

## **Credit Risk Management, Capitalization and Performance in the Nigerian Banking Sector (1990-2012)**

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**Abstract:** *Several attempts made since 1952 to date designed at ensuring stable financial health for the Nigerian banking sector have faced challenges particularly in the last ten years 2004 to-date when the system is afflicted with reported incidences of rising “toxic-assets”. This paper analyses relationship between efficiency of credit risk management, level of capitalization and financial health in selected Nigerian commercial banks and the sector as a whole. Data collections are mainly secondary spanning fifteen years before and seven years after the consolidation programme of the Nigerian banking sector. The study hypothesized negative relationship between Credit Risk Management (CRM), Operational Efficiency and levels of capitalization for selected banks. Collected data mainly selected Bank Specific Variables (BSV) for the study period were summarized, correlated and regressed to verify nature of relationship for each time series data employed. Findings indicate significant level of causation between Efficiency of Credit Risk Management (ECRM) and Operational Efficiency with  $R^2 = 0.711$  but other Bank Specific Variables such as performance indexes for selected banks in the sampled period were not as significantly related given a lower  $R^2$  (0.481). For the entire banking system, the level of causation and influence between Efficiency of CRM and bank financial health was more pronounced at  $R^2 = 0.967$  perhaps due to the crowding out effects with three of the four tested parameters demonstrating high level of significance at 5%. The study therefore traced Nigerian Bank financial health to the influences of Bank Specific Variable, operational efficiency and Credit Risk Management Practices. Policy recommendations were made on the basis of these findings.*

**Key words:** *Credit Risk Management, Capitalization, Bank Performance, Bank Credit, and Bank Specific Variables.*

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### **I. Introduction**

Banking operations in any nation revolves around provision of liquidity to both savers and depositors through the process of credit creation and deposit management activities. Credit function is designed primarily as a means of enhancing the ability of investors to exploit desired profitable ventures while mobilized deposit earns returns on investments for savers. Kargi (2011) identifies credit creation as the major income generating activities of a bank, a venture which also exposes the financial institutions to credit risk. According to the Basle Committee on Banking Supervision (BCBS) (2003), credit risk is defined as the possibility of losing an outstanding loan partially or totally due to credit event (default risk); while Credit Risk Management (CRM) relates to bank efforts designed to minimize the potential that a bank borrower or counter-party fails to meet its obligations in accordance with agreed terms.

In a bid to maximize shareholders' wealth and ensure safety of depositors fund, banks act as delegated monitors on behalf of lenders (depositors) using various innovations, technologies and procedures to enforce credit contracts. These measures have however not been able to eliminate some inherent bank risks including borrowers' outright default; unwillingness or inability to meet credit commitment due to the vagaries of business activities or other environmental dynamics; Bidani et al (2004). Credit Risk Management frameworks therefore become imperative tools in decision-making that relates to loan-pricing, delegating lending powers, mitigating or migrating as well as managing incidences of credit risk on bank portfolio.

The need to analyze the efficiency of CRM frameworks is particularly acute in a developing nation like Nigeria where the problem of credit administration, poor loan recovery, and undercapitalization have been variously identified as the major causes of bank distress; Juan (1987). Such incidences of distress have informed various reforms since Parton Commission of Enquiry (1952) to the recent Central Bank Of Nigeria (CBN) Consolidation Programme of December 2005 in Nigeria. Furthermore, in the period 2004-2009, the Nigerian banking system reported significant growth in its many performance parameters including rising capital adequacy (65%), earnings (150%), liquidity (120%) and asset quality (75%); Onwumere (2005); Fatemi and Fooladi (2006); Onaolapo (2007), Koizol and Lawrence (2008) and Hassan (2009). Many analysts relate this impressive performance to the consolidation and more importantly the Central Bank Of Nigeria (CBN) recapitalization exercise which increased the minimum capitalization of an average Nigerian bank from **₦100million** (Hundred Million Naira) to **₦25billion** (Twenty Five Billion Naira).

Since the completion of the Nigeria banks consolidation programme in 2005, rising competition within the entire financial system has accounted for intensive credit disbursement as a means of survival among banks that scaled the 'Recapitalization bar'. The practice has also been associated with increases in 'toxic' loan assets in the balance sheets of many of the banks, thus making perfection of CRM practices crucial tools for ensuring safety of depositors' fund and stabilizing the soundness of the system's financial health. In the seven years after the consolidation programme 2005 to 2012 the Nigerian commercial banking system witnessed further increases in capitalization with over 40% of the banks reporting capitalization well over **₦50billion** (Fifty Billion Naira). Furthermore, many of the banks posted handsome percentage increases in key performing indicators such as average liquidity ratio, loan to deposit ratio, total credit extended to economy and return on capital employed. Yet an audit conducted by the CBN in May 2010 also identified eight of these banks as seriously affected by liquidity and capitalization problems traceable to poor corporate governance and credit risk management practices; Okey (2010).

