Dynamics of capital adequacy and profitability of internationalized deposit money banks in Nigeria

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ABSTRACT

The study examined the dynamic responses of profitability indexes to capital adequacy ratios of authorized internationalized deposit money banks in Nigeria. The data were sourced from the financial year books of the deposit money banks and analyzed with static and dynamic panel estimators. The static estimator shows that the banks have differences in managerial style, size and profitability. Also, it was revealed that return on asset and return on equity responded positively to asset size, efficiency of the use of asset and current ratio in the static models and they were highly significant. However, they were insignificant in the dynamic specifications except asset size that was significant in the return on asset model showing a weak dynamic response of profitability to capital adequacy ratios. Hence the study recommended that Banks should improve their share based as to increase the asset as this will improve profitability.

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Introduction

Banks that are capitally adequate are considered sound and sound banking system ensures optimal allocation of financial resources. The soundness of banking system is important as its failure can undermine public confidence in the system and leads to sudden contraction in money supply and investment (Toby, 2008); as such the aim of ensuring capital adequacy and soundness of banks is paramount to the efficiency and effectiveness of the working of the economy. A weak banking sector is the one that are capitally inadequate and does not only jeopardize the short and long-term sustainability of the economy but can be a major source of financial crisis which can result to macroeconomic crisis. Thus, bank capital adequacy should be given sufficient attention to avoid its negative effect on the banking institution as well as the economy at large.

The relationship between capital adequacy and profitability of banks has well been examined in literature. Empirically, the findings have been inconclusive and debated. It has been shown that the effects of capital adequacy on the profitability of Nigerian banks are insignificant when using primary data but significantly positive when dealing with secondary data, also the relationship between equity-to-asset ratio and the liquidity ratio is significantly positive for small banks but significantly negative for medium banks (Yu, 2000 and Alshatti, 2015). Recently, scholars have identified that there is a positive relationship capital adequacy and the performance of Deposit Money Banks (DMBs) in Nigeria (Udom & Eze, 2018; Olarewaju & Adeyemi, 2015; Yusuf, 2015; Edem, 2017; Kadioglu, Telceken, & Ocal, 2017; and Muraina, 2018). To the best of our knowledge, the studies that pay attention to the dynamic composition of banking performances to changes in macroeconomic conditions and the banking measurement indicators are scanty. Based on the foregoing, this study examines the impact of capital adequacy ratios on profitability of selected internationalized DMBs in Nigeria from 2005 to 2017 in a static and dynamic composition.

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The study is divided into 5 parts. Part one is the introduction; Part two focuses the literature review, part three focuses on methodology. Part four deals with the empirical results and the discussions, while part five deals with the conclusion of the study.

Literature Review

Moussa, (2018) examined 18 banks from 2000 to 2013 in Tunisia and observed that the major determinants of the selected banks performances within the period are foreign ownership, inflation rate, private ownership, liquidity rates of the banks, net interest margin and profitability indexes. Kingu, Macha, & Gwahula, (2018) observed that non-performing loans negate the performances of 16 privates commercial banks in Tanzania. EL-Maude, Abdul-Rahman, & Ibrahim, (2017) examined samples of 10 banks in 5 years in Nigeria and observed a significant impact of non-performing loans, loans and bank size on bank performances while inflation rate and capital adequacy ratio are insignificant but positive. Taiwo, Ucheaga, Achugamonu, Adetiloye, Okoye, & Agwu, (2017) used non-performing loan, loan to deposit ratio, money supply and interest rate spread to proxy credit risk management and investigated their effects on the performances of DMBs in Nigeria for 17 years. They observed that risk management strategy of DMBs in Nigeria weaken their performance or simply insignificant to the growth of loans and advances of the DMBs. Udom & Eze, (2018) used the ordinary least square estimator to measure the effect of total qualifying assets, adjusted shareholders fund and credit to risk weighted asset on commercial banks performances in Nigeria for 21 years. They included inflation rate and the growth of gross domestic product in their model and discovered that the measurement of capital adequacy requirement significantly stimulated the profitability of the commercial banks.

