (2000) document that if banks exchange credit information on defaults, then, borrowers are encouraged to apply more energy in their projects knowing fully well that loan default carries the penalty of higher interest rates or no future access to credit facility.

Combined, these two theories offer a logical framework for how the four macroeconomic variables analyzed in this study are expected to interact to influence NPL results. The expected income theory suggests that a bank's expectations of a borrower's future income, which is determined by the macroeconomic environment (economic growth, inflation and exchange rate fluctuations that impact real income and cash flow), directly influences the ability of the borrower to repay the loan; and as the macroeconomic environment deteriorates, with lower growth or a sharp drop in the currency's value, the bank's expectations of borrower income are not met, and loan servicing capacity decreases, thereby increasing NPLs. The adverse selection theory, on the other hand, is about the transmission channel of interest rates: the higher the interest rates, the more the safer borrowers will self-select out of the credit market, and the riskier borrowers who are less sensitive to the cost will stay, making the average credit quality of the loan book worse. Together, the two theories imply that in each institutional context, inflation, interest rate, economic growth and exchange rate do not have to impact NPLs with the same magnitude and at the same time a hypothesis that is supported by the mixed empirical evidence found in the literature below and is confirmed empirically in this study through the panel evidence.

Olawumi et al., (2019) investigated the impact of monetary policy on credit performance of Deposit Money Banks in Nigeria. The population of the study consisted of the twenty-four DMBs in Nigeria, and the sample of the study was fourteen listed banks. The period of the study covered between 2006-2018. These data were analyzed using multiple regressions. The study found that; monetary policy rate and liquidity ratio had negative and insignificant impact on credit performance of DMBs in Nigeria. Evbayiro-Osagie & Emeni (2015) empirically evaluated Inflation rates, financial openness, exchange rates and stock market return volatility in Nigeri**a.** The scope of the study was between 1985-2012. The study employed Autoregressive Conditional Heteroskedasticity (ARCH) and Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models. The results showed that, inflation rate had negative (significantly) impact on the volatility in market return in Nigeria. Ahlem & Fathi (2013) tried to detect the determinants of non-performing loans for a sample of 85 banks in three countries (Italy, Greece and Spain) for the period of 2004-2008. After the application of the method of panel data, we found that, the problem loans vary negatively with the growth rate of GDP. Osamwonyi & Michael (2014) examined the impact of macroeconomic variables on the profitability of listed commercial banks in Nigeria. The scope of the study covered a time frame between 1990-2013. The empirical finding showed that, GDP, interest rate and inflation rate impact positively on ROE.

Bhattarai (2015) has examined the determinants of non-performing loans (NPL) of financial institutions in Nepal, for last few decades. The data were collected for 26 commercial banks, covering the period of 2002-2012. The study found that macroeconomic variables such as the real effective exchange rate have significantly negative impact on non-performing loan. The effect of macroeconomic factors on NPLs in Pakistan banking system was evaluated by Burki (2025) within 2007-2023, and the researcher used static panel analysis, together with GMM. Finding revealed NPLs were affected by macroeconomic factors. Macro-economic and other factors contributing to the emergence of non-performing loans was empirically conducted in five European countries (Greece, Cyprus, France, United Kingdom and Poland) by Bialas & Karafolas (2025) within the scope of fifteen years (2008-2023), applying correlation analysis. They found that, Greece and Cyprus had the highest ratio of NPLs, due to excessive borrowing from IMF.