Subsequent CBN report also identified the existence of predatory debtors whose 'modus operandi' involved abandonment of debt obligations in some banks only to contract new ones in others; thus creating a spiral of rising non-performing credit portfolios or 'toxic assets'.

### **1.1 Aims and Objective**

These contradictory reports on bank specific variables and credit performance makes it imperative to examine the effects of credit factors on the performance of selected Nigerian banks as well as evaluate the efficiency of Credit Risk Management(CRM) practices adopted by the banking sector on capitalization and financial health over a twenty three year study period(1990-2012). Specific objectives of the study include analysis of credit variables that determine variation in operational efficiency, performance and by implication the effects of changing CRM approaches among Nigerian commercial banks as well as an assessment of how such practices eventually influence changing capitalization and financial health in the Nigerian banking system as a whole.

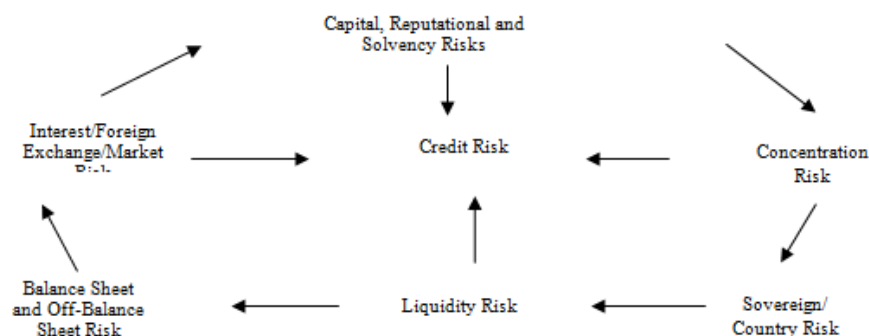
There are four more sections in this paper including section two which examines the theoretical and empirical framework as well as identifies basic determinants of credit risk management policies, capitalization, performance and financial health in the Nigerian Commercial Banking system. Section three briefly describes the research design adopted in relating the explanatory variables concerned while section four presents the results and discussions for the study. The last section, that is section five, provides summary, conclusion as well as recommendations for bank management and their implications for the regulatory policy decisions.

## **II. Material And Methods**

### **2.1 Credit Risk and Bank Operation**

Risk according to Athanasoglou et al. (2005) is a situation occasioned by internal or external environmental factors that create hindrances in the way of achieving certain objectives of an entity. Modern banks operate in a highly dynamic environment that exposes them to varied risks ranging from liquidity, credit, foreign exchange to market vagaries; thus creating a source of threat towards survival and success; Al-Thamimi and Al-Mazrooei (2007).

Apart from deposit – mobilization, lending is considered the most significant function of a commercial bank as loan asset created constitutes the highest income generating portfolio; Diamond (1984), Berger et al. (2003) and Casu et al. (2006). Almost every operational activities of a bank give rise to one form of risk ranging from interest, market, technology, concentration, reputational and other forms of risk including credit risk exposures. Credit risk occupies significant position in bank management given the key role financing perform in a deficit economic system and its contributory effort at ensuring shareholders' wealth maximization. Credit risk according to Chew and Pan (2012) is defined as the degree of value fluctuations in financial debt instruments and derivatives due to changes in the underlying credit quality of borrowers and counterparty. A typical money-deposit institution is exposed to borrowers defaults in honouring debt obligation on due date or at maturity. In some quarters the associated counterparty risk is believed to stem from limited institutional capacity, inappropriate credit policies, volatile interest rate regime, low capitalization and poor loan underwriting among others; Demirgüç-Kunt and Hunzinger (1999), Kithinji (2010) and Oke et al. (2012). The nature of risk associated with lending implies some elements of centrality in its effects as an increase in bank credit risk often gradually leads to liquidity, solvency, reputational and other risk related to banking operation. A conceptual representation of the generic linkage is presented in figure 2.1 below.



**Fig 2.1: Generic Linkage between Various Bank Operational Risks.**

Source: Author's Design (2012).

Figure 2.1 above described the centrality of the linkage between credit risk and other risks associated with bank operations and how its ripple effect further aggravates such other operational risk like concentration and market risks among others. Findings in some other studies have also identified international, national/sovereign, macro-economic variables as well as systemic factors as paramount in the evolution of credit risk; Demirguc-Kunt (1989), Ariff and Marrisetti (2001), Cebenoyan and Strahan (2004) and Athanasoglou et al. (2005). More than systemic and macro-economic variables, a bank peculiar credit features such as the size of risky loan making up the credit portfolio; internal loan policy; pre-lending criteria for the assessment of borrower and post audit analysis of financed project may constitute significant factors that shape the quality of a credit portfolio; Ahmed (2003) and Ahmed and Ariff (2007).

