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DETERMINANTS OF CAPITAL ADEQUACY IN LISTED DEPOSIT MONEY BANKS IN NIGERIA

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ABSTRACT

This study aimed at investigating the determinants of capital adequacy in Listed Deposit Money Banks in Nigeria from 2012-2019. The listed DMBs are 15 as at 31st December, 2019, out of which 12 banks were selected based on the availability of data. Specifically, the study seeks to identify the effect of Liquidity,loan loss provision, Return on Asset and firm size on the capital adequacy of listed deposit money banks in Nigeria. The study adopts Correlational and expost facto Designs and data were analyzed with the aid of multiple regression technique using 96 firm-year panelled observations. Data were extracted from the audited annual reports and accounts of the selected banks. The study reveals that liquidity and loan loss provision are positive and have significant impact on the capital adequacy of listed deposit money banks at 1% and 1% level of significance respectively. The study also found out that return on asset and firm size have no significant impact on the capital adequacy of listed deposit money banks. The study concludes that liquidity and loan loss provision constitute the determinants of capital adequacy of listed deposit money banks. Therefore, it is recommended among others that these variables should be considered in determining the capital adequacy of deposit money banks in Nigeria.

Keywords: *Capital Adequacy, Loan loss provision, Liquidity, Deposit Money Banks in Nigeria*

1. INTRODUCTION

Banks occupy an important position in the financial sector and their activities are subject to regulation and supervision for the purpose of preserving financial stability. The banking sector of an economy stimulates the economic competence by mobilizing savings to investment channels. It serves as a bridge between savers and borrowers and to execute all tasks concerned with the profitable and secure channeling of funds

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(Nyor & Adejuwon, 2013). Beyond the intermediation function, the financial performance of banks has significant implications for economic growth of an economy as sound financial performance rewards the investors and other stakeholders for their investment and encourages additional investment (Boloupremo & Ogege, 2018). On the other hand, poor banking performance may lead to banks' failure and collapse which could negatively impact on the economic growth of the economy. Banks serve as means of transmitting monetary policy of the federal government at the macroeconomic level. At micro economic level, banks are major source of financing for businesses and individuals. Banks therefore facilitate spending and investment that fuel growth in the economy. Banks are expected to have adequate amount of capital in order to support their business expansion; to serve as a buffer to prevent any unexpected loss that banks might face and also to absorb losses arising from various risks that they face. Banks are also required to have a buffer according to the provisions of the minimum capital requirement set by the regulatory authorities. Bank regulators everywhere in the world are concerned with the safety of depositors' funds. It is for this reason the capital adequacy becomes relevant and important.

Capital adequacy refers to the amount of equity capital and other securities which a bank holds as reserves against risky assets as a hedge against the probability of bank failure (Greuning & Sonja, 2003). It also refers to the extent to which the assets of a bank exceed its liabilities, and is thus a measure of the ability of the bank to withstand a financial loss. Capital adequacy in banking business gives protection against sudden financial losses (Al-Sabbagh, 2004). According to the Capital Adequacy Standard set by Bank for International Settlements (BIS)(2010), banks must have a primary capital base equal at least to eight percent of their assets.

The banking industry has been subjected to extensive regulation and supervision for many years. The Basel Committee on Banking Supervision is a central organ that develops and standardizes banking regulation. The first standardized framework on banking regulation; Basel I, was released in 1988 and the centerpiece of the document was capital adequacy within the banking industry. In 2004, the framework was superseded by the Basel II Accord. The Basel II framework was supposed to be more risk sensitive and it encouraged banks to use internal models to determine capital levels. However, the financial crisis of 2008 demonstrated that the Basel II Accords were not robust enough to assess the risks that banks faced. As a response to the crisis, the Basel Committee released the Basel III framework in December 2010. Basel III framework was as a result of the large number of bank failures in recent years and previous frameworks (Basel I and II) were unable to assess the risks that Banks face. The purpose of the Basel III Accord is to increase the resilience of the financial system

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and to create a competitive level playing field worldwide. Basel III is an extension of the previous frameworks. However, the capital requirements are more strict and the Basel Committee has also added other liquidity requirements in the framework.

In general, the Basel documents are set of rules for banking regulation and supervision. In particular, they set the global capital adequacy standards. That means, they prescribe globally accepted standards for improving banks' ability to absorb economic and financial shocks, improving risk management practices in banks, strengthening transparency and disclosure requirements for banks and have been adopted by more than 140 countries of the world. They are international agreements that describe the risk sensitive framework for the assessment of regulatory capital and require banks to take adequate precaution.

