NON-PERFORMING LOANS, INTEREST EFFECT AND BANK PERFORMANCE IN SUB SAHARAN AFRICAN ECONOMIES

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ABSTRACT

Nonperforming loans posed a great threat to the performance of banks in emerging economies. This study seeks to examine the effect of nonperforming loans on the banks' performance in sub-Saharan Africa region. A total of fifty (50) listed banks were drawn across six sub-Saharan African countries that include Nigeria, Ghana, South Africa, Zambia, Kenya, and Tanzania within 9 years period (2010-2018). The study employs a two-step system generalized method of moment as the technique of analysis and inference. Findings from the study revealed a significant negative association between NPLs and bank performance within the region. Bank management and regulators are advised to work hard toward ensuring that banks keep minimum NPLs in order not to threaten the liquidity position of the banks.

Keywords: Nonperforming loans, Banks' performance, Twostep system generalized method of moment, sub-Saharan Africa

INTRODUCTION

Banks contribute significantly towards the distribution of scarce resources between borrowers and lenders. Economic growth is greatly affected by the stability of the banking sector, particularly in emerging economies (Levine, 1997). Banking stability is challenged by several risks, prominent among them is credit risk, particularly for those countries whose financial system is dominated by banks (Claessens & Kose, 2013). Even though the 2008 global financial crisis encourages studies on bank credit determinants, the empirical research remained inconclusive. The primary function of banks is money creation through credit advancement. Thus, the probability of bank failure is high if the money loan out is not recovered in good time. Hence, banks give much attention to bank credit risk management which is mainly attributed to minimizing the chance of borrowers failure on repayment of a loan that could give rise to nonperforming loans (Laryea, Ntow-Gyamfi, & Alu, 2016)

Nonperforming loans (NPLs henceforth) help in revealing the loan portfolio credit quality of banks, and in all, show the quality of the credit of a country's banking sector loan portfolio. The financial stability and risk management roles of banks are better realized through a good understanding of NPL

level determinants within the banking sector (Ozili, 2019). NPLs aggregates of most countries were relatively low since before the experience of 2008-2009 financial crisis, but rise considerably within the crisis period and after necessitating banking regulators to mediate to curb the increasing NPL challenges in the banking sector. Despite the effort made to contain the increasing NPLs challenges through the formulation of much national policy framework like the imposing of strict compliance to regulatory capital of banks (ECB, 2017), yet continue rising cases of NPL posed a serious issue, which cast doubt about the sufficiency of the current policy solutions to manage the rising NPLs.

A large portion of bank failures are attributed to the problem posed by NPLs and this can result in a crisis of banks (Reinhart & Rogoff, 2011). Moreover, bank performance can be determined through the size of NPL, i.e the higher the NPLs the greater the threat (Beck, Jakubik, & Piloiu, 2015). The size of aggregate NPLs in the banking sector could be determined as well by the development attributes of certain financial sectors, hence this study is aimed at analyzing the association between bank performance and NPLs using country and bank-specific NPLs data. Studies on NPLs concentrate largely on developed and developing economies of the world other than Africa, with few studies from Africa that attract researchers' interest. In response to this challenge, this study intends to fill the research gap and examine the association between NPLs and bank performance within the context of sub-Saharan Africa.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Concept of Nonperforming loans

Nonperforming loans refer to loans that do not source returns for a relatively long period say ninety days and fail to recover both the interest and principal component within the period (Caprio & Klingebiel, 1996). NPL is a credit instrument that the principal and or interest amount is left past due for a particular period. Yeltulme, Kwesi, Agyeman, and Adu-asare, (2017) posits that NPLs are loans that exceed 90 days without accruing interest. Hennie, (2003) says NPL are those loans, which fail to generate income.

The operational efficiency of the loan portfolio is affected by NPL, which in turn affects the solvency, liquidity, and profitability of banks (Michael, Bradley, Wallace, & Burke, 2009). Batra, Alden, and Steenkamp (2003) explain that in addition to the impact on competitiveness, profitability, and liquidity, the bankers' psychology concerning their fund disbursement toward credit expansion and credit delivery is affected by NPLs. Banking failure is imminent if the effect of banking growth and survival created by NPL is not well managed.

