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# NON-PERFORMING LOANS AND BANKING SECTOR IN NIGERIA

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## ABSTRACT

The study examined the impact of non-performing loans on the bank performance in Nigeria. The approach used is a clear departure from previous studies as it made use of earning ratio of the banks precisely return on asset and profit after tax measures on bank performance. The independent variables used are non-performing loans, loan and advances, total deposits and lending rates. Auto-regressive distributed lags ARDL and Vector auto-regression VAR are applied. The results show that all the variables show significant long and short run relationships with ROA but not with PAT. The relationship between PAT and NPL with other variables are analysed via VAR since co integration could not be established. The VAR result indicates that PAT as measure of bank performance is more responsive to changes in total deposits more than any other variable including the NPL. It is concluded that ROA appears to be a better measure of bank performance when studying effects of NPL as it shows that it has significant negative impact on ROA but the PAT does not show any significant response to NPL

**Key Words**: bank performance, return on asset, profit after tax, non-performing loans.

## Introduction

A major challenge facing the Nigerian banking sector is the prevalence of non-performing loans (NPL). This has been identified as a factor that limits the effectiveness of the banking sector in promoting the growth of the country (see Boudriga*et al;* 2010). Though, other problems confronting the Nigerian economy include mammoth bribery and corruption, poor infrastructure development, weak institutions, governance issues, high levels of debt, and inadequate education systems, it is believed that if the problem of nonperforming loan can be fixed, banks will be in more pole position to provide the needed catalyst for boosting the growth of these economies and this will consequently enhance the confidence of potential investors and push these economies to a higher level of growth (IMF, 2010).

Incidentally, one instructive fact is that Nigerian economy has experienced financial sector problems and even though these occurred at different times, there is no evidence to rule out a re-occurrence. NPL is rising and high in Nigeria in recent times. The burden of NPL will stick economies to low growth, low profitability and low credit. Unfortunately, credit which sometimes birth NPLs, is the oil that greases economies and is unavoidable (Kerry *et al;* 2014).

Even though the definition of NPL is not uniform across countries, IMF (2004) gave a definition which represents a general convergence of the term. A loan is deemed to be nonperforming if payments (principal and/or interest) due have not been paid for at least 90 days. The Bank of International Settlement (BIS) 5-tier system of classification expatiates further by categorising loans into Pass, Special mention, Sub-standard, Doubtful and virtually lost. Of these, the last three classes of loans are the nonperforming loans. While the first category refers to a healthy loan, special mention loan may currently have no outstanding payments but collections problem may be foreseen. However, impairment is used in replacement of non-performing by international accounting and banking standards. Sound Practices 7 and 11 of the Basel Committee on Banking Supervision and the International Accounting Standard (IAS) 39 refer to such loans as being impaired.

The challenge of NPLs in banking sectors is also observed from evidences in Nigeria economy in the past. This challenge has led to a serious concern for a banking crisis for the country..

As for Nigeria in 1993, insolvent banks constituted 20% and 22% of banking systems assets and deposits respectively. This concern, again in 2010, made Nigeria follow the government bail-out option when the National Assembly established the Asset Management Corporation of Nigeria (AMCON) to buy some non-performing loans off banks (Kolapo*et al*; 2012).

## 1.2 STATEMENT OF THE PROBLEM

Over the year the relationship between non-performing loan and bank performance has been a subject of discussion among various authors. This has led to the development of a dichotomy regarding the conclusion of various authors on this subject matter. Explicitly, there is emergence of two distinctive views on the relationship between non-performing loan and bank performance.

Firstly, some group of authors believed and concluded from their studies, that credit risk (nonperforming loans) aids bank performance through interest yield on loans and according to them the yield on these loans often significantly out weights the principal there by increasing the profit of the banks and consequently increasing bank performance. Hosna, et al,(2009), for example; assessed the effect credit risk management and profitability in commercial banks inSweden. Using two credit risk indicators (NPLR and ROE), the findings and analysis revealed that credit risk management has effect on profitability in all 4 banks selected.