In Nigeria, the capital base of banks was raised up by the CBN from N2 billion to N25 billion minimum with effect from 31st December, 2005. The upward review of the capital base has resulted in bigger, stronger and more resilient financial institutions (Olalekan & Adeyinka, 2013). According to Nwokoji (2013), the average Capital Adequacy Ratio of the banks in the industry was consistently above the stipulated minimum of 10.0 per cent in the first half of 2012. The industry average CAR stood at 17.7 per cent, compared with 17.9 and 5.0 per cent at the end of December 2011 and the corresponding period of 2011 respectively(Olalekan & Adeyinka, 2013).

The adoption of Basel capital accord in Nigeria rendered most of the studies in this area outdated because most of the studies carried out in this area did not adopt a risk based approach in calculating their capital adequacy ratio as suggested by the Basel committee on banking supervision. Thus, the aim of this study is to fill the identified gap in the literature by adopting a risk based approach using multiple regression models to examine the bank specific determinants of Capital adequacy of Listed Deposit Money Banks in Nigeria.

2. LITERATURE REVIEW

Capital adequacy ratio is an important issue that has drawn the attention of researchers and academics. According to Al-Sabbagh (2004), capital adequacy is an indicator of risk exposure of banks (that is how banks are exposed to risks). Risk in the banking industry is classified into various types including credit risk, market risk, interest rate risk and exchange rate risk that are considered in the CAR calculation. According to Abdul-Karim (1996), regulatory authorities use capital adequacy ratio to evaluate the soundness of banks and other depository institutions because, to them, capital serves as a cushion to absorb losses. Capital adequacy ratio is the ratio which measures the

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ability of a bank in terms of meeting liabilities and risks such as credit risk, market risk, operational risk, and exchange rate risks. It is a measure of how much capital is used to support the banks' risk assets. It represents a total amount of funds that a bank should keep and plan to maintain in order to conduct its business in a prudent and orderly manner (Kishore, 2007). It is the minimum amount that is necessary to boost confidence in banks and effectively fulfill the principal task of preventing bank failure by absorbing losses without being strained into costly liquidation and enable banks to take advantage of profitable growth opportunities (Akintoye & Somoye, 2008).

A number of researchers have provided insights into the capital adequacy. A study conducted by Al-Sabbagh (2004) investigated the impact of 9 bank specific variables affecting CAR of Jodanian Banks by studying the financial statement of 17 sampled banks in two periods. That is 1985-1994 which represent the period before applying the Basel Committee Standards for CAR in Jordanian Banks while the second period covers 1995-2001 which is the period after applying the Basel Committee Standards for CAR. Using correlation coefficient and regression analysis, the study found negative relation between CAR and bank size while CAR was positively affected by ROA, loan to asset ratio, and equity ratio. CAR has a positive relation to risky asset ratio in the period 1985-1994 while the relation is negative in the period 1995-2001. CAR is negatively affected by deposits asset ratio between 1985-1994 and positively affected by a size of bank deposits in a period 1995-2001. CAR is negatively affected by loan provision ratio and positively affected by dividend pay-out ratio in the period 1995-2001

Asarkaya and Ozcan (2007) examined the determinants of capital structure in the Turkish banking sector covering 2002-2006 periods. The study proposed an empirical model in order to find out the factors that explain the reason why banks hold capital beyond the amount required by the regulators. They used a panel data set that employs bank-level data from the Turkish banking sector and estimated the model with generalized method of moments. The findings of their study suggested that lagged capital, portfolio risk, economic growth, average capital level of the sector and return on equity are positively correlated with capital adequacy ratio and share of deposits are negatively correlated with capital adequacy ratio.

Almazari (2013) investigated relationship between capital adequacy ratio and the profitability of the Saudi Arabia commercial Banks. The study measures efficiency with the Capital Adequacy Ratio (CAR) and the Cost income Ratio (CIR) while the profitability is measured by return on asset and return on equity. The study revealed that there is a positive relationship between capital adequacy and profitability and negative relationship between cost income ratio and profitability. The study also finds

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a positive relationship between banks size and profitability and negative relationship between capital indicators and profitability in the Saudi banks.

In a similar study conducted by Dreca (2013), he examined the factors influencing CAR in selected Bosnian banks for the period of 2005-2010. Using a sample of 10 banks, pooled OLS was adopted to analyze the relationship between dependent and independent variables, the result indicates that size, and liquidity have significant effect on CAR. On the other hand, loan loss reserve did not appear to have significant effect on CAR.

