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Analysis of Empirical Relationship among Agricultural Lending, Agricultural Growth and Non-Performing Loans in Nigerian Banking System

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Abstract

Increasing levels in Non-Performing loans (NPLs) which has remained an area of great concern contributed to issue of declining agribusiness activities in Nigeria in the 1990s and thereafter. The study examined non-performing loans relationship with agricultural lending and agricultural productivity from 1980 to 2015 in Nigeria. Time series data obtained from CBN were analyzed using, Granger causality test, Pearson correlation, and co-integration as well as error correction models. The empirical analyses revealed that, bilateral Granger causality existed between loans and advances granted to agricultural sector and non-performing loans in Nigeria. Also, growth in GDP has a positive and significant correlation with NPL in Nigeria. In the long run, NPL is positively related to agricultural productivity, growth in the GDP and value of loans and advances offered to agricultural sector. Whereas, in the short run, NPL reacted significantly to the negative influence of interest rate and positive impact of GDP growth rate. The adjustment coefficient of 52% was discovered for the NPL long run equation in Nigeria. It is recommended that short and long- term banking reform policies be adopted to reduce fluctuations in NPLs in the banking system and efforts should be geared towards increased participation of specialized financial institutions as to accelerate investments in agriculture sector.

Keywords: Non-performing loans, Agricultural lending, Agricultural output, Banking system

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1. Introduction

Globally, there have been more banking crises in the last two decades than ever before 1980s. The main cause seemed to be associated with increased growth rate of non-performing loans (NPLs) trend whose consequences have been far reaching (Ahmed and Bashir, 2013; Umoren, 2015). The Central Bank of Nigeria (CBN), the major supervisor and regulator of the banking system and the financial system is also facing the challenges of maintaining price and financial stability in the economy due to the increasing financial instability associated with increasing growth in NPLs.

The decrease in profitability of banks caused by high NPLs problem seems to have led to significant decline in productivity of various sectors of the economy notably agriculture which is a pivot of many developing economies such as Nigeria. In Nigeria, agriculture is a dominant sector and a major source of livelihood among a vast number of the population. It is one of the prioritized sectors in the national economy. Agricultural sector dominates the Nigerian economic landscape. Currently, the sector accounts for about 38.22 per cent of the total gross domestic product (GDP) and 40 per cent of total employment in the country (Umoren, 2008; NBS (National Bureau of Statistics), 2012). Other important roles ascribed to this sector include: provision of food for the teeming population of about 172 million people; provision of raw materials to the industrial sector; earning of foreign exchange through export of commodities; and provision of markets that facilitate the sales of the industrial products. In fact, in the early years of the nation, agriculture was traditionally described as a mainstay of the economy because of its largest contribution to the country's GDP. Paradoxically, it has drastically declined. Agriculture is not only a prioritized sector for the realization of national goal of increased productivity and income but a sector that enhances improvement in welfare of the citizens. However, food import bills in the country tended to be astronomically high while the production of these commodities seemed abysmally low.

Various studies in agricultural sector are of the views that increased productivity and improvement in income were greatly influenced by the injection of improved factors of production needed for intensive cum extensive land and infrastructural development (Akpan *et al.*, 2012). Among these major factors of production, loans and advance from the banking system were regarded as panacea for increased production or productivity in the sector. Bank loan constituted a major source of business capital and its availability increased efficiency of production while its inadequacy or non-availability might hamper productivity. The productivity in agricultural sector was crucial to the growth and development process of the economy and seemed to have been influenced by the availability of loans and advances from the banking system. The dismal performances of the sector might be linked with poor health of the banking system as evidenced by prevalent huge NPLs (Elegbe, 2013). Bank loan constitutes a major source of capital investment in agricultural sector, and its availability might be one of the factors which could increase efficiency of production in the sector.