Ihtesham, Adnan et al., (2018) assessed the macroeconomic factors as a determinant of NPL. The scope for the study range between 2006-2016, and a panel data was employed. The results show that GDP growth rate, exchange rate, tax rate, inflation, and unemployment affect NPL in a respectively different manner. Bhattarai (2018) attempted to ascertain the factors affecting non-performing loans in Nepalese commercial banks using a sample of ten banks for the period, 2013-2017. The estimated ordinary least square (OLS) regression model reveals that the bank specific: ROA, LTD and CAR and macroeconomic factors (GDP) have significant impact on non-performing loan in Nepalese commercial banks. On the other hand, Changjun et al, (2019) examined the influence of industry-specific and macroeconomic determinants of non-performing loans (NPLs) in the entire banking system of Bangladesh between 1979-2018, and he adopted ARDL, and found that, NPLs are affected by macroeconomic and industry-specific factors. Finally, Kure et al, (2017) investigated the determinants of non-performing loans (NPLs) and its feedback on the macroeconomic. They employed Pool Mean Group (PMG) and panel vector autoregressive (PVAR) distributed lag models. The results showed negative relationship between economic growth and NPLs.

It is important to note that some of the studies reviewed above (e.g., Olawumi et al., 2019; Evbayiro-Osagie & Emeni, 2015; Osamwonyi & Michael, 2014) do not focus directly on NPLs but rather on monetary policy transmission, stock market volatility, or bank profitability and are included here only as contextual background on the behaviour and interaction of the same macroeconomic variables in the broader financial system, not as studies of determinants of NPLs. The impact of GDP growth on NPLs is consistently negative (Ahlem & Fathi, 2013; Kure et al., 2017; Bhattarai, 2018), while the effects of inflation and interest rates are generally inconclusive, with effects being positive or negative and statistically significant or insignificant depending on the country and time period (Ihtesham et al., 2018; Burki, 2025), and the effects of exchange rate depreciation are generally positive in economies where foreign-currency loans are significant (Bhattarai, 2015; Bialas & Karafolas, 2025). This difference in results on inflation and interest rates does not stem from weak theory, but rather from the fact that the six countries in this study have different monetary policy regimes, different degrees of interest-rate regulation (including caps), and different interest-rate pass-through to bank lending rates, which this study's panel evidence, estimated using a single dynamic GMM technique, helps to fill.

3.0 Methodology

The study used the longitudinal survey research design, and in this research design, the researcher does not allow to influence or alter either dependent variable or independent variables. This research was targeted at examining how macroeconomic factors impact on non-performing loans, and at the same time, whether the influence is positive or negative and the possible causes for the positive or negative results. In this study, the macroeconomic factors comprised inflation rate, interest rate, economic growth rate and exchange rate.

Population and Sample Size

The population of the study was made up of all banks in the selected Sub-Saharan African countries. On the other hand, sample size deals with a selected group of some elements from the totality of the population. In this study, the sample size consists of listed banks in each of the six (6) Sub Saharan African countries. The six (6) Sub-Sahara African countries are; Nigeria, Ghana (West Africa), South Africa, Botswana (South Africa), and Kenya and Tanzania (East Africa). The total sample size of this study was made up of thirty-six (36) listed banks in Sub-Saharan African countries. The choice of selecting these countries is that, these countries have growing and strong economies with large markets.

Sources of Data

Secondary data were used for this study, and the data were retrieved from annual reports of the thirty-six (36) sampled banks for the period 2011-2023 financial years. The researcher utilized annual reports because they were readily available, accessible and also provides a greater potential for comparability of results. In addition, the macroeconomic data were retrieved from World Bank economic indicators fact book for the period 2011-2020.

Method of Data Analysis

This research work adopted two basic approaches to analysis data in this study. The first was descriptive statistics, while the second was econometric procedures for analyzing the data and attaining inferential statistics. The descriptive statistical methods include descriptive techniques such as the mean, standard deviation, and higher-level moment conditions of the datasets. The aim was to present the initial background for observing the characteristics of the datasets. The econometric analysis involves the estimation of the specified model in this study and the