Determinants of NPLs

Bank specific determinant of NPLs

The capital adequacy ratio or the regulatory capital is a crucial factor of NPLs determinants in the bank. Keeton and Morris, (1987) and Salas and Saurina, (2002) posit that higher NPLs proportion in banks is associated with low capital base banks. Moreover, Makri, Tsagkanos, and Bellas, (2014) opine that higher NPLs may also be associated with banks with higher capital ratios. Conversely, Berger and De young, (1997) report an inverse association between NPLs and a capital requirement on the understanding that risk-taking is more common among less capitalized banks. Santomero, (1984) and Rime, (2001) found the relationship between bank risk and capital adequacy to be positive, which will lead to an increase in NPLs. Bank lending is also another important factor that influences NPLs in banks. The studies conducted by Jiménez and Saurina, (2006) and Salas and Saurina, (2002) indicate that higher banking lending is associated with increased NPLs. Klein, (2013) revealed a positive association between NPLs and bank lending. Conversely, Khemakhem and Boujelbene (2018) and Vithessonthi, (2016) hold that NPLs and lending have a negative association due to strict lending standards. Keeton and Morris, (1987) revealed that higher default loans are linked with excessive lending of banks.

Bank size is a crucial specific bank determinant of nonperforming loans. Gong, Huizinga, and

Laeven, (2018) show that larger banks have a high chance of loan assessment, which results to lower NPLs. Isaev and Masih, (2017) indicate an inverse association between bank size and NPLs and posits that the hypothesis of "too big to fail" by banks may end up with greater NPLs due to excessive risk-taking.

Macroeconomic determinant of NPLs

The growth in the gross domestic product is seen as one of the crucial macroeconomic determinants of NPLs. Studies conducted by Fofack, (2005) and Khemraj and Pasha, (2009) reveal an inverse association between GDP and NPLs caused by borrowers' capacity increase in servicing debt within higher economic growth. Conversely, lesser NPLs are observing during lesser GDP growth and this may result in an unemployment rise which may complicate repayment of debt.

Inflation is one of the significant macroeconomic determinants of NPLs. It has a divergent effect on NPLs. Debt servicing is made with ease when there is a greater inflation rate through the minimization of the outstanding loans' real value, which in turn keeps low NPLs. Moreover, repayment of debt could be complicated in the event of a greater inflation rate through the minimization of real borrowers' income. Furthermore, greater inflation may result in higher lending rates, which obstruct debt repayment, particularly in economies with various loan rates. Abid, Ouertani, and Zouari-Ghorbel, (2014) indicate that the loan repayment and financial condition of debtors are affected by a lower positive inflation rate. A positive association between inflation and NPLs is obtained by (Klein, 2013). Conversely, Khemraj and Pasha, (2009) and Nkusu, (2011) establish an inverse association between inflation and NPLs.

The policy rate is another influencing factor of NPLs. Specifically; debt-servicing capacity could be affected by the alteration of the policy rate, which may, in turn, affect the lending rate. Espinoza and Prasad, (2010) reveal a positive association between interest rates increase and NPLs. Moreover, Bofondi and Ropele, (2013), indicate that increase in lending rates is associated with higher NPLs. Similarly, Sinkey, (1999) shows that increase in NPLs may result in to increase in interest rates while Berge and Boye, (2007), report a positive relationship between interest rates and NPLs.

Theoretical framework

The separation between bad borrowers and good ones is difficult to draw due to the provision contained in asymmetric information theory Richard, (2011). This may lead to moral hazards. It connotes a circumstance where the owners of business or managers are abreast regarding a particular risk situation affecting lenders and business owners. Asymmetric information theory, therefore, describe a circumstance where important fact is hidden to both parties that participate in an agreement (Kumah & Essel, 2003).