Though the banking system had attained prominence in its role in granting loan facilities for production and consumption purposes yet its biggest challenge was increasing accumulation of NPLs which emanated from loans and advances granted to various beneficiaries in agriculture, and other sectors of the economy. The problems of high level of accumulated NPLs in the banking system were experienced in both developed and developing economies. These were reported in prints and electronic media as the basic cause of crises in the banking system. Fofack (2005) argued that the collapse of over 60 banks in Indonesia during the 1997 East Asian financial and banking crisis affected a large population of Sub-Saharan African nations in the 1990s. These were followed by a rapid accumulation of NPLs. In Nigerian, these huge NPLs have significantly contributed to financial crises in the economy (Elegbe, 2013).

1.1. Statement of Problem

The prevalent high aggregate NPLs trends coupled with unstable macroeconomic and banks specific factors seem to be responsible for the decline in agricultural lending. This might have militated against accelerated agricultural lending because of decrease in availability of loanable funds to the sector. The key questions in the study were as stated thus: Did the high aggregate NPLs rate in the banking system adversely influence growth in agricultural lending from 1980 to 2015? Did the high level of NPLs affects the level of agricultural activities? These form the cardinal focus of the study. The shutting down of many large farms and agro-related enterprises might be associated with low loan supply for agriculture activities which tended to strangle the expansion of agribusinesses in Nigeria.

1.2. Objective of the Study

The study sought to determine the relationships among aggregate NPLs in the banking system, agricultural lending and agricultural productivity in Nigeria during the study period

1.3. Conceptual Framework

Nonperforming loans are loans made by banks or finance companies on which repayment of principal amount and interests were not made on time. Loan is an asset to a bank because interest payments create a stream of cash flows in addition to the payments of the principals. It is from the interest payments that banks make their profits. Banks treat loans as NPLs if they are not serviced for over 90 day's period of time. If payments were late for some time, a loan might be classified as past due. As payments became really late usually from 90 days, the loan might be classified as non-performing loan (NPLs) or impaired loan. High level of NPLs in an economy might be a sign of problem of poor health in banks as could be a sudden or prolong increase in level of NPLs which might point to poor performance of the banking system.

A loan becomes non-performing (NPLs) when it cannot be recovered within a specified period of time as covenant by the loan contract. This definition of NPLs is from the lending institution point of view. A loan may be NPLs if it is used for different purposes other than the initial purpose for which it was granted. This is the users'

point of view. However, our perspective is mainly on the banking system point of view. In the banking system, loans become NPLs when the principal and interests are not paid after 180 days and beyond hence they are classified as bad, doubtful and lost for which the macro-prudential guidelines stipulate 100% provisioning by the banks (CBN, 2010).

Literature on NPLs definition is so varied, resulting to changes in NPLs levels within individual countries rather than a group. A loan facility is said to be NPLs when a borrower is 30, 60, 90 days delinquent in making payment. Another consideration of NPLs can happen when a loan granted by banks in a specific sector such as agriculture is re-negotiated or restructured. In all these instances, the loan is not making interest for the banks; such a loan may said to be NPLs. Hence, NPLs are indicative of quality of or performance of financial assets granted to customers that have become risky, and could become lost. NPLs can also be described as inability of loan beneficiaries to meet contractual terms of the loans. The loan beneficiaries being delinquent were placed in non-accrual basis. Though there seemed to be no global standard definitions of the concept of NPLs at practical stage yet. Saba *et al.* (2012) attempted to define NPLs as sum of borrowed money upon which debtors had not made their scheduled payments for at least ninety (90) days. NPLs were either in default or near default. As observed by Saba *et al.* (2012) in a situation of NPLs, the odds that they would be repaid in full were deemed to be significantly minimal. However, should the defaulters (debtors) commence repayments; the NPLs become re-performing loans even if the debtors had not caught up with all the missed portions of the agreed payments. They documented in their study that NPLs consisted of loans in three categories namely standard, bad and doubtful; and lost. These were segmented based on the degree of collectability difficulty.