Dasah, et al (2012) found a positive relationship between nonperforming loans and profitability in Ghanaian commercial banks. The result is consistent with that of Afriyie and Okotey (2010), who found a significant positive relationshipbetween non performing laons with profitability of

rural and community banks in Ghana. The study by Achouand Tegnuh (2008); indicated that effective credit risk management leads to better bank performance. The result of the study by Achou and tegnuh (2008) is supported by the study by Hosna et al (2009) in Sweden and Flaminiet al (2009) in Sub-Saharan Africa commercial banks. (see positive author)

Secondly, the other group of authors concluded from their findings that nonperforming loan is inimical to the growth of banking industries, in that it inhibit bank performing by accumulation of bad debt which limit bank efficiency. (See: Hou & Dickinson(2007), Felix & Claudine (2008), Kaaya & Pastory (2013), Ahmed, Takeda & Shawn (1998), Oke, et al, (2012), Kithunji,(2010))

Based on these difference views explained, it is apparent that a consensus has not being reach on what exactly the relationship between non-performing loan and bank performance. Again, Hou & Dickinson(2007) stated that the this relationship might varies from countries to countries due to difference in political and institutional set up of these countries. However, most of all the empirical works around nonperforming loans and bank performance have used some selected banks as their case study. This might not revealed the entire situation for the whole banking industry in Nigeria. Consequently, to examine the exact relationship between nonperforming loans and bank performance in Nigeria this study takes an holistic view of the entire banking sector, this will give a true picture of the relationship in Nigeria as it is done by Kaaya & Pastory (2013) and Takeda & Shawn (1998) for Pakistan and Turkey respectively.

## 1.3 OBJECTIVES OF THE STUDY

The major objective of this study is to evaluate the impact of nonperforming loans on banks performance in Nigeria, while the specific objectives are to:

i. Access the effect of nonperforming loans on some bank's performance indicators in Nigeria.
ii. To make a comparative analysis of the effects of nonperforming loans on the identified bank performance indicators.

## 1.4 SIGNIFICANCE OF THE STUDY

This study is expected to expose the true picture of the relationship between nonperforming loans and bank performance in Nigeria and thereby leading to evolvement of policies that will guide in magagind nonperforming loans in Nigeria in such a way that it will not hamper the performance of the banking sector. Agencies such as the Central Bank of Nigeria, the commercial banks among others will benefit from the findings of this research work.

## 1.5 SCOPE AND LIMITATION OF STUDY

The study will be conducted on the whole banking sector in Nigeria using some key bank performance indicators. The period being specifically targeted covers period of ten (13) years from 2000-2013, this will be broken down to quarterly data to take account of periodical changes in the variables.

## 2.0 LITERATURE REVIEW

### 2.1 Conceptual Literature

According to World Bank (2002)non-performing loan, or NPL, is a loan that is in default or close to being in default. Many loans become non-performing after being in default for 90 days, but this can depend on the contract terms. According to International Monetary Fund IMF (2008) "A loan is nonperforming when payments of interest and principal are past due by 90 days or more, or at least 90 days of interest payments have been capitalized, refinanced or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons to doubt that payments will be made in full. By bank regulatory definition, non-performing loans consist of:

- other real estate owned which is taken by foreclosure or a deed in lieu of foreclosure,
- loans that are 90 days or more past due and still accruing interest, and
- loans which have been placed on nonaccrual (i.e., loans for which interest is no longer accrued and posted to the income statement) ( CIBN 2012)

However, According to SNA (1993), there is no criteria to decide what should be classified as nonperforming loans, and other international statistics manuals are also silent on the subject. Concerning nonperforming loans, the bottom line in the international manuals seems to be that loans are good unless there is absolute certainty that a loan is not going to be repaid under existing arrangements. Thus, loans remain on the balance sheets until a debt cancellation, write-off, or write-down has taken place.

In addition, The extent to which authorities have been involved in developing criteria to distinguish between "good" and "bad" loans differs substantially between countries and, as mentioned, banking and accounting institutions have come in to provide guidance on this issue. Some countries use quantitative criteria (e.g. number of days of overdue scheduled payments), while other countries exclusively rely on qualitative norms (such as availability of information about the client's financial status, management judgment about future payments). Some countries (including Germany and the U.K.) do not give standard criteria at all.[1] Furthermore, it cannot be said that a loan is either "good" or "bad" as there is a sliding scale in credit quality from risk-free loans to those that do not give any hope for recovery.

To improve the ability to make comparisons between banks across countries, the *IIF Report* proposes that, for world-wide external reporting, the following categories be used:

- **Standard**: Credit is sound and all principal and interest payments are current. Repayment difficulties are not foreseen under current circumstances and full repayment is expected.

- **Watch**: Asset subject to conditions that, if left uncorrected, could raise concerns about full repayment. These require more than normal attention by credit officers.

- **Substandard**: Full repayment is in doubt due to inadequate protection (e.g., obligor net worth or collateral) and/or interest or principal or both are more than 90 days overdue. These assets show underlying, well-defined weaknesses that could lead to probable loss if not corrected and thus risk becoming impaired assets.

- **Doubtful**: Assets for which collection/liquidation in full is determined by bank management to be improbable due to current conditions and/or interest or principal or both are overdue more than 180 days. Assets in this category are considered impaired but are not yet considered total losses because some pending factors may strengthen the asset's quality (merger, new financing, or capital injection).