Al-tamimi and Fakkhri (2013) examined the determinants of CAR in commercial banks of Jordan during the period of 2000-2008 using annual report and account of 12 sampled banks. Using Multiple Linear Regression Analysis and the Correlation Coefficient (Pearson Correlation), the study shows that there is a statistically significant positive correlation between the degree of capital adequacy in commercial banks and the following independent variables: liquidity risk, and the rate of return on assets. On the other hand, there is an inverse relationship with statistical significance between the degree of capital adequacy of commercial banks and loan loss provision

Abusharba, Triyuwono, Ismail and Rahman (2013) examined the determinants of the capital adequacy ratio in the Indonesian Islamic banking industry. Secondary data were obtained from Islamic banks annual reports and Islamic banking statistics that derived from Bank Indonesia covering the period of 2009 until the end of 2011. Multiple linear regression analysis and pair-wise correlation matrix are used to explain the effect of explanatory variables on a proxy variable which is the capital adequacy ratio (CAR). The study found that profitability and liquidity are positively related to the capital adequacy requirements. Meanwhile, uncollectable funds measured by non performing financing (NPF) is significant but negatively related to the capital adequacy ratio. On the other hand, depositor's funds and operational efficiency have no significant effect on capital adequacy of Indonesian Islamic banks. Moreover, this study revealed that all selected Islamic commercial banks in Indonesia are committed over than 8 percent minimum of capital requirements during the period of global financial crises. Finally, it was found that Indonesian Islamic banks have an excessive fund to meet their obligations and protect the owners of capital.

Shingjergji and Hyseni (2015) examined the determinants of CAR of Albanian banking System for the period of 2007-2014. The study used ordinary least square to test the relationship between dependent and independent variable using quarterly data from the first trimester of 2007 until the third trimester of 2014. The result indicates that profitability indicators such as ROA and ROE do not have any influence on CAR

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while non performing loans, loan to deposit ratio and equity multiplier have negative and significant impact on CAR. In this study, only bank size was found to have positive impact on CAR.

A study conducted by Aktas, Acikalin and Celik (2015) aims to evaluate the impact of bank-dimensional and environmental factors on bank's capital adequacy ratio in South Eastern European region. Annual data from 71 commercial banks from 10 different countries in South East European region for the period of 2007-2012 is used. The result of the study shows that among the bank-dimensional explanatory Variables: bank size, return on asset and liquidity have statistically significant effect in determining CAR for the region. Among all the environmental factors: (economic growth rate, eurozone stock market volatility index, deposit insurance coverage and governance) have statistically significant effect on capital adequacy ratio for the banks in South East European region.

The objectives of the study conducted by Meconnen (2015) were to examine whether bank specific variables have effect on CAR of Ethiopian commercial Banks. The study period was 2004-2013 and the sample size was 8 banks. The study used secondary data which was gathered from the annual reports of the banks under study. Panel data regression was used and the result revealed that return on asset, deposit ratio, and size have positive effect on capital adequacy while return on equity and net interest margin have a negative effect on capital adequacy. However, liquidity, loan asset and leverage were not found to have any significant impact on capital adequacy.

Furthermore, a similar study conducted in Nigeria by William (2011) investigated the impact of banks characteristics, financial structure and macroeconomic indicators on banks' capital base using an error correction model during 1980-2008 in Nigeria. The author concludes that the money supply is a very important determinant of the capital adequacy base in Nigeria having a high and very strong level of significance. The real interest rate is negatively related to capital adequacy base which could mean that an increase of real interest rate dampen the capital adequacy base. The real exchange rate is a significant determinant but its coefficient is not as expected while the deposit liabilities and liquidity risk are not statistically significant.

Furthermore, in another study conducted by Buyuksalvarci and Abdioglu (2011) which empirically analyzed determinants of CAR of Turkish Banks for the period of 2006-2010. Specifically, the study sought to find if bank specific variables proxied by bank size, Deposit asset ratio, loan asset ratio, loan loss reserve, liquidity, profitability, net interest margin and leverage have any impact on CAR of Turkish Banks. The study adopted multiple regression technique and data were collected from secondary source

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through the annual reports and accounts of the 24 sampled Banks. The findings revealed that loan asset ratio is negatively and strongly influencing CAR of Turkish Banks. The results of the study indicated that loan asset ratio, return on equity and leverage have a negative effect on CAR, while loan loss reserve and return on assets positively influenced CAR. On the other hand, size, deposit asset ratio, liquidity and net interest margin do not appear to have any significant effect on CAR.

In the same vein, Bateni, Vakilifard and Asghari (2014) examined the various influential factors on Capital Adequacy Ratio of Iranian Banks such as Loan asset ratio, return on equity, return on asset, equity ratio, risk asset ratio, Deposit asset ratio and size. Hypotheses were tested using regression analysis on a sample of 6 Iranian Banks for the period of 2006-2012. The results obtained indicate negative relationship between bank size and CAR and positive relationship between loan asset ratio, return on equity, return on asset, equity ratio and CAR. Risk asset ratio and deposit asset ratio do not have any impact on CAR.

Aspal and Nazneen (2014) investigated the determinants CAR of Indian Private sector Banks during the period of 2008-2012. Secondary data of 20 sampled banks were analyzed using multiple regression to explain the effect of explanatory variables on the dependent variable which is capital adequacy ratio. The results highlighted that capital adequacy ratio is negatively correlated with proxy variables of lending (loans), asset quality and management efficiency. However, liquidity and sensitivity are positively correlated. The regression results have revealed that Loans, Management Efficiency, Liquidity and Sensitivity have statistically significant influence on the capital adequacy of private sector banks. However, the independent variable asset quality has negligible influence on capital adequacy of Indian private sector banks. Moreover the study reveals that the Indian private sector banks maintain a higher level of capital requirement than prescribed by Reserve Bank of India.