## 2.2 Concepts Of Bank Credit Risk Management (CRM)

The implication for banks as institutions that hold little owners' capital relative to the aggregate value of its asset is that only a small percentage of total loans need to turn bad to push the entire credit portfolio to the brink of failure. According to Peter and Sylvia (2008) the probability that credit portfolio will decline in value and perhaps become worthless is known as credit risk while various attempts designed to protect a bank against adversities associated with these risk exposures are referred to as Credit Risk Management (CRM) processes. According to Demirguc-Kunt and Hirzinga (1999) the process of analyzing credit risk, ranking and quantifying them constitute a substantial aspect of a framework and governance structures for most bank management. Among the reasons advanced for CRM include managerial self-interest and appraisal goal; high cost of financial distress and the existence of capital market imperfection. Other motivation for expending managerial resources on CRM according to Meyer (2000) is the need for insolvency avoidance, given the likelihood of poor credit risk management snowballing into financial crisis.

Since 1987 the Basle Committee on Banking Regulation and Supervision Practices (BCBS) under the aegis of Bank for International Settlement (BIS) developed a Risk Based Capital (RBC) structure for measuring capital adequacy in banks. In August 2009, the CBN issued guidelines for developing CRM framework for individual Nigerian banks' risk elements in line with its supervisory model. The guideline among others was designed to close the widespread lacuna in previous CRM codes and standards of individual banks in the sector as well as strengthening the credit appraisal procedures. It further enhanced credit data storage, dissemination, monitoring of over-exposure by borrowers, facilitating consistent credit classification and affording regulators first hand information on customer's global debt profile; [www.cenbank.org](http://www.cenbank.org) (2010).

A typical CRM procedure according to Onyiriuba (2004), Satchindanada (2006), and Casu et al. (2006) often entails process of standardization, documentation and reporting; whereby a bank identifies existing and potential risk associated with its credit portfolio and design appropriate policy- framework to control them. There also exist application of a consistent evaluation and rating scheme of all customers' credit proposals so as to ensure meaningful reporting of risk exposure for both the borrowers underlying credit quality and facility. Such procedure often encompasses data accumulation of credit risk exposure or concentration not exceeding a predetermined limit; reporting, monitoring and review of loan quality. Bank CRM procedures are therefore tailored towards ensuring a financially healthy loan portfolio; qualitative operational performance and enhanced capitalization, Velnamphy and Niresh (2012).

## 2.3 Bank Capitalization, Credit Risk and Performance Interface.

A business firm's capital serves a variety of purposes; in the case of a bank, it helps in establishing a level of confidence sufficient to attract enough deposits to fund operations as well as absorb unforeseen losses. Bank loan portfolios on the other hand are designed and as a means of protecting and boosting a bank capital

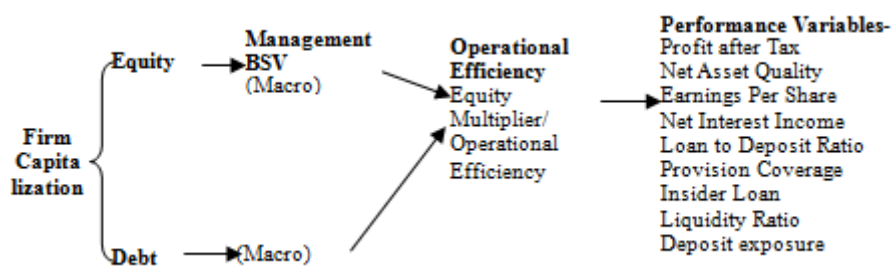
profile. Theoretical expositions on the relationship between capitalization and profitability was traditionally believed to be linear as increasing corporate leverage was expected to enhance profit and corporate values; a view that has been challenged by the seminal articles of Modigliani and Miller (1963) by their famous irrelevant theory. The theory argued that capital structure is unrelated to a firm's value under some perfect market assumptions.

Mixed results however exist in subsequent studies on the relationship between profitability, debt level and firm's capital. For instance, while some studies such as Kester (1986), Tilman & Wessels (1988) and Rajan & Zingales (1995), found negative relationship between profitability and leverage, others found significantly positive relationship between total debt and profitability using four basic theoretical constructs; namely Net Profit, Return On Capital Employed, Return On Equity and Net Interest Margin (as surrogate for Profitability) and Leverage Ratio (as surrogate for capital); Taub (1975) Peterson and Rajan (1994) Chang, Chan and Hui (2002). Abor (2005) and Velnampy & Niresh (2012) also found a significantly positive association between profitability and debt ratio and conclude that profitable firm portends better lending deposit prospects than otherwise. Most of these studies further found that highly geared capital structure has the potentiality to make a company very profitable as it is growing, but with the attendant increases in the probability of bankruptcy and ruin if the growth slows down or temporarily becomes negative. Banks as highly geared firms that source substantial proportion of their operating capital from depositors fund are exposed to this 'probability of bankruptcy' as risk emanating from credit creation becomes real.