interpretation of relevant coefficients of the estimates. The goal is to draw appropriate outcomes that are evaluated and employed to test the hypotheses of the study as well as provide a background for making informed conclusions and recommendations in the study. It is however demonstrated that while macroeconomic factors affect non-performing loans, non-performing loans also affluence the behaviour of these variables (Fajar & Umanto, 2017; Rose, 2017; Ihtesham et al., 2018; Dmitrios et al., (2016). Meanwhile, the performance of the economy can influence non-performing loans; the proportion of such loans can also indirectly influence economic growth through the amount of credit disbursed in the economy. With this pattern of possible reverse effects, there is heavy presence of endogeneity and simultaneity bias in the model. Hence, the application of an OLS-based estimation procedure (like the random/fixed effects) will be biased and the coefficients will be unreliable (Wooldridge, 2011). In order to avoid this bias, a method that takes the endogeneity between the dependent and the independent variables into account was employed. In this case, this study adopted 'system Generalized Method of Moments' as a method of technique, while the dynamic panel data (DPD) approach is adopted as a robustness check. The dynamic panel data (DPD) procedure is a generalized method of moments (GMM) estimation for panel data.

In particular, three reasons for using system GMM in this study are provided. First, dynamic persistence: the lagged dependent variable (NPLRit-1) is included to account for the mean-reverting behaviour of NPLs, which mechanically correlates the lagged regressor with the error term, and biases OLS and even standard fixed-effects estimators (Nickell bias) in short panels. Second, reverse causality/simultaneity: economic growth influences NPLs via borrowers' ability to repay, and increased NPLs also limit bank lending and credit supply, which in turn reduces economic growth, making GDP growth not strictly exogenous to the NPL equation. Third, omitted variable bias due to unobserved time-varying bank- and country-level shocks (such as regulatory reforms, banking-sector distress episodes) that are correlated with both NPLs and the macroeconomic regressors. System GMM overcomes all three of these problems by instrumenting endogenous regressors with their own lagged levels and lagged first-differences, which OLS and static panel estimators do not.

The panel data structure includes banks that are subject to different regulatory, legal and macro-prudential regimes in the six SSA countries, with respect to cross-country institutional heterogeneity. This heterogeneity is dealt with in two ways in the estimation framework: (i) the country-level fixed effect (αi) in the model specification captures all time-invariant country-specific institutional and regulatory characteristics (e.g., differences in loan-classification rules, deposit insurance regimes, and banking supervision frameworks), and (ii) the period fixed effect (μt) captures common shocks that affect all countries simultaneously in a given year (e.g., global commodity price or interest-rate cycles). It is however recognised that the study does not include any separate modelling of country-specific institutional changes that occurred over time (e.g. a change in the rules for loan classification in a particular country in the middle of the sample), which is noted as a limitation of the study and will be addressed in future research by including country-specific interaction terms or sub-sample analysis.

Model Specification

The focus of the study was to examine the impact of macro-economic factors on non-performing loans in Sub-Saharan Africa. The model specified for this study follows the background provided by Rose, (2017) and Dimitrios et al, (2016), where the endogeneity between non-performing

loans and macroeconomic variables were taken into account. Hence, a dynamic panel data structure was developed for the estimation of the relationship. The basic framework for the model is:

$yit = \lambda y_{it-1} + x'_{it}\beta + \alpha_i + \mu_t + \varepsilon_{it}$ ----------(3.1)

Where:
y= The dependent variable,
x= A vector of independent variables,
i= The indicator of cross sections,
t= The indicator of period,
α= A cross-sectional fixed effects factor,
μ= The period of fixed effects factor,
ε= The stochastic error term.

This model can also be estimated using the system Generalized Method of Moments (sys-GMM) procedure. The specified models are therefore in the form indicated in (3.1). This model shows that non-performing loans can impact macroeconomic factors. It is specified as:

$NPL = f(MEF)$----------(3.2)

Where:
NPL= Non-performing loans
MEF= Macro economic factors
The econometric model was thus presented below;

$NPL_{it} = \partial_0 + \lambda NPL_{it-1} + \partial_1 INFR_t + \partial_2 IR_{it} + \partial_3 EG_{it} + \partial_4 ER_{it} + \alpha_i + \mu_t + \varepsilon_{it}$ (3.3)

Where:
NPLs= Non-performing loans (measured as the ratio of NPLs to total loans).
INFR=Inflation rate (This study adopted Consumer Price Index to measure inflation rate).
IR= Interest rate (Interest rate was measured by using real interest rate)
EG=Economic growth (In this study, economic growth was measured by using Real Gross Domestic Product)
ER=Exchange rate (exchange rate is measured by using 'real effective exchange rate.