Massod and Ansari(2016) analysed the bank specific factors which had an impact on the determination of Capital Adequacy Ratio (CAR) of Pakistani commercial banks during the period of 2008-20014 using annual report and account of 14 Pakistani banks which were included in Karachi Stock Exchange. The results revealed that the LAT and ownership concentration had a significant but a negative impact on the CAR. The EAR, DAR, LLR had a significant and positive impact on the determination of CAR, whereas the Size of the Bank, ROA, ROE and NPL had no impact on CAR.

Olarenwaju and Akande (2016) carried out an empirical analysis of capital adequacy determinants in Nigerian banking sector during the period of 2005-2014. Secondary data of 15 quoted banks were analysed using multiple regression to explain the effect

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of explanatory variables on the dependent variable which is capital adequacy ratio. The result highlighted that capital adequacy is positively correlated with return on asset and bank size and negatively liquidity.

Gabriel (2015) empirically examined the impact of micro-prudential indices on capital adequacy ratio of deposit money banks in Nigeria. Multiple regression model was adopted as the tool of analysis using data from 12 sampled banks over a ten year period from 2005-2014. Four independent variables were included in the model after which three (including deposit asset ratio, return on asset and asset quality ratio) were found to have significant impact on capital adequacy ratio. The study found out that capital adequacy ratio of Nigerian Banks is well above the regulatory minimum. Also, Nigerian banks loans to deposit ratio is within the regulatory limit. The study recommends that Nigerian deposit money banks should adopt a more robust data management system and also ensure strict compliance with various capital regulations.

2.1 Theoretical Framework

The theoretical framework adopted for this study is capital buffer theory. It predicts that banks hold safety cushions above the regulatory capital requirement. Stolz (2007) define capital buffer as the capital that banks hold in excess of the regulatory minimum capital requirement. It is due to the fact that the banks may not be able to adjust capital and risk instantaneously due to adjustment costs or illiquid markets. Furthermore, under asymmetric information, raising equity capital could be interpreted as a negative signal with regard to a bank's value (Myers & Majluf 1984), rendering it unable or reluctant to react to negative capital shocks instantaneously. However, to breach regulations trigger costly supervisory actions that can possibly lead to a bank's closure. Consequently banks have an incentive to hold more capital than required (a capital buffer) as an insurance against violation of the regulatory minimum capital requirement (Milne & Whalley 2001). This theory will specifically guide us to understand the capital ratio requirement advised by the BIS through the regulatory agent.

3. METHODOLOGY

The study uses correlational research design. The population of the study comprises all the listed Deposit Money Banks (DMBs) in Nigeria as at 31st December 2019. There were fifteen (15) listed banks on the Nigeria stock exchange as at that date. Of the fifteen listed deposit money banks, three banks have been filtered out and a sample of twelve banks have been selected on the basis of availability of data. Therefore, the

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sample of the study is 14 listed deposit money banks in Nigerian Stock Exchange.. Therefore, the sample size is also 12. The secondary data are collected from the published annual reports and accounts of the sampled banks. The annual reports were retrieved from the websites of the banks as well as the Nigerian Stock Exchange Fact Book.

3.1 Model Specification

The model for this study is:

CAR = F (LIQ, LLP, ROA, FSIZE,)

That is:

$$CARit = \beta_0 + \beta_1 LLP_{it+} \beta_2 LIQ_{it} + \beta_3 ROA_{it} + \beta_4 FSIZE_{it} + \varepsilon it$$

Where;

CARit = Capital Adequacy Ratio for firm i in time t.

LIQit = Liquidity for firm i in time t.

LLPit = Loan Loss Provision for firm i in time t.

ROAit = Return on Asset for firm i in time t.

FSIZEit = Firm Size for firm i in time t.

$\alpha 0$ =Intercept.

$\alpha 1, \alpha 2, \alpha 3, \alpha 4$ = Model coefficients.

Eit =Error term.

3.2 Techniques for Data Analysis

The major tool of data analysis used is multiple regression analysis which was carried out with the aid of STATA statistical software. Robustness tests for Colinearity, normality and Heteroskedasticity were conducted to ensure reliability of the study results. To address panel effect of the data, fixed effect and random effect options were explored. Hausman specification test was used to provide direction as whether fixed effect or random effect would be used. The essence of these analyses is to improve the validity of all the statistical inferences that would be made.

