



Analysis of Critical Determinants of Commercial Banks Profitability: Evidence from Nigeria

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Abstract

This study investigated the critical determinants of commercial bank profitability in Nigeria. The objective was to develop empirical models for predicting commercial bank profitability. The study adopted a combination of ex-post facto and survey research design in data collection and analysis, while quantitative and qualitative tools were employed in data analysis. The CAMELS performance basket provided the framework that guided the investigation. Two industry drivers (bank size and market share) and one macroeconomic driver (cyclic output growth rate of the economy) were included into the CAMELS basket. The quantitative approach made use of descriptive statistics and set of econometric tools in the analysis. The result of econometric analysis identified assets quality, liquidity and earnings as the significant determinants of commercial bank profitability in Nigeria. The result of the qualitative analysis based on expert opinion equally identified asset quality, earnings and liquidity as three top determinants of commercial bank profitability. This also validates the result of quantitative analysis. The study concludes that irrespective of whatever is the industry and macroeconomic state of the economy, commercial banks' ability to remain profitable, strictly dependent on the capacity of internal management to invest the banks resources into quality assets that affords the bank the opportunity to maintain optimal liquidity and generate earnings sufficient to offset all associated cost of doing business as well as create positive margin adequate to reward shareholders. Based on the above conclusion, the study recommends for increased capacity building (technical and managerial) of internal managers of commercial banks in Nigeria for enhanced strategic, tactical and operational planning and management of banks.

Keywords: Commercial banking; Profitability; Capital adequacy; Management efficiency; Earnings quality; Liquidity; Interest rate sensitivity.

1. Introduction

1.1. Background of Study

The commercial banking is a critical sector of all economies including Nigeria and plays important role of financial intermediation, which is critical to the growth and development of the economy (Weidmann, 2014). The profitability or otherwise of the banking sector is therefore critical index that signals the general state of the economy at a point in time (Bank for International Settlements, 2010).

The last decade experienced rapid increase in the level of commercial banking activities in Nigeria due to the successful implementation of the banking system consolidation initiated by the Central Bank of Nigeria (CBN) in 2004, that led to the reduction of the number of commercial banks in operation from 89 to 25 highly recapitalized commercial banks, each having a minimum capital base of N25.0bn (NDIC, 2014). This has fostered high competitiveness among Nigerian commercial banks to the extent that efficiency in service delivery is becoming critically important for profitability (Ejoh and Sackey, 2014; Kolapo *et al.*, 2012).

In present globalized competitive financial markets, the most critical challenge faced by managers of commercial banks is how to maximize profit within ethical limits without increasing the risk exposure of their institutions (Epure and Lafuente, 2012). In order for a commercial bank to operate profitably, it must create reasonable value for stakeholders as well as its customers with regards to products and services offered when compared with that offered by other competitors in the market place (Ebiringa, 2012). Unfortunately, most managers of commercial banking units seem not to have been properly focused in terms of the indispensability of operational efficiency in the realization of above objective (Business Monitor International, 2012). The high frequent cases of delinquency, illiquidity, technical insolvency and bankruptcy that results from unprofitable operations of some banks is a clear reflection of the above situation (Bank for International Settlements, 2010a).

Since the era of the post-consolidation, Nigeria has experienced some improved level of macroeconomic stability (BGL, 2010). For this reason commercial banks are now in a position to effectively play their primary role of financial intermediation (channeling funds from savers to borrowers for investment) in the economy. As financial

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intermediaries, commercial banks play an important role of providing financial infrastructure, products and services that induce economic growth and development (Cucinelli, 2013; Ebiringa and Duruibe, 2015).

The concept of profitability is of importance in all business undertakings as well as commercial banks as it is a basic index of measuring viability of all investment effort (Calomiris and Haber, 2014). The sustainability of the business of commercial banking depends largely on the development and deployment of competitive, cost effective savings mobilization and investment diversification strategies that ensure risk minimization and profitability (profit margin and returns on asset) and corporate growth (Ebiringa and Chigbu, 2012).

1.2. Statement of the Problem

Managing the business of commercial banking is associated with a number of conflicting objectives. Top among which is the conflict between being liquid and at the same time being profitable. For a commercial bank to make profit, it must mobilize liabilities, which are made up of the shareholders' funds and depositors' funds. Shareholders of course expect returns out of their investments, while customers equally expect interest payments on their deposits. It follows that for the returns expectations of shareholders and depositors to be met, commercial banks must invest the funds in income yielding assets that yields return high enough to off-set cost of operations as well as adequate margin of profit. This of course, means that commercial bank must invest in fixed assets (infrastructure for operations), as well as grant loans and advances (liquid assets). However, in view of the fact that depositors of a commercial bank are not expected to give notice of when they are to withdraw their deposits, commercial banks must maintain liquidity, high enough to meet daily withdrawal demand needs of depositors. The above of course limits the extent to which commercial banks can maximize their profitability prospects through credit creation. This explains the profitability-liquidity conflict faced by commercial banks, which can only be balance through effective asset-liability management. Also, problem of distress in commercial banking has often been traced to increasing credit risk exposure, which arises due to increased presence of non-performing loans in the credit portfolios of commercial banks, which by regulatory requirements must be provided for out of profits made. Inability of management of commercial banks to strike strategic balance between profit maximization and liquidity management objectives has remained a global concern to industry stakeholders (Basel Committee on Banking Supervision BCBS, 2001).

