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Determinants of Capital Adequacy of Deposit Money Banks in Nigeria

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Abstract

Capital adequacy is critical to the safety and soundness of banks as it serves as a buffer or cushion for absorbing losses. This study examined the determinants of capital adequacy of deposit money banks in Nigeria. The study adopted correlation research design in a sample of 9 banks for a period of five years (2014-2019). Random effect regression technique of data analysis was employed, and the study found a significant association between capital adequacy ratio and the determinants of capital adequacy of banks in Nigeria. The study found that firm performance (ROA) of the sample deposit money banks has significant positive impact on the capital adequacy ratio (CAR). The results show that bank size (BSZE) of the sample deposit money banks has significant positive effect on the capital adequacy ratio (CAR). And, also loan to deposit ratio (LDR) of the sample deposit money banks has significant positive impact on the capital adequacy ratio (CAR). The study concludes that ROA, BSZE and LDR are significant determinants of capital adequacy of banks in Nigeria during the period under review. The study recommends that regulators (CBN) should encourage banks to improve on their size, financial performance and enhanced risk assets (loans and advances). Management of deposit money banks in Nigeria should deploy more strategies that could improve the capital adequacy of their banks, so as to ensure sound banking industry in Nigeria.

Keywords:
Determinants, Capital Adequacy, Deposit Money Banks

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Background to the Study

Capital adequacy ratio is an important measure of "safety and soundness" for banks and depositing institutions because it serve as a buffer or cushion for absorbing losses Abba et al, (2018). It is one of the major benchmarks for financial institutions the world over, especially with the introduction and adoption of various Basel Accords. Capital adequacy ratio is one of the fundamental measures of the strength and wellness of banks the world over.The Basel Accord recommends minimum capital adequacy ratio that banks should meet so as to safeguard depositor's interest and ensure continued existence of banks. Thus the Basel Accords is the global response to the fragility and incessant crisis that characterized the banking world in the 1970s and 1980s. The Basel committee on banking supervision handed down the first Basel Accord in 1988 which is popularly referred to as Basel I.

This marked significant milestone in the governance of the global financial system as it focused on defining regulatory capital measuring risk-weighted assets and setting acceptable levels for regulatory capital. Thus applying the Basel capital adequacy ratio standards serves to promote the stability and efficiency of the financial system by reducing the likelihood of banks becoming insolvent. So far, there have been Basel I, Basel II and Basel III. Basel I and Basel II fixes minimum capital adequacy ratio at 8% while in 2010, the world's central bankers represented by the bank of international settlement (BIS) handed down Basel III which hiked capital adequacy ratio requirement from 8% to at least 10.5% of a bank's risk-weighted assets.

In Nigeria, the Central Bank being the apex regulatory authority of the banking industry increased the capital base of the banks to a minimum of twenty-five billion naira in 2005. This popularly referred to as the recapitalization or consolidation policy resulted in the reduction of Nigeria's eighty-nine Banks to twenty-five bigger, stronger and more resilient financial institutions. However, increasing the capital base of banks through recapitalization may increase the capital adequacy ratio in the short-run but may not increase their risk portfolio at the expense of their capital base as a result of increased liquidity and overall financial position.

Thus in the wake of rising level of non-performing loans, expansion of banking operations and the attendant rise in their risk portfolio with the adoption of Basel II and preparations for the adoption of Basel III by the Nigerian banking industry, there is a great need for an empirical study on the major determinants of capital adequacy ratio of deposit money banks in Nigeria. Although capital adequacy ratios at commercial banks have increased since the risk-based have been introduced, the question arose as to what degree of these increases were a response, specifically to risk-based capital maintenance, other bank specific ratios such as Deposit Asset Ratio, Asset Quality Ratio as well as financial performance of banks in terms of profitability.

Therefore this study is an attempt to determine the extent to which change in capital adequacy affect banking system in Nigeria as contained in the Basel Accord model for capital adequacy computation as well as the prudential guideline of the central bank of Nigeria.

