

CAPITAL CONUNDRUM: INVESTIGATING THE NEXUS BETWEEN BANK CAPITALIZATION AND PROFITABILITY IN NIGERIA

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Abstract

The profitability of commercial banks is of paramount importance to the overall health and vitality of an economy. This study delves into the determinants of bank profitability in Nigeria, particularly after a significant round of bank recapitalization in 2005. We address key questions regarding the factors influencing bank profitability in the post-recapitalization era and assess the impact of market power on bank returns. Through empirical analysis, we identify the driving forces behind profitability in Nigeria's commercial banks and examine the relative significance of market power among these determinants. Our findings offer valuable insights for policymakers and stakeholders in fostering a robust financial sector that can effectively support economic growth.

1. Introduction

Effective and efficient operations of the financial sector are very critical in any economy because the financial sector especially commercial banks serve as a fuel for running economic activities. Therefore, more attention has been focusing on how well banks are running. This calls for numerous studies on what drives bank profitability within a country, a region, and at the global level. Similarly, many studies have carried out for the Nigerian banks because special features of the country and its past experience. Nigerian banking industry experienced different reforms in order to ensure that the country has a strong banking industry that enhances the economic activities. This motivation led to the 2005 bank capitalization that reduced the number of commercial banks from 89 to 22 through merger and acquisition. A little concern has shown on how effective and efficient these 22 commercial banks operate.

Little studies on determinants of bank profitability in Nigeria such as Ani et al. [4], Aburime [1] did not focus on the bank capitalization. Owing to this, this paper intends to investigate factors that influence the level of bank profitability after bank recapitalization. In addition, it intends to provide answers to the following research questions: what are the determinants of bank profitability in Nigeria after bank recapitalization? Does any of these determinants reduce its strength because of the financial reforms? In addition, existing previous studies such as Flamini et al. [12] consider the limitation of their research as the inability to investigate whether market power influences bank returns. This paper will address the identified limitation by providing an answer to the question: Does relative market power matter after recapitalization? If yes, to what the extent and what is its magnitude compared to determinants of bank profitability in Nigeria?

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In the light of this, the paper aims to understand the factors that drive the level of profitability of Nigeria's commercial banks. In order to achieve this, the specific objectives are to empirically determine the factors that drive bank profitability in Nigeria, analytically investigate whether market power has a significant influence on bank profitability, and analytically examine the relative magnitude of significant determinants of profitability in Nigeria's commercial banks. Also, the paper provides country-level policy conclusions that can boost private productive sector through a sound financial system. The rest of this paper is segmented as follows; section II is on the stylized facts on the banking industry in Nigeria while section III reviews the existing studies. The analytical framework, as well as methodology, is discussed in section IV, while empirical results and discussion are presented in section V. Section VI is on conclusion and policy implications.

2. Stylized Facts of Banking Industry in Nigeria

Nigeria's economy grew at 3.05 percent for the first three-quarters of 2015 compared to 6.33 percent in 2014. Its low economic performance was as a result of continuous falling in the global crude oil price as well as reducing investor confidence arose from the delay in appointing the Buhari-led government cabinet, and the reluctance to devalue the naira. However, the country experienced the worst with the negative growth rate of -3.00% due to the delay in the approval of 2016 budget. Prior to the drastic fall in oil price that commenced in the mid-year of 2014, the Nigerian economy was driven by non-oil sector. However, the oil sector witnessed a declining growth rate towards the last quarter of 2014. This triggers government efforts towards reducing the over-dependence on oil sector and diversifying the domestic economy.

The 2015 election posed a great uncertainty that accounted for volatility in the financial sector in replicating to a continuous rise in yields among all fixed income securities. The trending fall in government revenue as well as foreign exchange scarcity led to the slow growth rate in Nigeria in 2015. The country's monetary authority reacted to the event by employing different policy interventions with the aim of curbing the demand for foreign currency and preventing the naira devaluation. In addition, the cash reserve ratio (CRR) was put at 31 percent for both public and private deposits, banks were prevented from accepting foreign cash deposits from their customers, as well as the removal of 41 items from accessing foreign exchange at the official market rate.

Despite all these government measures, the country's external reserves reduced substantially from about US\$35 billion in 2014 to US\$ 28 billion in April 2016. This points to a reason against the continuous devaluation of the naira by economists. However, since the introduction of naira for over the past four decades, its value was not eroded to the extent that a US\$ 1 was exchanged for N282 in the parallel market in December 2015. Whereas, the Central Bank of Nigeria (CBN) still fixed the official exchange rate at US\$1/197 in December 2015, even with the widely acceptable fact that floating exchange market might be the solution to the shortage of foreign exchange in the economy.