The challenges posed by moral hazard indicate that agreement default among clients is expected unless if a stringent penalty is imposed on defaulters of the credit agreement. This compounds some of the challenges faced by lenders in the examination of the asset owned by clients and the actual repayment date for the loan at the time of application. If information regarding borrowers' assets is not fully disclosed, such actions may result in variation in the rates imposed by lenders which may finally affect the market performance (Didar & Eda, 2014).

Nonperforming loans and bank performance

Several studies were conducted on the association between bank performance and NPLs. The association between NPL and performance could be positive or negative as reported from the following empirical studies. Podpiera and Weill (2008) in their study that analyzes the context of the Czech banking sector between the period of 1994-2005 and reveals that potential rise in NPLs is positively related to inefficiency. The same findings are reported by Louzis, Vouldis, and Metaxas (2012) within the context of Greek banks. Regulators support the idea of concentrating more on the performance of management to improve the stability of the financial system.

Berger and De young (1997) in their mismanagement assumptions, managers lack the required

expertise to evaluate and monitor loan risks offered to new clients. . Jeitschko and Jeung (2011) in his study on the causal association between capital, loan quality, and performance in the context of U.S banks for the period of 1985-1994, with return on asset (ROA) as performance proxy. The study reveals that NPLs and performance have a negative association. The findings revealed that high potential risk is associated with greater levels of return on equity (ROE), confirming that profit maximization is associated with the high-risk level.

Sinkey and Greenawalt (1991) investigate banking industry losses in the U.S. The study revealed that external and internal determinants justify the rate of losses in the banks. The findings further indicate a positive significant association between internal factors like high interest rates, excessive lending, and loan losses. Credit institution's effective functioning is affected by loan losses (Pesola, 2011). Laryea et al. (2016) assess the association between macroeconomic and bank-specific factors affecting non-performing loans and bank profitability. The findings of the study revealed a significant association between macroeconomic and bank-specific factors affecting NPLs and bank profitability except for inflation and concentration.

Ghosh, Sen, and Riva (2020) explore the behavioral NPLs influencing factors in Bangladesh. Findings from the study reveal nepotism, poor handling, the problem associated with moral hazard and inadequate collateral have significant positive impacts on the increasing rate of NPLs. Ozili (2019) evaluates financial development's impact on NPLs. The result of the study shows the presence of foreign banks as a proxy of financial development and financial intermediation related positively with NPLs.

Messai and Jouini (2013) analyze the macro and micro factors affecting nonperforming loans (NPLs), across three countries of Spain, Italy, and Greece using 85 banks sample within the period of 2004-2008. Mpofu and Nikolaidous (2018) examine credit risk caused by macroeconomic variables within sub-Saharan African banking industry. The study outcome indicates decreasing nonperforming loans to gross loans with a rise in the growth rate of real GDP.

The following hypotheses have been developed based on empirical studies presented above;

$H_{01:}$ There is a significant negative relationship between the non-performing loan and bank performance in SSA.

$H_{02:}$ There is a significant positive relationship between interest effect and bank performance in SSA.

METHODOLOGY

Data

The study employed a total of 50 commercial banks between 2010-2018, making a 9 years panel data. The commercial banks were drawn from six nations that include Nigeria, Ghana, Kenya, Tanzania, South Africa, and Zambia based on the strength of their market within the SSA region. Bank equity data are obtained from Thomson and Reuter's data stream, while the macroeconomic variable data are obtained from World Bank open data source.

Variable description, Model specification, and Estimation technique

The study seeks to evaluate the association between NPLs and bank performance within the SSA region. The model below is adapted from the work of (Laryea et al., 2016). The main independent variable of interest is a nonperforming loan (NPLs), which is measured by the ratio of non-performing loan to total loan. Bank specific variables included in the model are interest effect (ITE) measured by net interest margin; bank credit advance (BCA) measured by ratio of total advances to total deposit, capital adequacy ratio (CAD) measured by the ratio of the book value of equity to total asset assets and bank size (SIZE) measured by the logarithm of total asset.