Empirical studies exist that suggest two main determinants of bank performance designated as macro and micro-economic Bank Specific Variables (BSV); Cebenoyan and Strahan (2004). For instance Huges et al (1997) found a positive and significant relationship between such macro-economic determinants as bank lending type, and money supply; while the effects of inflation and interest rates are not conclusive. The same study identified bank lending as a micro-economic variable and a financing activity generally influenced by operational variables including Asset Quality, Bank Capitalization, Loan Loss Provisioning and Net Interest Margin among others. According to Bikker and Metzmakers (2004), and Eng and Nabar (2007) Xiaoying-Chen (2011) Asset Quality measured as a proportion of performing loans to total banks loan asset or as ratio of loan loss provision to total asset also have significant and positive relationship with credit risk given that when loan financing model are of low quality, credit risk level increases with a higher proportion of total asset potentially becoming non-performing and risky. Similar opinion was expressed by Samad (2004) who identified capital as a significant BSV; an increase of which reduces risk of insolvency and enhances depositors' confidence in a bank. In essence, an increase in equity capital will lower borrowing cost; increase average cost of capital and potentially increase credit risk level thereby requiring higher net interest margin support

Results are mixed regarding the relationship between capitalization and credit. Berger and De Young (1997) suggest that capitalization (i.e. Ratio of tier 1 capital to risk weighted asset) will have a negative relationship with credit risk but Ahmed and Ariff (2007) find a positive relationship between regulatory capital and credit risk among banks in Japan, Malaysia, and Mexico. Relationship between a bank total assets size and credit risk have also been found to range from positive to negative depending on the size of bank (as larger banks tend to offer more loan compared to smaller banks with attendance increase in credit risk); Konishi and Yasuda (2004). Bank performance (measured using profit parameters) according to Yener et al (2007) will influence capitalization because Return On Equity (ROE) is a product of Return On Asset (ROA) and an intervening equity multiplier. Thus, the higher the equity multipliers, the higher the currency equivalent for bank asset support as both Return On Equity (ROE) and growth rate of a typical bank are positively linked to ROA.

Given the consistency in previous theories in establishing some elements of relationship between Capitalization, Performance and Leveraging, the present study conceptualize a generalized model (an adaptation of Du-point approach to evaluation of firm's return on investment and earning power) to explain relationship between the study variables of the form presented below.



**Fig 2.2: Conceptualized Study Model**

**Source:** A Conceptualized Model Relating Bank Capitalization; Performance and Operational variables - An adaptation of Du-point model; Van-Horne and Wachowich 1993.

### III. Methodology

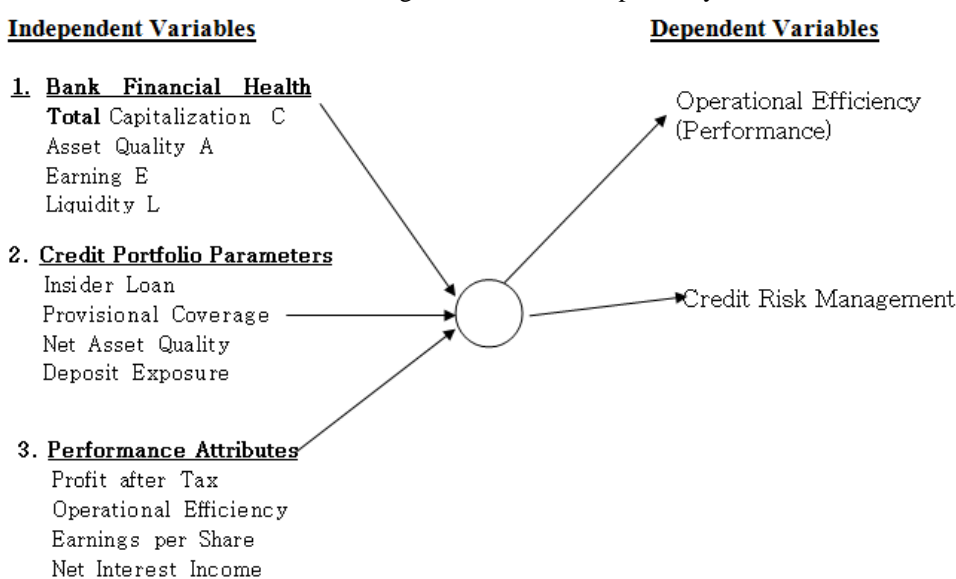
#### 3.1 Research Design

The present study adopts a generalized model of credit risk management to test relationship between CRM efficiency and some micro economic bank specific variables. The research design adopted is mainly explanatory wherein the study adopts components of Nigerian bank Credit Risk Management to explain changes in capitalization, operational efficiency, performance and financial health variables.

Data are collected mainly from secondary sources including annual reports of selected Nigerian Commercial Banks and CBN publications in the study period. For instance, the data gathered consist of annual report of six (6) banks selected out of twenty (20) existing Nigerian Commercial Banks in the period and CBN statistical bulletin covering the entire sector for a holistic assessment of the relationship between variables in the study period. The entire variables for the study are based on book – values in line with the argument by Meyers (2000) that book values are proxies for the values of assets in place.