Nigeria being the largest economy in Africa, was recovering from commodity price shock of 2008-2009 as well as the banking crisis. Of recent, the country needs to address the issue of massive infrastructure deficits, and the high level of abject poverty and inequality. A sound banking system enhances channels for more savings into productive investments, particularly in quality infrastructure. The average contribution of the financial sector to the Nigerian economy is with the range of 2.5 percent and 3.5 percent between the first quarter of 2014 and the first quarter of 2016 (Fig. 1).

Commercial banks are very important key players in the financial sector. For instance, the banks witnessed a peak growth rate of about 60 percent in their total assets at the end of 2005, indicating the positive outcome of the Nigeria's bank capitalization. However, the growth rate declined to the lowest in 2009 as a result of the 2007-2009 global financial crisis. Afterward, an upward trend was recorded in their asset growth rate (Fig. 2). The poor performance of Nigeria's oil sector has significantly created a high pressure on the banking system in the country. Banks confronted with the issues such as uncertainty before 2015 election. Implementation of the Treasury Single Account (TSA) which mops cheap government deposits from banks, higher level of non-performing loans arising from a drastic fall in oil prices; and the CBN's restrictive policies on foreign exchange, which hinders their lucrative foreign currency business. In addition, the Nigerian banks are heavily dependent on oil and gas sector in the sense that about 23.8 percent of their loans is provided to the oil and gas sector in the first half of 2015 from 10 percent in 2014.

The three largest banks in terms of asset raised their oil and gas portfolios by 101 percent, 47 percent, and 37 percent respectively in 2014 (Oxford Analytica [23]). The recent falling oil prices have adversely affected banks' performance in the country. Therefore, there might significantly increase non-performing loans in most banks, which invariably might lead to low revenue and profits for them. Another issue is how honest banks are in disseminating their financial information on the Nigerian Stock Exchange.

Nigerian banks are running in an increasing unfavorable business environment as a result of a drastic fall in their profitability, asset quality, liquidity, and capital ratios. Their low performance is driven by their high exposure to their domestic market and the economic slowdown. The slowdown is attributed to lower oil prices, reduced government spending, and restriction on foreign exchange availability. Since the implementation of TSA in August 2015, public deposits which account for about 8 percent of total deposit withdrew their money from commercial banks. This poses an added pressure to bank liquidity. Loan growth rate was contracted in mid-year of 2015 and nonperforming loans were below 10 percent in 2015.

Some structural reforms have been implemented by developing economies like Nigeria in order to ensure that the banking sector is financially and efficiently healthy. The banking system in Nigeria was recorded better performance in the 1990s since there was adequate capital base in each bank to perform the financial operations. The sector experienced a high level of fragmentation complemented with a low level of financial intermediation at the end of 2014. This drives the banking sector reform by the Central Bank of Nigeria to raise the capital base of the banks from 2 billion naira to 25 billion naira, and invariably reduce the number of commercial banks from 89 to 25 through the process of mergers and acquisition in 2006 (Hessen, 2007 as cited Gil-Alana . [14]).

However, some of the 25 commercial banks were characterized with fund mismanagement and overvaluation of assets after CBN reform in 2006. This further reduced the number of banks to 22 (CBN, 2014 as cited in Gil-Alana et al. [14]). A robust, stable and firmly anchored financial system is the key engine of a long-term sustainable economic growth. This is based on the fact that the banking industry provides required funds for carrying out production activities in the other sectors of the economy as well as money needed by final consumers. Addressing this important and urgent issue motivates this study.

3. Literature reviews on the determinants of Bank profitability

The empirical studies on determinants of bank profitability have increased particularly those that investigated the level of profitability in the banking industry of advanced economies and more recently, in some developing economies like Nigeria. Table 1 summarizes the selected recent studies on the determinants of bank profitability at country-specific or cross-country levels. Based on the literature, the existing studies on determinants of bank profitability can be broadly grouped into two. The first stream of research examined factors that drive the level of profitability in a bank using cross-country data while the second stream examined this based on the country-specific data.

The first stream of research work includes Flamini et al. [12], Titko et al. [32], Petria et al. [27], Djalilov and Piesse [10], Bourke [6], Short [28], Pasiouras and Kosmidou [25], Hsieh and Lee [15], Molyneux and Thornton [20], Naceur & Omran [22], Albertazzi and Gambacorta [2]. For instance, Djalilov and Piesse [10] examined the factors that influence the level of bank profitability in transition economies particularly in Central and Eastern Europe between 2000 and 2013 for 275 banks using the generalized method of moments (GMM) technique. They found that credit risk positively and significantly determined bank profitability in the early transition but exhibited a negative impact in the late transition countries. The adverse relationship was found between governance and bank profitability, and between monetary freedom and bank profitability only in late transition economies. In addition, better-capitalized banks were more profitable in early transition countries. However, Titko et al. [32] conducted both multiple regression and correlation analyses to determine the drivers of bank profitability in Latvia and Lithuania from 2008 to 2014. Their findings indicated the absence of a significant link between net interest margin (measures profitability for Latvia), net commission and fees income as a percentage total assets (measure profitability for Lithuania), and independent variables. Petria et al. [27] employed panel data to analyze the determinants of bank profitability in the European Union between 2004 and 2011 with the aid of fixed effect and random effect models. Their result showed that bank profitability (returns on average assets and returns on