2. Literature Review

There are numerous literature on non-performing loans especially in developed countries. A study by Beck *et al.* (2013) showed that loan performance was closely linked to economic cycle. They maintained that standard determinants of NPLs were economic activity and lending interest rates. Interest rate affected loan performance because it is a channel which connect rise of debt service cost to loan beneficiaries especially with variable rates of loan contracts. The study concluded that real GDP growth was the major driver of NPLs and that a drop in economic activity remained the most important risk for bank loan quality.

Studies on the relationship between NPLs and banks failures include Dash and Kabra (2010); Saba *et al.* (2012); Elegbe (2013); Adebola *et al.* (2011); Nanita *et al.* (2011). These studies maintained that the prevalent high NPLs were a major threat to the banking system. These literature argued that NPLs in loan portfolio affect the operational efficiency of banks which in turn affected the profitability, liquidity, and solvency positions of the banking system. This also affects bank disposition to credit creation and expansion (Hou and Dickson, 2007). NPLs generate vicious effects on the survival and growth of the banking system and if not adequately managed could lead to bank failures and the consequence spill-over effects on the economy.

In Nigeria, the existence of high aggregate NPLs in the banking system seemed to be one of the factors behind the gradual decline in agricultural gross domestic products. Various opinions seem to, point out that the impacts of high aggregate NPLs in banks on the economy also include decline in economic activities epitomized by massive job losses in most sectors of the economy; declining capital inflows into agriculture and manufacturing and other sectors, de-accumulation of foreign reserves and mounting pressure on exchange rates; and limited foreign trade financing for banks while credit lines dried up for some banks and corporate businesses engaged in agricultural sector of the economy. They conclude that high level of aggregate NPLs in the economy may be responsible for the reduction in credit supply to the agriculture sector (Fofack, 2005). Some of these studies have reported inverse association between growth in GDP and NPLs of banks (Ahmed *et al.*, 1999; Salas and Saurina, 2002; Rajan and Dahl, 2003; Fofack, 2005; Hou and Dickson, 2007; Louzis *et al.*, 2010). As GDP increases, the income of loan beneficiaries also improves indicating enhanced loan repayment capacity. This may lead to low level of aggregate NPLs in the banking system and vice versa.

The importance of loans to agricultural sector is very vital to the growth of the economy. Umoren *et al.* (2014) posits that it reactivates, expands and modernizes all kinds of agricultural activities considered economically viable and desirable to the realization of the stated goal of increased productivity in agriculture. However, prevalent increases in loan defaults (impaired loans or problem loans) which tend to enhance banking system losses as result of increase in level of NPLs might be associated with decline in banks investment in agricultural sector of the economy. Espinoza and Prasad (2010) reported that higher interest rates increased NPLs while higher non-oil export growth reduced NPLs. They concluded that the effects of interest rates and non-oil export growth were significant. Increase in interest rates caused a reduction in non-oil export growth with a significant feedback effects.

Attempts to expand knowledge on NPLs have sprung up many empirical researches; for instance, Ahmed and Bashir (2013); Saba *et al.* (2012) carried out an empirical study on the determinants of NPLs in US Banking sector. They found negative relation of lending rate and NPL while inflation and Real GDP per capital had positive and significant relationships. In another study, Louzis *et al.* (2010) examined the determinants of NPLs in the Greek financial sector using dynamic panel data model. They discovered that, the real GDP growth rate had negative association with NPL whereas lending rate exhibited positive significant relationship. Also, loan to deposit ratio and capital adequacy ratio had insignificant effect on NPLs. The study of Skarica (2013) on the determinants of NPLs in Central and Eastern European countries through fixed effect model reported significant negative relationship between NPL and GDP growth rate, unemployment rate and inflation. In their study, Badar and Javid (2013) assessed long and short run dynamics between nonperforming loans and macroeconomic variables (inflation, exchange rate, interest rate, gross domestic product and money supply) covering the period from January 2002 till December 2011 of commercial banks in Pakistan. Employing Johansen and Juselius Multivariate Co-integration Test, a long run relationship was found among variables in the study. Using Granger causality test it was found that

inflation and exchange rate were the causes of non-performing loans however, vector error correction model provided that there was weak short run relationship between Nonperforming loans with inflation and exchange rate.