The macroeconomic variable comprises gross domestic product (GDP) and inflation (INF). GDP is measured by the annual GDP growth rate while INF is measured by the consumer price index per

annum. The bank performance is the dependent variable proxy by return on asset (ROA) and returns on equity (ROE). ROA is measured by the proportion of profit before tax and interest to total asset and ROE is measured by the proportion of profit before tax and interest to total equity.

$$PER_{ijt} = PER_{ijt-1} + \beta_0 + \beta_1 NPL_{ijt} + \beta_2 ITE_{ijt} + \beta_3 BCA_{ijt} + \beta_4 CAD_{ijt} + \beta_5 SIZE_{ijt} + \beta_6 INF_{jt} + \beta_7 GDP_{jt} + \eta_i + \lambda_t + \varepsilon_{ijt} \quad 1.$$

$$ROA_{ijt} = ROA_{ijt-1} + \beta_0 + \beta_1 NPL_{ijt} + \beta_2 ITE_{ijt} + \beta_3 BCA_{ijt} + \beta_4 CAD_{ijt} + \beta_5 SIZE_{ijt} + \beta_6 INF_{jt} + \beta_7 GDP_{jt} + \eta_i + \lambda_t + \varepsilon_{ijt} \quad 2.$$

$$ROE_{ijt} = ROE_{ijt-1} + \beta_0 + \beta_1 NPL_{ijt} + \beta_2 ITE_{ijt} + \beta_3 BCA_{ijt} + \beta_4 CAD_{ijt} + \beta_5 SIZE_{ijt} + \beta_6 INF_{jt} + \beta_7 GDP_{jt} + \eta_i + \lambda_t + \varepsilon_{ijt} \quad 3.$$

The study employs the two-step system generalized method of moment propounded by (Arellano & Bond, 1991; Arellano & Bover, 1995). The choice of this technique is justified by the dynamic type of data employed in the study and the numerous advantage associated with the system generalized in proving more consistent and unbiased estimates and its ability in addressing endogeneity bias in the model. Hence, this study employs the system GMM estimator. This mitigates the bias and gives more reliable and proficient parameter estimates in regression, in which the regressors are not completely exogenous. Moreover, the system GMM estimator addresses the issues of endogeneity of regressors and fixed impacts, besides controlling the bias within the dynamic panel.

the system GMM is capable of addressing the biases produced by other less strong models like the random and fixed effect. Also, the system GMM method provides a consistent and efficient co-efficient value despite having predictor variables that are not mainly exogenous and even if autocorrelation and heteroscedasticity exist within (Ahmed, Fauziah, & Noor Azman, 2018).

RESULT AND DISCUSSION

Descriptive Statistics

The study constitutes 450-year observations. The two alternative measures of bank performance, ROA and ROE have a mean value of 2.7078 and 18.4319 with the latter recording a higher return. NPL being the main interest variable has a mean value of 5.3045 with a standard deviation of 6.3047. BCA has the highest mean value of 58.4985 and GDP has the lowest with 4.7577. CAD is the variable with the highest spread of values with a standard deviation of 20.0172 and ROA has the lowest with 1.7007.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA_{ijt}	450	2.7078	1.7007	2.5218	9.97
ROE_{ijt}	450	18.4319	13.4848	67.8	98.37
NPL_{ijt}	450	5.3045	6.3047	-0.02	69.33
ITE_{ijt}	450	8.9569	7.0302	0.5	91.35
BCA_{ijt}	450	58.4985	14.5586	8.4251	95.201
CAD_{ijt}	450	29.0618	20.0172	1.8588	101.01
$BIZE_{ijt}$	450	18.6784	2.7082	12.5874	22.6218
INF_{jt}	450	9.2171	3.9851	3.4944	17.8697
GDP_{jt}	450	4.7577	2.9088	-1.61686	14.0471

Correlation matrix

ROA and ROE have a moderate positive relationship. The co-efficient being the highest correlation figure in the matrix indicate the absence of multicollinearity problem. ROA has a low negative

association with NPL with -0.0570. ROA maintains a positive association with ITE, CAD, and GDP with 0.2246, 0.0856, and 0.2719 respective. While it maintains a negative association with BCA, SIZE, and INF with -0.1079, -0.3008, and -0.0060 respectively. ROE equally maintains a low negative association with the interest variable NPL with -0.036. It maintains a positive association with ITE, CAD, and GDP with a value of 0.0061, 0.0631, and 0.2203 respectively. ROE sustains a negative relationship with BCA, SIZE, and INF with a value of -0.0794, -0.0793, and -0.0023 respectively.