Furthermore, the study is necessary in that there have not been sufficient researches on bank-specific determinants of capital adequacy ratio since the wake of the banking sector consolidation in 2005 and the adoption of Basel II and III in Nigeria. Thus, this study is an attempt to fill the identified gaps and thus contribute to body of knowledge on the subject matter in Nigeria.

Objectives of the Study

The main objective of the study is to critically examine the determinants of capital adequacy of deposit money banks in Nigeria. The study will be guided also with the following specific objectives;

i. To examine the impact of firm performance on the capital adequacy of deposit money banks in Nigeria.
ii. To determine the impact of bank size on the capital adequacy of deposit money banks in Nigeria.
iii. To assess the impact of loan to deposit ratio on the capital adequacy of deposit money banks in Nigeria.

Research Hypotheses

The following hypotheses are formulated in null form for the study;

H01: Firm performance has no significant impact on capital adequacy of deposit money banks in Nigeria.

H02: Bank size has no significant impact on capital adequacy of deposit money banks in Nigeria.

H03: Loan to deposit ratio performance has no significant impact on capital adequacy of deposit money banks in Nigeria.

Significance and Scope of the Study

This study highlights the necessity and importance of capital adequacy in deposit money bank in order to have sound banking system. This study is beneficial to both public and private sectors because it indicate the impact of some firm specific factors on capital adequacy of banking system. The public sector might also know the mechanisms that determine capital adequacy of banks in Nigeria. The study will also benefit regulators especially CBN in understanding the effect of the determinants on the capital adequacy of banks in Nigeria. Lastly the study will be useful to students and researchers as a guide for conducting similar studies and as a source of knowledge. The focus of the study is on Deposit Money Banks in Nigeria and the period of study is five (5) years 2014-2019. The study covers the following determinants, bank size, firm performance and loan to deposit ratio.

Literature Review

According to Shahatit (2011), Capital adequacy simply means capacity and efficiency of commercial banks to measure, direct and monitor the risk they encounter in order to not only curtail and control these risks but also to take decisions consistent with the banks' strategies and policies as well as enhancing their competitive ability. Capital is one of the

bank specific factors that influence the level of bank profitability. Capital is the amount of own fund available to support the bank's business and act as a buffer in case of adverse situation (Athanasoglou et al., 2005). Banks capital creates liquidity for the bank due to the fact that deposits are most fragile and prone to bank runs. Greater bank capital reduces the chance of financial distress. Adequacy of capital is judged on the basis of capital adequacy ratio (CAR). CAR shows the internal strength of the bank to withstand losses during crisis as sited by Dang (2011).

Prior to the 2007-2009 crisis, the banking sector of many countries had built up excessive on and off-statement of financial position leverage that was accompanied by the gradual erosion of the level and quality of the banks' capital base (Bank of International Settlements (BIS), (2009). As a result, the banking system was not able to absorb the resulting systemic trading and credit losses nor could it cope with the re-intermediation of large off-SFP exposures that had built up in the shadow banking system (BIS, 2009). Capital adequacy regulation is often viewed as a buffer against insolvency crises, limiting the costs of financial distress by reducing the probability of insolvency of banks. Irrespective of the viewpoint, a general consensus is that banks with higher capital and liquidity buffers are better able to support businesses and households in bad times since buffers enhance the capacity of banks to absorb losses and uphold lending during a downturn (Barrell et al., 2009).

In the last decades there were some important banking crises in the world, because banking sector plays a key role in the economies of the countries, it also affected many different sectors in different countries such as Turkey, Argentina and United States due to the crises, many companies went bankrupt. Additionally, lots of people lost their jobs as result of these crises. consequently, these countries suffered from economic recession for a long time (Oktar and Yuksel, 2015).

This situation showed that the result of banking crises might be very harmful. Therefore, countries aimed to take some actions in order to prevent banking crises in the future. This lead to creation of authorities that govern the banking sector. Capital adequacy of the bank is a very significant concept which is controlled by these authorities.