The major issues associated with the increased accumulation of high aggregate NPLs in Nigeria, seemed to have continued to remain elusive despite concerted efforts by the monetary authority in reforming the banking system. The relationship between NPLs and the impacts on agricultural sector in Nigeria has significantly been ignored. However, few existing empirical studies focused on banking system reforms (Balogun, 2007) the financial structure and economic growth, Olofin and Afangide (2008). However, not much intensive studies had been conducted linking NPLs in banking system, agricultural lending and growth in agricultural economy in Nigeria. In fact, no previous empirical studies had considered the possibility of developing a model that can capture the relationship among NPLs, agricultural loan/advances and their impacts on the level of the agricultural economy. Therefore, minimization of high aggregate NPLs may be a necessary condition in order to improve the agricultural activities conducive for accelerated agricultural growth. This paper contributes to inadequate literature on the relationship among aggregate NPLs; agricultural lending and agricultural activities in Nigeria by utilizing time series data collected from the Central Bank of Nigeria (CBN). Exploiting banking system NPLs; agricultural lending and agricultural activities trends is likely to yield more robust results than analysis of individual banks as well as unit agricultural enterprise (Beck et al., 2013).

3. Research Methodology

3.1. Study Area

The study was conducted in Nigeria. The country is located on the Gulf of Guinea in the Sub-Saharan region of Africa. It lies between 4⁰ and 14⁰ north of the equator and between longitude 3⁰ and 15⁰ east of Greenwich meridian. Nigeria had a total land area of 923,768.622km² which was approximately 98.3 million hectares (Akpan et al., 2012). It had a population of over 140 million. The agricultural sector dominated the Nigerian economic landscape accounting for 38.22 of the total GDP and more than 60 per cent of employment (NBS, 2012).

3.2. Sources of Data

Time series data from 1980-2015 were used in the study. The data were collected from Central Bank of Nigeria (CBN), Security and Exchange Commission (SEC), National Bureau of Statistics (NBS), Nigeria Deposit Insurance Corporation (NDIC), International Monetary Fund (IMF), World Bank, Food and Agriculture Organization (FAO). The study used specific information on aggregate NPLs in the Nigerian Banking system. Standard macroeconomic variables used in the study included gross domestic product, lending interest rates, loans and advances to agriculture and agricultural output. The data spanned from 1980-2015.

3.3. Analytical Techniques

Multiple regression model was used to determine the relationship among NPLs in the Nigerian Banking System, Agricultural lending and agricultural output in Nigeria. In addition, the study employed Pearson correlation and Granger causality test analyses.

3.4. Long Run Model of NPLs in Nigeria

Based on the result of unit root, a long run model for NPL was specified at the level of variables. The primary model in explicit and implicit forms is shown in equation 1 and 2 respectively:

$$NPLS_t = f(AGDP_t, INTR_t, ATOP_t, LADA, LTDR_t) \dots \dots \dots (1)$$

$$NPLS_t = \delta_0 + \delta_1 INTR_t + \delta_2 LADA_t + \delta_3 ATOP_t + \delta_4 LTDR_t + \delta_6 AGDP_t + \varepsilon_t \dots \dots \dots (2)$$

Where;

NPLs_t = Non performing loan (%)

INTR_t = Commercial Bank lending interest rate (%)

LADA_t = Loan and advances to agricultural sector (Loan and advances to agricultural sector/Total loan and advances to the economy) expressed in (%)

ATOP_t = Agricultural sector's total productivity (Agric. GDP/Total GDP) expressed in (%)