4.0 Analysis of Results and Discussion of Findings

Section 4.1 deals with descriptive statistics, and descriptive statistics show the summary of data and other basic characteristics within the series. The annualized summary statistics for annual changes in the main variables in the study were presented for the sampled banks and reported in table 4.1. Average non-performing loan ratio is 4.34, suggesting that about 4.3 percent of loans by banks across the selected SSA countries are non-performing. Although, this ratio appears relatively low, but it is the highest for banks when compared to other regions in 2020, for example, 2.63 percent in Europe, 0.89 percent in the United State of America, 4.2 percent in South East Asia, and 2.77 percent in Latin America (World Bank, 2020). The mean value is generally positively skewed, indicating that more of the non-performing loans recorded by the banks in our sample were generally less than the reported mean value. However, there are large values of non-performing loans among the banks in the sample, with maximum value of non-performing loan of 33.58 percent. This shows that there are banks in the SSA region that have excessive non-performing loan ratios, and this is quite appalling for these economies. The standard deviation value for the non-performing loan ratio variable is higher than the mean value,

which indicates that there is a high level of divergence in the non-performing loan conditions of banks in the SSA region.

Table 1:
Descriptive Statistics Of Main Variables

Variable	Mean	Max.	Min.	Std.D.	Skew.	Kurt.	J-B (prob.)	Obs
NPLR	4.34	33.58	0.00	6.26	2.24	8.21	707.7 (0.00)	360
GDPG	3.46	14.05	-8.49	3.46	-0.31	4.98	64.67 (0.00)	360
INFL	9.08	17.45	1.89	4.17	0.49	2.19	24.47 (0.00)	360
INT	7.67	14.10	2.83	2.87	0.18	2.41	7.26 (0.03)	360
EXRT	159.94	2294.15	1.52	327.19	5.05	30.25	1260.7 (0.00)	360

Source: Author's Compilation, 2026.

For the macroeconomic variables, average growth rate of real GDP is 3.46 per the period for all the sampled countries. This average value is relatively impressive given that average global growth in GDP over the same period was around 2.9 percent (World Bank, 2020). The growth rate among the SSA countries was negative in some years, indicating that growth trajectories are not unique among the countries. Average inflation rate is also 9.08, which is close to double digits, with maximum value at 17.45 percent. These are high inflation values for the countries. Interest rate is 7.67 percent on average with a standard deviation of 2.87, suggesting that the mean value is relatively representative among the economies.

The Jarque-Bera statistics for all the variables were all significant at the 5 percent level, which shows the absence of normality in their respective data distributions. This outcome is to be expected since a panel of different banks was adopted for the datasets. Hence, the result shows that bank-level characteristics may be exerting strong heterogeneous influences for the behaviour of the datasets. This is a strong basis for providing a panel-form analysis in the regression process for the study.

This basis is strengthened by a closer look at the moment conditions. The exchange rate variable (EXRT) is the most extreme from normality (skewness of 5.05 and kurtosis of 30.25), indicating that there are a few countries or periods with a very large depreciation of the exchange rate compared to the panel average, which is consistent with the occurrence of currency crises rather than gradual depreciation. The NPL ratio is also highly right-skewed (2.24) and leptokurtic (kurtosis of 8.21), meaning that most bank-year observations are in the middle range of the NPL ratio, but a small number of banks or country-years have extreme NPL deterioration, which skews the mean above the median. The non-normal, non-homogeneous panel behaviour that motivates the use of the system GMM estimator is just the type of panel behaviour that OLS-based panel estimators are not consistent for.

Tests of Panel and Time series Properties of Data
This section comprised the cross-sectional dependence test, unit root and cointegration tests.