- **Loss**: An asset is downgraded to Loss when management considers the facility to be virtually uncollectible and/or when interest or principal or both are overdue more than one year.

This classification may indicate that there are two cases that have to be addressed, (i) loans that are a complete loss, and (ii) loans whose quality is significantly impaired (substandard or doubtful) and for which, taken as a group, experience shows that a considerable portion of the future interest and/or installment payments will never be made.

**2.2 Empirical Literature**

Hosna, Manzura & Juanjuan (2009) studied ―Credit Risk Management and Profitability of Commercial Banks in Sweden. They took 4 banks to study this area and used multiple regression models to analyze their findings. Lastly, the researchers obtained that ―there is a reasonable effect of credit Risk Management on profitability of those banks. (Hosna, Manzura&Juanjuan, 2009, p 43).

Ahmad and Ariff (2007) examined the key determinants of credit risk of commercial banks on emerging economy banking systems compared with the developed economies. The study found that regulation is important for banking systems that offer multi-products and services; management quality is critical in the cases of loan-dominant banks in emerging economies. An increase in loan loss provision is also considered to be a significant determinant of potential credit risk. The study further highlighted that credit risk in emerging economy banks is higher than that in developed economies.

Hou and Dickinson (2007), which examined the non-performing loans on microeconomics, specifically at the bank level to empirically evaluate how non-performing (NPLs) affectcommercial banks' lending behavior loans. In particular, it is discussing some consequences of nonperforming loans (NPLs) on the economics. They have used empirical methodology for testing the effect of non-performing loans (NPLs) which the data taken from individual bank's balance sheet to assess whether non-performing loans (NPLs) will negatively affect bank's lending behaviour.

Heffernan (1996) stressed that credit risk is the risk that an asset or loan becomes irrecoverable, in the case of outright default or the risk of delay in servicing of loans and advances. Thus, when this occurs or becomes persistent, the performance, profitability, or net interest income of banks is affected.

Felix and Claudine (2008) investigated the relationship between bank performance and credit risk management. It could be inferred from their findings that return on equity (ROE return on assets (ROA) both measuring profitability were inversely related to the ratio of non-performing loan to total loan of financial institutions thereby leading to a decline in profitability.

Kargi (2011) evaluated the impact of credit risk on the profitability of Nigerian banks. Financial ratios as measures of bank performance and credit risk were collected from the annual reports and accounts of sampled banks from 2004-2008 and analyzed using descriptive, correlation and regression techniques. The findings revealed that credit risk management has a significant impact on the profitability of Nigerian banks. It concluded that banks' profitability is inversely influenced by the levels of loans and advances, non-performing loans and deposits thereby exposing them to great risk of illiquidity and distress. Epure and Lafuente (2012) examined bank performance in the presence of risk for Costa-Rican banking industry during 1998-2007. The results showed that performance improvements follow regulatory changes and that risk explains differences in banks and non-performing loans negatively affect efficiency and return on assets while the capital adequacy ratio has a positive impact on the net interest margin.

Mohammed (2012) studied the bank performance in context of corporate governance forwhich mainly the ratios of non-performing loans and loan deposits have been used. Study was conducted on 9 banks of Nigeria for a period of 10 years from 2001-2010. According to generalized least square regression results, non-performing loans ratio has significant negative effect while loan deposit ratio has insignificant negative effect on performance. So, survival of banks is strongly dependent upon the better asset quality means dependent upon minimizing the non-performing loans ratio.

Kolapo, Ayeni and Oke(2012) carried out an empirical investigation into the quantitative effect of credit risk on the performance of commercial banks in Nigeria over the period of eleven(11) years (2000-2010). Using panel model analysis to estimate the determinants of the profit function. The result showed that the effect of credit risk on bank performance is cross-sectional invariant. That is the effect is similar across banks in Nigeria suggesting that banks in Nigeria should enhance their capacity in credit analysis and loan administration.

Onyiriuba (2009), provided some empirical evidence on how poor stock returns emanating from underperforming Nigerian bank credit portfolio fuelled negative volatilities in foreign exchange, substantial reduction in the aggregate value of capital market and contagious in other sectors of the Nigerian economy.

## METHODOLGY

### Model specification

The model adopted for this study takes its root from the bank risk management theory as propounded by David (1977). This theory was adopted byKargi (2011) which measured profitability with Return on Asset (ROA) as a function of the ratio of Non-performing loan , Total loan & Advances, Total deposit used as indicators of credit risk. However, the study improved on the model by incorporating the lending rate and total liquidity ratio which has been identified as important determinants of NPL as part of the independent variables.Again, the model is modified to include another bank performance indicator that is profit after tax. Therefore, two models are to be estimated, this will pave way for a comparative analysis of the effect of NPL on the two performance indicators.