4. RESULTS AND DISCUSSIONS

This section presents and discusses summary of descriptive statistics, correlation matrix and regression results. The overall aim is to examine whether liquidity, loan loss provision, return on asset and firm size affect capital adequacy ratio of listed Deposit Money Banks in Nigeria. The section contains analysis of descriptive

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statistics, correlation matrix, robustness test, Hausman specification test, regression results, test of hypotheses, discussion of findings and policy implications.

4.1 Descriptive Statistics

The various descriptive statistics are displayed in table 1 below. The essence of the table is to provide understanding on the nature of data used.

Table 4.1: Summary of Descriptive Statistics

Variables	Min	Max	Mean	Std Dev	N
CAR	-154.75	23.75	9.61	23.74	96
LIQ	0	33.58	5.66	6.79	96
LLP	-494.02	2.18	-7.64	50.28	96
ROA	1.65	46.22	11.73	8.32	96
FSIZE	8.19	9.85	9.17	0.39	96

Source: Stata output of Descriptive Statistics (Appendix)

Table 1 reveals that the mean value of CAR is 9.61. The minimum value of CAR for the firms is about -154.75. This implies that the lowest level of capital adequacy ratio of the firmsis -154.75. The maximum value of CAR is about 23.75. This implies that the maximum level of CAR of the firms is about 23.75. The standard deviation of CAR is 23.74, which implies that there is low variability in the level of capital adequacy ratio by the studied firms.

LIQ has mean value of about 5.66, minimum value of about 0, maximum value of about 33.58, with a standard deviation of about 6.79. The standard deviation of 6.79 suggests low variability in the level of liquidity of the studied firms over the period of study. LLP has minimum value of about -494.02, maximum value of 2.18, with a standard deviation of 50.28. The standard deviation of 50.28 implies that there is high variability in loan loss provision of DMBs in Nigeria over the period of study.

The mean of ROA is 11.73, which means that on average, DMBs in Nigeria have about 11.73 % as return on asset. High return on Assets signifies high profitability while low return on assets signifies low profitability The minimum number of ROA is 1.65, which suggests the lowest return on asset is about 1.65%. However, the maximum value is 46.22 suggests that the highest return on asset is 46.22%. The

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standard deviation is 8.33, which indicates variability in the level of ROA among DMBs in Nigeria.

FSIZE has mean value of 9.17 which shows that on average, the size of the DMBs in Nigeria is about 9.17. The minimum value is 8.19 while the maximum value is 9.85. The standard deviation is about 0.39 which means that there is variability in the size of the DMBs in Nigeria.

4.2 Correlation Matrix

The correlation matrix reveals the correlation between the dependent variable and each of the independent variables as well as among the independent variables.

Table 4.2: Correlation Matrix of Dependent and Independent Variables.

Variables	CAR	LIQ	LLP	ROA	FSIZE
CAR	1.0000				
LIQ	0.1462	1.0000			
LLP	0.7226	0.0443	1.0000		
ROA	-0.0071	0.1289	0.0136	1.0000	
FSIZE	0.3897	-0.0421	0.2724	0.0031	1.0000

Source: Stata output of Correlation Matrix (Appendix)

The above table shows that liquidity, Loan Loss Provision Ratio and firm size are positively correlated with capital adequacy ratio of the listed deposit money banks in Nigeria with a coefficient of 0.1462, 0.7226 and 0.3897 respectively. The implication is that the above variables move in the same direction with the CAR of Deposit Money Banks in Nigeria. On the other hand, return on asset is negatively correlated with capital adequacy ratio of listed deposit money banks in Nigeria with a coefficient of -0.0071 implying that they move in opposite direction with CAR.

4.3 Fixed and Random Effect Tests

In order to decide between fixed and random effect models output, Hausman specification test is conducted. The Hausman test is designed to detect violation of the random effects modelling assumption that the explanatory variables are orthorgonal

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to the unit effects. If there is no correlation between the independent variables and the unit effects, then the estimates of β in the fixed effects model should be similar to estimates of β in the random effects model. The Hausman test statistic H is a measure of the differences between the two estimates. Under the null hypothesis of orthogonality, H is distributed chi-square with degrees of freedom equal to the number of regressors in the model. A finding that ($p < 0.05$) is considered an evidence that at conventional levels of significance, the two models are different enough to allow us reject the null hypothesis, and thus to reject the random effects model in favour of the fixed effects model. Where the Hausman test does not depict a clear difference ($p > 0.05$), however, it does not necessarily emphasize that random effects estimator is 'safely' free from bias, and thus to be preferred over the fixed effects estimator. Therefore, the result obtained from Hausman specification test conducted in this study indicates that ($p < 0.05$) and as such the fixed effect is chosen over the random effects model.

4.4 Fixed Effect Regression Results

The result of the fixed effect is presented in table 3 below:

Table 4.3: Fixed Effect Regression Result

VAR	COEFF	T-value	P-value
LIQ	1.3348	4.92	0.0000
LLP	0.2369	7.53	0.0000
ROA	0.2328	1.15	0.252
FSIZE	5.7468	0.49	0.629
C	46.13642	107.6323	0.669

Source*:* Output from *STATA* (Appendix)

In table 3, it can be observed that the R^2 is 0.4680 which means that 46.80% of variation in CAR of Deposit Money Banks in Nigeria is explained jointly by the independent variables captured in the model.

