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THE DETERMINANTS OF NON-PERFORMING LOANS IN NIGERIA: AN EMPIRICAL ANALYSIS.

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Abstract
The objective of this paper has been to develop a model to investigate the determinants of non-performing loans in Nigeria. The co-integration technique with its implied ECM was applied. Using data covering the periods between 1980 and 2010, the parsimonious ECM result indicates that the international competitiveness measured by the real exchange rate is an important determinant of non-performing loans in Nigeria. The parsimonious ECM result also indicates that the interest rate and inflation rate are significant factors that influenced the level of non-performing loans in Nigeria. Power supply is also an important determinant of non-performing loan in Nigeria. Contrary to expectations, the result shows that the level of economic growth is not an important determinant of non-performing loans in Nigeria. The negatively signed and significant ECM shows a satisfactory speed of adjustment. Policy efforts to reduce the level of non-performing loans should be pursued by the monetary authorities if the Nigeria financial system is to achieve its target goals

Keywords: Non-performing loans, real exchange rate, inflation rate, interest rate, co-integration.

Introduction

The role of banking sector in every economy is highly significant to the extent that it is one of the most regulated sectors of the economy. Essentially, the banking sector performs the function of intermediation by linking the surplus side with deficit side of the economy for transactions. These transactions result in credit creation as well as the expansion of credit which ultimately leads to economic growth if there are no repayment hitches. Nonperforming loans generally refer to loans which for a relatively long period of time do not generate income, that is principal and or interest on these loans has been left unpaid for at least 90 days (Carprio and Klingabie, 1999). The Nigerian banking environment had witnessed series of serious crises since the inception of Structural Adjournment Programmed (SAP) in 1986, the deregulation of the financial system gave room for the influx of banks into the banking industry.

The increase number of banks over-stretched their existing human resources capacity which resulted into many problems such as poor credit appraisal system, financial crimes, accumulation of poor asset quality among others. Consequent upon the above, the existence of systemic distress in the system was inevitable. There are costs associated with non-performing loans. Such costs are essentially, economic, financial and fiscal. These loans may impact negatively on the level of private investments; constrain the scope of bank credit to the private sector by virtue of reduction in banks capital. According to Fofack (2002), these loans also have potential for reducing private consumption and can be a source of economic rate as well as erosion of banks quality and assets. When non performing loans are left untreated they may evolve to financial crisis as soon as these loans exceed banks capital in a relatively large number of banks. From the foregoing, the

inability to collect repayment on loans and advances extend to customers and directors of companies and this was a major contributor to the distress of the liquidated banks. In spite of the association between banking crisis and non- performing loans, literature on banking crises focused more on the determinants of banking crisis and less on the various sources of non-performing loans as observed by Fofack (2002). Non- performing loans are used as indicator variable to measure banking crisis intensity and are viewed as possible consequence of the crisis rather than a critical factor leading to it. Deducing from the above, it is apparent that banking crises are associated with the emergence of non-performing loans, therefore having a deep insights into the leading causes of these loans may be critical to improving the soundness of health of banks and other financial institutions, thereby impacting positively on private investment as well as economic growth. The main objective of this paper is to develop a model to investigate the determinants of non-performing loans in Nigeria. Following this introductory section, the second section dwells on an overview of related literature. The third section presents an exposition of the methodology and the fourth section is on result results and findings. The fifth section concludes the paper.

Literature review

Transactions involving granting of facilities by banks to customers involve credit risks. Credit creation is the main income generating activity for banks, however, it involves huge risk to both the lender and borrower. In a bid to survive and maintain adequate profit level in this highly competitive environment, banks tend to take excessive risks. Credits risks are the current and potential risks to earnings or capital arising from an obvious inability to meet the terms of facility granted. Credit crisis as soon as banks get is committed through actual or implied contractual agreements whether on or off the balance sheet. Risk is thus determined by endogenous factors outside the bank like general unemployment levels, changing socio-economic conditions and sector attitudes.

Banks are increasingly facing credit risk in various financing instruments other than loans, including acceptances, interbank transactions, trade financing, foreign exchange transactions financial future, swaps, bonds, equities, options and in the extension of commitments and guarantees and the settlement of transaction.