average equity) received significant influence from credit and liquidity risk, management efficiency, the diversification of business, the market concentration/competition, and economic growth.

However, bank size did not exhibit any significant influence on ROAE but had a small and weak significant impact in the case of ROAA. Furthermore, Nuceur and Omran [22] examined the influence of bank regulation and financial reforms on banks' performance in MENA region by applying the dynamic system generalized method of moments (GMM) technique for the sample period 1988-2005. They found that the bank-specific variables particularly bank capitalization and credit risk exhibit a positive and significant impact on net interest margin, cost efficiency and profitability of banks, but no significant influence from macroeconomic and financial development variables. In addition, they identified that regulatory and institutional variables have an influence on bank performance.

In the same vein, Hsieh and Lee [15] empirically addressed the puzzle between banking competition and profitability for 61 countries from 1992 to 2006 using the dynamic generalized method of moments (GMM) technique. They concluded that higher degree of activity restriction with the change in market structure boosts banks' profit; restriction of commercial banks to involve in non-banking related activities, as well as entry barrier for foreign banks, would weaken the positive link between banking competition and profit. In addition, the positive link might be weakening in economies with a sound financial system or high income per capita; and greater competition would mitigate the influence of banking competition on profit. On the other hand, Albertazzi and Gambacorta [2] investigated the link between business cycle fluctuations and banking sector profitability in selected 10 countries from Euro area and the Anglo-Saxon region between 1981 and 2003 using the generalized method of moments (GMM) estimator. Their findings indicated that gross domestic products (GDP) influenced both net interest income and loan loss provisions; and fluctuations of the long-term interest rate exhibited a slight impact on the net interest income in Italy, Spain and Portugal but a substantial impact recorded from the money market interest rate.

Similarly, Flamini et al. [12] empirically investigated the determinants of bank profitability in Sub-Saharan Africa between 1998 and 2006 using the panel data. With the aid of Arellano-Bond two-step Generalized Method of Moment (GMM), they found that variables such as bank size, activity diversification, and private ownership have a positive influence on the level of bank profitability (ROA) in the region. Also, their results revealed that returns on assets granger cause capital, implying that high returns are not instantly retained in the form of equity increases. However, Pasiouras and Kosmidou [25] analyzed the determinants of profitability in 584 commercial banks for selected fifteen European countries between 1995 and 2001 using a balanced panel dataset of 4,088 observations. They applied fixed effect estimation technique, and their findings indicated that all independent variables significantly influenced the level of profitability of both domestic and foreign banks. However, only the variable of concentration did not exhibit a significant influence in the case of domestic banks profit.

Studies with a country-specific focus include Aburine [1], Alkhazaleh and Almsafir [3], Tariq et al. [31], Isaac Boad [5], Ani et al. [4], Park et al. [24], Naceur and Goaied [21], Mamatzakis and Remoundos [19], Sufian and Habibullah [30], Sufian and Habibullah [29], Trujillo-Ponce [33], Dietrich & Wanzenried [8]. Of recent, Boad [5] investigated factors that determine the bank profitability in Ghana with the aid of random effect and pooled models from 1997 to 2014. He concluded that internal and external variables significantly determine bank profitability unlike other studies found evidence of significant influence from only non-interest income. In addition, no significant impact is recorded from variables such as the number of employees, inflation and real interest rate in Ghana.

Similarly, Alkhazaleh and Almsafir [3] conducted an empirical analysis of determinants of bank profitability in Jordan between 1999 and 2013 using the fixed effect regression model. Their result showed that capital structure, bank size, and liquidity exhibit a significant influence on bank profitability. Tariq et al. [40] also analyzed the determinants of profitability level in Pakistan banks for the sample period 2004-2010 by utilizing both fixed and random effect models. However, Antonio (2013) investigated what determines the profitability of banks in Spain using data from 1999 to 2009 with the estimation technique of Generalized Method of Moments (GMM). He revealed that variables such as the percentage of loans in total assets, customer deposits, efficiency and low doubtful assets ratio positively affect bank profitability, but no impact of economies or diseconomies of scale

when profitability is captured by return on assets (ROA). Sufian and Habibullah [30] employed an unbalanced panel data of 153 banks to examine the effect of globalization on bank performance in China with the aid of panel regression method. Their result revealed that bank profitability is positively and significantly determined by trade flows, cultural proximity, and political globalization.