The model by Okoye, Ikechukwu, Leonard, Chinyere, & Christian, (2017) disclosed that the indicators of capital adequacy positively impact on deposit money banks performance in Nigeria within 2010 and 2015. Ebenezer, Omar, & Kamil, (2017) used the measures of macroeconomic and bank specific effect on the profitability of 16 DMBs in Nigeria for 6 years in a panel framework. They noticed that bank specific (capital adequacy ratio and liquidity) significantly stimulated the profitability of the 16 selected banks. Ajide & Aderemi, (2014) examined the effect of bank size, corporate social responsibility and owners' equity on the return on asset of 12 commercial banks in 2012 and disclosed that corporate social responsibility scores and bank size positively affected the profitability of the 12 banks. Furthermore, the result shows that owners' equity negates the profitability of the banks. Islam, Sarker, Rahman, Sultana, & Prodhan (2017) identified that diversified banking activities, ratio of non-performing loans to total loans, investment activities are the most significant determinants of privates commercial banks performance in Bangladesh between 2014 and 2015.

The regression models also indicates that regular capital adequacy indexes such as asset size and net interest margin are less determining factors of profitability of the selected commercial banks. Marshal & Onyekachi, (2014) and Olarewaju & Adeyemi, (2015) shows that there is a positive relationship between measures of efficiency of management (credit risk and the ratio of loan to total asset) and commercial banks performances in Nigeria (return on asset). Owoputi, Kayode, & Adeyefa, (2014) argued that macroeconomic indicators, bank specific and industry specific significantly impacted on commercial bank profitability in a panel framework for 11 years in Nigeria. Alshatti, (2015) argued that liquidity management indicators have mixed reactions on banks profitability in Jordan. He pointed out that profitability indicators reacted to investment ratio and quick ratio positively, and reacted negatively to liquid assets ratio and capital ratio. Aspa & Nazneen, (2014) observed in India that private commercial banks specific performance factor (liquidity and sensitive, management efficiency, asset quality and loan) statistically stimulated capital adequacy ratios. Godswill, Ailemen, Osabohien, & Pascal, (2018) argued that the profitability of banks depends on the efficiency of management.

Various studies have examined impact of managerial efficiency indexes and indexes of capital adequacy ratios on private banks profitability indicators and the result shows that there are significant impact of the indicators on profitability indicators (Ani, Ugwunta, Ezeudu, & Ugwuanyi, 2012; Olalekan & Adeyinka, 2013; Soyemi, Ogunleye, & Ashogbon, 2014; Ejoh, Okpa, & Egbe, 2014; Yusuf, 2015; Agbeja, Adelakun, & Olufemi, 2015; Edem, 2017; Kadioglu, Telceken, & Ocal, 2017; and Muraina, 2018).

Based on the empirical review, the impact of capital adequacy ratios on bank profitability has been inconclusive (EL-Maude, Abdul-Rahman, & Ibrahim, 2017; Islam, Sarker, Rahman, Sultana, & Prodhan, 2017; Udom & Eze, 2018; and Okoye, Ikechukwu, Leonard, Chinyere, & Christian, 2017), therefore, this study tends to contribute to the existing literature. In doing this, the study follows the works of Arellano and Bond (1991), Arellano-Bover (1995), and Blundell-Bond (1998); Blundell, et al, (2000), Davidson & Mackinnon (2004), Bun & Windmeijer (2009) Alege & Ogundipe (2013) and Medee & Ikue-John (2017) to estimate the dynamic the impact of capital adequacy ratios on profitability of selected internationalized DMBs in Nigeria from 2005 to 2017.