There seem to be some level of agreement among researchers that bank-specific factors are the most critical determinants of profitability. The above agreement may have crystalized into the general acceptance of CAMELS (capital adequacy, asset quality, management efficiency, earnings, liquidity and sensitivity to interest rate) as drivers of commercial banks performance globally. Though CAMELS have been found to significantly explain variations in performance of commercial banks in the developed economies, but this has not been the case in most less developed economies such as Nigeria, given its high volatility and instability.

Perhaps, it may be that the necessary conditions for the applicability of CAMELS are not sufficiently available in Nigeria or that the profitability model having CAMELS as predictors may have been over-parameterized. Equally it may imply that there is need to adapt the CAMELS profitability prediction model through the introduction of additional determinants such as size of a bank, market share and trends of general economic growth in the profitability modeling process as control variables as well as allowing all the explanatory variables to contest for significance leading to the isolation of fewer critical predictors of profitability, hence the need for this study.

1.3. Aim and Objectives of the Study

This study aims to investigate the critical determinants (bank specific, industry specific and macroeconomic specific) of commercial bank's profitability in Nigeria. The focus is on bank specific (CAMELS), industry specific (size and market share) and macroeconomic specific (cyclic growth rate of the economy). In order to achieve the above aim, the study set the following specific objectives for itself:

1. To assess the extent to which capital adequacy is a critical determinant of profitability of commercial banks in Nigeria.
2. To investigate the extent to which asset quality is a critical determinant of commercial banks profitability in Nigeria.
3. To analyze the significance level of management efficiency on profitability of commercial banks in Nigeria.
4. To evaluate the criticality of earnings as a determinant of profitability of commercial banks in Nigeria.
5. To analyze the significance of liquidity to profitability of commercial banks in Nigeria.
6. To assess the extent to which profitability of commercial banks in Nigeria is sensitivity to interest rate.
7. To evaluate the extent to which industry conditions affect individual commercial bank's profitability in Nigeria.
8. To investigate the significance of the effect of cyclic growth rate of Nigerian economy on profitability commercial banks.

1.4. Research Questions and Hypotheses

In order to achieve the aim and objectives of this study, a number of research questions and hypotheses are formulated to guide the investigation.

1.4.1. Research Questions

Finding answers to the following hypothetical questions are essential to the realization of the above stated aim and objectives of this study:

1. To what extent is capital adequacy a critical determinant of profitability of commercial banks in Nigeria?
2. To what extent is asset quality critical to the determination of profitability of commercial banks in Nigeria?
3. How significant is management efficiency level of a critical determinant of commercial bank profitability in Nigeria?
4. How significantly important is earnings to the profitability of commercial banks in Nigeria?
5. To what extent is liquidity, significant to the determination of profitability of commercial banks in Nigeria?
6. To what extent is interest rate sensitivity critical to commercial banks' profitability in Nigeria?
7. Does empirical evidence available in Nigeria suggest that banking industry conditions significantly affect commercial banks profitability?
8. Does empirical evidence exist in Nigeria, suggest that cyclic growth rate of the economy affect profitability of commercial banks significantly?

1.4.2. Research Hypotheses

- H_{01} : Capital adequacy is not a significant determinant of commercial bank profitability in Nigeria.
 H_{02} : Assets quality is not a significant determinant of commercial bank profitability in Nigeria.
 H_{03} : Management efficiency level is not a significant determinant of commercial bank profitability in Nigeria.
 H_{04} : Earnings of a commercial bank is not a significant determinant of profitability in Nigeria.
 H_{05} : Liquidity of a commercial bank is not a significant determinant of profitability in Nigeria.
 H_{06} : Interest rate sensitivity does not affect commercial banks' profitability in Nigeria significantly.
 H_{07} : Industry conditions do not affect commercial banks profitability in Nigeria significantly.
 H_{08} : Cyclic growth rate of the Nigeria economy does not affect profitability of commercial banks significantly.

1.5. Significance of the Study

The significance of this study stems from its integration of three categories of variables (bank-specific, industry-wide and macroeconomic factors) in the explanations of the dynamics of commercial banks' profitability in Nigeria. Since the banking industry play a major role in the economic growth and development process of all economies, it follows that a significant relationship is expected to exist between profitability of commercial banks and stability of the economy (Levine, 1998). This study is significant as it empirically evaluated most critical determinants of commercial banks profitability in Nigeria.