On the other hand, Dietrich & Wanzenried [8] utilized unbalanced panel dataset of 372 commercial banks to examine the drivers of bank profitability in Switzerland before and during the global financial crisis with the application of the dynamic system GMM estimator. Their results revealed that capital ratio and credit quality exhibit no influence on bank profitability before the financial crisis but a negative and significant impact during the crisis. In addition, taxation significantly and negatively determines the level of bank profitability but market concentration (measured by Herfindahl Index) has a significant and positive influence before the crisis. Whereas, ownership and market structure do not have any impact on the level of profitability in the banking sector.

Sufian and Habibullah [29] provided an empirical answer on whether economic freedom influences banks' performance in Malaysia using panel data between 1997 and 2007 with the OLS estimation technique. They found that economic freedom and business freedom have a favourable effect on banks' performance while an adverse effect comes from monetary freedom. They concluded further that corruption has a corrosive impact on Malaysian banks profitability. However, Aburine [1] analyzed factors that influence the profitability level in Nigerian commercial banks using panel regression technique for the period 2000-2004. He revealed that bank profitability is significantly influenced by variables such as capital size, the size of the credit portfolio, extent of ownership concentration, while no significant impact was recorded from the size of deposit liabilities, labour productivity, and the state of IT ownership, control-ownership disparity, and structural affiliation. Similarly, Ani et al.[4] utilized pooled ordinary least square (OLS) to investigate the drivers of bank profitability in Nigeria between 2001 and 2010. They found that bank size, capital and asset composition mainly affect the level of profitability (ROA, ROE, NIM) in Nigeria. Based on the above literature reviews, it is obvious that little research has been carried out for Nigeria where commercial banks are so relevant for driving economic growth and development. In addition, the existing works found mixed and inconclusive results while none of the studies reviewed pays attention to the effect of 2005 bank capitalization in Nigeria. The need to fill this relevant gap motivates this study. To support the main contribution of the present study, Table 1 summarizes a recent documentation of the empirical evidence so far.

4. Analytical Framework and Methodology

4.1 Analytical Framework

4.1.1 Conceptual Framework

Bank profitability is measured in three different ways. Some studies measured bank profitability using returns on assets (ROA) and returns on equity(ROE)(see Antonio Trujillo-Ponce,[33]; Naceur & Omran,[22]) while another stream of research extends the measure of bank profitability by including net interest margin (NIM) (see Ani et al.[4], Andreas Dietrich and Gabrielle Wanzenrid [8].Andreas and Gabrielle [8] and Pasiouras and Kosmidou [25] used returns on average assets (ROAA) instead of ROA in their empirical work. In addition, the formerly employed returns on average equity (ROAE) in place of ROE to measure bank profitability. However, Short [28] used the profit rate to capture the bank profitability. In the light of this, this study employs returns on assets (ROA), returns on equity (ROE), and net interest margins (NIM) as a proxy for bank profitability.

4.1.2 Theoretical Framework

Two broad approaches have been employed to examine the market structure, namely; traditional and empirical approaches. The traditional approach supports the Structure Conduct Performance (SCP) hypothesis which states that greater concentration leads to less competitive bank conduct and invariably results in higher bank profitability. Therefore, it uses concentration indices such as market share of the largest banks or the Herfindahl index ((Fungáčová et al. [13])).However, the empirical approach carries out non-structural tests to address the problem of indirect proxies for market competition under the traditional method. The non-structural measures under the banks' conduct directly through indices such as Lerner index with the aid of micro-level bank data (Fungáčová et al., [13]). However, the argument against Lerner index is that it is applicable in the case of a monopoly situation. Consider the nature of Nigeria's banking industry; it is a widely acceptable fact that the

industry is not a monopoly. Therefore, the study will employ Herfindahl index based on the nature of data availability and the real situation of commercial banks in Nigeria.

4.2 Methodology

4.2.1 Nature of Data

Table 2 provides the description of variables utilized for this study as well as their data source.