Table 2: Correlation matrix

	ROA_{ijt}	ROE_{ijt}	NPL_{ijt}	ITE_{ijt}	BCA_{ijt}	CAD_{ijt}	$SIZE_{ijt}$	INF_{jt}	GDP_{jt}
ROA_{ijt}	1								
ROE_{ijt}	0.5965	1							
NPL_{ijt}	-0.0570	-0.036	1						
ITE_{ijt}	0.2246	0.0061	-0.1257	1					
BCA_{ijt}	-0.1079	-0.0794	-0.1862	-0.0664	1				
CAD_{ijt}	0.0856	0.0631	-0.0975	0.0139	0.1743	1			
$SIZE_{ijt}$	-0.3008	-0.0793	-0.0265	-0.0082	0.1294	-0.2051	1		
INF_{jt}	-0.0060	-0.0023	0.1712	-0.0427	-0.393	-0.1767	-0.0908	1	
GDP_{jt}	0.2719	0.2203	0.0066	0.0426	-0.1627	0.1001	-0.335	-0.163	1

Regression result

First regression result

The interest of the study is to test the influence of non-performing loans on the performance of deposit money banks in Nigeria. The study employs a two-step system generalized method of moment as method of inference due to its robustness in providing more consistent findings and its ability to address endogeneity-related issues. Moreover, the nature of the data could also justify the adoption of the analysis technique as its best fits dynamic data. The result for pooled OLS, random effect, fixed effect, and differenced generalized are provided for comparison.

The result of the lagged dependent is significant at 1 percent, this justifies the adoption of the technique of analysis. NPL is significant at 1 percent and negatively associated with the performance of banks in SSA. This implies that an increase in the rate of NPL negatively affects the ROA of banks in the region, this is consistent with Partovi and Matousek (2019). ITE is significant at 1 percent and positively related to the ROA of banks in the SSA region. This indicates an increasing banking performance with the rise in the rate of BIR within the banks, this is with the findings obtained by Laryea et al.(2016).

BCA reports a positive association with ROA, with the findings being significant at 1 percent. This shows that an increase in the rate of BCA positively relates to the profitability of banks in the SSA region. CAD is significant at 10 percent and positively relates to the ROA of the banks. This implies that an increasing rate of CAD brings about a positive increase in banks' performance in terms of their ROA, which this similar to the result obtained by Bitar, Pukthuanthong, & Walker (2018). SIZE is significant at 1 percent and negatively associated with ROA. This indicates that any percentage increase in bank size decreases the performance of the banks in terms of their ROA in the SSA region, this finding is consistent with that of Kasman, Tunc, Vardar, and Okan (2010).

The two macroeconomic variables in the model are INF and GDP. INF is positive and significant at 1 percent. This signifies that any increase in the rate of INF will increase the performance of SSA banks, which is in line with the result obtained by Tan and Floros (2012). GDP is significant at 1 percent and positively relates with ROA of SSA banks and it implies an increase in the banks'

performance with an increase in the GDP rate, this is consistent with the result obtained by Dietrich and Wanzenried (2011).