The role of bank remains central in financing economic activities and its effectiveness could exert positive impact on the overall economy as a sound and profitable banking sector is able to withstand negative shocks and contribute to the stability of the financial system. Robert and Gary (1994) in the same vein opined that the most obvious characteristics of failed banks is not poor operating efficiency but on an increased volume of non-performing loans. The US office of controller of currency round that difference between failed banks and those that remained healthy or recovered from problems was the earliest of management, as observed by De.Young and Whalen (1994). Superior managers not only run their banks in a cost efficient fashion, and generate large profits relative to their peers, but also impose better loan underwriting and monitoring standards than their peers which result to better credit quality. There had been series of bank crises across the world caused by non-performing loans as experienced in East Asian Countries, American and Sub-Saharan African.

Farhan, Chaudhry and Khalil (2012) examined the factors responsible for non-performing loans. They found that the determinants of non-performing loans are both institutional. Nkuzu (2011) contented that the institutional or structural indicators pertain to financial regulation and supervision

and the incentive structure therein. The macroeconomic environment influences borrowers' balance sheets and their debt servicing capacity. The set of macroeconomic variables used varies across studies, but broad indicators of macroeconomic performance, such as GDP growth and unemployment are generally included on the literature on determinants of non- performing loans.

There are basically three strand of literature on determinants of non-performing loans. The first strand focused on explaining differences in non-performing loans across banks within specific countries emphasizing the role of macroeconomic performance, management quality and policy choices see Dash and Kabra (2010). The work of Kaminsky and Reinhart, 1999 exposed the second stand of literature on non-performing loans. These scholars analyzed the link between non-performing loans and macro financial conditions by highlighting the positive impact of non-performing loan on the probability of crisis. Their study also focused on explaining or predicting non-performing loans at the macroeconomic level from aggregate non-performing ratios. These aggregates can relate either to total outstanding loans in an economy or to specific types of loans, Nkuzu (2011). The above view was supported by Japelli, Pagano and Macro (2008). In an attempt to have a deep insight into the nature, behaviour and determinants of non-performing loans, we draw on the experience in literature. The possible determinants of non-performing loans included those on interest rate, growth in Gross Domestic Product, inflation, unemployment. Power supply was also included as it is an economic problem faced by the Nigerian economy presently. The inclusion of power supply as a determinant parameter as well as illuminating issues on non-performing loans in Nigeria lies the justification for our study.

Trends in Non-Performing Loans in Nigeria

Nigerian banks face the challenges of competition and are expected to create risk assets. The industry benchmarks for non-performing loans are not expected to exceed 5% limit on non-performing loans. Stress test performed on Nigerian banks in 2009 revealed that 9 out of the 24 banks had huge non-performing loans exposures (mainly to oil & gas sector and capital market) that rendered them insolvent. The average industries non-performing loan (NPL) ratio at 20.8% on the bade of which AMCON was established December 2010. Asset Management Company of Nigeria purchase N868 billion (face value N2.2 billion) in exchange for 3 years zero coupon bonds with a face value of NGN 1.03 billion (issued at NGN 770 billion, discount to per value). On March 31, 2011, AMCON purchased another round of NPL for a consideration of 3 years zero coupon bonds with a face value of NGN 525 billion. To grant liquidity to the bond, the Nigerian Stock Exchange (NSE) admitted zero coupon bonds with face value of NGN 1.675 trillion on its daily official list on 21/4/2011. AMCON is reported to have purchased about 9,000 NPL representing to 30 to 40% of total assets in the banking industry (source or reference). As part of its role in recapitalizing banks, AMCON injected capital in the nationalized banks it assumed from NDIC to enable the banks meet the minimum capital requirement of NGN 25 as well as provide funds for their operations.