4.2.2 Panel Unit Root

Panel unit root is analogous to unit root in time series data. However, the main difference is testing the asymptotic behavior of time series (T) only, while panel unit root considers asymptotic behavior in both time series (T) and cross-sectional (N). To determine the asymptotic behavior of estimators, we will critically examine how N and T converge to infinity. Thus, this is used for testing non-stationary panels. The asymptotic behavior can be achieved through the following: (a) sequential limit theory whereby a dimension, say T is fixed and dimension N is allowed to move to infinity, giving an intermediate limit, then allows T to move to infinity successively; (b) diagonal path limits that allowed both dimensions N and T to approach infinity along a diagonal path; and (c) joint limits, also allowed both cross-sectional (N) and time-series (T) to approach infinity simultaneously without placing diagonal path restrictions on the divergence and these are more robust than the other ones (sequential limit theory and diagonal path limits). Let us consider the model:

$$y_{it} = \alpha + \beta_1 x_{it} + \beta_2 x_{it-1} + \dots + \beta_k x_{it-k} + \epsilon_{it}, \quad i = 1, 2, \dots, N, \quad t = 1, 2, \dots, T \quad (1)$$

where y_{it} is the exogenous variables, $\beta_1, \beta_2, \dots, \beta_k$ are the autoregressive coefficients and ϵ_{it} is the error term which assumed to be independent idiosyncratic disturbance. In series is said to contain a unit root if $\rho = 1$ and it is weakly stationary if $\rho < 1$.

2.2.2.1 Levin-Lin-Chu Test

Levin, Lin and Chu [24] suggest that each time series contains a unit root and the lag of k is allowed to vary across individuals. Levin et al. [17] showed that individual unit root tests have limited power against the alternative hypothesis that has high persistent deviations from equilibrium.

$$\Delta y_{it} = \alpha_i + \rho_i y_{it-1} + \beta_1 x_{it-1} + \beta_2 x_{it-2} + \dots + \beta_k x_{it-k} + \epsilon_{it} \quad (2)$$

Under $H_0: \rho_i = 0$ versus $H_1: \rho_i < 1$

2.2.2.2 Im, Pesaran and Shin W-stat Test

In the case of Im, Pesaran and Shin (IPS) test allows for heterogeneous coefficients. The test assumes that all individuals cross-sectional have unit roots. This can be represented mathematically as follows:

$$\Delta y_{it} = \alpha_i + \rho_i y_{it-1} + \beta_1 x_{it-1} + \beta_2 x_{it-2} + \dots + \beta_k x_{it-k} + \epsilon_{it} \quad (3)$$

: $\rho_i = 0$ for all individuals in the panel

However, the test assumes that some of the individuals cross-sectional have unit roots.

$$\rho_i < 0, \quad i = 1, 2, \dots, N$$

$$\rho_i = 0$$

:

$$\rho_i = 1, \dots, N$$

Individual t-statistic (t_i) is used to test the null hypothesis $H_0: \rho_i = 0 \forall i$, then t-statistic is obtained from the average individual unit root test. Thus, $t_i \sim (0,1)$.

2.2.2.3 ADF-Fisher Chi-square Test

ADF-Fisher Chi-square Test is the extension of Fisher [11] which was proposed by Maddala and Wu [18] to test panel unit root. This test uses the p-values of the test statistics for each residual cross-sectional component i. The test is a symptomatically chi-square distributed with 2N degree of freedom and where N is the number of cross sections in the panel. It is a robust test for unbalanced panels. The test can be represented in the form:

N

$$\sum_{i=1}^N -2 \ln p_i \quad (4)$$

i=1

where p_i is the p-value of the test statistic in unit i.

2.2.2.4 PP-Fisher Chi-square Test

Choi [7] proposes two test statistics to test for unit roots in the panel data. The tests are inverse normal test and logit test. The inverse normal test is represented as follows:

$$Z_i = \frac{1}{\sqrt{T}} \sum_{t=1}^T \Phi \left(\frac{y_{it}}{\sigma_i} \right) \quad (5)$$

where Φ is the standard normal cumulative distribution function and $\frac{y_{it}}{\sigma_i} \in [0,1]$, $\Phi \left(\frac{y_{it}}{\sigma_i} \right)$ has a standard normal distribution as the time series observations for the i th group ($\frac{y_{it}}{\sigma_i}$) tends to infinity, therefore, Z also approaches standard normal with mean 0 and variance 1.

The logit test is of the form:

$$Z_i = \frac{1}{\sqrt{T}} \sum_{t=1}^T \ln \frac{\exp(y_{it})}{1 + \exp(y_{it})} \quad (6)$$

where $\ln \frac{\exp(y_{it})}{1 + \exp(y_{it})}$ has a logistic distribution with mean zero (0) and variance $\frac{\pi^2}{3}$. When $T \rightarrow \infty \forall i, \sqrt{T} Z_i \sim N(0,1)$ and

$$Z_i = \frac{\left(\frac{1}{\sqrt{T}} \sum_{t=1}^T \ln \frac{\exp(y_{it})}{1 + \exp(y_{it})} \right)}{\left(\frac{1}{\sqrt{T}} \sum_{t=1}^T \frac{1}{1 + \exp(y_{it})} \right)}$$

4.2.3 Co-integration Test

To test for the existence of long-run relationship among the variable in the panel, residual-based co-integration tests were used in this paper. These tests are Kao Residual Co-integration Test and Pedroni Residual Cointegration Test.