Review of Empirical Studies

Abba et al, (2018) attempt to analyze the bank-specific determinants of CAR in the Nigerian Deposit Money Banks (DMBs) using balanced panel data collected from financial statements of 12 selected quoted banks for the ten-year period 2005-2014. The index for profitability which is ROA was found to be the most important determinant of CAR, having recorded the highest coefficient in the multiple regression result. The study found out that Capital Adequacy Ratio of Nigerian deposit money banks is well above the regulatory minimum set by CBN as well as the requirements of Basel Accord. Also, Nigerian banks' risk portfolio is quite high and ROA is quite low. Depositors' interests are well protected as the asset base of DMBs is well above the total deposits. The study concludes that CAR is largely determined by banks risk-portfolio, deposit level,

profitability and asset quality and that CAR of Nigerian banks is well above the regulatory minimum. The study recommends that Nigerian deposit money banks should adopt a more pragmatic risk-management mechanism and a risk-based capital maintenance approach backed by a robust data management system. The study recommends improvement in operational performance of banks, strict compliance with various capital regulations, frequent stress tests for banks and more detailed disclosure practice to include details of changes in Tier I and Tier II capital, risk-weighted assets and trend analysis of changes in Capital Adequacy Ratio.

Shahatit's study (2011) measured the effect of applying the capital adequacy standard by the commercial banks operating in Jordan in a risky environment, it has become necessary for them to strengthen their financial positions through implementation of financial safety standards particularly the capital adequacy standard which is global standard representing the minimum limit of safety and financial security requirements. The study concluded that the application of capital adequacy standard had no statistically significant or negative effect on the profitability of the commercial banks in Jordan whereas there was no positive impact for raising capital, except for three ratios of profitability.

Abu Sharba et'al (2013) identified the most important determinants of capital adequacy of the Islamic Indonesian banks. They tested whether there is an inverse or direct correlation between capital adequacy ratio and the following independent factors: return on assets rate, deposits structuring, liquidity, operational efficiency and asset quality using multiple linear regressions. The study concluded that there was a statistically significant direct relationship between the capital adequacy ratio of Islamic banks of Indonesia and the rate of return on assets.

Ali Polat and Hassan Al-khalaf (2014) found that banks usually maintain a level of capital that is more than required by regulatory bodies as they operate cautiously to survive operation and financial shocks. Ali Polat and Hassan Al-khalaf, in their attempt to empirically investigate some internal factors and their relation with capital adequacy ratio, used fixed effect, robust estimation and least squared dummy regression (LSDR) in analyzing their collected data in Saudi banks and the results shows that loans to assets ratio has negative significant effect on capital requirement ratio while leverage and the size of the banks have positive significant effect in determining that ratio, and in generalized linear regression (GLS) estimation they found that, in addition to the mentioned results, the loan to deposit ratio has negative significance and the return on assets has positive significance on capital ratio.

Dickson Pastory and Marobhe Mutaju (2013) found that the banks increase in capital ratios had led to increase in asset quality and an increase in nonperforming loans has a tendency to worsen capital ratio. Asset quality, in terms of large exposure to core capital, and Capital Adequacy are inversely related, while Non-performing loans increases the capital adequacy.

Abdelkader Boudriga, Neila Boulila Taktak and Sana Jellouli (2009), in their empirical analysis about the cross-countries determinants of nonperforming loans (NPLs), the potential impact of supervisory devices, and institutional environment on credit risk exposure, used banks specific variables aggregated data on a panel of 59 countries over the period 2002 - 2006 and other econometric techniques and found that higher CARs and higher provisions ratios are negatively related to the level of bad loans.