The model for this study functionally becomes;

ROA= f (NPL, LA,LEDR,TD)……..... (1)

PAT= f (NPL, LA, LEDR,TD)……..... (1)

The model to be estimated is stated in linear form thus;

Where;

ROA: Return on Assets

NPL: Non-Performing Loan

LA: Loan and Advances

TL: Total Liquidity

LEDR: Lending rate

TD: Total Deposit

The econometric equation for the model is specified as

Where;

$\beta 0$ = Constant parameter/Intercept

$\beta 1$-$\beta 3$ = Coefficients of independent variables

$\mu$ = Error term

The ‘a priori expectation’ in the model is that all the independent variables are expected to have a negative relationship on bank performance measured by Return on Assets (ROA) except loans and advances which is expected to have a positive relationship with bank performance. The mathematical expression is represented as; $\beta 1$, $\beta 2 < 0$ and $\beta 3 > 0$ implying that a unit increase in the independent variables will lead to decrease in ROA by a unit

**Estimating technique**

The estimation procedures employed in this empirical investigation is based on ARDL bound test. The reason for the adopting ARDL bound test is explained later. However, the techniques starts with the investigation of the time series properties of the variables using unit root test.

(A) **Unit Root Test**

Testing for the existence of unit roots is a key pre-occupation in the study of time series models and co-integration. What are unit roots? Let us begin with a definition. A stochastic process with a unit root is itself non-stationary. Another way of looking at it is that testing for the presence of unit roots is equivalent to testing whether a stochastic process is a stationary or non-stationary process. In sum, the presence of a unit root implies that the time series under scrutiny is non-stationary while the absence of a unit root means that the stochastic process is stationary, Maddala (1992) has offered an interesting perspective and interpretation on the testing for unit roots.

According to him (1992:578), testing for unit roots is a formalization of the Box-Jenkins method of differencing the time series after a visual inspection of the correlogram. No wonder then that testing for units roots plays a central role in the theory and technique of co-integration.

Currently, there are some commonly accepted methods of testing for unit roots. These are the Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) test and the Philip Peron (PP) test.

The Augmented Dickey-Fuller (ADF) test is considered superior to the Dickey-Fuller (DF) test because it adjusts appropriately for the occurrence of serial correlation.

$$X_t = b_0 + b_1 X_{t-1} + b_2 X_{t-2} + b_n X_{t-n} + U$$

Where U is a stationary error term. The null hypothesis that $X_t$ is non stationary is rejected if $b_1$ is significantly negative.

The number of lag (n) of $X_t$ is usually chosen to ensure that the regression is approximately white noise. It is simply referred to as the DF test if no such lags are required in which case $b_i = 0$ (i = 1……..n). However, the t-ratio from the regression does not have a limiting normal distribution.

An important assumption of the DF test is that the error term are independently and identically distributed. The ADF test adjust the DF test to take care of possible serial correlation in the error term by adding the lag difference terms of the regress and. Phillip and Peron use non-parametric methods to take care of the serial correlation in the error term without adding lagged difference terms. Since the asymptotic distribution of PP test is the same as the ADF test statistic, the PP test is preferred for this study.

Co-integration is based on the properties of the residuals from regression analysis when the series are individually non stationary.

A series is stationary if it has a constant mean and constant finite variance.

Thus, a time series $X_t$ is stationary if its mean E(Xt) is independent of time and its variance $E\{X_t - E(X_t)^2\}$ is bounded by some finite number and does not vary systematically with time. It tends to return to its mean with the fluctuations around this mean having constant amplitude.

(B) **Estimating technique: ARDL MODEL**

The choice of this estimation procedure is primarily informed by the fact that it passes the fitness-for-the-purpose-test. For instance, one option available to perform the co-integration test is the Engle-Granger approach (1987), but its weakness lies in the fact that it is only able touse two variables. A multivariate analysis, such as that considered in this study, leads to the use of the Johansen and Joselius co-integration analysis or ARDL model. The statistical equivalence of the economic theoretical notion of a stable long-run equilibrium is provided by these two models, but the choice will depend on the characteristics of the data.

This study is unable to use the Johansen procedure (an option) as all the variables are not completely I(1), that is, integration of order one. This assumption is a pre-condition for the validity of the Johansen procedure. Alternatively, the ARDL model is appropriate to run the short-run and long-run relationships (Shin *et al.,* 2014).

The guide that will be followed in this study is that if all variables are stationary, I(0), an ordinary least square (OLS) model is appropriate and for all variables integrated of same order, say I(1), Johansen's method is very suitable when we have fractionally integrated variables, variables at different levels of integration (but not at I(2) level) or co integration amongst I(1) variables.