4.2.3.1 Kao Residual Co-integration Test

Kao [16] proposed DF and ADF types tests for testing co-integration in panel data. From the panel regression model:

$$y_{it} = \alpha_i + \beta_i x_{it} + \varepsilon_{it}, \quad i = 1, 2, \dots, N; t = 1, 2, \dots, T \quad (7) \sim (0,1)$$

where y_{it} and x_{it} are integrated at order 1 and non-cointegrated. The residual based cointegration

$$y_{it} = \alpha_i + \beta_i x_{it} + \varepsilon_{it}$$

Where ε_{it} is estimated as $\varepsilon_{it} = \frac{\sum_{i=1}^N \sum_{t=1}^T y_{it} - \frac{1}{N} \sum_{i=1}^N \sum_{t=1}^T y_{it}}{\sum_{i=1}^N \sum_{t=1}^T x_{it} - \frac{1}{N} \sum_{i=1}^N \sum_{t=1}^T x_{it}}$

To test the null hypothesis of no cointegration, then, the t-statistic is:

$$t_{\varepsilon} = \frac{\frac{1}{N} \sum_{i=1}^N \sum_{t=1}^T \varepsilon_{it}}{\sqrt{\frac{1}{N} \sum_{i=1}^N \sum_{t=1}^T \varepsilon_{it}^2}}$$

4.2.3.2 Pedroni Residual Co-integration Test

Pedroni [26] proposed some tests for the testing null hypothesis of co integration in panel data. The test allows for heterogeneity across units of a panel. Considering this model:

$$y_{it} = \alpha_i + \beta_i x_{it} + \gamma_i + \delta_i t + \varepsilon_{it} \quad (8)$$

Where y_{it} and x_{it} are $I(1)$, α_i and γ_i are slope coefficients, specific fixed effect and deterministic trends respectively. The slope coefficients vary by individual cross-sectional, thus cointegrating vectors are heterogeneous across units of the panel.

From equation (8), $\hat{\varepsilon}_{it} = y_{it} - \hat{\alpha}_i - \hat{\beta}_i x_{it} - \hat{\gamma}_i - \hat{\delta}_i t$

$$\hat{\varepsilon}_{it} = y_{it} - \hat{\alpha}_i - \hat{\beta}_i x_{it} - \hat{\gamma}_i - \hat{\delta}_i t$$

Under the null hypothesis $\rho = 1$ against $\rho < 1$.

Pedroni has five-panel statistics: panel variance ratio statistics, panel rho-statistic, panel pp-statistics, group rho-statistic and group PP-statistic. The panel statistics obtained by pooling the data across the within group of the panel while group statistics derived by pooling the data along the between group of the panel. The followings are the statistics for each of the Pedroni residual co-integration test statistics.

i. Panel variance ratio statistic

$$= \frac{\sum_{i=1}^N \sum_{t=1}^T \hat{\varepsilon}_{it}^2}{\sum_{i=1}^N \sum_{t=1}^T \hat{\varepsilon}_{it}^2}$$

ii. Panel rho-statistic

$$= \frac{\sum_{i=1}^N \sum_{t=1}^T \hat{\varepsilon}_{it} \Delta \hat{\varepsilon}_{it}}{\sum_{i=1}^N \sum_{t=1}^T \hat{\varepsilon}_{it}^2}$$

iii. Panel PP-statistic

$$= \frac{\sum_{i=1}^N \sum_{t=1}^T \hat{\varepsilon}_{it} \Delta \hat{\varepsilon}_{it}}{\sum_{i=1}^N \sum_{t=1}^T \hat{\varepsilon}_{it}^2}$$

$$= \frac{1}{N} \sum_{i=1}^N \Delta \hat{\rho}_i$$

$$\text{iv. } \tilde{\rho} = \frac{1}{N} \sum_{i=1}^N (\Delta \hat{\rho}_i - \bar{\Delta \hat{\rho}})$$

$$\text{v. } \text{Group PP-statistic}$$

$$\text{vi. } = \sum_{i=1}^N \left(\sum_{t=1}^T \Delta \hat{\rho}_i \right) \sum_{t=1}^T (\Delta \hat{\rho}_i - \bar{\Delta \hat{\rho}})$$

$$\text{where } \tilde{\rho} = \frac{1}{N} \sum_{i=1}^N \sum_{t=1}^T \Delta \hat{\rho}_i \text{ for some lags } \Delta \hat{\rho}_i = \hat{\rho}_i - \hat{\rho}_{i-1}, \quad \bar{\Delta \hat{\rho}} = \frac{1}{N} \sum_{i=1}^N \Delta \hat{\rho}_i$$

