The Impact of Commercial Banks Non–performing Loans on Financial Development in Nigeria

J. A.T. Ojo¹
College of Development Studies,  
School of Business, Department of Banking and Finance,  
Covenant University, Canaanland, Ota  
e-mail: adewaletojo@yahoo.com

&

R.O.C. Somoye²
Faculty of Social and Management Science,  
Department of Accounting, Banking & Finance,  
Olabisi Onabanjo University, Ogun State, Nigeria,  
e-mail: olukayodesomoye@hotmail.com

¹ Prof. J. A. T. Ojo, Distinguished Professor of Banking & Finance, College of Development Studies, School of Business, Department of Banking & Finance, Covenant University, Canaanland, Ota, Ogun State, Nigeria. P.O.Box 4787, Shomolu Post Office, Lagos, Nigeria, e-mail:adewaletojo@yahoo.com &

²Prof. R. O. C. Somoye, Professor, Department of Accounting, Banking & Finance, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, P. O. Box 2030, Sapon, Abeokuta.
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Abstract

The paper, therefore, reviews the impact of commercial banks non-performing loans on financial development in Nigeria from 1981 to 2012. We employ unit root, causality, and co-integration tests and subsequently develops the Error Correction Models (ECM) econometric techniques to measure the impact of non-performing loans on the level of financial development in Nigeria. Also utilized are uses time-series data covering 1981-2012. The results show that non-performing loans, commercial bank interest rate, liquidity ratio and inflation exert long-run relationship and significant influence on financial development. The paper recommends that regulatory authorities need to put in place measures aimed at tackling excessive risk-taking at the source and efficient financial policy that will continue to reduce the level of non-performing loans.

Jel Code: G20; G21, E50; C32
Key Words: Non-performing Loans, Commercial Banking; Financial development; Co-integration.
1.0: Introduction

The role of financial development in accelerating economic performance has long been recognized by many authors. Prominent among them was Schumpeter (1934) who acknowledged the positive link between financial institutions through commercial banks and economic growth. Followers of this proposition are Gurley and Shaw (1967), Goldsmith (1969), Patrick (1966), Cameron (1961) and Ojo (1974; 2010). Commercial banks generally serve as the financial bridge between the user of funds and supplier of funds and this form of asset transformation is required to ensure that funds are moved from the surplus economic units to deficits economic units within the economy (Somoye, 2008). The endogenous growth framework, being a new growth theory, explains the long-run growth rate of financial development on the basis of endogenous factors that create externalities and generate an additional productivity through new innovations and spill-over effects in the commercial banking sector (Romer, 1994; Fry, 1997; Aghion and Howitt, 1998; Somoye, 2011).

Non-performing Loans (NPLs henceforth), generally refer to loans which for a relatively long period of, say, 90 days upwards have been in default or close to being in default. It is also a sum of borrowed money upon which the debtor has not made his scheduled payments for at least 90 days (Caprio and Klingebiel 1999). NPLs could also occur when the amortization schedules are not realized as at when due with direct consequences on the cash-flow of the affected commercial banks. NPLs as noted by (Somoye, 2010), reduces the liquidity of banks, credits expansion; it slows down the growth of the real sector with direct consequences on the performances of banks; reduces the growth of firm in default, and the economy as a whole. Commercial banks in return face many financial and non-financial risks such as credit risk, liquidity risk, market risk, operating risk, reputation risk and legal risk.

In Nigeria, the rising trend in NPLs between 1981 and 2013 accounts for over 10% of the total loans granted and significantly resulted in bank distress. Bank defaulting debtors were in many cases found to abandon their debt obligations and went to other unsuspecting banks to contract new debts that again most likely to degenerate into nonperforming loans. The use of status reports on bilateral basis was not effectively utilized to detect such dubious multiple loan defaulters. Thus, the need for a central information data-base from which the required consolidated credit information on borrowers has become inevitable. This prompted the establishment of the Credit Risk Management System (CRMS) or Credit Bureau by the Central Bank of Nigeria (CBN).

The decision of the CBN to effect Credit Bureau in Nigeria as reported in the Presidential Budget Speech of 1990, was given a legal backing by the Central Bank of Nigeria (CBN) Act No. 24 of 1991 (sections 25 and 52) as amended. This empowered the CBN to obtain from all banks returns on all credits with a minimum outstanding balance of #100,000.00 (now 1 million Naira and above of principal interest). It also required the updating of the outstanding credits on monthly basis. All financial institution institutions were also required to render returns to the Credit Risk Management System (CRMS) in respect of all customers with aggregate outstanding debit balance of One Million Naira (#1 000,00) and above. The objectives of CRMS (CBN, 2009) are as follows:

- Strengthening the Credit Appraisal Procedures of Banks – achieved by generating accurate and reliable credit information on bank borrowers from a Central Database.
• Storage and dissemination of Credit Data
• Monitoring of Over-Exposure to Borrowers
• To assist banks make better information on borrowers’ creditor worthiness and loan repayment capability
• To Facilitate consistent classification of credits to assist the regulators in having first had information on all customers’ global debit profile that facilitates correct classification of customer’s loan.