LTDR_t = Liquidity ratio (Total loan and advances per total Bank deposit (%)

AGD_t = Growth rate in total GDP (%)

To validate the existence of the long run stable relationship in NPLs equation in Nigeria, the study applied the Engle and Granger two-step technique (Engle and Granger, 1987) and Johansen co-integration test. Following the Granger Representation Theorem, the Error Correction Model (ECM) for the co-integrating series in the study was specified. The error correction Model specified for NPLs in Nigeria is implicitly shown below:

$$\Delta \ln NPLS_t = \delta_0 + \delta_1 \Delta \ln NPLS_{t-1} + \delta_1 \Delta \ln INTR_t + \delta_2 \Delta \ln LADA_t + \delta_3 \Delta \ln ATOP_t + \delta_4 \Delta \ln LTDR_t + \delta_5 \Delta \ln AGDP_t + ECM_{t-1} + \varepsilon_t \dots \dots \dots (3)$$

Where variables are as described previously in equation 2 and ECM_t is the error correction term.

3.5. Bivariate Granger Causality Test between NPLs and Other Variables

In this study, the bilateral Granger Causality tests were conducted on NPLs and selected macroeconomic variables in Nigeria. The primary model in Vector Autoregressive Regression forms are represented as thus:

$$\left\{ \begin{aligned} \Delta \ln NPL_{1t} &= \beta_0 + \beta_1 \sum_{i=1}^n \Delta \ln NPL_{1t-i} + \beta_2 \sum_{i=1}^n \Delta \ln AGDP_{t-1} + \varepsilon_{1t} \dots \dots \dots (4) \\ \Delta \ln AGDP_t &= \delta_0 + \delta_1 \sum_{i=1}^n \Delta \ln AGDP_{t-1} + \delta_2 \sum_{i=1}^n \Delta NPL_{t-1} + \varepsilon_{2t} \dots \dots \dots (5) \end{aligned} \right.$$

This was specified for all variables used in the equation 2.

4. Results and Discussion

Emerging developments in Economic literature has shown that most time series are non-stationary, and this has invalidated the application of most estimation methods to time series at level. This is essential in order to prevent spurious or nonsense regression. It becomes imperative to determine the stationarity of variables used in the study since existence of unit root is a common feature in time series data. The standard Augmented Dickey–Fuller (ADF) test for unit root was conducted on specified variables (Dickey and Fuller, 1981). Table 1 presents the results of ADF test statistic for each variable conducted at level and also at the first difference involving two sets of ADF equations.

Table-1. Result of the Unit Root test for Variables Used in the Analysis

	With Constant			With constant and Trend		
	Level	1 st Diff.	OT	Level	1 st Diff.	OT
NPLs	-0.9871	-6.3743**	1(1)	-2.6231	-6.5377**	1(1)
ATP	-0.4115	-6.7761**	1(1)	-1.9467	-6.9767**	1(1)
LADA	-1.1413	-6.0713**	1(1)	-1.6579	-6.0424**	1(1)
LTDR	-0.2438	-5.6223**	1(1)	-3.2250	-5.3752**	1(1)
INTR	0.4758	-7.5778**	1(1)	-2.5493	-7.6818**	1(1)
AGDP	-3.3250**	-	1(0)	- 5.34099**	-	1(0)
Error	-3.1080*	-	1(0)	-3.7260*		1(0)

Note: OT means order of integration. Critical values (CV) are defined at 1% and 5% significant levels and asterisks * and ** represent 5% and 1% significance levels respectively. Variables are as defined in equations 3 and 4.

The above results indicate that at level for both ADF equations, the series were non-stationary with the exception of AGDP. The results imply that, most specified variables have unit root issue. Following the unit root results, it indicates that, equations involving the specified variables cannot be specified at level to avoid the incidence of having spurious regression estimates. The implication of this result is that equation 2 should be subjected to co-integration and error correction model.