$\Omega = \Omega - \Omega \Omega \Omega$, Ω is a consistent estimate of Ω and is the estimator of contemporaneous covariance of $\Delta \hat{\rho}_i$, $\Delta \hat{\rho}_i$

4.2.4 Model Specification

The model to be estimated in the analysis is of the form:

$$= \alpha + \sum_{i=1}^N \beta_i + \sum_{j=1}^N \gamma_j + \sum_{k=1}^N \delta_k + \epsilon \quad (9)$$

$$= \alpha + \beta_i, \text{ where } \epsilon \sim (0, \sigma^2) \text{ and } \delta_k \sim (0, \sigma^2)$$

Where ϵ is the profitability of bank i at time t , with $i = 1, \dots, N$; $t = 1, \dots, T$, α is a constant term, β_i , γ_j , δ_k are the coefficients for bank-specific, sector-specific and macroeconomic determinants. X_{it} is a set of independent variables, ϵ is the disturbance having ϵ as the unobserved bank-specific effect and ϵ as the idiosyncratic error. To measure

the persistence of bank profits over time, we adopted the dynamic specification of the model in (1) as:

$$= \alpha + \beta_i + \sum_{j=1}^N \gamma_j + \sum_{k=1}^N \delta_k + \epsilon \quad (10)$$

where ϵ measures speed of adjustment to equilibrium and $\epsilon = [0, 1]$.

Due to the development that occurred in the banking system over time, we introduced a dummy variable to account for unobservable time effects and the model in (10) is augmented as follows:

$$= \alpha + \beta_i + \sum_{j=1}^N \gamma_j + \sum_{k=1}^N \delta_k + \epsilon \quad (11)$$

Where ϵ is the dummy variable for the nationality of the bank ownership?

Hypothesis Testing

: Relative market power has significant effect on bank profitability

: Relative market power has no significant effect on bank profitability

4.2.5 Method of Analysis

This study uses unbalanced panel data of the Nigerian 20 commercial banks listed in Nigerian Stock Exchange covering 2001 to 2015.

4.2.5.1 GMM Dynamic Panel Model

The dynamic model is of form:

$$\alpha + \beta_i + \sum_{j=1}^N \gamma_j + \sum_{k=1}^N \delta_k + \epsilon \quad (12)$$

$$\alpha + \beta_i + \sum_{j=1}^N \gamma_j + \sum_{k=1}^N \delta_k + \epsilon \quad (13)$$

$$\alpha + \beta_i + \sum_{j=1}^N \gamma_j + \sum_{k=1}^N \delta_k + \epsilon$$

+ + (14)

Where ROA is returns on assets, ROE is returns on equity, NIM is net interest margin, MCON is market concentration, INFL is inflation rate, LRIS is liquidity risk, RGDP is real GDP growth rate, CRIS is credit risk, BMIX is business mix indicator, CADE is capital adequacy and ER is efficiency ratio.

4.2.5.2 Sargan Test

The Sargan test is employed to test for the validity of over-identifying restrictions. This test ensures that the instrumental variables are not correlated with the error terms.

: Over-identifying restrictions are valid (instruments are valid)

: Over-identifying restrictions are invalid (instruments are invalid)

5. Empirical Results and Discussions

The study commences its empirical analysis by conducting pre-test investigations that include the descriptive patterns of the concerned variables, correlation matrix as well as stationary test etc. The descriptive results as presented in Table 3 reveal that the expected value of efficiency ratio(ER) accounts for the highest with about 76.9 percent, followed by inflation rate with 12.05 percent, while credit risk has the lowest expected value with 0.02. In addition, the efficiency ratio is highly volatile as showed by the standard deviation of 63.46 while credit risk (CR) experiences the lowest level of fluctuation with as standard deviation of 0.06. The implication is that any shock in the banking industry leads to a change in the efficiency ratio of the industry. Therefore, there is a high level of uncertainties in the movement of the efficiency ratio.

Table 4 provides the outcomes of a simple correlation matrix for all the level series for the entire sample period 2001-2015. As shown in the table, the ROA has a highest negative correlation with the CRIS, a correlation of about -83 percent while there is a very weak and negative correlation between the ROA and the BAGE. In addition, strong and positive correlation is evidently found between the MCON and the RGDP whereas no correlation is established between the ER and the MCON. The least correlation occurs between the BMIX and the CADE; and between the ROE and the MCON with a correlation coefficient of 1 percent. The study prevents spurious results that would lead to a wrong policy decision by subjecting all the variables to unit root test using four techniques applicable to panel dataset.