Leila Bateni, Hamidreza Vakilifard and Farshid Asghari (2014) have investigated empirically the determinants of CAR in Iranian banks and its effect on the bank financial position, using banks internal factors (SIZE, LAR, RAR, DAR, ROA, ROE, EQR) as independent variables CAR as the dependent variable. They have aggregated data from the annual report for the period from 2006 to 2012. They have concluded that CAR is adversely affected by bank's SIZE, this means that large Iranian banks have low supervisory control on their capital adequacy ratio (CAR), and large banks attain a high risk assets portfolio, represented in a positive relationship between RAR and SIZE, while EQR, ROA, ROE and LAR positively influence CAR, While, RAR and DAR do not have any significant relationship with CAR.

Noor Mohammad Alsabbagh in his thesis (Determinants of Capital Adequacy Ratio) applied in 17 Jordanian banks during the period 1985 to 1994 (before applying Basel committee standard for CAR) and during the period 1995 to 2001 (after applying Basel committee standard for CAR) used correlation coefficient and regression analysis to determine the effect of the banks internal factors (like log SIZE, RAR, LAR, ROE, ROA, DAR, EQR, DR and LPR) on the bank CAR. He found that CAR is adversely affected by banks' size (log SIZE) in the second period, which means that large banks have low supervisory control on their CAR while maintaining low risky assets in their portfolio, as indicated by the negative relationship between RAR and log SIZE. CAR is positively affected by ROA in the first period and positively affected by LAR and EQR in the second period, which explains the decreased shareholder's equity in large banks, which have a significant negative relationship with log SIZE. CAR was positively affected by RAR in the first period and negatively affected by RAR in the second period and that can be attributed to the use of Capital to Risk Weighted Asset ratio in the second period instead of the traditional method of Capital to total asset Ratio used before applying Basel committee standard for CAR. CAR was negatively affected by DAR in the first period and positively affected by DAR in the second period. Finally, CAR was negatively affected by LPR in the second period and banks decreasing CAR in the second period could be attributed to banks increased loan loss reserve.

Jaber et al (2014), investigated the impact of internal and external factors on commercial banks profitability in Jordan. The banks internal factors taken in the study were capital adequacy, the cost to income ratio, liquidity calculated as loans to customers and the accounting value of the bank's total assets. They found out, after using multivariate analysis that the internal factors have a significant impact but not capital adequacy and liquidity ratio for the transformed model, while the size is insignificant for the transformed and untransformed model.

Vatansever et al (2015), analyzed the relationship between non-performing loans and several macroeconomic factors and bank specific factors, such as capital adequacy ratio, in Turkey by using ordinary least square estimation approach with integration analysis and the time series from January 2007 to April 2013. They found out that capital adequacy ratio has a positive effect on non-performing loans ratio. Furthermore, the findings of the positive effect are such a long term not spurious, which have several implications on the banking and credit markets in terms of policy and regulation.

Jasevičienė et al (2014), studied six factors (return on assets, loans over total assets, assets growth, assets assessed according to risk over total assets, impact of bank management and size of the bank) affecting capital adequacy ratio in commercial banks of Lithuania. The author analyzed data from banks for six years from 2008 -2013 on a quarterly basis. Multiple regression analysis shows that return on assets has a statistically significant negative impact on banks' capital adequacy changes.

Al Omar et al (2008) assessed the impact of bank specific determinants of profitability on Kuwaiti commercial banks from 1993 to 2005 by using unrelated regression technique. Their results indicated that equity ratio, loan- assets ratio, operating expenses ratio, non-interest assets ratio, and total assets explain about 67% of the variation in ROA. The results stressed the importance of improving capital adequacy and reducing non-interest assets to improve profitability. The positive impact of the size variable (total assets) reflects scale efficiency, indicating a potential for higher profits as the size of these banks increases.

Research Methodology

The research design adopted for this study is correlational research design, to investigate the determinants of capital adequacy of listed deposit money banks in Nigeria. This research design is chosen because the aim of correlation research design is to investigate the relationships between theoretically related variables, and to observe the impact of the independent variable(s) on the dependent variable, so as to establish the causal relationship or otherwise among the variables. Thus, the design is consistent with the objectives of this study.