Keystone Bank	PHB	₦285 billion
Enterprise Bank	Spring	₦110.5 billion
Inter-continental Bank		₦530 billion
Union Bank		₦306 billion
Oceanic Bank		₦ 290 billion
Eco- Bank		

This has enabled the rescued banks to repay the NGN 620 billion tier 2 capital provided by CBN in the wake of the crisis. As it mid 2012,

Methodology

The conventional approach to time-series econometrics is based on the implicit assumption of stationarity of time-series data. A recent development in time-series econometrics has cast serious doubts on the conventional time-series assumptions. There is substantial evidence in the recent literature to suggest that many macroeconomic time series may possess unit roots. That is, they are non-stationary processes. A time-series integrated of order cero 1(0), is level stationary, while a time-series are found to be integrated of order one, or 1(1), is stationary in fist difference. Most commonly, series are found to be integrated of order one, or 1(1). The implication of some systematic movements of integrated variables in the estimation process may yield spurious results. In the case of a small sample study, the risk of spurious regression is extremely high. In the presence of 1(1) or higher order integrated variables, the conventional t-test of the regression coefficients generated by conventional OLS procedure is highly misleading (Granger and Newbold, 1977). Resolving these problems requires transforming an integrated series into a stationary series by successive differencing of the series depending on the order of integration (Box and Jenkins, 1970). However, Sergan (1964), Hendry and Mizon (1978 and Davidson, Hendry, Sbra and Yeo (1978) have argued that the differencing process loses valuable information in data, especially in the specification of dynamic models. If some, or all, of the variables of model are of the same order of integration, following the Engle-Granger theorem, the series are cointegrated and the appropriate procedure to estimate the model will be an error correction specification. Hendry (1986) supported this view, arguing that correction formulation minimizes the possibilities of spurious relationship being estimated as it retains level information in a non-integrated from (Hendry, 1986). Davidson, Hendry, Sbra and Yei. (1978) proposed a general autoregressive distributed lag model with a lagged dependent variable, which is known as the 'error-correction' term. Davidson, Hendry, Sbra and Yeo (1978) also advocated the process of adding lagged dependent and independent variables up to the point where residual whiteness is ensured in a dynamic specification. Therefore, error correction models avoid the spurious regression relationships. To guard against the possibility of estimating spurious relationship in the presence of some nonstationary variables, modeling (ECM) procedure. This procedure begins with an over-parameterised autoregressive distributed lag (ADL) specification of an appropriate lag. The consideration of the available degrees of freedom and type of data determine the decision on lag length. With annual data, one or two lags would be long enough, while with quarterly data a maximum lag of four can be taken. Under this ECM procedure, the long run relationship is embedded within the dynamic specification.

The model to be estimated is thus stated as:

$LNPL = b_o + b_1GDPR + B_2LREER + B_3IR + b_4INFL + b_5LPS + U_t$

Data Description and source(s): The data used for the study are secondary in nature. The data covered the period between 1980 and 2011. This period included the pre-Structural Adjustment Programme (SAP), SAP and post-SAP periods. The data include:

NPL: This is non performing loan proxied by total commercial loans and advances the data was gotten from the Central Bank of Nigeria Statistical Bulletin, 2010 edition.

GDPR: Growth rate of Gross domestic Product was computed by the author with data from the Gross Domestic Product

which was collected from Central Bank of Nigeria Statistical Bulletin, 2010 edition.

IR: This is the Interest rate. The data was collected from the Central Bank of Nigeria Statistical Bulletin, 2010 edition.

INFL: This is the Inflation rate. The data was gotten from the Central Bank of Nigeria Statistical Bulletin, 2010 edition.

PS: This is the power Supply proxied by total energy consumption. The data was collected from the various issues of the World Bank Indicators for Nigeria.

REER: Real Effective Exchange Rate which is the Nominal Effective Exchange Rate deflated by price level differentials. It measures the international competitiveness of domestically produced goods. The data was collected from the Central Bank of Nigeria Statistical Bulletin, 2010 edition.