To this end, in specific terms, this study will be of benefit to the following groups of stakeholders:

1. It will enable policy makers and management body of the commercial banks to adjust the bank management system and mechanisms.
2. It will help the management to hedge against adverse factors, like uncertainty, and capitalize on other, like strong demand and cost effectiveness that improve performance.
3. Moreover, it will help investors to measure the performance of their portfolios and proceed with re-adjustments as required.
4. It will provide empirical literature evidence for researcher who are interested to conduct their research in this area.
5. It will provide a road map for managers and the shareholders to evaluate their bank performance in terms of profitability with respect to the internal and external determinants.
6. It will give direction for economic policy makers to measure the impact of the bank industry performance on the economy and its implications on the issues of policy.

1.6. Scope and Limitations

Thus, this study seeks to examine the criticality of bank-specific (CAMELS), industry-specific and macroeconomic factors as joint determinants of profitability of commercial banks in Nigeria. The study is limited in time scope to the period 1990 – 2015, which represents a landmark period of banking reforms in Nigeria. This period is characterized by the reintroduction of civil democracy in Nigeria in 1999, which created the atmosphere for real financial liberalization and globalization of Nigerian banking system.

This study is limited to only eight (8) commercial banks that have maintained their corporate identity and have complete financial records for the period 1990-2015. Financial statements data from Six (6) of the banks (United Bank for Africa Plc, Access Bank Plc, GT Bank Plc, First Bank Plc, Union Bank Plc and Wema Bank Plc) were pooled together to generate the group averages that were used for analysis and models development. Two other banks Diamond Bank Plc and First City Monument Bank (FCMB) Plc were used as holdout sample for testing the validity and the reliability of the models developed in this study.

2. Literature Review

2.1. Conceptual Framework

Profitability is very important in commercial banking because the confidence of depositors, creditors and shareholders' hinges on it (Abbasoglu *et al.*, 2007). No doubt commercial banks must always seek to increase the value of owners' wealth through making better profits than that generated by other competing investment alternatives, which are exposed to the same degree of risk (Abreu and Mendes, 2001). In order to achieve these profits, banks must employ the funds obtained from different sources and work effectively to reduce its operating expenses and costs (Athanasoglou *et al.*, 2008).

Profitability has been defined as the ability of the firm to achieve an increase in the value of invested assets (Berger, 1995); as it is the increase of cash generated over capital invested within a given period of time (Bissoondoyal-Bheenick and Treepongkaruna, 2011).

2.2. Theoretical Framework

There is no specific theory that provides a unifying framework for studying determinants of profitability in commercial banks (Kyj and Isik, 2008). Hence, this study relied on some theories which are nearer in expressing views on market structure, behaviours and drivers of performance in commercial banking industry.

2.2.1. Market Structure Theories and Bank Profitability

The traditional theory of the firm assumes that a firm's central objective is simply to maximize profits. This has led to situations where firms are faced with much more complex decisions of sustainable profit (Devinaga, 2010). To this extent, market structure theories have been preferred by previous researchers rather than the traditional theories to analyze the determinants of profitability of firms (Davydenko, 2011; Duca and McLaughlin, 1990; Goddard *et al.*, 2004b).

2.2.2. Structure Conduct Performance (SCP) Hypothesis

In formulation of theoretical framework for studying determinants of commercial banks profitability, market structure conduct performance hypothesis, which emphasizes industry –specific determinants, provide useful paradigms and constructs (Molyneux and Thornton, 1992). Market structure conduct and performance (SCP) framework derived from the neo-classical analysis of markets, was first formalized by Mason in 1939 as a method of analyzing markets and firms (Olson and Zoubi, 2011). The SCP was the central opinion of the Harvard Business school's thought and was popularized during 1940-60 with its empirical work involving the identification of correlations between industry structure and profitability (Ramadan *et al.*, 2011). Most early research explanation for the relationship between the market concentration and profitability based on the structure-conduct performance (SCP) hypothesis focused on the interpretation of a positive relationship between concentration and profitability (Goddard *et al.*, 2004a).

2.2.3. The Efficient Structure Hypothesis (ESH)

The second formulation of theoretical framework for studying determinants of commercial banks profitability is the efficient structure hypothesis. According to the 'efficiency' hypothesis, a positive concentration– profitability relationship may reflect a positive relationship between size and efficiency. It states that efficient banks in the market lead to increase in the firms' size and market share due to the aggressive behaviour. This behaviour of the efficient banks allowed such firms to concentrate and earn higher profits with further enhancing their market share. Those firms can maximize profits either by maintaining the present level of product price or service charge and firms' size or by reducing the service charge and expanding the firm size (Smirlock, 1985).

Over the years, other theories have been formulated in managing profitability of commercial banks. They include liquidity asset theory, shiftability theory, anticipated income theory, commercial loan theory and liabilities management theory.

2.3. Empirical Review

A number of studies have examined the determinants of banks' profitability in many countries around the world. Most of the studies consider internal factors (i.e., banks' specific) and external factors (i.e., industry-specific and economic environment) and examine either a particular country or a number of countries.