4.5 Liquidity and Capital Adequacy Ratio

Liquidity measured as the ratio of liquid assets to total debt & borrowings was found to be negative and significantly associated with Capital Adequacy Ratio at 1% level of significance (p-value of 0.000). This means that Liquidity positively and

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significantly influences the Capital adequacy of Listed Deposit Money Banks in Nigeria. Therefore, Liquidity has significantly influenced the capital adequacy ratio of Listed Deposits Money Banks in Nigeria. Therefore, the result reported provides an evidence to reject the null hypothesis of the study.

The regression result as depicted in Table 3 shows that Liquidity has a T-value of 4.92 and a coefficient value of 1.3348 with a p-value of 0.000 which is significant at 1% level of significance. This reveals that liquidity is positive and significantly affects the capital adequacy of listed deposit money banks in Nigeria. This implies that for every one (1%) increase in the liquidity level of Listed Deposit Money Banks in Nigeria, their capital adequacy will increase by 1.3348.

The findings of this study are in line with earlier studies conducted by Altamimi and Fakkhari (2013), Aktas, Acikalin and Celik (2015) and Aspal and Nazneen (2014) and contradicts that of Meconnen (2015) and Buyuksalvarci and Abdioglu (2011) where liquidity was not found to have any significant impact on the capital adequacy.

4.6 Loan Loss Provision and Capital Adequacy Ratio

Loan loss provision ratio which was measured as the ratio of loans loss provision to total loans was found to be positive and statistically significant at 1% level which signifies that it is associated with the capital adequacy ratio of listed deposit money banks in Nigeria. This therefore means that loan loss provision positively and significantly affects the capital adequacy of listed deposit money banks in Nigeria.

As a corollary to the result reported with respect to loan loss provision ratio depicting that it is strongly influential in determining the capital adequacy ratio of listed deposit money banks in Nigeria, the result provides an evidence for rejecting the null hypothesis which says that loan loss provision has no significant impact on CAR of listed deposit money banks in Nigeria.

Table 3 reveals that loan loss provision has a T-value of 7.53, coefficient value of 0.2369 and a p-value of 0.000. This implies that loan loss provision significantly influences capital adequacy ratio of listed deposit money banks in Nigeria at 1% level of significance. This means that 1% increase in loan loss provision will lead to an increase in capital adequacy of listed deposit money banks in Nigeria by 0.2369.

The finding of this study is in line with earlier studies conducted by Dreca (2013), and the study contradicts the findings of Buyuksalvarci and Abdioglu (2011) in which loan loss reserve was not found to have any significant impact on Capital Adequacy of Deposit Money Banks.

Text ISSN: 2795-3831
E-ISSN: 2795-3823

4.7 Return on Asset and Capital Adequacy Ratio

Return on Asset measured as the ratio of net income to total asset is found to be statistically insignificant at all levels. That is, it is not significantly associated with the capital adequacy ratio of listed deposit money banks in Nigeria. Hence, Return on Asset does not significantly influence the capital adequacy ratio of listed deposit money banks in Nigeria. Therefore, the result reported provides evidence for the failure to reject the null hypothesis of the study. Hence, the study fails to reject the null hypothesis.

From table 3, it can be seen that the T-value for return on asset is 1.15 and the coefficient value of 0.2328 with a p-value of 0.252. This signifies that return on asset does not significantly influence capital adequacy of listed deposit money banks in Nigeria. This implies that increase in return on asset may not necessarily lead to any decrease in the capital adequacy of listed deposit money banks in Nigeria since it is not significant at all levels. The result is surprising because it is not in line with our apriori expectation that the more the listed deposit money banks make profit, the higher will be their capital adequacy ratio.

The findings of this study is in line with earlier studies conducted by Shingjergji and Hyseni (2015) and the findings contradict that of Aktas, Acikalin and Celik(2015).

4.8 Firm Size and Capital Adequacy Ratio

FSIZE has positive relationship with CAR, with its coefficient of 5.7468 which means a unit increase in FSIZE will lead to about 5.7468 increase in CAR of DMBs in Nigeria. However, this relationship is not significant even at all levels of significance.