Results and Findings: The first stage in the analysis is the unit root test which enables us to know whether the variables are stationary or not and that order of integration. The augmented Dickey Fuller (ADF) unit root test was used for this purpose. The ADF unit root test has advantage over the Dickey Fuller (DF) test since it amongst other correct for first order serial correlation in the variable. The summary of the ADF unit root test is shown in Table 1 below:

Table 1: Summary of ADF Unit Root Test Result

Variables	Level data	1st difference	1% CV	5% CV	10% CV	Order of integration
REER	-2.30	3.85*	-3.69	-2.97	-2.62	I(1)
PS	-2.05	-4.78	-3.69	-2.97	-2.62	I(1)
NPL	-2.32	-5.19	-3.69	-2.97	-2.62	I(1)
IR	-2.08	-4.94	-3.69	-2.97	-2.62	I(1)
INFL	-3.02	-5.14	-3.69	-2.97	-2.62	I(0)
GDPR	-4.39	-6.41	-3.69	-2.97	-2.62	I(0)

NB: * Indicate stationary at the 1% level
** indicate stationary at the 5% level

The unit test rest in table 1 indicates that all the variables, except the INPL and GDPR were non-stationary. They however, become stationary after difference once. The INFL and GDPR were stationary the levels probably because they are in growth rates. However, following Harris (1995) and Gujarratti (2003) both I(1) and I(0) variables can be carried forward to test for cointegration.

Cointegration Test: The Johansen methodology will be used to test for the existence or not of a long run relationship among the variables. The Johansen methodology is preferable to other methods because amongst others, it allows for more than one cointegrating vector. The result of the Johansen cointegration test is shown in table 2 below:

Table 2: Summary of Johansen Cointegration Test Result

Hypothesized No of CE(s)	Eigenvalue	Trace Statistic	5 percent Critical value	1 Percent Critical value
None**	0.949928	200.1242	94.15	103.18
At most 1**	0.835475	119.2784	68.52	76.07
At most 2**	0.736195	70.55154	47.21	54.46
At most 3*	0.467794	34.57293	29.68	35.65
At most 4*	0.333805	17.54334	15.41	20.04
At most 5*	0.216183	6.576665	3.76	6.65

Hypothesized No of CE(s)	Eigenvalue	Max-Eigen Statistic	5 percent Critical value	1 Percent Critical value
None**	0.949928	80.84580	39.37	45.10
At most 1**	0.835475	48.72677	33.46	38.77
At most 2**	0.736195	35.97871	27.07	32.24
At most 3*	0.467794	17.02959	20.97	25.52
At most 4*	0.333805	10.96668	14.07	18.63
At most 5*	0.216183	6.576665	3.76	6.65

The trace statistics in table indicates 4 cointegrating equations at the 1 percent level and 2 cointegrating equations at the 5 percent level. The Max-Eigen statistic shows 3 cointegrating equations at the 1 percent level. Thus, we conclude that there is a long run relationship among the variables. The existence of at least one cointegrating equation per units is to estimate the over-parameteric Error Correlation Model (ECM) and the parsimonious ECM model.

Error Correction Model: An error correction model is a dynamic system of estimation with the characteristics that the deviation of then current state from its long run relationship will be fed into its short-run dynamics. The results of the overparameterize ECM model is shown in table 3 below:

Table 3: Summary of Overparameterize ECM. Modeling: DLNPL

Variable	Coefficient	Std. Error	t-statistic	Prob.
DLPS	0.014438	0.010255	1.407815	0.1745
DLPS (-1)	-0197169	0.179697	-1.097230	0.2856
DLPS(-2)	-0.794600	0.197815	-4.015370	0.0003
DLREER	0.218038	0.170931	-4.015370	0.2105
DLREER(-1)	-4.155380	1.423149	1.275587	0.0061
DLREER (-2)	-0.804358	0.089032	-2.919848	0.0000
GDPR	0.054174	0.097291	-9.034514	0.5823
GDPR(-1)	0.184941	0.516911	0.557955	0.7234
GDPR(-2)	1.343783	3.191782	0.357780	0.6772
INFL	0.107741	0.090975	0.421013	0.2463
INFL(-1)	0.543836	0.059050	1.184297	0.0000
INFL(-2)	0.044931	0.029428	9.209750	0.1353
DLIR	0.416793	0.138104	1.526830	0.0047
DLIR(-1)	0.009418	0.007082	3.017669	0.3709
DLIR(-2)	1.129976	0.026783	0.187492	0.8525
ECM(-1)	-0.791345	0.267674	-2.956370	0.0131
C	-3866171	1011743	-2.399993	0.0352