Many empirical literatures conducted on banks profit determinants belong to developed countries economies. Mainly focused on the U.S. banking system (Berger, 1995; Ramadan *et al.*, 2011; Saira *et al.*, 2011) and the banking systems in the western developed countries for instance, European countries (Staikouras and Wood, 2004), south-east Europe (Athanasoglou *et al.*, 2008), Korea Sufian and Habibullah (2009) and Greece Kosmidou *et al.* (2004), Athanasoglou *et al.* (2008); Kosmidou *et al.* (2008). By contrast few studies have looked bank performance in developing economies (Flamini and Schumacher, 2009) in SSA countries, Kolapo *et al.* (2012) in Nigeria). Both studies usually expressed bank profitability, as a function of internal and external determinants.

Davydenko (2011), using accounting decompositions, as well as panel regressions, studied the determinants of bank net interest rate margins in 10 SSA countries. He found that credit risk and operating inefficiencies (which signal market power) explain most of the variation in net interest margins across regions. On the other hand, macroeconomic risk was found to have only limited effects.

Demirguc-Kunt and Huizinga (1999), used bank level data from 80 countries for the period 1988–1995 to analyze how bank characteristics and the overall banking environment affect both interest rate margins and bank returns. Their study considered a decomposition of the income effects of a number of determinants that affect depositor and borrower behaviour, as opposed to that of shareholders. The results they obtained do suggest that macroeconomic and regulatory conditions have a pronounced impact on margins and profitability of banks.

Devinaga (2010), while studying the determinants of bank interest margins in Malaysia using bank and country level data, found that spreads are large because of relatively high interest rates (a proxy for high macroeconomic risk, including from inflation), less efficient banks, and higher reserve requirements.

3. Research Methodology

3.1. Bank-Specific Determinants of Profitability: The CAMELS Index

Table-3.1. Grouping of determinants of Bank profitability

Variables	Notation
Profitability measures: Profit margin Return on Assets	PAT ROA
Bank-specific determinants of Profitability: Capital adequacy Assets quality Management Efficiency Earnings Liquidity Sensitivity to interest rate	C A M E L S
Industry determinants of Profitability: Size Market power/share	Bs Mp
Macroeconomic specific determinant of Profitability: Cyclical output growth rate	G

Source: Adapted from Basel Committee on Banking Supervision (2013)

3.2. Population and Sample Size

For this study, the target population is commercial banks operating in Nigeria. Usually, it is very difficult to study every object or element of the study population. A small part or fraction of the population is selected and studied and the results of the outcomes are generalized to the entire population, it is not possible to study all commercial banks operating in Nigeria, therefore, a sample is selected to serve as a representative study in Nigeria.

3.3. Estimation model and Analysis Procedure

The method adopted for analysis of collected data includes formulation of estimation model, and the econometric procedures.

3.3.1. Estimation Model

We use annual selected commercial banks'-specific, Nigerian banking industry-specific and Nigerian macroeconomic data for the period 1990 –2015 for our analysis. Balance sheet and income statement information were obtained from the respective banks' database, while the CBN statistical bulletin and NDIC annual reports were used to collect the industry specific variables. The CBN statistical bulletin, IMF's *International Financial Statistics* (IFS) and Global Data Source dataset (GDS), along with the World Bank database for the macroeconomic variables.

The general estimation model used is of the linear form:

$$PAT = a_0 + b_1C + b_2A + b_3M + b_4E + b_5L + b_6S + b_7Bs + b_8Mp + b_9G + e_0 \dots \quad 3.1$$

$$ROA = a_0 + b_1C + b_2A + b_3M + b_4E + b_5L + b_6S + b_7Bs + b_8Mp + b_9G + e_0 \dots \quad 3.2$$

$$A\text{-priori expectation:} \quad + \quad + \quad + \quad + \quad - \quad + \quad + \quad + \quad +$$

Where:

PAT = Profit after tax of Commercial banks

ROA = Return on Assets of Commercial banks

C= Capital adequacy ratio

A = Assets quality ratio

M = Management efficiency ratio

E = Earnings

S = Sensitivity to interest rate

Bs = Bank size

Mp = Market power/share

G = Cyclic output rate of the economy

a_0 = Constant

$b_1 \dots b_9$ = Coefficients to be estimated

4. Results and Discussions

This section presents results and discussion in two stages. First, each sampled bank is analyzed individually and secondly, data on the entire sampled are pooled together, analyzed and discussed.

4.1. Analysis of Effects of Determinants of Profitability on Each of the Sampled Banks

Descriptive statistics and stepwise regression analysis were employed in analysis and discussion of the effects of determinants of profitability on the return on asset (ROA) of each of the sampled banks.

4.1.1. UBA Plc

Step 1: $ROA = 0.004 + 0.115C$... 4.1

Step 2: $ROA = -0.024 + 0.242C + 0.001S$... 4.2

The result shows that at 5% level of significance, C (Capital adequacy) and S (interest rate sensitivity) are the two critical determinants of profitability of UBA Plc, given their respective t_{cal} values of 3.451 and 2.519. Equally, the corresponding F_{cal} of 4.554 and 5.958 for equations 4.1 and 4.2 confirms that they are all significant at 5% level. The adj. R^2 values of 0.124 and 0.284 for equations 4.1 and 4.2 imply that C(Capital adequacy) explains 12.4% of UBA Plc profitability; this is further increased to 28.4% with introduction of S (interest rate sensitivity) as in equation 4.2.