To reduce the rising trend of NPLs in the commercial banking sector, the Asset Management Corporation of Nigeria (AMCON), acquired banks, huge non-performing loans that distressed the banking industry in Nigeria to avert the collapse of many of the banks. The non-performing loans were taken up by AMCON in exchange for the banks’ bad loans, with AMCON’s issue of seven year bonds guaranteed by the Federal Ministry of Finance in Nigeria (CBN, 2011). Banks’ non-performing loans declined to ₦692 billion (10.4%) in 2011 from ₦1.11 trillion in Dec. 2010.

From the preceding discussion, it is evidenced that the problems of NPLs have negative impact on financial development in Nigeria. The paper therefore reviews the impact of the incidence of non-performing loans on the financial sector in the context of endogenous framework with a view to contributing to the literature. Section 2 is on the literature review, while section 3 is on the review of non-performing loans in Nigeria. Section 4 handles evidences in some selected countries. Section 5 handles methodology, while Section 6 discusses the results of the analysis. Section 7 concludes the paper.

2.0: Literature Review

The theory of financial development in the context of endogenous growth theory explains that the processes of a long-run growth are emanated from the activities related to the opportunities and incentives created by innovation, R&D, and banking sector performance, technological knowledge (human capital) missing in an exogenous growth model (Romer, 1994; Lucas, 1988; Uzaka, 1965; Frankel, 1962; Somoye, 2011). Goldsmith (1969, pp. 44-48) explains that in the course of economic development, a country’s financial system grows more rapidly than national wealth. He posited further that financial development in the modern sense has started everywhere with the banking system and as economic development progresses, the share of the banking system in the assets of all financial institutions may decline due to non-performing loans among others.

Non-performing Loans (NPLs) have become contemporary issues in credit management and undoubtedly the new frontier in finance. The accumulation of Non-performing Loans (NPLs) is generally attributable to a number of factors such as economic down turns, macroeconomic volatility, terms of trade deterioration, high interest rates, excessive reliance on overly high-priced inter-bank borrowings, insider lending, moral hazard and asymmetric
information (Turner, 1996; Somoye, 2010). It is also the view of deServigny and Renault (2004) that Non-performing Loans (NPLs) has taken a new dimension in finance just as interest rate and asset and liability management were 20 years ago. However, Kassim (2002) and Ojo (2010), suggested some causes of NPLs as:

- Lack of sound credit management and policy
- Inadequate credit analysis
- Errors in documentation
- Undue emphasis on profitability at the expense of loan quality
- Fraudulent practices
- Political instability / economic depression
- Abnormal competition
- Policy and regulatory inconsistencies
- Weak real sector
- Political and social influences on bank operators.

In the opinion of Elaine (2007), Non-performing Loans (NPLs) or credit risk encapsulates the potential loss in the event of credit deterioration or default of a borrower. Thus, a sound credit appraisal of loans is very important to the creditor. As argued by Dorfman (1998), bankers required an understanding of credit standards, the process by which credit worthiness and credit structure are analyzed, as well as employing decision-making techniques, negotiation, follow-up and problem resolution, in order to effectively manage credit risk.

In the study on problem loans and cost efficiency in commercial banks, Berger and Young (1997) examined the intersection between the problem loan literature and the bank efficiency literature, employing Granger-causality techniques which show that problem loans precede reductions in measured cost efficiency; measured cost efficiency precedes reductions in problem loans; and that reductions in capital at thinly capitalized banks precede increases in problem loan. Hence, it is believed that cost efficiency may be an important indicator of future problem loans and problem banks.

Further analysis of the results of the study by Berger & Young (1997) suggests that the inter-temporal relationships between loan quality and cost efficiency run in both directions. Their data provide support for the bad luck hypothesis – that increases in nonperforming loans tend to be followed by decreases in measured cost efficiency, suggesting that high levels of problem loans cause banks to increase spending on monitoring, working out, and/or selling off these loans, and possibly become more diligent in administering the portion of their existing loan portfolio that is currently performing.

For the industry as a whole, their data favour the bad management hypothesis over the skimping hypothesis – decreases in measured cost efficiency are generally followed by increases in nonperforming loans, evidence that bad management practices are manifested not only in excess expenditures, but also in subpar underwriting and monitoring practices that eventually lead to nonperforming loans. Their overall results, however, show some ambiguity concerning whether or not researchers should control for problem loans estimation.

A number of other studies have also found negative relationships between efficiency and problem loans even among banks that do not fail (Kwan & Eisenbeis, 1994; Hughes & Moon, 1995; Resti 1995). Cost-inefficient banks might, as noted, tend to have loan performance
problems for a number of reasons like banks with poor senior management and those with loan quality problems.