R2 = 0.63 R2 = 0.59 AIC = 32.53 SC = 33.34 DW = 2.39, LL = -438.46

The parsimonious ECM was gotten by deleting insignificant variables from the over-parameterize ECM model. The Akaike information criterion, Schwarz criterion and selecting criteria. The summary of the parsimonious ECM result is shown in table 4 below:

Table 4: Summary of Parsimonious ECM result. modeling: DLNPL

Variable	Coefficient	Std. Error	t-statistic	Prob.
DLPS(-2)	-0.869035	0.165638	-5.246582	0.0000
DLREER(-1)	-0.396659	0.141285	-2.807485	0.0109
DLREER (-2)	-0.032162	0.014401	-2.233259	0.0371
INFL(-1)	0.658105	0.113333	5.806808	0.0000
DLIR	0.022560	0.009665	2.334155	0.0307
ECM(-1)	-0.829263	0.253887	-3.255275	0.0039
C	-3773704	1204548	-3.132619	0.0052

$R^2 = 0.71$, $\bar{R}^2 = 0.69$, AIC = 29.15 SC = 12.53 DW = 2.18, LL = -456.13

The result shows that power supply is a significant determinant of the level of non-performing loan in Nigeria. The result shows that an increase in power supply by 1 percent reduced the land of non-performing loan by 87 percent. This high elasticity is symptomatic of the significant role played by good power supply in improving the efficiency of investors who collect loan from the bank. Thus, a low poor power supply as is the case in Nigeria will increase the incidence of non-performing loan in the country. The result shows further that the international competitiveness as measured by the Real Effective Exchange Rate is an important determinant of non-performing loan in Nigeria. The negative sign attached to the coefficients of both the Real Effective Exchange Rate and its two period lag is an indication that a low level of international competitiveness of domestic products will reduce the profits of investors and hence increases the occurrence of poor non-performing loans. The result shows that an appreciation of the exchange rate which signifies low competitive level of domestic product increased the level non-performing loan by 40 percent. The inflation rate has also played a significant role in determining the existence and non-performing loans in Nigeria. A high rate of inflation reduces the profit of investor and this hinders the ability of investors to pay back borrowed money. Contrary to expectations the level of economic growth is not an important and determinant of non-performing loans in Nigeria and is thus dropped from the parsimonious ECM model. The statistical significance of the 1 period lagged value of the ECM which also has the right negative sign indicates a satisfactory speed of adjustment. The ECM indicates that about 83 percent of the errors are corrected each period.

Vector Error Correction: The relevant portion of the Vector Error Correction (VEC) is shown in table 5 below:

Table 5: Summary of VEC Result

Cointegrating Eq	CointEq1					
LNPL(-1)	1.000000					
LPE(-1)	-56.555					
	(1.00717)					
	(2.63511)					
LREER(-1)	3.838807					
	(1.09241)					
	(3.51416)					
LIR(-1)	-0.89001					
	(2.83112)					
	(-0.31471)					
INFL(-1)	-0.074197					
	(0.03122)					
	(-21056)					
GDPR(-1)	-4.203349					
	(0.40359)					
	(-10.6492					
C	5.509035					
Error Correlation	D(LNPL)	D(LPS)	D(LREER)	D(LIR)	D(NFL)	D(GDPR)
cointEq1	0.054492	-0.0200139	-3.027197	0.001690	0.585809	0.022887
	(0.04818)	(0.4527)	(0.01090)	(0.00812)	(0.57696)	(0.12183)
	(1.79373)	(-2.27118)	(-2.49555)	(0.20809)	(0.86535)	(0.16790)

The result of the Vector Error Correction (VEC) shows that the power supply equation and the Real Effective Exchange Rate equation represents the true cointegrating equation. The others are either wrongly signed or not statistically significant.