Research & Methodology

Data and Sources

The investigation covered the international authorized Deposit Money Banks (DMBs) in Nigeria which are Access Bank Plc, Diamond Bank Plc, Fidelity Bank Plc, First City Monument Bank Plc, First Bank Plc, Guarantee Trust Bank Plc, Union Bank Plc, United Bank of African Plc and Zenith Bank Plc. The variables covered are measurement of bank profitability indexes and Capital adequacy ratios. The index of bank profitability is limited to Return on equity and Return on Assets. Table 1 shows the variables,

descriptions, measurement and sources of the data. Our samples are taken from the financial and regulatory year books of the selected DMBs spanning from 2005 to 2017. The dependent variables are ROA and ROE

Table 1: Data Measurements and Sources

Variables	Measurement	Description	Source
ROA	Profitability	Profit after Tax/ Total Asset	Financial and regulatory year books of DMBs
ROE	Profitability	Profit after Tax/ Equity	Financial and regulatory year books of DMBs
LR	Asset Quality	Loan/Total asset	Financial and regulatory year books of DMBs
BNKSIZ	Size of Asset or Bank Size	Log of Total Asset	Financial and regulatory year books of DMBs
CR	Current Ratio	Current Ratio/Current Asset	Financial and regulatory year books of DMBs
CDR	Efficiency of the use of Asset or Capital Adequacy	Equity/Total Asset	Financial and regulatory year books of DMBs

Source: Author's Computation

Method of Analysis and Model Specifications

The models are developed in a panel framework because it controlled for individual heterogeneity of the DMBs employed. The frameworks are categories in static and dynamic models. The static model contains variables that are not lag or difference, the effect of time on this model is ignored hence they are long-run models while the dynamic model contains variables that are lag or difference. Two estimators are used for the estimation of the static model; Generalized Least Square (GLS) estimator and the Least Square Dummy Variables (LSDV) estimator. Generalized Least Square (GLS) estimator is used for the random effect model because the estimator assumes there are no differences between the management style and profitability of the individual DMBs in the model while the Least Square Dummy Variables (LSDV) estimator is used for fixed effect models because it assumes that the banks in the model have differences in their managerial style and profitability. Therefore, the rational for employing The Generalized Least Square estimator and the Least Square Dummy Variables is to show whether or not there are differences in the management style and profitability of the DMBs used in the model which could affect the results of the analysis. Based on this, the Generalized Least Square estimator and the Least Square Dummy Variables estimator are used for the estimation of the Fixed and Random Effect models respectively and the spirited Hausman test is used to select the model that has a better fit and consistent coefficient.

The GLS and LSDV estimators cannot be applied to the dynamic specifications because it will render the estimates biased and inconsistent. That is, the both estimators cannot account for the autocorrelation resulting from the introduction of the lag of the dependent variable among the explanatory variables and, the unobserved main effects and interaction effects characterizing the heterogeneity among the units. To overcome these econometric problems inherent in the use of GLS and LSDV estimators for dynamic panel models, the study follows the works of Arellano and Bond (1991) Generalized Methods of Moment (GMM) also called the difference GMM and Blundell-Bond (1998) system GMM (Arellano-Bover, 1995; Blundell, et al, 2000; Davidson & Mackinnon, 2004; Bun & Windmeijer, 2009; Alege & Ogundipe 2013; and Medee & Ikue-John, 2017) to estimate the dynamic specification of the model.

The general specification of a static model is given as

$$Y_i = X_i\beta + \varepsilon_i;$$

(i = 1, 2... N)

$$Y_i = \begin{bmatrix} Y_{i1} \\ Y_{i2} \\ \vdots \\ Y_{iT} \end{bmatrix}_{T \times 1} = \begin{bmatrix} X_{i1} \\ X_{i2} \\ \vdots \\ X_{iT} \end{bmatrix}_{T \times k} + \begin{bmatrix} \varepsilon_{i1} \\ \varepsilon_{i2} \\ \vdots \\ \varepsilon_{iT} \end{bmatrix}_{T \times 1}$$

Where:

Y_i is the dependent Variables

X_i is the explanatory variables and ε_i is the error term.