Cross-section Dependence Test
The panel structure (combination of cross-sectional and time series) of this study indicates that there may be heterogenous characteristics of the variables of the study that may present certain

influences on the outcome of the estimation strategy. In particular, banks often demonstrate similar characteristics in terms of loan policy in a country, which may heighten the presence of loan-related agglomeration effects (Fofack, 2005; Rezina et al., (2020). These banks operate within the Sub-Saharan African region with financial systems and operational environment, especially in relation to external influences. These characteristics may therefore likely force the banks to exhibit similar responses to overall patterns of macroeconomic characteristics. The occurrence of this may present certain levels of interdependencies that are related to spatial autoregressive processes among the banks that may reduce the efficiency of the estimates (Adegboye, 2020). It is therefore necessary to disentangle the cross-sectional features of the relevant variables in order to observe the pattern of dependence. Given that the number of cross-sectional units (36 banks) in this study was more than the time period (10 years), both the Breusch & Pagan (1980) LM test and cross-sectional dependence (CD) test developed by Pesaran (2004) were employed for testing the cross-sectional dependence characteristics. The test result is reported in Table 4.2.

Table 2:
Cross-section Dependence Test Results

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	21.68	90	0.1164
Pesaran scaled LM	1.219		0.2225
Pesaran CD	1.014		0.3106

Source: Author's Compilation, 2026.

From the result in table 4.2, it is seen that all the test coefficients fail the significance test at the 5 percent level (p-value > 0.05). It should be noted that the null hypothesis for this test is that, there is no cross-sectional dependence, indicating that an insignificant coefficient is what is required in this case. Thus, the tests fail to reject the null hypothesis of absence of cross-sectional dependence in the block of variables. This implies that, there is no cross-sectional dependence in the datasets among the variables in the study. Thus; the cross-sectional properties and efficiency of the datasets were justified. The next set of analysis involves the evaluation of the time series properties of the datasets. This will further contribute to the efficiency of the estimation procedure especially as the estimation also allows for slope heterogeneity across panel units. We thus proceeded by testing for the presence of unit roots and co-integration among the variables in the study.

Unit Root and Co-integration Tests

Bank and country-specific characteristics (individual heterogeneity) and common (homogenous) characteristics of the banks used in the study reflect in the data employed for this study. This calls for the use of panel unit root tests to check for the stationarity of the data, in order to avoid incidence of "spurious" inference. In this study, the test developed by Levin, Lin and Chu (LLC) was used to examine the stationarity properties of the homogenous panel. These tests assume identical co-integration vectors among the countries. Moreover, in order to account for the differences exhibited by individual banks in their loan strategies, the Im, Pesaran and Shin (IPS, 2003) and the Augmented Dickey-Fuller tests (which allow for heterogeneity in the panel's

cross-section and assumes a null hypothesis of no cointegration in the panel data) were also conducted. All the unit root test results were presented in table 3.

Table 3:
Panel Data Unit Root Tests Results in levels

Variables	Common unit process	individual unit root process		
	LLC	**IMP**	**ADF**	**PP-Fisher**
NPLR	-4.15	-0.31	159.21	98.98
CGRI	-9.74	-1.78	97.47	111.1
CGOI	-157.00	-27.38	111.57	79.06
CGBSI	-1.85	-0.24	93.02	165.2
CGBEI	-16.21	-4.06	85.11	169.1
LDR	-2.75	-0.27	79.74	89.12
GDPG	1.77	-1.15	109.6	29.82
INFL	-11.32	-3.60	135.1	155.1
INT	-1.29	1.86	58.48	154.1
EXRT	-1.96	3.67	20.13	122.6
MS	-8.38	-3.25	131.6	179.2
CEM	-8.57	1.15	61.56	50.87

Source: Author's Compilation, 2026.