3.0: Review of Non-performing Loans and Financial Development in Nigeria

We review the trends of financial development, ratio of nonperforming loans to total loans and ratio of non-performing loans to assets of commercial banks from 1981 to 2012 as depicted in Figure 1 and Appendix 1. The figure shows a disturbing trend when the growth rate of non-performing loans is compared with that of the level of financial development between 1989 and 1999. This trend continued to overshadow the level of financial development up till 2005 – a period that witnessed many bank failures. The incidence of failed banks has persisted over the years.

However, due to the efforts of the monetary authorities which resulted in bank restructuring and merger, the disturbing trend has become ameliorated. As of 2012, the rate of non-performing loans has dropped to 8.1% (2012) from 10.4% in 2011, while that of financial development has increased to 36.1% in 2012 (See Figure 1 and Appendix 1).

The above analysis shows that the issue of non-performing loans in commercial banks needs to be addressed. It has brought various malpractices and unprofessional behaviour that threatened the stability of the Nigerian banking system as revealed from the thoroughly audited accounts of the banks in 2009.
Ojo (2010) also reviewed the problems of non-performing loans in the banking sector and submitted that they can be seen in the following perspectives:

(i) Poor supervision by the CBN and NDIC that failed to check the reckless selfish ambition of the banks that resorted to reckless and risky employment of depositors funds;
(ii) Weak internal controls and poor risk management within the banks’ operational system that failed to ensure prudential appraisal and control of credit and risk assessment;
(iii) Unethical practices such as speculative buying and round tripping at the foreign exchange market, as well as various insider dealings and abuses like granting of unsafe loans to bank directors and/or relatives, friends and businesses;
(iv) Imprudent manner by which the CBN granted access to some banks to the Expanded Discount Window (EDW), which made them have constant as against occasional recourse to the borrowing facility, and thus merely delayed taking the needed remedial actions to address the banks’ problem on time; and
(v) The general poor compliance with code of corporate governance by most banks, auditing firms and supervisory agencies in Nigeria.

Ojo (2010) noted further that in most of the banks, especially those that failed, insider abuse was a major significant factor that led to their failure. Many owners and directors abused or misused their privileged positions or breached their fiduciary duties by engaging in self-serving activities. The abuses included the following:

i. Granting of unsecured credit facilities to owners, directors and related companies which in some cases were in excess of their banks’ statutory lending limits;
ii. Granting of interest waivers on non-performing insider-credits without obtaining the CBN’s prior approval as required by the banking law;
iii. Diversion or conversion of banks’ resources to service their other business interests such as allocation of foreign exchange without naira cover to insiders which later crystallized as hard-core debts; and
iv. Compelling their banks to directly finance trading activities either through the banks or other proxy companies, the benefits of which did not accrue to the banks. Where losses were incurred, they were passed to the banks.

Ojo (2010) concluded that the above unethical practices, bordering mainly on insider abuses, have continued unabated in the banks, including reckless granting of loan facilities to board members and staff. Many other scholars have also discussed about the problems of non-performing loans in Nigeria.

The paper by Udegbunam (2001) on Nigeria reviews the severe loan problems and unprecedented losses in the Nigerian banking industry in the 1990s. It examines the empirical relationship between the employed strategies and problem loans at these banks. The paper employed a simple multiple regression model using a pooled cross-sectional data. The paper uses the model to estimate and test the relationship between the banks’ problem loans and bank – specific attributes such as capital adequacy, credit policy, management quality, level of leverage, and credit risk. The empirical result suggests that differences in management quality and level of
credit risk were the key determinants of problem loans and loan losses at the Nigerian commercial banks in the mid-1990s. However, it is also shown that there was an evidence of indirect role of credit policy, which appears to suggest that collaterization of loans is not a sufficient guarantee for loan repayment.

The paper also shows that there were an increasing number of delinquent borrowers, an unprecedented increase in non-performing loans and loan losses, a sharply decreasing average profitability, and an increasing rate of bank failure. The paper submits further that a large number of particularly new banks failed during the period and many were financially distressed due mainly to loan losses. It noted that in spite of this, a significant number of these banks recorded high performance in terms of loan portfolio and profitability.

The paper by Somoye (2010, pp. 87-88) looks at the variation of risks on non-performing loans on banks’ performances in Nigeria between 1997 and 2007. The paper estimated a neo-classical multiple regression econometric model and adopted non-performing loans as the dependent variable, defined as the average of the aggregate non-performing loans of 15 selected banks. The explanatory variables were monetary policy rate, interest rate, credit risk, liquidity risk, market risk, interest rate risk, earning risk and solvency risk. The time series data used were drawn from the published audited accounts of the selected banks to analyse the relationship between non-performing loans and bank performance.

The results of the paper by Somoye (2010) suggest that earnings risk is most prevalent in explaining variations in non-performing loans followed by interest rate risk and monetary policy rate. The paper recommended that an Efficient Loan Appraisal Techniques (ELAT) consisting of conventional investment analysis and risk measurements be adopted and credit policy must be in line with the institutional objectives.