#### 3.2 Study Variables and Descriptions

Figure 3.1 is a representation of the extent that dependent variables i.e. operational Efficiency and CRM practices of banks are influenced by independent variables i.e Bank Specific Variables (BSV) and Financial Health parameters. Modelling frameworks employed is an adaptation from, Guidara (2010) and Tobias et al (2011) and are in line with suggestions by Shrieves and Dahs (1992); Jacques and Nigro (1997) Kwan and Eisenbeis (1997), Rime (2001) and Yener et al (2007). Bank Specific Variables (BSV) such as Earning per Share (EPS), Net Interest Income (NII), Net Asset Quality (NAQ), and Insider Loan (IL) are employed as independent variables and regressed against Operational Efficiency and Provisional Coverage as surrogate for Performance and Credit Risk Management Practices respectively.



**Fig. 3.1 Relationship between the Dependent and Independent variables**

Summaries of the variables used in the study are also provided in Table 3.1 below with necessary expected signs.

**Table 3.1: Summaries of Study Variables: Dependent and Independent**

| Variables                   | Definition  | Expected sign |
|-----------------------------|---|---------------|
| Deposit Exposure (DE)       | The excess of liquid asset over deposit and short term liabilities. | -             |
| Net Deposit (ND)            | Excess of total loan over total deposit.                            | -             |
| Operational Efficiency (OE) | Returns on capital employed.  | +             |
| Provision Coverage (PC)     | Total bank provision for bad loan over non-performing loan.         | -             |
| Earnings Per Share (EPS)    | Total earning divided by total number of shares.                    | -             |
| Net Interest Income (NII)   | Excess of interest income earned over net interest payable.         | +             |
| Net Asset Quality (NAQ)     | Excess of total loan over non-performing loan.                      | +             |

|                           |   |   |
|---------------------------|---|---|
| Insider Loan (IL)         | Proportion of total loan attributable to the directors. | + |
| Total Capitalization (TC) | Total capital of bank in the system.                    | + |
| Liquidity Ratio (LR)      | Proportion of total liquid asset to total assets.       | - |

Source: Author’s Conceptualization (2012).

Pooled Bank Performance variables synthesized on a cross-sectional form are presented in Table 3.1 while linear models between elements of credit risk management and selected performance metrics are expressed in equations 3.1 to 3.5 .

$$Y_{it} = \beta_0 + \beta_i X_{it} + e_{it} \text{-----Equation (3.1)}$$

Subscript i represent cross – sectional and t denotes time series dimensions while  $Y_{it}$  represent the dependent variable with  $X_{it}$  standing for the explanatory variables such as Net Interest Income (NII), Net Asset Quality (NAQ), Earning Per Share (EPS), Insider Loan (IL), Operational Efficiency (OE) and Provision Coverage (PC) among others in equation 3.1. Given the ability of  $\beta$  to be the same across units, Ordinary Least Squares (OLS) provides a consistent and efficient estimate of  $\beta_i$  and  $\beta_{in}$  in the equations adopted to explain variables relationship in equation (3.2)-(3.5)

$$Oe_{it} = f(\beta_0 + \beta_{i1}nii + \beta_{i2}eps + \beta_{i3}pc + \beta_{i4}il + \beta_{i5}pat + \beta_{i6}naq + \beta_{i7}de + e) \text{-----Equa. (3.2)}$$

Where,  $Oe_{it}$  is the sampled banks Operational Efficiency measured using Return On Capital Employed and related to parameters of CRM and Performance parameters as explanatory variables as described in table 3.1 with ‘e’ representing the stochastic (error) term for the equation.

$$PC_{it} = f(\beta_0 + \beta_{i1}naq + \beta_{i2}pat + \beta_{i3}eps + \beta_{i4}nii + \beta_{i5}oe + \beta_{i6}il + e) \text{-----Equation (3.3)}$$

In Equation (3.3) Provisional Coverage (PC) is a surrogate for Credit Risk Management (CRM) efficiency and expressed as a function of sampled bank performance metrics namely; Net Asset Quality (NAQ), Profit After Taxes (PAT), Earning Per Share (EPS), Net Interest Income (NII), Operational Efficiency (OE), Insider Loan (IL) and Deposit Exposures (DE) for the sampled banks in the study period, with (e) representing the stochastic error term .

Apart from data generated from sampled banks; a holistic analysis of the entire Nigerian banking system also relates Net Deposit (ND) as representative of bank CRM practices with financial health metrics of the sector as explanatory variables over the study period in equation 3.4 and 3.5

$$Nd_{it} = f(C,A,E,L+u) \text{.....Equation(3.4)}$$

$$Nd_{it} = f(\beta_0 + \beta_{i1}c + \beta_{i2}a + \beta_{i3}e + \beta_{i4}l + u) \text{-----Equation (3.5)}$$

Where,  $Nd_{it}$  as the excess of Total Deposit (TD) over Loan and Advances (L and A) of the entire banking sector stands in for CRM efficiency and C,A,E,L, representing Capital ,Asset Quality, Earnings and Liquidity as surrogates for bank financial health in the system as explanatory variables in equation 3.5 with u representing the stochastic (error) term for the equation.