Note: ** and * indicate significant at 1% and 5 % levels respectively; IPS = Im, Pesaran & Shin; LLC = Levin, Lin & Chu

In the unit root analysis, only the tests for level variables were reported in the results since the variables were essentially stationary at their levels. It can be seen that the coefficients of the test for all the variables in their levels were stationary (given that the critical test values were higher than the test statistic). Given this condition, it is shown that the variables were all integrated of the same order zero (i.e., I[0]). This implies that these variables will likely converge simultaneous in the same pattern, suggesting that cointegration analysis can be performed for the variables with meaningful outcomes.

Analysis of Regression Results

In this section, the results of the estimated models based on the specifications in the previous section was presented and analysed. The analysis of the regression results was conducted by examining the effects of macroeconomic factors on non-performing loans in SSA countries. This is done by interpreting the estimated results for the goal of drawing relevant policy.

The Baseline Estimates

This section presents the results of the generalized method of moments (GMM) estimate from which the policy and hypotheses testing conditions of the study were based. As stated in methodology, the dynamic panel data (DPD) procedure is a generalized method of. moments (GMM) estimation for panel data. This technique internalizes any form of endogeneity in the relationships between the dependent variable and any of the independent variables. In table 4.4,

the results of the dynamic estimates of the relationships using the GMM technique were presented.

The diagnostic tests in the result are generally impressive. The two diagnostic tests include the test for over-identifying restriction on the instruments for the GMM (using the *J-stat test*), and the test for the serial correlation condition of both the model and the included instruments (using the AR(1) and the AR(2)). The coefficients of the over-identifying restriction test statistic (*J-test* statistic) for the GMM estimates are expected that the probability value for the statistic is greater than the 10 percent level. For the results in table 4.4, p-values for each of the equations were greater than 0.1. The size of the p-value associated with the *J-stat test,* therefore indicates that the instruments used in the estimation were valid and that the models were appropriately specified. The Arrelano and Bonds (AR) tests were used to identify any form of serial correlations among the errors in the estimates based on the instruments employed in the estimation. The second order coefficient needs to be insignificant in order to satisfy the AR condition.

Table 4.4:
GMM estimates of the Results for determination of non-performing loans ratio

Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
$NPLR_{t-1}$	0.638**	0.000	0.518**	0.000
GDPG			-0.472**	0.000
INFL			0.001	0.993
INT			-0.122	0.216
EXRT			0.020**	0.001
J-stat.	0.479		0.297	
AR(1)	-1.98*		-1.99*	
AR(2)	-0.69		-0.77	

Source: Author's Compilation, 2026.

Note: * and ** indicate significance at 5% and 1% level, respectively.

The coefficients of the lagged dependent variable ($NPLR_{t-1}$) in the result in table 4.4 were all significant at the 1 percent level for each of the equations. This also justifies the use of a dynamic form for the relationship in estimating the behaviour of non-performing loans of banks in SSA countries. The coefficient was positive, indicating the presence of mean reversion and long run stability in non-performing loans characteristics among the banks in the SSA region.

For the macroeconomic factors in table 4.4, the result shows that the coefficients of inflation and interest rate both fail the significance test at the 5 percent level (p-value > 0.05). This means that, the increases in the general price level and the interest rates do not matter for determining non-performing loans of banks in the selected SSA region. Furthermore, the coefficients of GDP growth, and exchange rate were significant at the 1 percent level. This result therefore indicates

that growth in the economy leads to a reduction in non-performing loans of banks in the sampled SSA countries. It suggests that a well performing economy ensures that non-performing loans are limited. In particular, the result shows that a one percent rise in real GDP leads to a 0.47 percent decline in non-performing loans of banks. This is a strong impact and indicates that the direction on the economy matters a lot for the direction of non-performing loans in these banks.