However, to reduce the incidence of bank failure as a result of non-performing loans in the banking sector, Ojo (2010, pp. 202-209) suggests the following measures, among others:

- Raising the level of capitalization as recently done in 2005 in Nigeria;
- Improving the risk-return characteristics in the composition of the bank’s portfolio. Both of these require individual banks to adjust their own management in order to avoid failure.
- To distribute the risk of outside agents. This can be done through methods such as risk-hedging through floating – rate loans, or through swap transactions (if developed) or by improving the buffer facilities that the bank has, such as stand-by credit with other banks.
- To consider, whenever appropriate, the viable option of merger and acquisition
- The imposition of holding actions on the technically insolvent banks implies recapitalization, intensification of:
  - Aggressive debt recovery drive;
  - Freeze on new loans;
  - Curbing of over-trading;
  - Perfection of collateral securities;
  - Improvement of internal control management; and
  - Rationalization of staff and costs.

The problems of non-performing loans and its attendants negative impact on the financial sector are not peculiar to the Nigerian banking sector. It also exists in other nations. It is a universal problem and needs a universal solution. This forms the subject of our next discussion.
4.0: Review of Evidences of Non-Performing Loans in some Selected Countries

Empirical evidences and results from studies show similar trends on the negative effect of non-performing loans on bank performances and consequently on financial development. For instance, in Turkey, Karabulut & Bilgin (2007) carried out a study with the purpose of examining the impact of the unlimited deposit insurance on Non-performing Loans (NPLs) and market discipline. They argued that deposit insurance programmes play a crucial role in achieving financial stability and reducing the risk of systemic failure of banks. The report shows that deposit insurance has a beneficial effect of reducing the probability of a bank run. However, deposit insurance systems have their own set of problems which include the creation of moral hazard incentives that encourage banks to take excessive risk and that unlimited deposit insurance caused a remarkable increase of Non-performing Loans (NPLs). The report concludes that deposit insurance institutions need to re-evaluate the policy of blanket guarantee of deposits in the banking sector.

In Taiwan, Hu, Li and Chu (2004), examined the effect of ownership structure on Non-performing Loans (NPLs). The findings suggest that an increase in the government’s shareholding facilitates political lobbying and that private shareholding induces more Non-performing Loans (NPLs) as a result of asymmetric information. The results suggest that the rate of NPLs decreased as the ratio of government shareholding in a bank rose (up to 63.51%), while the rate thereafter increased. The report concludes that joint ownership has the lowest rate of NPLs among Taiwanese public, mixed and private commercial banks and the size of bank is negatively related to the rate of NPLs, which supports their argument that larger banks have more resources for determining the quality of loans.

The Japanese financial sector is equally facing the problem of non-performing loans. To reduce this problem, Wallinson (2001) suggests as follows:

- Japan’s accounting system must fairly reflect values – Auditors must be held accountable for their certifications
- NPLs must be sold at whatever price they will bring as soon a possible
- When Non-performing Assets are sold at whatever price, they must be sold at auction
- Foreign holders must be welcomed
- The government must recapitalize the banks

In Africa, Fofack (2005) estimated the determinants of non-performing loans in sub-Saharan Africa, using correlation and causality analysis based on data drawn from 16 African countries: Benin, Cameroon, Chad, Cote d’Ivoire, Senegal, Togo, Botswana, Cape Verde, Ethiopia, Kenya, Malawi, Rwanda, South Africa, Swaziland and Zimbabwe. The study adopted per capita GDP, inflation, interest rates, changes in the real exchange rate, interest rate spread and broad money supply (M2) at the macroeconomic level to estimate the long-run relationship between NPLs and economic growth.

The study also investigates the association between non-performing loans (NPLs) and domestic credit, broad money supply (M2) and inflation. At the microeconomic level, the paper focuses on the association between Non-performing Loans (NPLs) and banking-sector variables, such as return on asset and equity, net interest margins and net income, and inter-bank loans.

The results show a positive association between real exchange rate appreciation and Non-performing Loans (NPLs). At the microeconomic level, the results show a negative association...
between non-performing loans and most banking variables, including return on asset and equity, total deposit, net interest margin and net income. This result is consistent for most countries in the sub-panel of CFA and non-CFA countries, and between state and privately-owned banks.

At the macroeconomic level, the results revealed that inflation, real interest rate, growth rate of GDP per capita are causal to non-performing loans across most sub-Saharan countries, while the measure of profitability (net interest margins and returns on assets) play a key role in explaining the causal link between non-performing loans and banking sector variables at the microeconomic level. In particular, net interest margin is significant across the sub-panel of CFA and non-CFA countries, and Granger-causes Non-performing Loans (NPL) at one and in some cases up to two lags.

Demirguc–Kunt, Detragiache & Gupta, (2006) also undertook an empirical analysis of banking systems in distress. They look at what happens to the economy and the banking sector crises, focusing on early warning indicators and after banking crisis breaks out. They noted that banking distress could occur with or without runs on the banks. Using aggregate and bank level data for several countries, the results that banking show crises are not accompanied by a significant decline in aggregate bank deposits relative to GDP.