Pooled Regression Model

$$Y_{i,t} = X'_{i,t}\beta + \varepsilon_{i,t}$$

$$Y_i = \begin{bmatrix} X_{i,t}^1 \\ X_{i,t}^2 \\ \vdots \\ X_{i,t}^k \end{bmatrix}_{k \times 1} + \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_k \end{bmatrix}_{k \times 1}$$

Fixed Effect Model

$$Y_{i,t} = X'_{i,t}\beta + \varepsilon_{i,t} \quad ; \quad \varepsilon_{i,t} = \alpha_i + \gamma_t + \eta_{it}$$

Where

α_i is the unobserved cross sectional specific effects

γ_t is the unobserved time specific effects

η_{it} is the common cross sectional specific effects

Random Effects Model

$$Y_{i,t} = X'_{i,t}\beta + \alpha + u_i + \eta_{it}$$

Where

α and u_i is the random individual effect.

Dynamic Model

$$Y_{i,t} = \partial Y_{i,t-1} + X'_{i,t}\beta + u_i + v_{it}$$

$$Y_{i,t} - Y_{i,t-1} = \partial(Y_{i,t-1} - Y_{i,t-2})\beta_i + \partial(X'_{i,t} - X'_{i,t-1})\beta_j + (v_{it} - v_{i,t-1})$$

$$\text{or. } \partial Y_{it} + \partial \beta_i Y_{i,t-1} + \partial \beta_j X'_{i,t} + \Delta v_{it}$$

$$\partial Y_{it} + \alpha \partial Y_{i,t-1} + \partial X'_{i,t}\beta + \gamma Z'_{it} + v_i + \varepsilon_{it}$$

∂Y_{it} is the first difference of the dependent variable in bank i at time t ; $\partial Y_{i,t-1}$ is the lagged difference of the dependent variable, $\partial X'_{i,t}$ is a vector of lagged level and differenced pre-determined explanatory endogenous variables; Z'_{it} is a vector of endogenous variables; and α, β and γ are parameters to be estimated. The term v_i and ε_{it} are assumed to be independent over all time period in $Bank_i$.

Results and Discussion

The results of the second period lag variables in the difference and system-GMM models in Table 2 and Table 3 show significant cluster effects of lagged dependent variables (see equation c, d, e and f) reflecting the strength of the effects of profitability on the performances of the selected banks. This implies that good performances of the DMBs can internally stimulate more profits. The spirited Hausman statistics reveals that the banks in the model have differences in their management style and levels of performances. That is, fixed Effect models are better fit with consistent coefficient than the random effect models in the static modification on Table 2 and Table 3.

Table 2: Results for ROE Models

	FIXED EFFECT OLS (A)	RANDOMEFFECT OLS (B)	DIFF-1 GMM (C)	DIFF-2 GMM (D)	SYS-1 GMM (E)	SYS-2 GMM (F)
<u>L1.ROE</u>			-0.009*** (-11.23)	-0.0292*** (-7.82)	-0.6312*** (-4.66)	-0.6015** (-2.77)
<u>L2.ROE</u>			0.3812*** (4.97)	0.3927*** (3.64)	0.0358*** (3.42)	0.0168** (2.19)
<u>BNKSIZ</u>	0.1294** (2.09)	0.1236*** (2.44)	0.0162 (1.32)	0.0496 (1.29)	0.1471 (0.86)	0.1384 (0.50)
<u>CDR</u>	0.6067** (2.57)	0.5917** (2.78)	0.2395** (2.17)	0.3433 (1.31)	0.3127 (1.40)	0.4441 (1.63)
<u>LR</u>	-0.660*** (-4.37)	-0.5417*** (-3.58)	-0.0141 (-2.76)	-0.0778** (-2.07)	0.7712*** (-3.97)	-0.5797** (-2.78)
<u>CR</u>	0.5287*** (3.75)	0.4129*** (2.88)	0.1121 (0.62)	0.1938 (0.47)	0.2001 (1.38)	0.1037 (1.52)
<u>C</u>		-0.4017 (-1.27)			-3.6783 (-1.67)	-4.4205 (-1.36)
Models Diagnostic						
<u>R²</u>	0.3488	0.1671				
<u>AR(1)</u>			[0.038]	[0.022]	[0.040]	[0.019]
<u>AR(2)</u>			[0.108]	[0.598]	[0.174]	[0.273]
<u>H-test</u>	14.44 [0.0060]					
<u>Instrument</u>			8	8	9	9
<u>Hansen J-Test</u>			[0.722]	[0.722]	[0.161]	[0.145]
<u>Diff-In-Hansen Test</u>			[0.078]	[0.078]	[0.998]	[0.449]
<u>Observations</u>	117	117	90	90	99	99
<u>Banks</u>	9	9	9	9	9	9