Table 3: Regression 1

			ROA		
VARIABLES	(1) Pooled OLS	(2) Random Effect	(3) Fixed Effect	(4) Differenced GMM	(5) System GMM
ROA_{ijt-1}	0.904***	0.864***	0.638***	0.506***	0.649***
	(0.0201)	(0.0231)	(0.0356)	(0.0146)	(0.00407)
NPL_{ijt}	-0.00365	-0.00255	-0.000228	-0.00633**	-0.0161***
	(0.00505)	(0.00535)	(0.00611)	(0.00274)	(0.00111)
ITE_{ijt}	0.000793	0.00123	-0.00337	0.0134***	0.0225***
	(0.00450)	(0.00475)	(0.00539)	(0.00440)	(0.00132)
BCA_{ijt}	-0.00182	-0.00212	-0.0138***	-0.00228	0.00482***
	(0.00256)	(0.00289)	(0.00456)	(0.00292)	(0.000721)
CAD_{ijt}	0.000559	0.000869	0.00629*	0.00558***	0.000835*
	(0.00169)	(0.00198)	(0.00346)	(0.000945)	(0.000506)
$SIZE_{ijt}$	0.00153	-0.00443	-0.159***	-0.353***	-0.0116***
	(0.0132)	(0.0162)	(0.0577)	(0.0598)	(0.00294)
INF_{jt}	-0.0112	-0.00763	0.00458	-0.0108***	0.0290***
	(0.00943)	(0.00999)	(0.0127)	(0.00259)	(0.00147)
GDP_{jt}	0.0120	0.0203	0.0407**	0.0208***	0.0841***
	(0.0129)	(0.0137)	(0.0179)	(0.00663)	(0.00472)
Constant	0.277	0.428	4.299***		
	(0.386)	(0.448)	(1.223)		
Observations	400	400	400	350	400
R-squared	0.863		0.567		0.647
Number of Banks		50	50	50	50
Diagnostic test					
Vif	1.19				
Breush & Pagan LM test		0.0033			
Hausman test			0.0000		
No. of Instruments				35	42
AR(1): *P*-Value				0.0000	0.0808
AR(2): *P*-Value				0.8629	0.6711
Sargan test: *P*-Value				0.2952	0.2690

Standard errors are in parentheses while the co-efficient values are outside the parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's Computation using STATA 15 (2021)

In the diagnostic test, the distribution shows an absence in multicollinearity with a mean vif at

1.19. The consistency of the system GMM technique was reflected in the null hypothesis of the Sargan test, where the test for the validity of the instrument is not rejected and the confirmation of the absence of second-order serial correlation [AR2] and the presence of first-order serial correlation [AR1].

Second regression result

The study evaluates the impact of non-performing loans on banks' performance in the SSA region.

The lagged dependent variable is significant in all the models, this justifies the appropriateness in using the two-step system GMM in the estimation. NPL is significant at 1 percent and positively associated with ROE. This implies that an increase in the rate of the non-performing loan, decreases the performance of banks in the SSA region, this is similar to the result obtained by Zhang, Cai, Dickinson, & Kutan (2016). ITE is significant at 1 percent and positively relates ROA of banks. This indicates an increase in banks' profitability, with the increase in interest effect.

BCA is significant at 10 percent and positively relates with ROE. This implies that an increase in the rate of bank lending increases the performance of the banks in returns, this is consistent with Laryea et al. (2016). CAD is significant at 10 percent and positively relates to the performance of banks in the SSA region. This shows an increase in bank performance when there is a higher capital base, this is in line with the result obtained by Ashraf, Rahman, Rahman, and Zheng (2018). SIZE is significant at 1 percent and negatively associates with ROE. This indicates that any percentage rise in bank size decreases the performance of banks, this is in line with the result obtained by Ghenimi, Chaibi, and Omri (2017).

The macroeconomic variables in the model are two: INF and GDP. INF is significant at 1 percent and positively relates to the performance of banks in terms of ROE. An increase in inflation rates positively affects the profitability of the banks in the SSA region, this is similar to the result obtained by Albertazzi and Gambacorta (2009). GDP is significant at 1 percent and positively associates with ROE. This implies that an increase in the GDP rate increases the performs of banks in the region, this is consistent with Trujillo-Ponce (2013).