The ARDL model will then be performed with the formulation of a conditional error correction model (Pesaran*et al.,* 2001) as below:

$$\Delta roa = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta npl_{t-i} + \sum_{j=0}^{q_1} \propto_j \Delta tl_{t-j} + \sum_{k=0}^{q_2} \emptyset_k ta + \sum_{l=0}^{q_3} \varepsilon_l \Delta td + \sum_{m=0}^{q_4} \epsilon_m \Delta ledr_{t-m} + \sum_{v=0}^{q_5} e_v \Delta exr_{t-v} + \theta_0 npl_{t-1} + \theta_1 tl_{t-1} + \theta_2 ta_{t-1} + \theta_3 td_{t-1} + \theta_4 ledr_{t-1} + \theta_5 exr_{t-1} + e_t$$

where p,$q_1$,….., $q_5$ represents appropriate maximum lags.

### 3.4 Sources of Data

In the process of collecting data for this study, all the variables used are sourced from the MUNDI index and World Bank (2013) edition.

## RESULT AND DISCUSSION

The analysis starts with the unit root test which is a pre-condition for co integration test. Apart from showing if cointegration test can be conducted, it will also show the method of co integration analysis to be adopted. The method adopted for the stationary test is the ADF method. Some of the variables such as loan and advance, non-performing loan, total deposit and lending rates are logged while return on asset and profit after tax are not logged because they are already in percentages to avoid missing values. The result is presented in table 1

**Table 1: Unit root test**

| Variables | ADF Statistics | Order of integration |
|---|---|---|
| Log of Loan and advance [LLA] | -8.863548 | I(1) |
| Log of nonperforming loan [LNPL] | -5.094282 | I(1) |
| Log of total deposit [LTD] | -2.745959 | I(0) |
| Log of lending rate [LLEDR] | -3.807445 | I(1) |
| Return on asset[ROA] | -5.331091 | I(1) |
| Profit after tax [PAT] | -7.746037 | I(1) |

*(*) Statistical significance at 10%,(**) Statistical significance at 5%,(***) Statistical significance at 1%*

*Source: Authors computation*

The results of the unit root test show that all the variables are integration of order one that is I(1) except total deposit which is stationary at levels that is I(0). The implication is that five out of the six variables in the model are non-stationary and thus a linear combination of them can be stationary. This is the essence of cointegration. However, the choice of the cointegration techniques depends on the order of integration of the variables. Since not all the variables are I(1) then, Johansen cointegartion technique cannot be applied hence Autoregressive distributed lags ARDL bound test is used. Two models are used. The first model used profit after tax as the dependent variable and the second model made use of return on asset. The results of the ARDL regression for the two model are first presented in equations 4.1 and 4.2

**ARDL regression equations for ROA and PAT**

$$ROA = 3.331288 + 0.888209ROA_{t-1} - 0.074459ROA_{t-2} + 0.819298\text{LNPL} - 0.388130NPL_{t-1} + 1.657042\text{LTD} + 0.131651\text{LLA} - 0.712201LLA_{t-1} - 1.423341\text{LLEDR} + 1.300663LLERD_{t-1} \quad \text{.....[4.1]}$$

$R^2 = 0.99$, F stat = 342.9. rob(F-statistic)=0,0000 , Durbin Watson DW=1.71

$$PAT = -14.71412 + 0.887839PAT_{t-1} + 0.032432\text{LNPL} - 0.388130NPL_{t-1} - 8.861650\text{LTD} + 0.562324LTD_{t-1} + 00.88671\text{LLA} + 1.195555\text{LLEDR}$$
……..[4.2]

$R^2 = 0.81$, F stat = 32.56. rob(F-statistic)=0,0000 , Durbin Watson DW=2.003

Equations 4.1 and 4.2 explains the relationship between ROA and the independent variables and PAT and other independent variables respectively. However the essence of the estimated equations is to be able to investigate te existence of cointegration by conducting the cointegration test

The test of cointegration using the ARDL bound test is the next. This will provide an insight into the existence of cointegration or otherwise before the estimation of the long run nd short run equations for both models.