4.9 Policy Implication of the Findings

Several policy implications can be gleaned from the findings of the study. The analysis shows that liquidity is positively and significantly influencing capital adequacy of Listed Deposit Money Banks in Nigeria. This implies that liquidity plays an important role in capital adequacy of Listed Deposit Money Banks in Nigeria. The result reveals that the higher the investment in short-term liquid asset, the higer the capital adequacy. The implication of this result is that stakeholders should consider liquidity as an indication that a bank is well capitalized.Moreover, the analysis conducted in the study reveals that loan loss provision has a positive and significant impact on the capital adequacy of listed deposit money banks in Nigeria. This implies that an increase in loan loss provision would lead to an increase in the capital adequacy of listed deposit money banks in Nigeria. The analysis reveals that return on asset which is used as profitability proxy was found to be statistically insignificant in influencing capital

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adequacy of Listed Deposit Money Banks in Nigeria. This implies that return on asset does not have any significant impact on capital adequacy of Listed Deposit Money Banks in Nigeria. Thus, change in return on asset may not lead to any change in the capital adequacy especially in a period of economic recession. Thus, regulatory authorities and other stakeholders should not use profitability in trying to determine the capital adequacy of banks.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Arising from the result of the analysis that was carried out, the following conclusions can be made:

The study found a positive and significant association between liquidity and capital adequacy of Listed Deposit Money Banks in Nigeria. Thus, the study concludes that liquidity is one of the determinants of capital adequacy of listed deposit money banks in Nigeria.

The study also found a positive and significant association between loan loss provision and capital adequacy ratio of listed deposit money banks in Nigeria. Thus, the study concluded that loan loss provision is among the determinants of capital adequacy as it plays a crucial role in predicting the capital adequacy of listed deposit money banks in Nigeria.

In addition, the study found a positive and insignificant association between return on asset and capital adequacy ratio. It is therefore concluded that return on asset does not influence the capital adequacy of listed deposit money banks in Nigeria during the period under study and is not one of the determinants of capital adequacy of listed deposit money banks in Nigeria.

5.2 Recommendations

The following recommendations have become necessary in view of the findings of the study:

i. The CBN should ensure that the liquidity of Listed Deposit Money Banks in Nigeria is always at optimum level by regulating their deposit – liquidity - loans nexus, as it has been empirically found that liquidity is one of the factors that determine the capital adequacy.

Text ISSN: 2795-3831
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ii. The management of listed deposit banks should increase the amount of their provision for loan loss as it was found to have positive impact on the capital adequacy.

iii. The CBN and management of listed deposit money banks should not consider profitability as an important indicator of capital adequacy of banks especially during this period when the Nigerian economy is facing a lot of crisis.

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Appendix 1: Population of the Study

	Names of bank	Year incorporation	Year of listing
	Access bank plc	1989	1998
	Diamond bank plc	1990	2005
	Eco bank nig. Plc	1986	2006
	Fidelity bank plc	1987	2005
	First bank nig. Plc	1969	1971
	First city moment bank plc	1982	2004
	Guarantee trust bank plc	1990	1996
	Skye bank plc	1989	2005
	Stanbic-IBTC Bank pc	1989	2005
	Sterling Bank plc	1992	1993
	Union bank plc	1969	1970
	United bank plc	1961	1970
	Unity bank plc	1987	2005
	Wema bank plc	1069	1991
	Zenith bank plc	1969	2004

Source: (1) Nigeria Stock Exchange Annual Report, 2015

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Appendix 11 STATA OUTPUT

```
. xtset id year, yearly
      panel variable:  id (strongly balanced)
       time variable:  year, 2012 to 2019
               delta:  1 year
. su car liq llp roa fsize, detail
```

car

	Percentiles	Smallest		
1%	-154.7496	-154.7496		
5%	6.9897	-103.2676		
10%	8.8951	-95.1557	Obs	96
25%	11.18715	.523	Sum of Wgt.	96
50%	13.5877		Mean	9.607539
		Largest	Std. Dev.	23.74213
75%	15.1849	21.6871		
90%	18.4522	22.0217	Variance	563.6889
95%	21.465	23.2995	Skewness	-5.538846
99%	23.7535	23.7535	Kurtosis	33.90341

liq

	Percentiles	Smallest		
1%	0	0		
5%	.7018	.585		
10%	1.2077	.6541	Obs	96
25%	1.80755	.6658	Sum of Wgt.	96
50%	3.31465		Mean	5.664661
		Largest	Std. Dev.	6.793189
75%	6.1924	24.5251		
90%	13.5617	27.3881	Variance	46.14742
95%	24.3268	29.491	Skewness	2.417825
99%	33.5805	33.5805	Kurtosis	8.276545

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llp

	Percentiles	Smallest		
1%	-494.0192	-494.0192		
5%	-11.1846	-17.5569		
10%	-7.5166	-13.6483	Obs	96
25%	-2.624	-12.9678	Sum of Wgt.	96
50%	-1.27375		Mean	-7.643665
		Largest	Std. Dev.	50.2823
75%	-.70455	.6663		
90%	-.0948	.8231	Variance	2528.31
95%	.4696	1.3481	Skewness	-9.574973
99%	2.1796	2.1796	Kurtosis	93.12185

roa

	Percentiles	Smallest		
1%	1.65	1.65		
5%	2.41	1.65		
10%	2.99	1.94	Obs	96
25%	4.92	2.19	Sum of Wgt.	96
50%	10.245		Mean	11.72719
		Largest	Std. Dev.	8.317692
75%	16.59	29.33		
90%	22.85	29.41	Variance	69.184
95%	27.13	34.32	Skewness	1.20027
99%	46.22	46.22	Kurtosis	4.989556