4.1.2. Access Bank Plc

Step 1: $ROA = 0.028 - 0.099C$... 4.3

The result shows that at 5% level of significance, C (Capital adequacy) is the only critical determinant of profitability for Access Bank Plc, given its t_{cal} value of -2.927. Also the corresponding F_{cal} of 8.567 for equations 4.3 confirms the significance of the relationship equation. The adj. R^2 value of 0.265 implies that C (Capital adequacy) only explains 26.5% of Access bank Plc profitability.

4.1.3. GTBank Plc

Step 1: $ROA = 0.074 - 0.03A$... 4.4

Step 2: $ROA = 0.082 - 2.258A + 2.197L$... 4.5

The result shows that at 5% level of significance, A (Asset quality) and L (liquidity) are the two critical determinants of profitability of GTBank Plc, given their respective t_{cal} value of 3.451 and 2.519 respectively. Also the corresponding F_{cal} of 9.063 and 7.939 confirms that equations 4.4 and 4.5 are significant at 5% level. The adj. R^2 values of 0.268 and 0.387 imply that A (Asset quality) only explains 26.8% of GTBank Plc profitability, which is further increased to 38.7% with introduction of L (liquidity).

4.1.4. First Bank Plc

Step 1: $ROA = -0.074 - 0.004M$... 4.6

Step 2: $ROA = -0.12 + 0.007M - 0.108Mp$... 4.7

Table 4.4 show that at 5% level of significance, M (Managerial efficiency) and Mp (market power) are the two critical determinants of profitability of First Bank Plc, given their respective t_{cal} value of 3.835 and -2.729 respectively. Also the corresponding F_{cal} of 5.730 and 7.393 confirms that equations 4.6 and 4.7 are significant at 5% level. The adj. R^2 values of 0.165 and 0.348 implies that M (Managerial efficiency) only explains 16.5% of First Bank Plc profitability, which is further increased to 34.8% with introduction of Mp (market power).

4.1.5. Union Bank Plc

Step 1: $ROA = 0.03 - 0.192C$... 4.8

Step 2: $ROA = -0.003 - 0.349C + 0.149A$... 4.9

The result show that at 5% level of significance, C (Capital adequacy) and A (Asset quality) are the two critical determinants of profitability of Union Bank Plc, given their respective t_{cal} value of -3.778 and 2.567 respectively. Also the corresponding F_{cal} of 6.238 and 7.141 confirms that equations 4.8 and 4.9 are significant at 5% level. The adj. R^2 values of 0.173 and 0.329 implies that C (capital adequacy) only explains 17.3% of Union Bank Plc profitability, which is further increased to 32.9% with introduction of A (Asset quality).

4.1.6. Wema Bank Plc.

Step 1: $ROA = -0.021 + 0.357C$... 4.10

Table 4.6 shows that at 5% level of significance, C (Capital adequacy) is the only critical determinant of profitability for Wema Bank Plc, given its t_{cal} value of 4.058. Also the corresponding F_{cal} of 16.467 for equations 4.10 confirms the significance of the relationship equation. The adj. R^2 value of 0.382 implies that C (Capital adequacy) only, explains 38.2% of Wema Bank Plc profitability for the period 1990-2015.

Table-4.1. Summary of profitability determinants for sampled banks

Determinants	UBA (Equ. 4.1)	Access (Equ. 4.3)	GTBank (Equ. 4.5)	FBN (Equ. 4.7)	Union (Equ.4.9)	Wema (Equ.4.10)
Capital adequacy (C)	√	√			√	√
Assets quality (A)			√		√	
Management efficiency (M)				√		
Earnings quality (E)						
Liquidity (L)			√			
Interest rate sensitivity (S)	√					
Bank size (Bs)						
Market power/share (Mp)				√		
Growth rate of economy						

Table 4.1 shows that of the eight (8) commercial banks' profitability determinants identified as having been used by previous researchers, a maximum of two (2) determinants were found as being significant and hence critical for four banks (UBA Plc, GTBank, First bank and Union bank). On the other hand, one (1) determinant (capital adequacy) was found to be a critical profitability determinant in the case of two banks (Access bank and Wema bank).

Table 4.1 equally shows that there is no agreement as to what constitutes critical determinants of profitability across the six (6) sampled banks given the mixed results obtained for individual banks. However, capital adequacy (C) seems most dominant as it was found to be a critical determinant in four (4) out of the six sampled banks. The above inconsistent results provide justification for further investigation using the pooled data of the six banks used as sample in this study, in order to have a more industry perspective of what constitutes critical determinants of profitability of commercial banks in Nigeria.