The population of this study consists of all the 15 deposit money banks listed on the floor of Nigerian Stock Exchange market as at 31st December, 2019. However, based on the availability and accessibility of data six banks are dropped, and a new population of nine (9) banks emerged, and are used as a sample size of the study as well. Therefore, the study covers the period of five years (2014-2019).

The study used secondary sources of data, because of the fact that the estimation of the models of the study requires the use of quantitative data. Therefore, the method of data collection for the study involves the financial statements of the sample banks for all years covered by the study (2014-2019).

In this research, Random Effect regression technique of data analysis is adopted. The choice of regression as a tool of data analysis in this study is informed by the effectiveness of the technique in testing relationships among theoretically related variables and estimating the effects of one variable on the other. This is consistent with the objective of this study, which is the effect of firm specific attributes on capital adequacy of listed deposit money banks in Nigeria.

Variables Measurements and Models Specification

The variables of the study are, capital adequacy (dependent variables) and the determinants (firm size, firm performance and loan to deposit ratio) as independent variables.

Table 1: Variable Measurement

Variables	**Definition/Measurement**
Capital Adequacy	Is measured using the ratio of total equity to loan and advances.
Bank Size	Is measured using the natural logarithm of total assets.
Firm Performance	Defined as financial performance or profitability, and is measured using the ratio of profit before tax to total assets (return on assets ROA).
Loan to deposit ratio	Is measured by the ratio of total loan and advances to total deposit.

In order to test the hypotheses formulated in this study and to achieve the objectives of the research, the following model is used.

$$CAR_{it} = a + \beta_1 ROA_{it} + \beta_2 BSZE_{it} + \beta_3 LDR_{it} + £_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots I$$

Where,

CAR_{it} = capital adequacy ratio of bank I in year t
ROA_{it} = return on assets of bank I in year t
$BSZE_{it}$ = size of bank I in year t
LDR_{it} = loans to deposit ratio of bank I in year t.
Intercept = α
Residual = $£_{it}$
β_1- β_3 are the coefficients

Results and Discussions

This part deals with the descriptive statistics of the data collected for the study. The descriptive statistics of the data collected for the variables of the study are presented in table 2

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
car	45	.3480506	.1452383	.1086659	.689947
roa	45	.1036201	.0823413	.0256371	.5320771
bsize	45	22.91841	1.077248	20.39476	24.67522
ldr	45	.8510583	.0533071	.689947	.944057

Source: STATA OUTPUT (Appendix)

The descriptive statistics result in Table 2 show that the average measure of capital adequacy (CAR) of the sample deposit money banks is 0.3481 with standard deviation of 0.1452. The standard deviation implies that, the CAR deviate from both sides of the mean by 0.1452. The minimum and maximum CAR variable during the period of the study are 0.1087 and 0.6899 respectively.

The results in Table 2 indicated that the average firm financial performance, return on assets (ROA) during the period covered by the study is 0.1036 with standard deviation of 0.0823. This implies that the average performance of the sample banks during the period is 10.36% return on assets, and the performance deviate from the mean by 8.23%, on both sides. While the minimum and maximum financial performance of the sample banks during the period of the study are 0.0256 and 0.5321 respectively.

The Table also indicates that the average bank size (BSZE) during the period covered by the study is 22.918 with standard deviation of 1.077. The minimum and maximum values of BSZE during the period of the study are 20.394 and 24.675 respectively. The results in Table 2 indicated that the average loan to deposit ratio (LDR) during the period covered by the study is 0.8511 with standard deviation of 0.0533. This implies that the LDR of the sample banks during the period deviate from both sides of the mean by 0.0533. While the minimum and maximum LDR of the sample banks during the period of the study are 0.6899 and 0.9441 respectively. Following the analysis of the descriptive statistics of the data collected for the study, the study employed shapiro-wilk test to check the distribution of the data collected.