Inflation and interest rate are not important enough to be presented as a bare statistic and should be explained economically. Historically, in several of the SSA countries sampled (such as the interest rate cap in Kenya before it was repealed, and the administratively influenced lending rates in other countries), lending rates have not been responsive to market or policy interest rates, reducing the direct pass-through from the real interest rate variable used here to the actual bank loan interest rate, and ultimately to the repayment burden of borrowers. Likewise, the impact of inflation on the quality of loans is theoretically indeterminate: moderate inflation can reduce the real value of fixed-rate loans (benefiting some borrowers) but can also reduce real incomes (worsening the situation for others); and the impact of inflation on loan quality can be offset by the impact of inflation on the economy's overall health, as the economies in the pooled panel have very different inflation regimes (from single-digit averages to near double-digit averages, as seen in Table 4.1). These offsetting mechanisms offer a plausible economic explanation as to why inflation and interest rate do not appear as significant drivers of NPLs in this panel, despite economic growth and exchange rate appearing through more direct, less ambiguous channels on borrower income and foreign-currency debt burden, respectively.

The coefficient of exchange rate is however positive and shows that higher currency exchange rates lead to higher non-performing loans of the banks. This highlights the central role of the exchange rate (which is a critical external and policy factor) on the non-performing loan rates of the banks in SSA countries.

Tests of Hypotheses

The hypotheses formulated in this study were tested using the t-ratios from the GMM regression results in tsable 4.4. The study adopted 5% level of significance to conduct the test on the different hypotheses formulated.

Hypothesis One

Inflation rate has no significant impact on non-performing loans in Sub-Sahara Africa

For this hypothesis, the coefficient of INFL is considered from the output in table 4.8. The coefficient of the inflation variable was 0.001 ($p > 0.05$), indicating that the coefficient fails the significance test at the 5 percent level. Based on this outcome, the null hypothesis cannot be rejected in this case. Thus, it shown that inflation rate essentially has no significant effect on non-performing loans in Sub-Sahara Africa.

Hypothesis Two

Interest rate has no significant impact on non-performing loans in Sub-Sahara Africa

The coefficient of INT in table 4.4 is used for testing this hypothesis. The coefficient is -0.122 ($p > 0.05$), which fails the significance test at the 5 percent level. From this result, the null hypothesis cannot be rejected. Based on this, it is therefore concluded that in the macroeconomic-only model estimated in this study, interest rate does not significantly affect non-performing loans in Sub-Sahara Africa.

Hypothesis Three

Economic growth has no significant impact on non-performing loans in Sub-Sahara Africa

For this hypothesis, the coefficient of GDPG was considered from the output in table 4.8. The coefficient is -0.472 ($p < 0.01$). It is therefore seen that the associated p-value of the t-test for the coefficient is less than 0.01, which implies that the coefficient passes the significance test at the 1 percent level. Thus, the null hypothesis is rejected and it is shown that economic growth has a significant and negative impact on non-performing loans in Sub-Sahara Africa.

Hypothesis Four

Exchange rate has no significant impact on non-performing loans in Sub-Sahara Africa

For this hypothesis, the coefficient of EXRT was considered from the output in the second column of table 4.8. The coefficient is 0.020 ($p < 0.01$). Since the associated p-value of the t-test for the coefficient is less than 0.01, it is demonstrated that, the coefficient passes the significance test at the 1 percent level. Thus, the null hypothesis is rejected, suggesting that exchange rate has a significant positive impact on non-performing loans in Sub-Sahara Africa.

Discussion of Findings

The main findings in this study are interesting and apt for empirical and policy discussion. The study found that the macroeconomic environment exerts a major influence on bank soundness. Essentially, the study shows that even when banks are well managed, adverse developments in the macroeconomic environment can provide strong influences on the loan management outcomes of the banks. In particular, the study found that economic growth has a negative impact on non-performing loans. This implies that growth in the economy has the capacity to reduce the rate of non-performing loans of the sampled banks in SSA countries. This agrees with the fondly held consideration that the pattern of economic movements is critical for bank failure or sustainability (Amidu, 2015; Rajha, 2016; Wood & Skinner, 2018).