Table-4.2. Ordinary Least Square (OLS) Analysis of PAT using CAMELS index

Dependent Variable: PAT				
Sample: 1990 2015				
Included observations: 26				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	6.59E+09	5.65E+10	0.116485	0.9085
C	7.25E+10	1.12E+11	0.646501	0.5257
A	-1.62E+12	1.87E+12	-0.867602	0.3964
M	-1.88E+08	2.71E+09	-0.069265	0.9455
E	0.404099	0.081181	4.977761	0.0001
L	1.60E+12	1.87E+12	0.858003	0.4016
S	-1.02E+08	5.93E+08	-0.171638	0.8655
R-squared	0.793368	Mean dependent var		1.08E+10
Adjusted R-squared	0.728116	S.D. dependent var		1.66E+10
S.E. of regression	8.65E+09	Akaike info criterion		48.82396
Sum squared resid	1.42E+21	Schwarz criterion		49.16268
Log likelihood	-627.7115	Hannan-Quinn criter.		48.92150
F-statistic	12.15847	Durbin-Watson stat		2.281276
Prob(F-statistic)	0.000012			

$$\text{PAT} = 6.59\text{e}+09 + 7.25\text{e}+10*\text{C} - 1.62\text{e}+12*\text{A} - 1.88\text{e}+08*\text{M} + 0.404099*\text{E} + 1.60\text{e}+12*\text{L} - 1.02\text{e}+08*\text{S}$$

4.12

Table 4.2 and equation 4.12 show that a significant short run relationship exist in the association between PAT and CAMELS index (F- statistics = 12.16; p-value = 0.000012 < 0.05). 72.81% of annual variation in PAT is explained by the joint variations in CAMELS. Testing the specific contributions of each of the explanatory variables, shows that only E (earnings) is significant at 0.05level (t-statistic = 4.977761; p-value = 0.0001 < 0.05).

Table-4.3. Summary of OLS Analysis of PAT on CAMELS plus Bs Mp and G

Table 4b: Summary of OLS Analysis of PAT on CAMELS plus Bs, Mp and G							Adj. R ²	F	Sig.
Variables		Unstandardized Coefficients		Standardized Coefficients	t	Sig.			
		B	Std. Error	Beta					
	(Constant)	40381757040.17	111653282181.55		.362	.722	.718	8.951	8.951
	C	106703919760.48	123048337875.98	.168	.867	.398			
	A	-16109764206.802	7634481689.88	-.314	-2.110	.050			
	M	-11914647318.356	8641576438.08	-1.250	-1.379	.186			
	E	.349	.125	.800	2.785	.013			
	S	-122172001.636	673684205.42	-.030	-.181	.858			
	Bs	9760386353.449	7214922789.26	1.173	1.353	.194			
	Mp	-86824608491.775	110406890519.55	-.158	-.786	.442			
	G	122146021.474	332191426.45	.046	.368	.718			
a. Dependent Variable: PAT									
b. Predictors in the Model: (Constant), G, E, MP, A, S, Ca, Bs, M									
Excluded Variables									
Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics			
						Tolerance			
L		30.731 ^b	.814	.427	.200	8.086E-006			

Table 4.3 shows that the introduction of Bs (bank size), Mp (market power/share) and G (state of the economy proxy by GDP growth rate) into equation 4.12 led to the level of explanation of variations in PAT decreasing from 72.81% to 71.80%; and F value from 12.16(p-value = 0.000012) to 8.951(p-value = 8.951). The study concludes that CAMELS as a globally acceptable index for commercial bank performance prediction remains significant for

predicting profit after tax (PAT) of commercial banks in Nigeria, as shown in equation 4.12. However, in order to adapt the CAMELS index for more accurate prediction of commercial banks profitability in Nigeria, the stepwise OLS regression was carried as shown on table 4.21.

Table-4.4. Summary of stepwise OLS Regression

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Adj R ²	F	Sig
		B	Std. Error	Beta					
1	(Constant)	-344566668.50	2492004529.25		-.138	.891	.656	48.684	.000 ^b
	E	.357	.051	.818	6.977	.000			
2	(Constant)	6855741668.55	3029903523.70		2.263	.033	.756	39.760	.000 ^c
	E	.436	.049	1.000	8.841	.000			
	A	-19128482950.79	5806720709.31	-.373	-3.294	.003			
a. Dependent Variable: PAT									
b. Predictors: (Constant), E									
c. Predictors: (Constant), E, A									

Final step model: $PAT = 6855741668.55 + 0.436E - 19128482950.79A \dots 4.13$

Table 4.4 and equation 4.13 show that two components of the CAMELS index, E (earnings) and A (asset quality) jointly predicts 75.6% of the variations in profit after tax (PAT) of commercial banks in Nigeria. Also the F value of 39.760 ($p: 0.0001 < 0.05$) imply that equation 4.13 is significant. The conclusion of the study is though CAMELS is globally accepted for predicting performance (profitability) but in Nigeria, asset quality (A) and earnings (E) are the most significant for better prediction of profit after tax (PAT) of commercial banks.