Table 3: Data Normality Test

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
car	45	0.97156	1.232	0.442	0.32940
roa	45	0.64525	15.362	5.790	0.00000
bsize	45	0.96312	1.597	0.992	0.16062
ldr	45	0.97795	0.955	-0.098	0.53884

Source: STATA OUTPUT (Appendix)

Under this method, null hypothesis principle is used in the Shapiro-WIlk (W) test for normal data, under the principle; null hypothesis that 'the data is normally distributed' is

tested. Table 3 indicates that data from variables of the study (CAR, BSZE and LDR) are normally distributed because the P-values are not statistically significant at 5% level of significance. On the other hand, data from ROA variables is not normally distributed, because it is significant at 1% level of significance. Therefore, the null hypothesis (that, the data is normally distributed) is rejected for ROA, while not rejected for the CAR, BSZE, and LDR.

Correlation Analysis

The following table presents the relationships among the variables of the study;

Table 4: Correlation Matrix of the Variables

	car	roa	bsize	ldr
car	1.0000			
roa	-0.0121 0.9369	1.0000		
bsize	0.7140* 0.0000	-0.0242 0.8746	1.0000	
ldr	0.8305* 0.0000	-0.2115 0.1632	0.7027* 0.0000	1.0000

Source: STATA OUTPUT (Appendix)

The results from tables 4 shows that there is a statistical negative relationship between capital adequacy ratio (CAR) and firm performance (ROA) of the sample deposit money banks in Nigeria - from the correlation coefficient of -0.0121 which is not statistically significant at all levels of significance (p-value of 0.9369). This implies that capital adequacy decreases with an increase in the performance of banks during the period. The table shows that there is a significant statistical positive relationship between capital adequacy ratio (CAR) and bank size (BSZE), from the correlation coefficient of 0.7140 which is statistically significant at 1% level of significance (p-value of 0.0000). This implies that capital adequacy increases with increase in the size of banks during the period under review. Lastly, Table 4 indicated a significant statistical positive relationship between capital adequacy ratio (CAR) and loan to deposit ratio (LDR), from the correlation coefficient of 0.8305 which is statistically significant at 1% level of significance (p-value of 0.0000). This implies that capital adequacy increases with increase in the loan to deposit ratio of banks during the period under review.

Regression Analysis and Hypotheses Testing

In this section, the regression results are presented and analyzed. The hypotheses formulated for the study are also tested from the results as presented in table 5 below;

Table 5: Summary of Regression Result of the Model of the Study

Variables	Statistics	P-values
R^2 Within	0.7246	
R^2 Between	0.9014	
R^2 Overall	0.7420	
VIF	1.75	
F-Stat (Wald Chi2)	117.89	0.0000
Hettest Chi2	1.30	0.2548
Hausman	3.68	0.2982
ROA	1.2116	0.085
FPER	0.1451	0.049
LEV	0.5295	0.000
CONSTANT	6.0399	0.000

Source: STATA Output (Appendix)

The results from table 5 show that the independent variables (bank size, firm financial performance and loan to deposit ratio) explained 74.20% of the total variation in the dependent variable (capital adequacy ratio) from the coefficient of multiple determinations (Overall R square of 0.7420). The F-statistic of 117.89 implies that the model is fit at 1% level of significance as indicated by the p-value of 0.0000. The mean Variance Inflation Factor (VIF) shows that there is absence of multicollinearity among the explanatory variables, because the mean VIF is 1.75. The decision criterion is that a VIF value of 10 and above indicates severe collinearity.

Moreover, table 5 shows an absence of Heteroskedasticity in the panel as indicated by the Breuch Pagan/Cook-Weisberg test for heteroskedasticity Chi2 of 1.30 with p-value of 0.2548. This proved that the assumption of constant variance of the error term (homocedasticity) is being met, and as a result OLS estimators may be best linear unbiased estimators (BLUE). The results of hausman specification test indicated that the random effect regression model is the most appropriate for the study, from the hausman Chi2 of 3.68 with p-value of 0.2982.