**TABLE 2 Cointegration bound test for ROA**

Null Hypothesis: No long-run relationships exist

| Test Statistic | Value | k |
|---|---|---|
| F-statistic | 6.743636 | 4 |

Critical Value Bounds

| Significance | I0 Bound | I1 Bound |
|---|---|---|
| 10% | 2.2 | 3.09 |
| 5% | 2.56 | 3.49 |
| 2.5% | 2.88 | 3.87 |
| 1% | 3.29 | 4.37 |

**TABLE 3 Cointegration bound test for PAT**

Null Hypothesis: No long-run relationships exist

| Test Statistic | Value | k |
|---|---|---|
| F-statistic | 1.213357 | 4 |

Critical Value Bounds

| Significance | I0 Bound | I1 Bound |
|---|---|---|
| 10% | 2.2 | 3.09 |
| 5% | 2.56 | 3.49 |
| 2.5% | 2.88 | 3.87 |
| 1% | 3.29 | 4.37 |

Comparing tables 2 and 3 shows that only the ROA estimated model passed the bound test. This is because the F statistics value is greater than all the critical values at both the lower and upper bounds. But the case is different for the PAT model where the F statistics is less than all the critical values at both the lower and upper bounds. Consequently, it is obvious that only ROA as a measure of bank performance exhibit long run relationship with non-performing loans and other independent variables.

The next step is to estimate both long run and short run relationship for the two models. However, only the cointeration equation of ROA will be interpreted because it as a valid cointegration relationship with non-performing loans and other variables used as independent variables. The estimation of PAT relationship with the independent variables will be explored through the unrestricted VAR since it does not exhibit a valid long run relationship with non-performing loans and other variables.

Equations 4.4 to 4.8 explain the long and short run relationships between each of the dependent variables that is ROA and PAT and non-performing loans.

**Long run and short run equations for ROA**

**Short run equation**

$$ROA = -0.39\text{cointEq}(-1) + 0.2\text{D}ROA_{t-1} - 0.2ROA_{t-2} - 0.7\text{DLNPL} + 1.1\text{DLTD} + 0.31.1\text{DLLA} - 1.4\text{DLEDR}$$

……[4.3]

**S .E** $(0.05)^{***}(0.101)^{***}(0.108)\ \ (0.22)^{***}(0.57)^{**}$

$(0.29)\ \ (0.08)^{***}$

**Long run equation**

$$\boldsymbol{ROA = 8.5 - 1.1LNPL + 4.2LTD - 3.9LLA - 1.4LEDR}\text{.....[4.4]}$$

**S.E** $(10.0)\ \ (0.33)^{***}(1.37)^{**}(0.87)^{***}(0.77)^{***}$

Equations 4.3 explains the short run relationship between ROA and NPL with other independent variables. Firstly the error correction term in the estimated model is -0.39 implying that the error

term is correctly signed is statistically significant, therefore the error correction term can perform the adjutant role very well.

Secondly, non-performing loan shows a negative and significant relationship with bank performance as proxied by ROA. This implies that non-performing loan will have a significant short run impact on bank performance. other variables such as total deposit and lending rate all shows significant short run impact on bank performance.

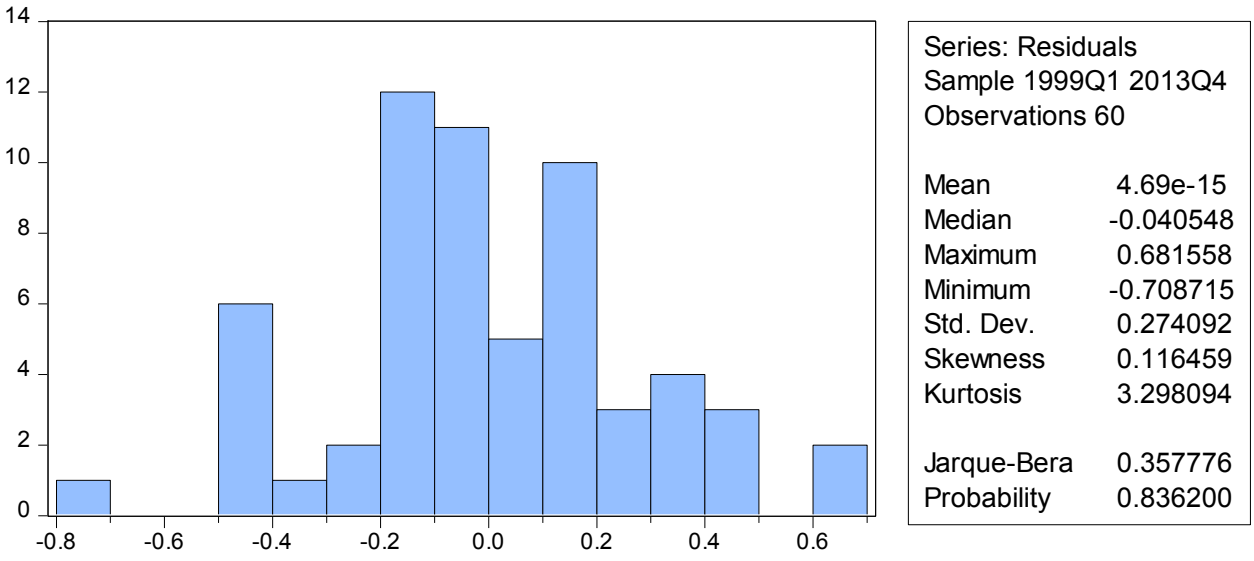
Equation 4.4 explains the long run relationship between ROA and non-performing loans and other independent variables. The results show that ROA exhibit significant long run relationship with non-performing loan and all other variables in the estimated model. The coefficient of non-performing loan is 1.1. This indicates that a unit rise in nonperforming loan will lead to about 1.1 unit fall in the ROA. Total deposits also have significant positive impact on ROA both lending rate and loan and advance show significant inverse relationship with ROA