The preceding discussion suggests that monetary policy such as monetary policy rate; interest rate and inflation variables have strong influence on bank performance as a result of non-performing loans. The quality of bank assets is also a significant variable to the performance of commercial banks. It can then be suggested that the combined influences of these variables will impact on financial development and consequently, on economic growth. The next discussion therefore, estimates the impact of a long-run relationship between non-performing loans and financial development in an endogenous framework.

5.0: Methodology: Data, Adopted Variables and Model Specification

The preceding discussion of our paper focuses on the impact of Commercial Banks Non-performing Loans (NPLs) on Financial Development (FD) in Nigeria. The methodology is discussed as follows.

5.1: Data and Variables Adopted


The paper also adopted Financial Development (FD) as the dependent variable. The paper also adopted Non-performing loans (NPLs) proxy by Commercial Bank Assets (NPFLs/CBA denoted as NPBA) to reflect the level of impact of bad assets occasioned by non-performing loans on the commercial banks’ assets, Commercial Bank Interest Rate (CBINTR), Liquidity Ratio (LR) and Level of Inflation (INF) as independent variables. The regressands and regressors are endogenous variables.

5.2: Model Specification and Estimation Techniques

The model of the paper is calibrated from the aggregate production function specified by Romer (1986; 1994) and Lucas (1988), which produces a new modified $\varphi AK$ growth model
from the neo-classical Cobb-Douglass production function. The new model with endogenous framework is specified as:

\[ Q = \alpha K^\beta L^\varphi R^\eta \]  

where \( Q \) = growth; \( K \) = Capital; \( L \) = Labour; \( R \) = Knowledge/innovation; \( \eta \), \( \beta \), \( \varphi \) are growth parameters; and \( \alpha \) is the efficiency parameter. Following the works of Acs et al. (2005, p. 4), Audretsch & Kielbach (2007) and Somoye (2011, p. 183), the model can be calibrated. Injecting the adopted endogenous variables into equation 2, the model will yield a normalised equation stated as:

\[ FD = Af(NPBA^\beta, CBINTR^\varphi LR^\alpha INF^\gamma) \]  

(2)

By linearizing equation 2 and using \( \beta_1, \beta_2, \beta_3, \beta_4 \) as coefficients, the model adopted for the paper can be stated as:

\[ FD_t = \beta_0 + \beta_1 NPBA_t + \beta_2 CBINTR_t + \beta_3 LR_t + \beta_4 INF_t + \mu_t \]  

(3)

where \( FD \) = Dependent variable on which the regression will be normalised. It is defined as the ratio of credit to private sector (CPS) and gross domestic product (GDP), i.e. CPS/GDP.

\( NPBA \) = Explanatory Variable, defined as the ratio between Non-performing Loans (NPLs) and Commercial Bank Assets (CBA), i.e. NPLs/CBA.

\( CBINTR \) = Explanatory Variable, defined as commercial banks maximum interest rates in the financial market.

\( LR \) = Explanatory Variable, defined as the liquidity ratio.

\( INF \) = Explanatory Variable, defined as the level of inflation.

The theoretical a priori expectations of the coefficients, \( \beta_1 < 0 \), \( \beta_2 < 0 \), \( \beta_3 > 0 \), \( \beta_4 < 0 \) of the endogenous variables in the model are expected to be significant in the long-run. The economic implication of the endogenous variables adopted is that low levels of non-performing loans, interest rates and inflation will have positive and significant impact on financial development and consequently improve the economy in the long-run (CBN, 2009; Korosteleva and Mickiewicz, 2008; Bettignies, and Brander, 2007; Ojo, 2010).

High liquidity structure of commercial banks will also improve the investment capacity of the commercial banking sector, and low level of interest rates will allow the entrepreneurs to borrow at low transaction costs in the capital market (Lammers, Willebrands and Hartog, 2010, Keynes, 1936; Hirshleifer, 1980; Watkins, 2009; King & Levine, 1993a). In addition, increase in gross domestic production will influence banking activities and this will in turn allow it to contribute positively to economic growth (Wennekers and Thurik, 1999).

To estimate the long-run relationship between financial development and non-performing loans using the endogenous variable adopted, the empirical analysis was done in two parts. First, we define the order of integration in the series and explore the long-run relationships between the variables by using unit root tests and cointegration tests respectively. Second, the paper conducts long-run and causal relationships between financial development and non-performing loans in the context of endogenous framework in a vector error correction model (VECM) or VAR (vector autoregression). This is discussed as follows:
5.2.1: Unit root tests

Unit roots are important in examining the stationarity of time series. The unit root test as measured by the Augmented Dick-Fuller (ADF) (1979) test examines the stationarity of variables. The regression forms of the ADF unit root test are specified as follows:

\[
\Delta y_t = a_0 + \gamma y_{t-1} + a_2 t + \sum_{i=1}^{k} \alpha_i \Delta y_{t-i} + \epsilon_t
\]  