Hypotheses Testing

The results from table 5 show that the firm performance (ROA) of the sample deposit money banks has significant positive impact on the capital adequacy ratio (CAR), from the coefficient of 1.2116 which is statistically significant at 10% level of significance (p-value of 0.085). This implies that when financial performance increase by N1, capital adequacy ratio increases by 1.21%. Based on this evidence, the study reject the null hypothesis one (H_{01}) which states that firm performance has no significant impact on capital adequacy of deposit money banks in Nigeria.

Similarly, the results from table 5 show that bank size (BSZE) of the sample deposit money banks has significant positive effect on the capital adequacy ratio (CAR), from the coefficient of 0.1451 which is statistically significant at 5% level of significance (p-value of 0.049). This implies that when bank size increase by N1, capital adequacy ratio increases

by 0.1451%. Based on this evidence, the study reject the null hypothesis two (H_{02}) which states that bank size has no significant impact on capital adequacy of deposit money banks in Nigeria.

Moreover, the results from table 5 indicates that loan to deposit ratio (LDR) of the sample deposit money banks has significant positive impact on the capital adequacy ratio (CAR), from the coefficient of 0.5295 which is statistically significant at 1% level of significance (p-value of 0.000). This implies that when loan to deposit ratio increases by 1%, capital adequacy ratio increases by 0.5295%, and is statistically significant. Based on this evidence, the study reject the null hypothesis three (H_{03}) which states that Loan to deposit ratio has no significant impact on capital adequacy of deposit money banks in Nigeria.

The findings from this study implied that for policy makers to achieve adequate capital in the Nigerian banking industry, there should be adequate assets (size) and adequate financial performance. The findings also implied that loan to deposit ratio is also a significant determinant of capital adequacy of banks in Nigeria.

Conclusion and Recommendations

Based on the findings, the study concludes that bank size, return on assets and loan to deposit ratio are significant determinants of capital adequacy of deposit money banks in Nigeria. Specifically, the study concludes that firm performance (ROA) of the sample deposit money banks has significant positive impact on the capital adequacy ratio (CAR). Similarly, the study concludes that bank size (BSZE) of the sample deposit money banks has significant positive effect on the capital adequacy ratio (CAR). And, also loan to deposit ratio (LDR) of the sample deposit money banks has significant positive impact on the capital adequacy ratio (CAR).

Emanating from the findings of this study, the study recommends that regulators (CBN) should encourage banks to improve on their size, financial performance and enhanced risk assets (loans and advances). Management of deposit money banks in Nigeria should deploy more strategies that could improve the capital adequacy of their banks, so as to ensure sound banking industry in Nigeria.

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Appendices

Appendix B: Deposit Money Banks
Population and Sample of the Study

S/N	Population	Selected Banks
1	Access Bank Plc	Selected
2	Diamond Bank Plc	Selected
3	First Bank of Nigeria Plc	Selected
4	First City Monument Bank Plc	Selected
5	Guaranty Trust Bank Plc	Selected
6	Jaiz Bank Plc	
7	Stanbic IBTC Bank Plc	
8	Sterling Bank Plc	Selected
9	Sky Bank Plc	
10	Unity Bank Plc	
11	United Bank for Africa Plc	Selected
12	Union Bank of Nigeria Plc	
13	EcoBank Trans. Incorp	
14	Fidelity Bank Plc	Selected
15	Wema Bank Nigeria Plc	
16	Zenith Nigeria Plc	Selected

Source: NSE 2017

Results

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. xtsum car roa bsize ldr
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Variable		Mean	Std. Dev.	Min	Max	Observations
car	overall	.3480506	.1452383	.1086659	.689947	N = 45
	between		.0769787	.2350432	.4525172	n = 9
	within		.1253282	.0554732	.6022255	T = 5
roa	overall	.1036201	.0823413	.0256371	.5320771	N = 45
	between		.0436787	.0678091	.2068694	n = 9
	within		.0710331	-.0431023	.4288277	T = 5
bsize	overall	22.91841	1.077248	20.39476	24.67522	N = 45
	between		.5675508	22.28433	23.6736	n = 9
	within		.931468	20.48813	24.58848	T = 5
ldr	overall	.8510583	.0533071	.689947	.944057	N = 45
	between		.0306672	.7962574	.8980432	n = 9
	within		.0445721	.7090235	.9078118	T = 5

```
. swilk car roa bsize ldr
```