4.1. Pearson Correlation Matrix of NPLs and Some Macroeconomic Variables

The estimation of the Pearson correlation coefficient became relevant in order to establish the linear and symmetric association between Non- performing loans (NPLs), lending interest rate (INTR), loan and advances granted to agricultural sector (LADA), agricultural sector’s total productivity (ATOP), liquidity ratio (LTDR) as well as growth rate in gross domestic product (GDP) in Nigeria. Table 2 shows the correlation matrix for the specified variables in the study.

Table-2. Correlation matrix for variables used in the Analysis

Variable	NPLs	ATOP	LADA	LTDR	INTR	GDP
NPLs	1.0000	0.314 (0.063)	0.272 (0.108)	0.390 (0.019)	-0.210 (0.220)	0.402 (0.015)*
ATOP		1.0000	-0.162 (0.344)	0.096 (0.577)	0.326 (0.052)	0.273 (0.107)
LADA			1.0000	-0.020 (0.906)	0.056 (0.746)	0.157 (0.361)
LTDR				1.0000	-0.558 (0.000)**	-0.007 (0.969)
INTR					1.0000	0.181 (0.292)
AGDP						1.0000

Note: variables are as expressed in equations 2. Values in bracket are probability value and others are correlation coefficient. Asterisks * and ** represent significant levels at 5% and 1% respectively.

The above results revealed that, NPLs has significant positive relationship with the growth rate of AGDP. This means that, the accumulation of NPLs grows with the positive growth rate in the country’s GDP. This implies that there is a strong linear relationship between NPLs and GDP growth rate in Nigeria. This finding satisfies the priori expectation as increase in GDP will entails increase in capital investment, loanable funds and other form of money transfer/exchange within the economy. With increase in economic activities, credit to all sectors of economy is likely to increase with the corresponding default. However, NPLs exhibited positive but weak and insignificant correlation with agricultural productivity, loan and advances granted to agribusinesses, and liquidity ratio in the banking system. The relationship was negative and weak with the banking system lending rate in the country. The result also indicates that, NPL might not have a strong linear association with these variables, but there could be significant relationships which are not expressed in linear forms.

4.2. Granger Causality Test between NPLs and Other Specified Variables

The long run causality relationship between NPLs and lending interest rate (INTR), loan and advances granted to agricultural sector (LADA), agricultural sector's total productivity (ATOP), liquidity ratio (LTDR) as well as growth rate in gross domestic product (GDP) in Nigeria is presented in Table 3. The result of the bilateral Granger causality suggests that there is an evidence of bi-directional Granger causality between non-performing loan (NPLs) and Loan and advances to agricultural sector (LADA) in Nigeria. This implies that, there is a reciprocal relationship between index of non-performing loans (NPLs) and value of loan and advances (LADA) directed to the agricultural sector in Nigeria. The value of F-test is significant at the conventional probability level.

Table-3. Results of Granger Causality Test between NPL and other specified variables

Null Hypotheses (H ₀)	Lag length	Observation	F-Statistic	Probability	Decision
NPLs does not Granger cause ATOP	2	34	2.0417	0.1481	Accept
ATOP does not Granger cause NPLs			0.6214	0.5442	Accept
NPLs does not Granger cause LADA	2	34	3.0987	0.0603*	Reject
LADA does not Granger cause NPLs			4.1578	0.0258**	Reject
NPLs does not Granger cause LTDR	2	34	0.0798	0.9235	Accept
LTDR does not Granger cause NPLs			1.8447	0.1761	Accept
NPLs does not Granger cause INTR	2	34	0.1798	0.8363	Accept
INTR does not Granger cause NPLs			1.4647	0.2477	Accept
NPLs does not Granger cause GDP	2	34	1.1.334	0.3358	Accept
GDP does not Granger cause NPLs			0.0462	0.9550	Accept

Note: Asterisk, *, and ** represent 10% and 5% significant levels respectively. Variables are as defined in equation 2 and are expressed as logarithm.