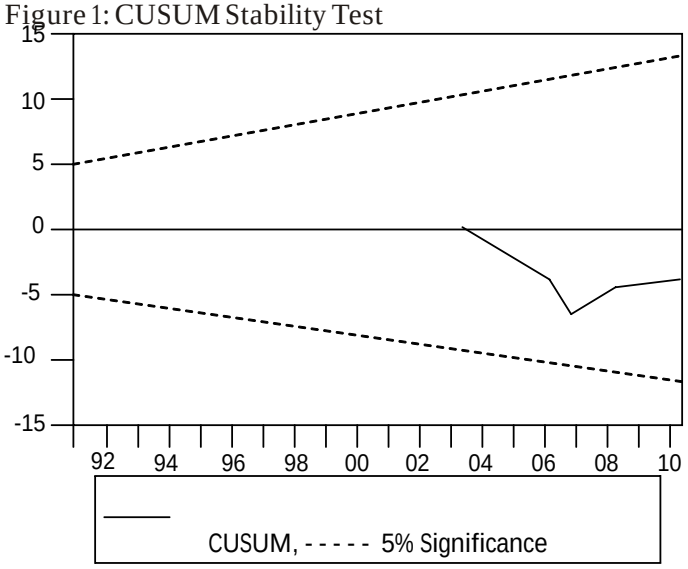
Diagnostic Tests: The diagnostic statistics are used to test the behaviour of the random variable. It tests whether the errors are properly distributed, whether the errors are homoskedastic and whether the errors are serially correlated. It also tests the stability of the residuals. Table 6 shows the results of the diagnostic tests.

Table 6: Diagnostic Tests Result

White Heteroskedasticity			
Estatistic	0.36	Probability	0.97
Breusch Godfrey serial correlation LM test			
F. Statistic	0.37	Probability	0.69
Jarque – Bera			
Jarque - Bera	3.35	Probability	0.17

The white heteroskedasticity test the acceptance of the null hypothesis that the errors are homoskedastic. The result of the Jarque-Bera normality test indicates the validation of the null hypothesis that the errors are normally distributed. The Breusch Godfrey test also validates the null hypothesis that the errors are not serially correlated. The result of the stability test is shown in figure 1 below:

Figure 1: CUSUM Stability Test



The cumulative sum of square (CUSUM) stability test indicates that the model is stable. This is because the CUSUM line falls in-between the two 5 percent line.

The relevant portion of the variance decomposition is shown in table 7 below:

Table 7: Survey of Variance Decomposition of LNPL

Period	S.E	LNPL	LPS	LREER	LIR
1	1.146462	100.0000	0.000000	0.000000	0.000000
2	1.463549	92.58366	0.312856	0.767738	4.689278
3	1.877025	88.77042	0.227122	1.161381	6.259560
4	2.190272	98.14307	0.254571	0.934290	6.373266
5	2.427549	84.19787	0.507128	0.854891	11.07320
6	2.636025	84.39506	0.431857	0.937481	11.09509
7	2.850767	84.06600	0.857511	0.866277	11.41207
8	3.028348	83.18848	1.045545	0.768974	12.34540
9	3.209712	83.56422	0.936958	0.691917	12.31485
10	3.366486	82.85853	1.040064	0.642936	12.99951

The result shows that other than shock to itself, which was about 100 percent in the first period, shocks to the interest rate explain about 5 percent of the changes in the non-performing loan in the 2 period, this increased to about 12 percent in the 10th period. Shocks to Real Effective Exchange rate and the power supply did not explain significant portion of the changes in non-performing loan.

Conclusion and recommendations

This study has been on the determinants of nonperforming loans in Nigeria. Numerous efforts have been made by the monetary authorities in Nigeria. However, non-performing loans still remains a relevant problem in the Nigerian financial system. Using the cointegration test and its implied ECM, the result show that both external factor and internal factors are significant determinants of non-performing loans in Nigeria. The result shows that the international competitiveness of the economy as measured by the Real Effective Exchange Rate is an important determinant of the non-performing loans in Nigeria banking system. The interest rate policy is also a significant determinant of the non-performing loans in Nigeria. The power supply situation is an important factor influencing non-performing loans in Nigeria. The result shows that poor supply increase the incidence of non-performing loan in Nigeria. It is thus recommended that appropriate policies be put in place to improve power supply and the international competitiveness of domestically produced goods to reduce the incidence of non-performing loans in Nigeria. The interest rate policy and the general price level should be stabilize and made relevant to the Nigerian financial system.

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