#### IV. Results & Discussions

Summary of findings based on the Ordinary Least Square (OLS) estimation of the general model presented in table 4.1 indicate that the overall regression result is normal and significant.

Table 4.1 Descriptive Summary Statistics

| Variables | Obs | Mean      | Std. Dev. | Min    | Max    |
|-----------|-----|-----------|-----------|--------|--------|
| Observ    | 42  | 21.5      | 12.26784  | 1      | 42     |
| pat       | 42  | 159066.1  | 213167.2  | 11096  | 757900 |
| nii       | 42  | 95431.43  | 121726.9  | 15100  | 447231 |
| eps       | 42  | 1.355952  | 1.418109  | -5.26  | 3.12   |
| de        | 42  | -16681.24 | 15568.72  | -60322 | -120   |
| naq       | 42  | 86.70286  | 10.17506  | 60     | 98.6   |
| pc        | 42  | -6208.119 | 9271.245  | -36963 | -205   |
| il        | 42  | 9734.952  | 7753.064  | 1379   | 48824  |
| oe        | 42  | 89245.29  | 98294.75  | 6239   | 336138 |

Source: Authors' Computation

This inference is drawn based on the result of a total of 42 observations with all the variables exhibiting minimum expected signs. Furthermore, tests of the assumption of validity for model residuals and for the existence of multi-collinearity were conducted using the Variance Inflation Factor(VIF) and Ramsey Reset both of which showed normalcy based on  $vif = 1.51$  and  $F(3,33)=0.34; Prob>F=0.7949$  indicating filled values of the model has no omitted variables.

#### 4.1 Relationship between Credit Risk Management (CRM) and Bank Operational Efficiency (OE)

Findings based on the tested model in equation 3.2 relating bank Operational Efficiency (OE) to Credit Risk Management (CRM) parameters are presented in table 4.2.



**Table 4.2 Pooled OLS Regression Coefficients**

| VARIABLES    | (1)<br>Model1        | (2)<br>Model2        | (3)<br>Model3        |
|--------------|----------------------|----------------------|----------------------|
| Pat          | -0.0439<br>(0.107)   |                      | 0.0115<br>(0.106)    |
| Nii          | 0.740***<br>(0.0465) | 0.702***<br>(0.0931) | 0.650***<br>(0.0554) |
| Eps          | 10,705<br>(7,756)    | 12,556*<br>(6,538)   | 4,010<br>(8,486)     |
| De           | 1.689***<br>(0.560)  | 1.525*<br>(0.787)    | 1.816***<br>(0.617)  |
| Naq          | -460.9<br>(962.3)    | -737.3<br>(813.0)    | -1,194<br>(1,158)    |
| Pc           | -4.816***<br>(1.324) | -4.780***<br>(1.223) |                      |
| Il           | -2.963***<br>(0.856) | -2.614***<br>(0.707) |                      |
| Constant     | 78,159<br>(70,300)   | 90,391<br>(61,427)   | 153,740<br>(99,848)  |
| Observations | 42                   | 42                   | 42                   |
| R-squared    | 0.711                | 0.707                | 0.483<br>0.000       |

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

All the explanatory variables included in the model equation :

$$Oe = 78159 - 2.963il - 4.816pc - 460.9naq + 1.689de + 10.70eps + 0.740nii - 0.0439pat \dots \text{equation 4.1}$$

According to the model in eq.4.1 for each one point increase in net interest income (nii) and deposit exposure (de); operational efficiency increases by 1.689 and 0.74 respectively while a point decrease in net asset quality (naq) provision coverage (pc) and insider Loan (il) will lead to a unit change in operational efficiency (oe) by 460, 4.816 and 2.963 respectively.

The amount of variance in Oe explained by the model is 71.10% given the  $R^2 = 0.711$ . A test of hypothesis to determine the extent of statistical relationship between each of the five explanatory variables and Operational Efficiency (oe) indicates that four variables; deposit exposure(de) Net Interest Income (nii) Inside loan (il) and Provisional Coverage(pc) are statistically significant at 5% level of significance given both their t, and p-values at 2.41 (0.021), 7.06(0.000), -2.14(0.040)and -4.71(0.000).The overall p-value of the model  $prob > F = 0.000$  also attest to the reliability of the independent variables nii; de; naq pc and il to predict operational efficiency (oe).An implication that bank operational efficiency(oe)is massively influenced by credit risk management practices parameters such as insider loans(il),deposit exposure(de)provisional coverage(pc) and net interest income(nii).The effects of Profit after Tax(pat) Earnings per Share(eps)and Net Asset Quality (naq)are however marginal. The statistically significant but negative relationship between insider loan(il)and provisional coverage(pc)with operational efficiency and the influence of micro-economic(Bank Specific) variables are in line with Cebenoyan and Stahan(2004)and Huges et al(1997)

**Relationship Between Performance and credit Risk Management Parameters**

Four independent performance variables viz Profit After Tax (pat); Net Interest Income (nii) Earning Per Share (eps) and Operational efficiency (Oe) are randomly selected and regressed with Credit Risk Management (using Pc as surrogate).Findings are presented in Table 4.3.