Table 4: Regression result 2

			ROE		
	(1)	(2)	(3)	(4)	(5)
Variables	Pooled OLS	Random Effect	Fixed Effect	Differenced GMM	System GMM
ROE_{ijt-1}	0.775***	0.775***	0.551***	0.727***	0.691***
	(0.0290)	(0.0290)	(0.0448)	(0.0119)	(0.00375)
NPL_{ijt}	-0.0215	-0.0215	-0.0263	-0.0491	-0.151***
	(0.0611)	(0.0611)	(0.0799)	(0.0528)	(0.0261)
ITE_{ijt}	-0.109**	-0.109**	0.228***	0.122***	0.132***
	(0.0534)	(0.0534)	(0.0706)	(0.0144)	(0.00788)
BCA_{ijt}	0.0119	0.0119	-0.0505	0.149***	0.0289*
	(0.0311)	(0.0311)	(0.0588)	(0.0253)	(0.0168)
CAD_{ijt}	0.0369*	0.0369*	0.0521	0.0249**	0.0103*
	(0.0205)	(0.0205)	(0.0473)	(0.00981)	(0.00600)
$SIZE_{ijt}$	-0.136	-0.136	-0.504	-2.034***	-0.396***
	(0.157)	(0.157)	(0.752)	(0.469)	(0.0588)
INF_{jt}	-0.223*	-0.223*	-0.0831	0.422***	0.306***
	(0.116)	(0.116)	(0.172)	(0.0488)	(0.0198)
GDP_{jt}	0.0979	0.0979	0.421*	0.0125	0.334***
	(0.157)	(0.157)	(0.240)	(0.0864)	(0.0462)
Constant	10.05**	10.05**	19.24		
	(4.576)	(4.576)	(15.76)		
Observations	400	400	400	350	400
R-squared	0.665		0.421		0.691
Number of Banks		50	50	50	50
Diagnostic test					
Vif	1.19				

Breaush & Pagan LM test	1.0000		
No. of Instruments		35	42
AR(1): *P*-Value		0.0055	0.0087
AR(2): *P*-Value		0.2030	0.1807
Sargan test: *P*-Value		0.1540	0.2026

Standard errors are in parentheses while the co-efficient values are outside the parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the diagnostic test, the distribution shows an absence in multicollinearity with a mean vif at

1.19. The consistency of the system GMM technique was reflected in the null hypothesis of the Sargan test, where the test for the validity of the instrument is not rejected and the confirmation of the absence of second-order serial correlation [AR2] and the presence of first-order serial correlation [AR1].

Main Result Discussion and Hypotheses reports

The study analyzes the effect of NPLs on bank performance in the context of sub Saharan African region. The study found that NPLs have a negative and significant impact on bank performance in the region. This implies that diminishing bank performance is expected in the event of an increase in NPLs rates within the banks in the region. Interest effect also revealed positive and significant influence on bank performance within the study context. Both the first and the second hypothesis postulated are supported by the result of the study. Confirming a significant negative association between NPLs and bank performance and a significant positive association between interest rate effect and bank performance.

Robustness check

The robustness model employs an alternative measure of performance that is earning per share (EPS). The regression is meant to test the influence of non-performing loans on the performance of deposit money banks in Nigeria. The lagged dependent is significant in all the models, which indicates the suitability of the analysis technique used. The system GMM is used for inference. The main independent variable of interest, which is NPLs is significant at 1 percent and negatively relates with EPS. This indicates an increasing banking performance with a decrease in the NPL rate, this is consistent with the result obtained by Lafuente, Vaillant, and Vendrell-Herrero (2019).

ITE is not significant in the model. BCA is significant and positively associated with EPS. This shows a rise in performance of banks with a rise in the rate of lending in the region, this is consistent with the result of Laryea et al., (2016). CAD is significant at 1 percent and positively relates with EPS. This implies higher capital base is associated with higher banking performance in SSA, this is similar to the result obtained by Abou-El-Sood (2016). SIZE is significant at 1 percent and negatively associated with EPS. This confirms an inverse association between SIZE and bank performance within the SSA banks, this confirms the findings by Luo, Tanna, and Vita (2016).