This shows that the previous values of loan/advances granted to economic agents in agriculture significantly determined the current value of NPLs in the banking system and vice versa. Alternatively, NPLs affects LADA in one direction; while LADA affects NPLs in the opposite direction. The presence of the bi-directional Granger Causality between the NPLs and LADA suggests that both NPLs and LADA exhibited significant level of co-movement within the period considered in the study. The result also suggests that NPLs is strongly endogenous to LADA and vice versa in Nigeria. However, there were no significant bilateral relationships between NPLs and other variables specified; hence the direction of causality could not be ascertained.

4.3. Long-Run Relationship between NPLs and Other Specified Variables

The results of Johansen's Co-integration test which aim at ascertaining the existence of potential equilibrium long-run relationship among specified variables considered in the study are presented in Table 4. The Engle- Granger two –step technique Johansen techniques were used to confirm the presence of co-integration in the NPLs equation.

Table-4. Johansen co-integration test for the specified model

Rank	Eigenvalue	Trace test	p-value	Lmax. Test	p-value
0	0.9539	211.04	0.0000***	98.457	0.0000***
1	0.7663	112.58	0.0000***	46.514	0.0004***
2	0.6863	66.068	0.0003***	37.094	0.0013***
3	0.4304	28.975	0.0626*	18.009	0.1330
4	0.2793	10.966	0.2171	10.480	0.1854
5	0.0151	0.4858	0.4858	0.4858	0.4858

Note: Asterisks, * and *** denotes 10% and 1% levels of significance respectively.

The above results showed that the trace statistics and maximum Eigen value were significant at various levels of conventional probabilities. Also, the error term generated from the long run equation was stationary at level as shown in Table 1. These indicated that, there is a stable long run relationship in NPLs equation specified when shocked or disturbed by changes in macroeconomic fluctuations in Nigeria. Based on the above test results, there was obvious need to generate the short- run relationship among NPLs in order to ascertain the speed of adjustment to equilibrium state in the long run.

Table-5. Estimates of the Long and Short Run Model for Non-Performing Loan in Nigeria

Long run model (A)			Short run Model (B)		
Variable	Coefficient	t-value	Variable	Coefficient	t-value
Constant	-2.3916	-0.7142	Constant	-0.0162	-0.2270
ATOP _t	1.4077	2.1683**	NPL _{t-1}	0.1277	0.7242
LADA _t	0.2459	2.1279**	ATOP _t	0.3763	0.7746
LTDR _t	0.7525	1.1980	LADA _t	-0.1037	-0.9067
INTR _t	-0.6753	-1.5109	LTDR _t	-0.1336	-0.3487
GDP _t	0.0809	2.1754**	INTR _t	-0.7669	-1.9746*
			GDP _t	0.0489	2.5944**
			ECM _{t-1}	-0.5161	-3.2320***
R ²	0.4565		R ²	0.4016	
F _{cal}	5.0398***		F _{cal}	2.4928**	

Note: Variables are as expressed in equations 3. Asterisks *, ** and *** represent significant levels at 10%, 5% and 1% respectively.

The above results show the long and short-run relationships in NPLs equation specified in the study. The diagnostic statistic revealed that, the R² is 45.65% and 40.16% for long and short –run model respectively. This means that, about 45.65% and 40.16% variation in NPL in the long and short run model respectively is attributed to

the specified explanatory variables. This indicates that, many variables affect NPLs in banking system in addition to these variables used in the study. The F-calculated for both long and short run models is statistically significant at 1% and 5% probability level respectively. This indicates that both R-squared are statistically significant and the two equations have goodness of fit. Furthermore, the coefficient of ECM in the short run model is statistically significant, exhibits appropriate sign and lies within the theoretical range. This justifies the fact that, NPL equation specified in this study has a stable long run relationship when shocked in the short run. This suggests that the disequilibrium in the previous period in NPL is corrected in the current period. The speed of adjustment from disequilibrium state is about 52% annually. This indicates about 52% of short-run deviations made in previous years are corrected in the current year.