**Table4.3:Pooled OLS Regression Coefficients**

| pc    | Coef.     | Std. Err. | t     | P> t  | [95% Conf. | Interval] |
|-------|-----------|-----------|-------|-------|------------|-----------|
| naq   | -90.3682  | 147.0836  | -0.61 | 0.543 | -388.9637  | 208.2273  |
| pat   | -.0024298 | .0072652  | -0.33 | 0.740 | -.0171789  | .0123194  |
| eps   | 1608.182  | 928.6705  | 1.73  | 0.092 | -277.1195  | 3493.483  |
| nii   | .0552048  | .0149471  | 3.69  | 0.001 | .0248606   | .0855489  |
| oe    | -.0751832 | .0164228  | -4.58 | 0.000 | -.1085233  | -.0418431 |
| il    | -.204706  | .1867149  | -1.10 | 0.280 | -.5837573  | .1743453  |
| _cons | 3267.216  | 11666.08  | 0.28  | 0.781 | -20416.19  | 26950.62  |

Number of obs = 42, F( 6, 35) = 4.34 ,Prob > F = 0.0023, R-squared = 0.4266

Adj R-squared = 0.3283 Root MSE = 7598.6

From the coefficient estimated in table 4.3 and with all the explanatory variables included; the prediction equation is presented in equation 4.2

$$Pc = 3267.216 - 0.204706il + 0.07518oe + 0.0552nii + 1608.18eps - 0.0024298pat \dots \text{equa 4.2}$$

According to the equation each point increase in operation efficiency (oe) earnings per share (eps) and net interest income lead to changes in provisional coverage (pc) by 0.0752,0.0552,and 1608 respectively while point decreases in insider loan and profit after tax cause changes in pc by -0.20470 and 0.002429 points .

Unlike the effect of the explanatory variable on the dependent variable in model 3.2; variance in provisional coverage are not as significantly explained by the regressands as the  $R^2 = 0.4266$  approximately 43% .

A two-tail test of hypothesis to determine whether each of the four explanatory variables are statistically significant in explaining changes in the dependent variables i.e. provisional coverage (pc) indicate that only two of the variables Net interest income (nii) and operational efficiency (oe) are significant at 1% given t and  $p > (t)$  3.69 (0.001) and -4.58 (0.000). The implication of the findings based on the OLS of the sampled banks in the study is that bank Credit Risk Management parameters are influenced to greater extent by Credit Risk Management parameters given  $R^2 = 0.711$  while the reversed is not the case for Credit Risk Management parameters which could not be said to have been significantly influenced by performance metric given  $R^2 = 0.4266$ .

**Relationship between Bank Financial Health and Credit Risk Management Efficiency**

An evaluation of the extent that credit Risk Management Efficiency of Nigerian banking system influence Financial Health adopts a CAEL- model consisting of Capitalization ,Asset Quality, Earnings and Liquidity as surrogate for financial health. These are related to Performing Loan as Ratio of Total Loan as surrogate for Credit Risk Management Efficiency. Finding from the study generate a Pearson correlation coefficient at 0.05 level of significance as presented in Table4.4

**Table4.4 Pearson correlation coefficient at 0.05 level of significance .**

| netdeposit | netdeposit               | npltl              | liquid~y          | earning           | capita~p          | totalpl           | Assqua |
|------------|--------------------------|--------------------|-------------------|-------------------|-------------------|-------------------|--------|
| netdeposit | 1.0000                   |                    |                   |                   |                   |                   |        |
| Npltl      | -0.5500*<br>0.0065       | 1.0000             |                   |                   |                   |                   |        |
| Liquidity  | -0.1148<br>0.6020        | -0.0996<br>0.6510  | 1.0000            |                   |                   |                   |        |
| earning    | <b>0.6387*</b><br>0.0010 | 0.6350*<br>0.0011  | 0.0814<br>0.7121  | 1.0000            |                   |                   |        |
| capitalemp | <b>0.5205*</b><br>0.0130 | -0.7778*<br>0.0000 | -0.2251<br>0.3139 | 0.7251*<br>0.0001 | 1.0000            |                   |        |
| Totalpl    | <b>0.6410*</b><br>0.0010 | 0.7981*<br>0.0000  | -0.2569<br>0.2368 | 0.7161*<br>0.0001 | 0.9691*<br>0.0000 | 1.0000            |        |
| assqua     | <b>0.5490*</b><br>0.0067 | 0.9986*<br>0.0000  | 0.0968<br>0.6604  | 0.6330*<br>0.0012 | 0.7749*<br>0.0000 | 0.7955*<br>0.0000 | 1.0000 |