The result in the study also showed that higher currency exchange rates lead to higher non-performing loans of the banks. This reveals a deleterious impact of exchange rate on non-performing loans among SSA countries. This is in line with Amuakwa-Mensah & Boakye-Adjei (2015), Yahaya & Oni (2015), Ihtesham et al, (2018), and Frehiwot (2020) and also highlights the central role of the exchange rate (which is a critical external and policy factor) on the non-performing loan rates of the banks in SSA countries.In particular, exchange rate depreciations often generate currency mismatches (Adegboye et al., 2014; Eberhardt & Presbitero, 2018).

The results of these analyses can be directly interpreted using the two theoretical perspectives used in this study (Section 2.3). The negative relationship between economic growth and NPLs is consistent with the predicted income theory, which suggests that when the economy grows, borrowers' expected future income rises, which increases the banks' ability to plan for the liquidation of loans based on future earnings and reduces default rates. On the other hand, the positive impact of exchange rate depreciation on NPLs is due to the fact that the same expected income mechanism that lenders are expected to rely on for repayment is being undermined by the depreciating currency: the currency depreciation increases the local-currency cost of servicing foreign-currency debts beyond what was expected when the loans were made, directly reducing the repayment capacity that the expected income theory assumes lenders can count on. The lack of statistical significance for inflation and interest rate is also consistent with the adverse-selection mechanism described in Section 2.3.2, which suggests that the adverse-selection channel through which higher rates would ordinarily exacerbate the quality of

borrowers is muted, which helps explain why interest rate and inflation are not significant drivers of NPLs in this panel.

Conclusion and Recommendations

In this study, the effects of macroeconomic factors on the rate of non-performing loans of banks were examined for sampled countries in the Sub-Saharan African (SSA) region. The study is centred on the realization that, bank loan defaults as well as inefficient loan management systems are interactive and are also consequences of both internal processes among the banks, and external factors that are beyond the banks' control. These outcomes were considered by focusing on the patterns of basic macroeconomic factors that determine the macroeconomic environment of the countries. Four (4) macroeconomic factors were included in the study (economic growth, interest rate, exchange rate, and inflation rate).

The study is confined to these four macroeconomic determinants of NPLs, and it does not model or make conclusions about bank-internal or corporate-governance factors, which were not included in the estimated model and are not the focus of the study.

A panel of thirty-six (36) banks in six SSA countries was used in the analysis for the period of 2011 to 2023. Moreover, a dynamic panel data framework (based on the generalized method of moments - GMM) procedure was devised for the panel data analysis). Thereafter, a robustness checks were performed on the estimates both in terms of variable changes and methodology. In general, the results from the empirical analysis reveal that, macroeconomic factors have strong impacts on non-performing loans of banks among the selected SSA countries.

Specifically, the study has found that the quality of loans that SSA banks can offer depends strongly on the performance of the macroeconomy, in particular on the stability of the growth rates and the stability of the exchange rates, while inflation and interest rates, on the evidence of this macroeconomic-only model, have no statistically significant independent effect. In general, the incentives to enhance loan quality in SSA countries can be encouraged by macroeconomic policy-making actions geared toward growth stability and exchange rate management.

The study recommends that, with the evidence given the debilitating effect of exchange rate depreciation on banks' non-performing loans among SSA countries, there is need for the financial system to adopt measures to at least, limit the impact of exchange rate movements on their lending and loan strategies over time. A critical element in this direction is the reduction in foreign currency denominated loans and financing mechanisms that hedge against exchange rate shocks.

In addition, and consistent with the four objectives of the study, policymakers and monetary authorities in SSA are encouraged to: (i) sustain policies that promote stable, broad-based economic growth, given its significant NPL-reducing effect found in this study; (ii) continue to monitor inflation and interest rate developments as part of prudent macro-financial surveillance, even though neither variable emerged as a statistically significant independent driver of NPLs in this particular panel, since their effects may become material under different monetary regimes or over longer horizons; and (iii) strengthen macro-prudential frameworks that limit banks' unhedged foreign-currency exposure, in direct response to the significant positive exchange rate effect identified. Future research should examine whether these results are robust to the inclusion of bank-specific and corporate-governance variables in an appropriately extended and separately justified model specification.

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