**Diagnostic tests**

As robust tests to our estimations, some diagnostics tests are conducted. The tests are normality, heteroskedaticity and serial correlation tests.

**Normality test**

Figure 1 : ARDL NORMALITY TEST




The Jarque-Bera value is 0.35776 with the probability of 0.836003. The implication of this is that the data is normally distributed and this is a good result that shows that the skewness and kurtosis values are in order.

**Test for heteroskedaticity**

**Table 5: ARDL HETEROSKEDASTICITY TEST**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

| | | | |
|---|---|---|---|
| F-statistic | 1.386405 | Prob. F(17,42) | 0.1918 |
| Obs*R-squared | 21.56713 | Prob. Chi-Square(17) | 0.2019 |
| Scaled explained SS | 12.14301 | Prob. Chi-Square(17) | 0.7914 |

The results of the hereoskedaticity test is presented in table 5. The null hypothesis is that there is no heteroskedaticity. Using the F statistics, it is discovered that the probability of F shows that the null hypothesis is to be accepted. Therefore we conclude that our model is not having the problem of heteroskedaticity which may affect the validity of our results.

**Test for serial correlation**

Table 6 : ARDL SERIAL CORRELATION LM TEST

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 0.935484 | Prob. F(2,40) | 0.4008 |
| Obs*R-squared | 2.681049 | Prob. Chi-Square(2) | 0.2617 |

The null hypothesis here is that there is no serial correlation. Considering the F statistics and the probability, it is obvious that the null hypothesis is to be accepted while we reject the alternative hypothesis that there is serial correlation. Consequently the estimates from our model are valid and can be used for forecasting.

**Analysis of the impact of non-performing loan on banks profit after tax PAT as measure of bank performance**

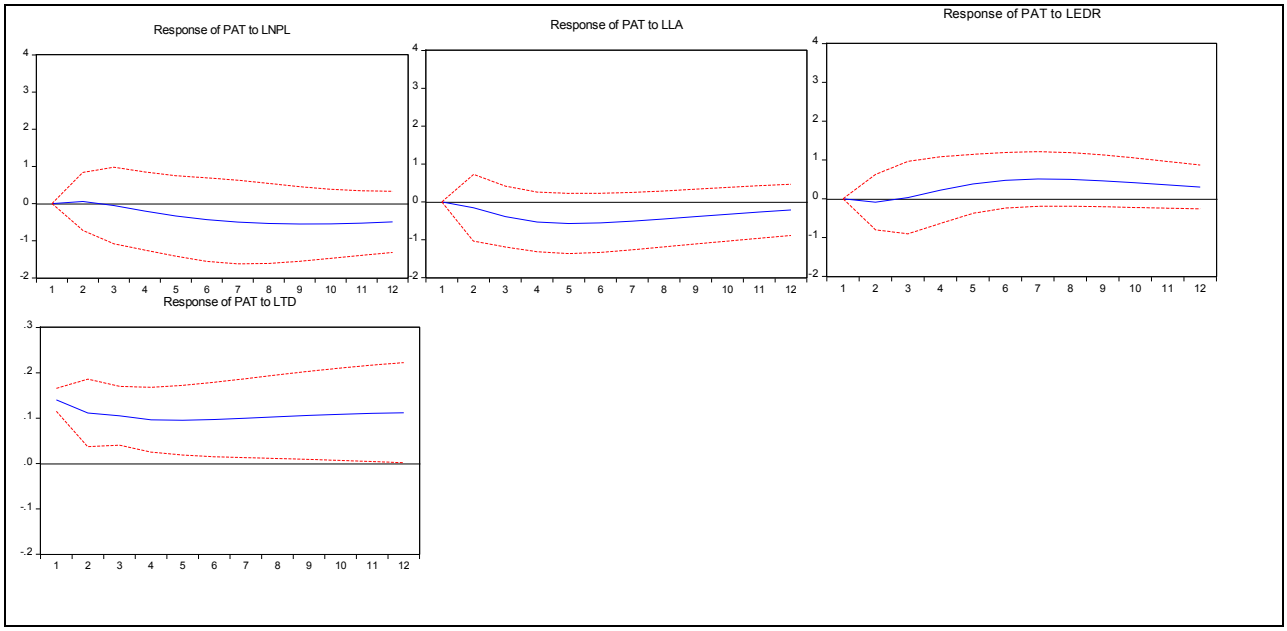
As earlier stated the relationship fails to exhibit a long run relationship. The implication is that there appear to exist only a significant transitory relationship between PAT and NPL and other independent variables. Table 3 at the appendix shows that some variables are significant in the short run estimated model for PAT. However, none of the variables have individual significant impact on PAT in the long run equation. Thus, affirming the nonexistence of long run relationship. The implication of this is that we can proceed to analyse the relationship via vector auto-regression VAR. the unrestricted VAR result is presented as follows;