The result of the long run model of NPLs in Nigeria revealed that, agricultural productivity has a positive significant relationship with NPLs. This implies that, NPL increases as total productivity in the agricultural sector increase. This result suggests that, as total investment in agricultural sector accumulate, it impacted positively on the NPL. Many instances could explain this result, firstly: total investment increase in agricultural sector will equally increase with loanable fund and advances as well as likelihood to default. By implication, the more investment opportunities in the sector, the more loans and advances and the more the likelihood of default among agents in the sector. Secondly; in Nigeria, farming activities are in the hands of poor resource farmers with little or no collateral and hence low probability for loan repayment. As agricultural production is in the mercy of nature, and output price not guaranteed as well as the mounting inflation in the country; an increase in farm output could result to a glut characterized by lower price and increase cost of production but less revenue to farmers. Given this scenario, default will accumulate in the face of increase farm productivity.

Similarly, loans and advances granted to agribusiness have positive significant association with NPLs in Nigeria. The result satisfies priori expectation as increase in volume of loanable fund in the economy will increase the likelihood of default. Other macroeconomic factors and political environment will work with increase loanable fund in the economy to affect NPLs. For instance, increase in inflation and political instability could negate the objective of increase loanable fund in the economy. In Nigeria, issue of macroeconomic volatility was so pronounce in recent years and could be responsible for this result.

Furthermore, growth rate in total GDP impacted positively on the NPLs and was significant at the conventional level of probability. This means that, as gross investment increases in the country, the likelihood of loan default by economic agent who borrowed fund increase too. This result is in consonance with the previous results; because as gross domestic investment increases, loanable funds and advances will be stimulated hence increase likelihood of default.

On the other hand, the short run model revealed that, interest rate has a negative significant relationship with NPLs in the economy. This means that, in the short run, as interest rate increases, the NPLs will decline and vice versa. The result again satisfies priori expectation as increase in interest rate in the short run will likely retard large number of credit beneficiaries in the economy. This will reduce the default rate and hence NPLs accumulation in the economy. Increase in interest rate will also induce financial discipline in the part of bankers; and will equally filter unintended beneficiaries or those with extreme lower value of collateral.

The growth rate in the country's GDP had positive and significant impact on NPLs in the short run in Nigeria. The impact of GDP growth on NPLs is similar in the long and short run periods. However, the magnitude of effect is greater in the long run compared to the short run period.

5. Conclusion and Recommendations

The empirical findings have revealed that, Non-performing loans in the banking system is actually affected by series of macroeconomic factors in the long and short run periods in Nigeria. The result of analysis has showed that, NPLs is positively related to agricultural productivity, loans and advances to the agricultural sector and growth rate in total gross domestic product (GDP) in Nigeria. However, in the short-run, NPLs showed negative association with interest rate and positive correlation with GDP growth rate in Nigeria. The study also discovered adjustment rate of 52% in NPL for a shock induces by the specified macroeconomic variables in Nigeria. Invariably, it implies that, it will take NPLs about 6.5 months to adjust back to equilibrium or stable state in the current year resulting from previous shock(s) induce by the banking system or macroeconomic variables in the economy.

Based on findings, it is recommended that short and long- term banking reform policies be adopted to reduce fluctuations in NPLs in banking system in Nigeria. However, the relationship between NPLs and agricultural productivity needs be interpreted with care. This is because the proportions of farmers that have access to loans and advances in Nigeria seem not significant hence their contributions to NPLs may not be significant. It is also recommended that interest rates should be minimized by the central bank through series of financial interventions to ease credit creation in the economy thereby encouraging enhance agricultural lending. Policy on increased participation of specialized financial institutions as to accelerate investments in agriculture sector is recommended.

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