Source: Author's Computation. **Note:** *, ** and ***denote that the coefficients of the parameters are statistically significant at 10%, 5% and 1% level of significance respectively.

Note: P-values - are in square brackets and t-values are in bracket. The AR(1) and AR(2) values reported -are the p-values for first and second order autocorrelation disturbances in the dynamic models. The Hansen J-test row reports -the p-values of the null hypothesis of instruments validity. All GMM regressions used robust standard errors and treat the lagged of Profitability as predetermined. In addition to these, we collapse the instrument matrix and use only two lag (Bond, 2002; and Heid, Langer, & Larch, 2012).

It is revealed in the static models of Table 2 and Table 3 that return on asset and return on equity significantly responded to changes in asset size, efficiency of the use of asset and current ratios positively. The inelastic nature of the coefficient means that a proportional increase in asset size, efficiency of the use of asset and current ratios leads to less than proportional increase in profitability indicators (ROA and ROE) (see Table 2 and Table 3). The results validated the works of Udom & Eze, (2018); Ani, Ugwunta, Ezeudu, & Ugwuanyi, (2012); Olalekan & Adeyinka, (2013); Soyemi, Ogunleye, & Ashogbon, (2014); Ejoh, Okpa, & Egbe, (2014); Marshal & Onyekachi, (2014), Olarewaju & Adeyemi, (2015); Yusuf, (2015); Agbeja, Adelakun, & Olufemi, (2015); Edem, (2017); Kadioglu, Telceken, & Ocal, (2017); EL-Maude, Abdul-Rahman, & Ibrahim, (2017); and Muraina, (2018). The scholars observed significant positive impact of capital adequacy ratios and commercial banks efficiency indexes on profitability indicators under different financial and macroeconomic conditions in Nigeria. However, this present work differs from the works reviewed as none considered the dynamic implications of their selected indicators on profitability or performance indexes.

Models (c, d, e and f) in Table 2 and Table 3 are the models for the dynamic responses of profitability indexes (ROA and ROE) to bank size, asset quality, efficiency of the use of asset and current ratios of the selected internationalized deposit money banks in Nigeria. The dynamic behaviour of the selected ratios was insignificant except that of asset size that was positive and significant in Table 2. This implies that bank size, efficiency of the use of asset and current ratios failed to contribute meaningfully to ROE in the short-term. The results show that asset quality (loan to assets) is the main determinant of profitability (ROE) in the Nigeria DMBs in the short-term.