The macroeconomic variables in the model are INF and GDP. INF is significant at 1 percent and positively relates with EPS. This indicates that an increase in inflation positively increases bank performance, so also with GDP, consistent with Berglund and Mäkinen (2019). The GDP has a significant positive relationship with bank performance, this confirms the result obtained by Dewandaru, Nagayev, Ng, Nizam, and Nkoba (2019).

Table 5: Robustness regression

VARIABLES	(1) Pooled OLS	(2) Random Effect	EPS (3) Fixed Effect	(4) Differenced GMM	(5) System GMM
EPS_{ijt-1}	0.820***	0.820***	0.412***	0.389***	0.526***
	(0.0326)	(0.0326)	(0.0475)	(0.00385)	(0.00332)
NPL_{ijt}	-0.0379	-0.0379	-0.0640	-0.0683***	-0.131***
	(0.0407)	(0.0407)	(0.0503)	(0.00678)	(0.00438)
ITE_{ijt}	0.0196	0.0196	-0.0123	-0.0161**	0.00321
	(0.0354)	(0.0354)	(0.0447)	(0.00755)	(0.00533)
BCA_{ijt}	0.0194	0.0194	-0.0259	-0.00172	0.0690***
	(0.0207)	(0.0207)	(0.0375)	(0.00419)	(0.00249)
CAD_{ijt}	-0.00530	-0.00530	-0.0425	0.0103***	0.0420***
	(0.0136)	(0.0136)	(0.0283)	(0.00272)	(0.00182)
$SIZE_{ijt}$	0.173	0.173	0.979**	0.590***	-0.210***
	(0.107)	(0.107)	(0.481)	(0.0796)	(0.00866)
INF_{jt}	-0.153*	-0.153*	-0.207*	-0.147***	0.331***
	(0.0799)	(0.0799)	(0.107)	(0.0120)	(0.00558)
GDP_{jt}	-0.0273	-0.0273	-0.162	-0.142***	0.322***
	(0.102)	(0.102)	(0.149)	(0.0113)	(0.00843)
Constant	-1.232	-1.232	-8.985		
	(3.044)	(3.044)	(10.00)		
Observations	400	400	400	350	400
R-squared	0.702		0.262		0.510
Number of Bank		50	50	50	50
Diagnostic test					
Vif	1.19				
Breausch & Pagan LM Test		1.0000			
No. of Instruments				35	42
AR(1): *P*-Value				0.0374	0.0376
AR(2): *P*-Value				0.3985	0.4109
Sargan test: *P*-Value				0.1035	0.1831

Standard errors are in parentheses while the co-efficient values are outside the parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the diagnostic test, the distribution shows an absence in multicollinearity with a mean vif at

1.19. The consistency of the system GMM technique was reflected in the null hypothesis of the Sargan test, where the test for the validity of the instrument is not rejected and the confirmation of the absence of second-order serial correlation [AR2] and the presence of first-order serial correlation [AR1].

CONCLUSION AND POLICY IMPLICATION

The study examines the association between NPLs and bank performance in the context of sub-Saharan Africa. The study covers a period of 9 years from 2010-2018, using 50 listed commercial banks across the six nations. The major result obtained revealed that NPLs are significant and negatively associated with bank performance in the selected countries. The study has some policy implications for its major stakeholders that include bank management, clients, academia, and

government.

The study exposes the danger inherent in working with high NPLs to bank management to be cautious and take proactive measures that will keep their NPLs within the barest minimum. Clients will also learn from this study in understanding that banks with high NPLs are likely to face liquidity problems, therefore need to avoid them in order not to be a victim of distress in the bank they operate with. The study also adds to the existing stock of literature, particularly in the area of NPLs and bank performance and the study could serve as a point of reference to future researchers due to the recent data set used in the study. The study will also inform the government about the dangers posed by NPLs and the need for them to make regulations capable of minimizing the rate of NPLs within the banking sector.

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