(3)

where \(a_0\) is the intercept, \(t\) is linear trend, the variables \(\Delta y_{t-i}\) expresses the first differences with \(i\) lags and final \(\epsilon_t\) is the variable that adjusts errors of autocorrelation. The null hypothesis is that the series contain unit root of \(I(1)\), while the alternative is that it is stationary at the level \(I(0)\). The \(\lambda, \lambda_\mu, \lambda_T\) statistics are all used to test the hypotheses \(\gamma = 0\). Dickey (1976) provides three additional F-statistics called \((\delta_1, \delta_2, \text{and } \delta_3)\) to test joint hypotheses \((\gamma = a_0 = 0, a_0 = \gamma = a_2 = 0, \text{and } \gamma = a_2 = 0 \text{ respectively})\) on coefficients (Becker, Enders and Hurn, 2004). If the coefficient of the lag of \(y_{t-1}\) \((\gamma)\) is significantly different from zero, then the null hypothesis is rejected. The appropriate order of integration is to be determined by computing a series of equations that cannot be rejected at a 5% level of significance in the variable levels until they are integrated of order \(I(d)\) (Engle and Granger, 1987, p. 252; Somoye, 2010).

5.2.2: Cointegration Tests

If the variables are non-stationary in their levels, they can be integrated with integration of order 1, \(I(1)\), when their first differences are stationary. It could also be of order \(I(2)\). These variables can be cointegrated as well, if there are one or more linear combinations among the variables that are stationary. If these variables are cointegrated, then there exists a long-run linear relationship among the variables. Granger (1977) argued that a test for cointegration can thus be thought of as a pre-test to avoid spurious regression results. The Johansen (1988) multivariate cointegration model based on the error correction representation is stated as:

\[
\Delta X_t = \mu + \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-i} + \Pi X_{t-1} + \epsilon_t
\]  

(4)

where \(X_t\) is an (nx1) column vector of \(p\) variables, \(\mu\) is an (nx1) vector of constant terms, \(\Gamma\) and \(\Pi\) represent coefficient matrices, \(\Delta\) is a difference operator, and \(\epsilon_t \sim N(0, \Sigma)\). Johansen’s methodology requires the estimation of the VAR equation and the residuals are then used to compute two likelihood ratios (LR) test statistics that can be used in the determination of the unique cointegration vectors of \(X_t\). The cointegration rank can be tested with two statistics: the Trace and maximal Eigenvalue tests.
5.2.3: The Granger Causality Test

The conventional Granger causality tests are valid in a level of VAR framework. The most celebrated test for Granger causality in time series models is based on the work of Granger (1969). The basic idea behind the Granger causality test is that the future cannot cause the past. This involves testing the lagged values of X_t if it plays a significant role in explaining Y_t in a model with several lagged values of Y_t on the right side. If so, then X is said to “Granger-cause” Y. Also, the direction of Granger causality between variables could be unidirectional, bidirectional and independent of the variables being considered. For example, the formal regression of two variables Y and X for Granger causality can be written as equations 5 and 6 as follows:

\[
Y_t = \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \alpha_3 Y_{t-3} + \cdots + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \beta_3 X_{t-3} + \cdots + \varepsilon_{1t} \quad (5)
\]

\[
X_t = \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \phi_3 Y_{t-3} + \cdots + \partial_1 X_{t-1} + \partial_2 X_{t-2} + \partial_3 X_{t-3} + \cdots + \varepsilon_{2t} \quad (6)
\]

If the X_{t-1} terms in equation 5 plays a significant role in explaining Y_t (as determined by F-test), X is said to “Granger-cause” Y.

6.0: The Results and Analysis

We discuss the results of the econometric estimation below.

6.1: Unit Root Test

The results of the units root test based on Augmented Dick-Fuller (ADF) (1979) and Phillip-Perron (1988) techniques are shown in Table 1.

Table 1: Unit Root Test for Augmented Dick-Fuller and Phillip-Perron

<table>
<thead>
<tr>
<th>Variable</th>
<th>Augmented Dick-Fuller Test</th>
<th>Phillip-Perron Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>FB</td>
<td>-0.65240</td>
<td>2</td>
</tr>
<tr>
<td>NPBA</td>
<td>-2.6521</td>
<td>3</td>
</tr>
<tr>
<td>LR</td>
<td>-2.5467</td>
<td>0</td>
</tr>
<tr>
<td>INF</td>
<td>-3.4523*</td>
<td>0</td>
</tr>
</tbody>
</table>

The unit root test results from Table 1 show that the null hypothesis in each of the variables has a unit root (non-stationary) against the alternative and cannot be rejected for all the series in their levels. They are affected by time trend and can become too large or small with little or no tendency to revert to their mean value. This indicates that all the variables are completely integrated of order-one I(1) as indicated in Table 1.
6.2: Selection of Optimal Lag Length in the VAR

The VAR length estimation in Table 2 provides evidence based on VAR lag order selection criteria.