Table 3: Results for ROA Models

	FIXED EFFECT OLS (A)	RANDOM EFFECT OLS (B)	DIFF-1 GMM (C)	DIFF-2 GMM (D)	SYS-1 GMM (E)	SYS-2 GMM (F)
<u>LROA</u>			-0.0503** (-2.87)	-0.0502** (2.16)	-0.3644*** (-3.09)	-0.2226** (-2.09)
<u>L2.ROA</u>			0.2159*** (5.12)	0.2122*** (8.02)	0.1159*** (6.23)	0.1578*** (5.22)
BNKSIZ	0.0187** (2.42)	0.0181*** (2.80)	0.0756** (2.17)	0.0713*** (3.81)	0.0514*** (2.61)	0.0521** (2.11)
CDR	0.1927*** (2.62)	0.1905*** (6.89)	0.0348 (0.74)	0.1211 (1.67)	0.3746 (1.25)	0.3081 (0.91)
LR	-0.0931*** (-4.96)	-0.0733*** (-4.03)	-0.0021 (-0.73)	-0.0012 (-1.21)	-0.1114 (-0.41)	-0.1936 (-0.77)
CR	0.0993*** (5.66)	0.0776*** (4.50)	0.0019 (0.72)	0.0042 (0.98)	0.0016 (1.18)	0.0102 (0.87)
C	-16.06*** (-7.55)	-0.0567*** (-1.01)			2.1303 (1.01)	1.6502 (0.73)
Models Diagnostic						
R ²	0.3540	0.3383				
<u>AR(1)</u>			[0.016]	[0.012]	[0.022]	[0.038]
<u>AR(2)</u>			[0.383]	[0.118]	[0.140]	[0.233]
H-test	12.42 [0.0145]					
Instrument			6	6	8	8
Hansen J-Test			[0.112]	[0.722]	[0.733]	[0.732]
Diff-In-Hansen Test			[0.099]	[0.118]	[0.563]	[0.564]
observations	117	117	90	90	99	99
Banks	9	9	9	9	9	9

Source: Author's Computation. **Note:** *, ** and ***denote that the coefficients of the parameters are statistically significant at 10%, 5% and 1% level of significance respectively.

Also, in Table 3 the dynamic behaviour of the selected ratios was insignificant except that of bank size that was positive and significant. This implies that asset quality, efficiency of the use of asset and current ratios failed to contribute meaningfully to ROA in the short-term. The results show that bank size (assets size) is the main determinant of profitability (ROA) in the Nigeria DMBs in the short-term. This shows that the profitability of the DMBs in the very short-term is highly dependent on the size of the banks and inversely dependent on the quality of the asset. Indicating that the higher the ratio of loan to assets the lower the profitability of the selected DMBs in Nigeria. The significant negative sign of loan to asset (efficiency of management) demonstrated the weak responses of management of the selected banks to macroeconomic, financial and external shocks in the very short-term (Marshall & Onyekachi, and 2014; and Olarewaju & Adeyemi, 2015).

Conclusion

The study used static and dynamic panel analysis to examine the responses of return on asset and return on equity to changes in asset size, efficiency of the use of asset (capital adequacy), current ratios and managerial efficiency for 13 financial years, that is, from 2005 to 2017. It revealed that return on asset and return on equity responded positively to asset size, efficiency of the use of asset (capital adequacy) and current ratio in the static models and they were highly significant. However, they were insignificant in the dynamic specifications except asset size that was significant in the return on asset model.

The study observed that most of the explanatory variables were insignificant in the dynamic model indicating that managerial efficiency of the selected banks has not contributed meaningfully to the profitability indexes. That is, the weakness of the management of the DMBs to handle short-term fluctuations is the main causes of failures of the banks. It also shows that the harsh macroeconomic and financial environment in Nigeria over power the management of the banks. The study concludes that the profitability of deposit money banks in Nigeria is weak in the very short-term due the inability of the management to respond immediately to short-term shocks as indicated by the current and 1st lag of the profitability indicator and, the constant level of managerial inefficiency (loan/asset).

Based on the results, the managerial styles of the banks are not dynamic to adjust to macroeconomic, external and financial shocks, hence the paper recommended for a managerial style that will accommodate the dynamism in macroeconomic (financial shocks) behavior in the Nigeria economic.

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Conflicts of Interest: The authors declare no conflict of interest.

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