Source: Outputs From STATA11 Based On Analysis Of Variables

Four variables namely Total Performing Loans(0.6410) capital employed (0.5205)Asset Quality(0.5490) and earning (0.6387) demonstrate high level of correlation with Net Deposit as surrogate for Credit Risk Management Practices. A pooled regression analysis of the study variables as presented in Table4.5 analysed model equation in4.3

**Table 4.5 Pooled OLS Regression Coefficients**

|              | (1)                      | (2)                   | (3)                  |
|--------------|--------------------------|-----------------------|----------------------|
| VARIABLES    | Model1                   | Model2                | Model3               |
| capitalemp   | 1.519***<br>(0.190)      | -0.606<br>(0.363)     |                      |
| assqua       | -25,713<br>(22,544)      | 3,283<br>(10,983)     | 1,128<br>(7,142)     |
| earning      | +0.239<br>(0.198)        | 0.360***<br>(0.114)   | 0.305**<br>(0.135)   |
| liquidity    | -19,234*<br>(10,349)     | -3,337<br>(8,054)     | 320.0<br>(5,356)     |
| npltl        | -43,164<br>(32,617)      | -431.9<br>(15,345)    | -943.4<br>(10,685)   |
| netdeposit   | 1.021**<br>(0.447)       |                       | -0.624**<br>(0.285)  |
| totalpl      |                          | 0.353<br>(0.240)      | 0.540***<br>(0.0890) |
| Constant     | 4.090e+06<br>(2.846e+06) | 25,223<br>(1.411e+06) | -10,782<br>(929,428) |
| Observations | 22                       | 22                    | 22                   |
| R-squared    | 0.969                    | 0.675                 | 0.964                |



Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Based on the regression result analysed equation 4.5 yielded the following model:

$$\text{Totalpl} = 4090215 - 43,164 \text{ npltl} - 19,234 \text{liquidity} + 0.239 \text{earning} - 25,713 \text{ assqua} + 1.519 \text{capitalemp} \dots \dots \dots \text{equation 4.3}$$

According to the model every unit increases in nonperforming loan(npltl), liquidity and asset quality(ass qua) lead to decreases banking system financial health while increases in earning, net deposit and capital employed have reversed effects. The overall effects of the model indicate  $R^2 = 0.9653$  (about 97%) while the relationship between three dependent variables and independent variables ( total pl, net deposit and earning) are significant at 1%, 5% and 10% levels of significant. According to the finding a significant association between highly geared Nigerian Banking System operations and Financial health in line with Abor(2005) and Velnampy and Nireshi(2002). This therefore explains the incidences of bankruptcies as risk derived from credit creation.

## V. Conclusion and Policy Implication of Findings

Bank annual data for the period 2004-2012 are analyzed to evaluate relationship between credit risk management practices, operational efficiency, performance and Capitalization. Empirical investigation of the extent of relationship between dependent and explanatory variables was also undertaken using regression analysis. Results of the pooled regression coefficients between operational efficiency and other parameters of performance are related to capitalization and Credit Risk Management parameters using Provisional coverage and Deposit Exposure (DE) among others as surrogates for credit risk management indicators.

Findings from the tests conducted indicate both positive and negative relationship between Credit Risk Management Practices, on the operational efficiency, elements of financial health with postulated null hypothesis rejected to indicate significance of the relationship between the variables. Regression result on the relationship between net interest incomes, profit after tax and Credit Risk Management (Provisional Coverage) using operational efficiency, earning per share, net asset quality among others was marginal.

Most of the findings however lead to a conclusion that causative influences exist between elements of Credit Risk Management; bank operational efficiency and financial health. The findings are also in line with Arif (2007) Yener et al (2007) Xiawung. Chen (2011) whose findings traced capitalization to performance metrics and similar to Velnampy and Nireshi (2012) where convergence was established between CRM Practices of banks as leveraged institutions and financial health in the study period. The implication of findings from the analysis buttresses the support for the significance of other micro-economic variables such as asset quality (assqua) capitalization and Performance parameters. This paper is of the view that regulatory authorities should demphasise on bail-out; spontaneous recapitalization and merger of banks as they are often designed as exit-attempts to correct incidences of financial ill-health in Nigeria. Rather a better approach that will streamline credit risk management policies in the system should be designed i.e. one that is focused on the management of bank level of insider loans; and such others Bank Specific variables such as provisional coverage, interest income, and net asset quality among other credit risk parameters. Furthermore, macroeconomic variables such as inflation and interest rate as influencing variables should also be effectively managed for the overall health of the entire economic and financial system. It is also recommended that government policies be designed towards correcting infrastructural decay, currently the bane of Nigerian Manufacturing Sector so as to reduce incidences of bank credit risk with ultimate effect on operational efficiency.

Perhaps more often than policies and infrastructural development is the need for personnel training and retraining in Nigeria banks. These will engender articulated research and development in new product and market, as well as ensure efficient management system leading to cost minimization effects.

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