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
car	45	0.97156	1.232	0.442	0.32940
roa	45	0.64525	15.362	5.790	0.00000
bsize	45	0.96312	1.597	0.992	0.16062
ldr	45	0.97795	0.955	-0.098	0.53884

```
. pwcorr car roa bsize ldr, star (0.05) sig
```

	car	roa	bsize	ldr
car	1.0000			
roa	-0.0121 0.9369	1.0000		
bsize	0.7140* 0.0000	-0.0242 0.8746	1.0000	
ldr	0.8305* 0.0000	-0.2115 0.1632	0.7027* 0.0000	1.0000

```
. reg car roa bsize ldr
```

Source	SS	df	MS		
Model	16.0837677	3	5.36125589	Number of obs	= 45
Residual	5.59347141	41	.136426132	F(3, 41)	= 39.30
				Prob > F	= 0.0000
				R-squared	= 0.7420
				Adj R-squared	= 0.7231
Total	21.6772391	44	.492664524	Root MSE	= .36936

car	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
roa	1.211568	.7032379	1.72	0.092	-.2086496	2.631786
bsize	.1451117	.0738448	1.97	0.056	-.0040208	.2942443
ldr	.5294834	.087183	6.07	0.000	.3534137	.7055531
_cons	6.039914	1.607915	3.76	0.001	2.792664	9.287164

```
. hettest

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

         chi2(1)      =     1.30
         Prob > chi2  =   0.2548

. vif
```

Variable	VIF	1/VIF
ldr	2.14	0.468339
bsize	2.04	0.489975
roa	1.08	0.924709
Mean VIF	1.75	

```
. xtreg car roa bsize ldr, fe

Fixed-effects (within) regression               Number of obs      =        45
Group variable: id                              Number of groups   =         9

R-sq:  within  = 0.7352                         Obs per group: min =         5
       between = 0.8087                                        avg =       5.0
       overall = 0.7285                                        max =         5

                                                F(3,33)            =     30.54
corr(u_i, Xb)  = -0.3733                        Prob > F           =    0.0000
```

car	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
roa	1.235287	.8480982	1.46	0.155	-.4901813	2.960756
bsize	.0456376	.0983959	0.46	0.646	-.1545503	.2458255
ldr	.6840253	.1196227	5.72	0.000	.4406511	.9273994
_cons	4.293976	2.025325	2.12	0.042	.1734213	8.41453
sigma_u	.17351246					
sigma_e	.38334124					
rho	.17003881	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(8, 33) =     0.63                 Prob > F = 0.7442

. est store fixed
```

```
. xtreg car roa bsize ldr, re

Random-effects GLS regression                   Number of obs      =        45
Group variable: id                              Number of groups   =         9

R-sq:  within  = 0.7246                         Obs per group: min =         5
       between = 0.9014                                        avg =       5.0
       overall = 0.7420                                        max =         5

                                                Wald chi2(3)       =    117.89
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

car	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
roa	1.211568	.7032379	1.72	0.085	-.1667528	2.589889
bsize	.1451117	.0738448	1.97	0.049	.0003786	.2898449
ldr	.5294834	.087183	6.07	0.000	.3586078	.700359
_cons	6.039914	1.607915	3.76	0.000	2.888458	9.19137
sigma_u	0					
sigma_e	.38334124					
rho	0	(fraction of variance due to u_i)				

```
. est store random

. hausman fixed random
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
roa	1.235287	1.211568	.0237194	.4740539
bsize	.0456376	.1451117	-.0994742	.0650284
ldr	.6840253	.5294834	.1545419	.0819067

```
                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(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =        3.68
              Prob>chi2 =      0.2982
```