Table 2: Results of VAR Lag Order Selected Criteria

<table>
<thead>
<tr>
<th>Lag order selection criteria (1 lag)</th>
<th>VAR Lag Order Selection Criteria</th>
<th>Endogenous variables: FD NPLBA CBINTR LR INF</th>
<th>Exogenous variables: C</th>
<th>Sample: 1981-2012</th>
<th>Included observations: 31</th>
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<td>LR</td>
<td>FPE</td>
<td>AIC</td>
<td>SC</td>
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<td>151.6450</td>
<td>164.439*</td>
<td>2.82e-11*</td>
<td>-7.3214*</td>
<td>-6.21893*</td>
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* indicates lag order selected by the criterion;
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The lag orders selection criteria are based on Log-Likelihood (LR), Akaike information criteria (AIC) and Schwarz information criteria (SIC), Final Prediction Error (FPE) and Hanna-Quinn Information criterion (HQ) consistently select a lag-order length ONE as being suitable for the data series indicating that the VAR model adopted will be stable at lag-length one.

6.3: Deterministic Specification and Cointegration Test

The cointegration summary statistics of the number of all the four possible specifications are shown in Table 3.
Table 3: Cointegration Test Summary

Sample: 1981—2012
Included observations: 29
Series: FD, NPBA, CBINTR, LR, INF
Lags interval: 1 to 1

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<tr>
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<th>Linear</th>
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<td>No Trend</td>
<td>Trend</td>
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<td>Max-Eig</td>
<td>5</td>
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<td>3</td>
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Selected (0.05 level*) Number of Cointegrating Relations by Model

An examination of Table 3 shows that the trace and max-Eigen value tests are consistent in their value of the latter specification. The detail of the cointegration test is presented in Table 4.

Table 4: Results of Co-integration Tests

<table>
<thead>
<tr>
<th>Hypothesised No of cointegrating Equations (CE)</th>
<th>Trace Test</th>
<th>Maximum-eigen value Test</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Trace Statistics</td>
<td>Critical value (p&lt;0.05)</td>
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<tr>
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<td>181.54011*</td>
<td>85.42066</td>
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<tr>
<td>At most 1</td>
<td>113.23401*</td>
<td>69.81889</td>
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<td>At most 2</td>
<td>71.97574*</td>
<td>58.71610</td>
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<td>At most 3</td>
<td>43.67576*</td>
<td>31.79707</td>
</tr>
<tr>
<td>At most 4</td>
<td>17.19180*</td>
<td>14.32470</td>
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</table>

Note: *implies that the statistics are significant at p<0.05

The results from Table 4 indicate that the null hypothesis of no co-integration is rejected by both the Trace test and Maximum-Eigen value test. Both tests indicate that at least three cointegrating equations exist among linear combinations of Financial Development (FD) in Nigeria and its hypothesised determinants at 5% level of significance. These results suggest, among others, some stable long-run equilibrium relationship exists among the series which could be given some error correction representations VECM (Engle and Granger, 1987). It also shows that there exists Granger causality between these variables (Granger, 1969), and rules out the possibility of spurious relationship (Granger and Newbold, 1974).

6.4: Long-run Equilibrium: Cointegration Results

The estimated long-run equilibrium obtained from the coefficients of the cointegration results of the model normalised on Financial Development (FD) is presented as equation 7.

\[
FD_t = -1.689 - 3.573NPBA_t - 5.544CBINTR_t + 0.12LR_t - 0.237INF_t
\]  (7)
Evidence from Equation 7 shows that Financial Development (FD), Non-Performing Loans (NPBA), Commercial Bank Interest Rate (CBINTR), and Inflation (INF) exert negative and significant influence on financial development, suggesting that low levels of these endogenous variables will have positive impact on financial development. On the other hand, Liquidity Ratio (LR), which exerts positive and significant influence suggests that a high level liquidity in the banking sector will bring about improved investment in the financial market (Fry, 1997).

The cointegration results also show that there exists long run equilibrium relationship between financial development and non-performing loans on the one hand and other hypothesised determinants on the other. These results confirm the *a priori* expectation as indicated in the preceding discussion.

The broad implications of these results are that policy measures aimed at stimulating financial development through reduction in non-performing loans must be accompanied by measures to reduce the interest rate on credits and the level of inflation and an increase in the level of liquidity (Li & Chu, 2004; Fofack, 2005; Ojo, 2010, Somoye 2010).

The null hypothesis that financial development has no significant influence on non-performing loans is therefore rejected against the alternative. The overall result indicates that improvement in financial development will improve the lending capacity of the banking sector.

### 6.5: Long-run Equilibrium: Cointegration Results

The Vector Error Correction Model (VECM) results indicate that the short run components of the relationship with restrictions implied by one co-integrating equation show that the error correction coefficient (ECM) of the Financial Development (FD) is properly signed at -0.42320 and significant at t= -3.45321. This shows that the speed of adjustment of the short run equilibrium to the shocks to its equilibrium relationship with its hypothesised determinants is significant, indicating that the short-run dynamics (ECM) supports the cointegration. This indicates that government policy actions aimed at improving the financial development and non-performing loans should essentially focus on both the short-run and the long-run equilibrium implications of the changes in the levels of all the hypothesised variables.