Table-4.5. Ordinary Least Square Analysis of ROA on CAMELS index

Dependent Variable: ROA				
Method: Least Squares				
Sample: 1990 2015				
Included observations: 26				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.001529	0.097563	-0.015668	0.9877
C	0.179061	0.193614	0.924836	0.3666
A	0.380282	3.226258	0.117871	0.9074
M	0.000485	0.004679	0.103621	0.9186
E	-1.06E-13	1.40E-13	-0.759965	0.4566
L	-0.396117	3.224002	-0.122865	0.9035
S	9.32E-05	0.001023	0.091140	0.9283
R-squared	0.251411	Mean dependent var		0.016793
Adjusted R-squared	0.015014	S.D. dependent var		0.015037
S.E. of regression	0.014923	Akaike info criterion		-5.346962
Sum squared resid	0.004231	Schwarz criterion		-5.008244
Log likelihood	76.51051	Hannan-Quinn criter.		-5.249423
F-statistic	1.063514	Durbin-Watson stat		2.535084
Prob(F-statistic)	0.417781			

Estimation Equation:

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$$ROA = C(1) + C(2)*Ca + C(3)*A + C(4)*M + C(5)*E + C(6)*L + C(7)*S$$

Substituted Coefficients:

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$$ROA = -0.002 + 0.18*C + 0.38*A + 0.0005*M - 1.06e-13*E - 0.40*L + 9.32e-05*S \dots 4.15$$

Table 4.5 and equation 4.15 show that a significant short run relationship does not exist in the association between ROA and the CAMELS indices (F- statistics = 1.063514; p -value = 0.417781 > 0.05). 1.50% of annual variation in ROA is explained by the joint variations in CAMELS. Testing the specific contributions of each of the explanatory variables, shows that none is significant at 0.05level (p -values > 0.05).

Table-4.6. OLS Analysis of ROA on CAMELS index plus Bs, Mp and G

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Adj R ²	F	Sig.
		B	Std. Error	Beta					
	(Constant)	.261	.180		1.448	.166	.103	1.360	.281 ^b
	Ca	.296	.199	.514	1.489	.155			
	A	-.014	.012	-.291	-1.097	.288			
	M	.004	.014	.426	.264	.795			
	E	2.735E-013	.000	.439	.856	.404			
	S	-.001	.001	-.218	-.743	.468			
	Bs	-.012	.012	-1.623	-1.050	.308			
	MP	-.199	.178	-.401	-1.115	.280			
	G	.000	.001	.162	.720	.481			
Excluded Variables ^a									
Model		Beta In	t	Sig.	Partial Correlation		Collinearity Statistics		
							Tolerance		
L		5.209 ^b	.076	.940	.019		8.086E-006		
a. Dependent Variable: ROA									
b. Predictors in the Model: (Constant), G, E, MP, A, S, Ca, Bs, M									

Table 4.6 shows that the introduction of Bs (bank size), Mp (market power/share) and G (state of the economy proxy by GDP growth rate) into equation 4.15 led to the level of explanation of variations in PAT increasing from 1.50% to 10.3%; and F value from 1.063514 (p-value = 0.417781 > 0.05) to 1.36 (p-value = .281 > 0.05).

Testing the specific contributions of each of the explanatory variables, shows that none is significant at 0.05 level (p-values > 0.05). The study concludes that CAMELS as a globally acceptable index for commercial bank performance prediction remains significant for predicting return on assets (ROA) of commercial banks in Nigeria, as shown in equation 4.15. However, in order to adapt the CAMELS index for more accurate prediction of commercial banks return on assets in Nigeria, the stepwise OLS regression was carried as shown on table 4.28.

4.4. Test of Hypotheses and Answers to Research Questions

The hypotheses earlier stated by this study are tested for validity using equations 4.13 and 4.16, while the result of the hypotheses test were used to answer the research questions.

4.4.1. Test of Hypotheses

Equation 4.13 identified earnings (E) and asset quality (A) as the only significant predictors of PAT of the sampled commercial banks, while equation 4.16 identified liquidity (L) as the only predictor of ROA. Table 4.24 summarizes the model statistics.

Table-4.7. Summary of Equations 4.13 and 4.16 Statistics

Hypotheses	PAT (Equation 4.13)			ROA (Equation 4.16)		
	t _{cal}	p-value	Decision	t _{cal}	p-value	Decision
H ₀₁ : Capital adequacy is not a significant determinant of commercial bank profitability in Nigeria.	Np	Np	Accept	Np	Np	Accept
H ₀₂ : Assets quality is not a significant determinant of commercial bank profitability in Nigeria.	-3.294	0.003	Reject	Np	Np	Accept
H ₀₃ : Management efficiency level is not a significant determinant of commercial bank profitability in Nigeria.	Np	Np	Accept	Np	Np	Accept
H ₀₄ : Earnings of a commercial bank is not a significant determinant its profitability in Nigeria.	8.841	0.00001	Reject	Np	Np	Accept
H ₀₅ : Liquidity of a commercial bank is not a significant determinant of its profitability in Nigeria.	Np	Np	Accept	-2.239	0.035	Reject
H ₀₆ : Interest rate sensitivity does not affect commercial banks' profitability in Nigeria significantly.	Np	Np	Accept	Np	Np	Accept
H ₀₇ : Industry conditions do not affect commercial banks profitability significantly in Nigeria.	Np	Np	Accept	Np	Np	Accept
H ₀₈ : Cyclic growth rate of the Nigeria economy does not affect profitability of	Np	Np	Accept	Np	Np	Accept

commercial banks significantly.						
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np= not present in model

Table 4.7 shows that of the eight stated hypotheses, only H_{02} and H_{04} were rejected as it relates to PAT; while H_{05} was the only one rejected for ROA.