**VAR estimation of the relationship between PAT and NPL with the other independent variables**

**T**his is analysis is done via the two tools of analysis offered by VAR. these rae impulse response function IRF and variance decomposition analysis. We begin with the impulse response analysis.

**Impulse response function for PAT**

This explains the responses of PAT to 1% standard deviation in NPL and other variables. In other words, the short run responses of PAT to shocks from NPL and other variables are described in figure 1




F***igure 1; impulse response function for PAT***

**F**igure 1 describes the responses of PAT to NPL shock and other shocks coming from other independent variables in the model. The response of PAT to NPL appears not to be significant. The implication is that the level of NPL currently in the banking sector has not significantly influenced the PAT of the banks in Nigeria. The same response is replicated by PAT in it response to LEDR and LLA shocks. The only variable that produces significant response from the PAT is the TD that is total deposit. The implication is that the PAT of the banks is highly responsive to bank deposits than NPL. Next is the variance decomposition analysis of PAT.

**Variance decomposition of PAT**

This is a table describing the contributions of each of the shocks to the behaviour of PAT. The relative impacts of NPL shock and other variables' shocks to the behaviour of the PAT are shown in the table.

T**able 2; Variance decomposition of PAT**

| PERIOD | S.E. | PAT | LNPL | LTD | LLA | LEDR |
|---|---|---|---|---|---|---|
| 3 | 4.421282 | 98.43430 | 0.030175 | 0.596880 | 0.893286 | 0.045364 |
| 6 | 4.792018 | 89.57405 | 1.502189 | 2.298587 | 4.752742 | 1.872432 |
| 9 | 5.051362 | 81.14910 | 3.038474 | 4.630954 | 6.682709 | 4.498764 |
| 12 | 5.204129 | 76.51457 | 3.327037 | 7.374144 | 7.118854 | 5.665396 |

The tables shows that apart from the own shock banks total deposit and llacontributes the largest shock to the behavior of the PAT when compared to other variables. This follows the results shown on the IRF. Loan and advances shock follows the bank deposits shock, then the lending rate shock and NPL shock. The implication of this result is that the behavior of the PAT is more dictated by the bank total deposits.

## CONCLUSIONS

Findings from the study have shown that NPL and other variables only exhibit long run relationship with ROA as a measure of bank performance. PAT only shows significant short run relationship with NPL and other variable. The implication of this result is that NPL has more effect on the earnings ratios than profit after tax. This result is evident in the annual report of some banks where bogus figures are published as there profit after tax and yet there is increase in their non-performing loans. Therefore PAT at times might not show the true reflection of the banks performances as the earnings ratios such as ROA. Aminu, Dogarawa and Sabari (2014) once posited that many of the figures for PAT in annual reports of some banks are tainted to give the shareholders good impression about the bank therefore it might not reflect the true performance of the banks

Again, the impact of non-performing loans on ROA is negative and significant. This implies that increase in NPL will also lead decrease in ROA. This indicates that the upsurge in NPL also brings about a significant fall in the ROA both in the long and short run periods. Other variables that have significant impact on ROA as a measure of bank performance in Nigeria are total deposits, loan and advance and lending rates all of them are very germane to the performance of the banks especially in the long run.

However, profit after tax has been shown to be mostly influenced by total deposits of the banks and not NPL. Findings from the research work indicate that PAT of banks is more responsive to changes in total deposits. This is followed by loan and advance and lending rate in that order.

Finally, it can be concluded from the study that NPL affects the ROA more than the PAT and ROA has been shown to be a better measure of bank performance than the PAT since it shows significant relationship with all the variables used in the model unlike PAT which is more responsive to total deposits alone in the short run, none of the variables shows a significant relationship with PAT in the long run. It is recommended that banks should consider the implication of NPL on their earnings ratios as against PAT which might be misleading. And they should guide against accumulation of NPL as it affects their performance negatively.

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