Text ISSN: 2795-3831
E-ISSN: 2795-3823

fsize

	Percentiles	Smallest		
1%	8.1945	8.1945		
5%	8.4669	8.3729		
10%	8.606	8.3881	Obs	96
25%	8.9597	8.4616	Sum of Wgt.	96
50%	9.15935		Mean	9.174471
		Largest	Std. Dev.	.3890065
75%	9.51005	9.7749		
90%	9.6875	9.7926	Variance	.151326
95%	9.7485	9.8026	Skewness	-.2743386
99%	9.8541	9.8541	Kurtosis	2.349605

. correlate car liq llp roa fsize
(obs=96)

	car	liq	llp	roa	fsize
car	1.0000				
liq	0.1462	1.0000			
llp	0.7226	0.0443	1.0000		
roa	-0.0071	0.1289	0.0136	1.0000	
fsize	0.3897	-0.0421	0.2724	0.0031	1.0000

Text ISSN: 2795-3831
E-ISSN: 2795-3823

```
. reg car liq llp roa fsize
```

Source	SS	df	MS	Number of obs =	96
				F(4, 91) =	31.32
Model	31019.2835	4	7754.82088	Prob > F =	0.0000
Residual	22531.1618	91	247.595184	R-squared =	0.5793
				Adj R-squared =	0.5608
Total	53550.4453	95	563.688898	Root MSE =	15.735

car	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
liq	.4557498	.2402569	1.90	0.061	-.0214909	.9329906
llp	.3109124	.0334252	9.30	0.000	.2445173	.3773075
roa	-.0957499	.1957353	-0.49	0.626	-.4845539	.2930542
fsize	13.17886	4.320098	3.05	0.003	4.597518	21.76021
_cons	-110.3838	39.87953	-2.77	0.007	-189.5996	-31.16804

```
.

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of car

        chi2(1)      =    14.24
        Prob > chi2  =   0.0002

. vif
```

Variable	VIF	1/VIF
llp	1.08	0.922656
fsize	1.08	0.922821
liq	1.02	0.978407
roa	1.02	0.983274
Mean VIF	1.05	

Text ISSN: 2795-3831
E-ISSN: 2795-3823

```
. xtreg car liq llp roa fsize, fe

Fixed-effects (within) regression               Number of obs      =        96
Group variable: id                              Number of groups   =        12

R-sq:  within  = 0.5948                         Obs per group: min =         8
       between = 0.2225                                        avg =       8.0
       overall = 0.4680                                        max =         8

                                                F(4,80)            =     29.36
corr(u_i, Xb)  = 0.0353                         Prob > F           =    0.0000
```

car	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
liq	1.334841	.2710733	4.92	0.000	.7953881	1.874294
llp	.2369123	.0314461	7.53	0.000	.1743326	.299492
roa	-.2328294	.2017429	-1.15	0.252	-.6343105	.1686517
fsize	5.7468	11.84058	0.49	0.629	-17.8167	29.3103
_cons	-46.13642	107.6323	-0.43	0.669	-260.3316	168.0587
sigma_u	12.630485					
sigma_e	13.447776					
rho	.4686908	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(11, 80) =     4.05              Prob > F = 0.0001
```

. est store fixed

```
. xtreg car liq llp roa fsize, re

Random-effects GLS regression                   Number of obs      =        96
Group variable: id                              Number of groups   =        12

R-sq:  within  = 0.5334                         Obs per group: min =         8
       between = 0.7470                                        avg =       8.0
       overall = 0.5793                                        max =         8

                                                Wald chi2(4)       =    125.28
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

car	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
liq	.4557498	.2402569	1.90	0.058	-.015145	.9266446
llp	.3109124	.0334252	9.30	0.000	.2454002	.3764246
roa	-.0957499	.1957353	-0.49	0.625	-.479384	.2878842
fsize	13.17886	4.320098	3.05	0.002	4.711625	21.6461
_cons	-110.3838	39.87953	-2.77	0.006	-188.5463	-32.22139
sigma_u	0					
sigma_e	13.447776					
rho	0	(fraction of variance due to u_i)				

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E-ISSN: 2795-3823

```
. est store random

. hausman fixed random

                ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
         liq |    1.334841     .4557498        .8790913        .1255284
         llp |     .2369123    .3109124       -.0740001              .
         roa |    -.2328294   -.0957499       -.1370795         .048866
       fsize |       5.7468    13.17886       -7.432062        11.02434
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       43.67
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```