4.4.2. Answers to Research Questions

Based on the decisions of test of hypotheses as summarized on Table 4.7, the following answers to the earlier stated research questions of this study are provided as it relates to the Nigerian commercial banking business environment:

1. Capital adequacy of commercial banks is a critical determinant of profitability.
1. Asset quality of commercial banks is a critical determinant of profitability.
2. Management efficiency of commercial banks is not a critical determinant of profitability.
3. Earnings quality is a critical determinant of commercial banks profitability.
4. Liquidity management is a critical determinant of commercial banks profitability.
5. Interest rate sensitivity is not a critical determinant of commercial bank profitability.
6. Market power is not a critical determinant of commercial banks profitability.
7. Cyclic output growth rate of the economy is not a critical determinant of commercial banks profitability.

4.5. Discussion of Results

This study found short run prediction models (equation 4.13 and 4.16) for predicting profitability of commercial banks in Nigeria. However, this study did not find significant long run relationships between the profitability indicators of commercial banks and selected profitability determinants (capital adequacy, asset quality, management efficiency, earnings, liquidity, sensitivity to interest rate, bank size, market share, and cyclic output growth rate of the economy). Also this study found that significant un-directional causality relations running from $E \rightarrow PAT$ and $PAT \rightarrow ROA$, while significant bi-directional causality exist $A \leftrightarrow ROA$ as well as $L \leftrightarrow ROA$.

The result obtained by this study that identified asset quality (A) and earnings (E) and liquidity (L) as significant determinant of profitability of commercial banks in Nigeria (equation 4.13 and 4.16) is in agreement with the findings of [Flamini and Schumacher \(2009\)](#), which investigated determinants of commercial bank profitability in Sub-Saharan Africa; [Cucinelli \(2013\)](#) on Euro banks; [Sivaperumaan \(2013\)](#) on Sri Lankan private commercial banks as well as that of [Davydenko \(2010\)](#) for commercial banks in Ukraine.

This study did not identify market power/share, sensitivity to interest rate, size of bank and cyclic output growth rate as significant determinants of profitability of commercial banks in Nigeria (equation 4.13 and 4.16), which is in agreement with the findings of [Abbasoglu et al. \(2007\)](#).

On the other hand, the result of the study that found assets quality and earnings as significant positive predictors of commercial bank profitability and not capital adequacy and management efficiency, suggest that efficiency of commercial banks management in the use of capital resources translates to existence of quality assets, which of course enhances the earnings profile of the bank.

5. Conclusion

Based on the findings of this study, the following conclusions are made:

That CAMELS as a globally accepted index of assessing performance of commercial banks can validly be applied in Nigeria.

Profitable management of commercial banks remains a sole responsibility of internal management (top, middle and lower levels managers) of individual banks.

Profitability is a short run objective in commercial banking business. Managers of commercial banks in Nigeria must focus attention on developing short term plans, targeting, creating and maintaining quality assets portfolio, optimum liquidity level and sustainable profit after tax.

Again, the bank must as a matter of fact be able to maintain adequate liquidity, to absorb market shocks. The implication being that increased liquidity by the nature of commercial banking business has the likelihood of limiting the ability of the bank to increase her loan portfolio.

The study concludes that irrespective of how unfavourable the macroeconomic conditions and stance of the regulatory authorities are, commercial banks can still remain profitable if internal management team are able to effectively and efficiently create quality assets, maintain optimum liquidity and maintain earning streams that are viable and stable.

Recommendations

Based on the conclusions arrived at by this study, the following recommendations are made as a way of ensuring that the business of commercial banks remains profitable and viable:

All stakeholders, especially the government and its agencies must ensure that proper policies (fiscal and monetary) are formulated and adequately implemented to ensure that enabling environment is created for business opportunities and enterprise to thrive.

The above recommendation can be implemented through effective fiscal and monetary policy formulation and implementation that targets critical infrastructure (motor able roads, electricity, and security) provision to the economy.

Management of banks must equally continuously monitor the adequacy of the bank's capital and as a matter of fact to ensure that their level of risk exposure through non-performing credits (loans and advances) is kept to the barest minimum. This can be achieved through effective credit administration.

Contribution to Knowledge

This study has been able to contribute to the existing body of knowledge given that it sufficiently addressed the gaps noticed in previous studies

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