### 6.6: Pairwise Granger Causality Test

The pairwise Granger causality test as presented in Table 5 shows that the null hypothesis cannot be rejected in most cases. In the case of “FD does not Granger cause NPBA”, the results show that Financial Development (FD) Granger causes Non-performing Loans (NPBA) under 1-lag uni-directionally. Surprisingly, Granger causality tends to run from Financial Development (FD) to Commercial Bank Interest Rate (CBINTR) to the level of Inflation (INF) under one lag.
# Table 5: Pairwise Granger Causality Test

<table>
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<tr>
<th>Null Hypothesis</th>
<th>1 lag</th>
<th>2-lags</th>
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<tr>
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<td>F-Statistics</td>
<td>Prob.</td>
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<td>FD does not Granger causes NPBA</td>
<td>3.03577</td>
<td>0.03146*</td>
</tr>
<tr>
<td>NPBA does not Granger causes FD</td>
<td>6.86510</td>
<td>0.01610*</td>
</tr>
<tr>
<td>CBINTR does not Granger causes FB</td>
<td>2.63054</td>
<td>0.01292*</td>
</tr>
<tr>
<td>FD does not Granger causes CBINTR</td>
<td>5.01470</td>
<td>0.00443*</td>
</tr>
<tr>
<td>LR does not Granger causes FD</td>
<td>7.11921*</td>
<td>0.01020*</td>
</tr>
<tr>
<td>FD does not Granger causes LR</td>
<td>1.08724*</td>
<td>0.40122</td>
</tr>
<tr>
<td>INF does not Granger causes FD</td>
<td>4.17925</td>
<td>0.27550*</td>
</tr>
<tr>
<td>FD does not Granger causes INF</td>
<td>1.95606</td>
<td>0.32719*</td>
</tr>
</tbody>
</table>

Observations: 1 lag: 29; 2 Lags: 28, Critical Value taken at 5% significance; * FD Granger causes.

### 6.7: Summary of the Results

The findings show that all the endogenous variables are integrated of the order 1, (I) and the series are, therefore, candidates for co-integration. The co-integration tests show there are at least a minimum of three co-integrating vectors which indicate that an Error Correction Model (ECM) can be estimated. The long-run equation normalised on financial development indicates that non-performing loans proxy by commercial bank assets, commercial bank interest rate and the level of inflation have significant influence on financial development.

The coefficient of the error correction model (ECM) is significant and properly signed, indicating that financial development adjusts to the shock arising from the equilibrium. The short run dynamics supports the cointegration test. It also combines both the short-run and long-run predictive power of the model. The Granger causality provides evidence that financial development ‘Granger causes’ non-performing loans and other hypothesised variable.

The overall results show that the model exhibits long-run cointegration, short-run dynamics and uni-directional causal relationship and consistent with the results of previous studies indicated in the preceding discussion. Thus, it can be stated that the results are not spurious.

### 7.0: Conclusion and Recommendation

From the preceding discussions, it can be suggested that there is the need for government to fashion appropriate financial policies that will have positive impact on non-performing loans, and consequently improve the financial sector. The regulatory authorities need to address a number of issues by putting in place measures aimed at tackling excessive risk-taking at the source. By so doing, prudential regulation and supervision of individual institutions could go a long way towards dealing with the origin of systemic disturbances. For the purpose of strengthening the regulatory framework to reduce the level non-performing loans and reduce the incidence of bank failure, the paper suggests that the Central Bank should fashion more effective oversight measures to address weak corporate governance, poor risk management and fraud that in the past played a significant role in non-performing loans and bank failures in Nigeria and other nations. In addition, an appropriate institutional framework that will manage relevant risks inherent on the impact of non-performing loans should be put in place and strengthened. Perhaps,
the Japanese approach may be adopted to reduce the negative impact of non-performing loans on commercial bank performances.

References


New York.


# APPENDIX 1: Financial Statistics

<table>
<thead>
<tr>
<th>Year</th>
<th>Financial Development (CPS/GDP) (%)</th>
<th>Total Assets of Commercial Banks (CB)(Nmill)</th>
<th>Commercial Banks Total Loans and Advances (Nmill)</th>
<th>Total Non-performing Loans (Nmill)</th>
<th>Ratio of NPLs to Total Assets of CB (Nmill)</th>
<th>Ratio of Non-Performing Loans to Total Loans</th>
<th>Liquidity Ratio</th>
<th>Deposit &amp; Lending rates of Commercial Banks (%)</th>
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<tbody>
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<td>1981</td>
<td>9.1</td>
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<td>8,5829</td>
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<td>40.5</td>
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<td>11,093.9</td>
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2: Somoye (2010, p. 94)
3: Statistical Simulations by the Authors