As illustrated in Table 5 below, all variables except the LRIS, the NIM, and the MCON are stationary at level implying that they are zero order of integration i.e I (0) when estimated without intercept and without trend. However, only the LRIS and the NIM are not stationary at the level when estimation is carried with intercept only. In addition, the number of non-stationary variables at the level increases to include the CRIS, and the ROE when estimation is conducted with intercept and trend. By comparing the three conditions, each of the series excluding the LRIS and the NIM is stationary at its level.

However, there is likely that OLS technique might break one of its assumptions especially the assumption of exogeneity of the explanatory variables. Owing to this, the study carries out the Granger Causality test for all the series. As revealed in Table 6, the ROA granger causes the RGDP, the ER, and the INFL while a bi-directional granger causality exists between the ROA and the SIZE; between the INFL and the RGDP; between the SIZE and the RGDP; between the ROE and the ER; between the INFL and the MCON; and between the SIZE and the MCON. Furthermore, the MCON granger causes the ROA, and the INFL granger causes the NIM (Table 6).

In order to address the problem of endogeneity as identified in the results of granger causality test, the study also includes the Generalized Method of Moments (GMM) among its estimation techniques as suggested in Flamini et al.[12]. Table 7 displays the outcomes of the panel cointegration test using the Kao and the Pedroni approaches. Based on the Kao residual cointegration test, the result reveals evidence of cointegration among the series with the inclusion of the LRIS. However, the Pedroni result indicates no cointegration among the selected series in line with the granger causality output. Therefore, the study utilizes both OLS and GMM estimation techniques to test the hypothesis of the influence of relative market power on banks' performance in Nigeria. Table 8 shows the result of the estimated equation 1. The study reveals the regression results with a statistical significance level of 5 percent in relation to the hypothesis. The details of results are as follows:

5.1 Regression Results with ROA as a dependent variable

Commencing with the fixed effect model, the market concentration negatively influences the level of profitability in Nigeria's commercial banks but the statistical significance of the impact is nil. In addition, both credit risk and capital adequacy have a significant and negative impact on the bank performance in the country even at 1 percent level of significance. However, the efficiency ratio significantly and positively affects the banks' profitability. The credit risk exhibits a higher relative impact with a coefficient of -0.51. This implies that a unit increase in the level of credit risk will reduce the bank performance by about 0.51 percentage on average holding other factors being constant. Similarly, both random effect model and pooled regression model reveal the same outcomes as in the fixed effect model except that market concentration exhibits a positive and insignificant effect on the level of profitability. This is in line with the results of Pasiouras and Kosmidou [25].

5.2 Regression Results with ROE as a dependent variable

For the fixed model, none of the explanatory variables has a significant effect on the level of Bank but the market concentration and the capital adequacy exhibit a negative sign. In the random effect and pooled regression model, only the credit risk has a significant and positive impact on the bank performance with a coefficient of 2.51. Djililov and Piesse [10] and Naceur and Omran [22] also found the significant influence of the credit risk.

5.3 Regression Results with NIM as a dependent variable

The results of models where net interest margin is used as the measure of banks' profitability indicate that only efficiency ratio significantly and positively determine the level of profitability in commercial banks, with a coefficient of about 0.39. This is in line with the findings of Antonio (2013) for Spain. However, the market concentration has a negative and statistically insignificant effect on bank performance with a coefficient of -26.28 and -31.68 respectively.

5.4 Testing for the Appropriate Model

As presented in Table 9 below, the result of Hausman test reveals that the fixed effect model is appropriate for ROA and ROE models while random effect model is considered as the appropriate model for NIM. Based on this, the model for ROA and ROE is subjected to Wald test to determine the appropriate model between fixed effect and pooled regression models, the outcome shows that pooled regression model is appropriate for both ROA model and ROE model (see Table 10).

5.5 Results of GMM Dynamic Panel Estimates for the Sub-Sample Period 2005-2015

In the ROA model, the efficiency ratio, the credit risk, the business mix indicator and the capital adequacy have a significant influence on the bank performance after bank capitalization in Nigeria at 5 percent level of significance. Other factors such as one year lag of returns on assets, market concentration, economic growth, inflation rate, and liquidity risk do not significantly determine the level of profitability. However, only the business mix indicator exhibits a positive influence with a coefficient of 0.0149 while the credit risk has the highest significant coefficient of -0.5423 (see Table 11).

For the case of the ROE model, all action variables except the efficiency ratio have no significant influence on the bank performance after bank capitalization in Nigeria at 5 percent level of significance. Efficiency ratio negatively and significantly affects the level of profitability. However, the highest impact on the level of profitability comes from the capital adequacy with a coefficient of -4.2238, with an insignificant effect (Table 12).

Similarly, in the NIM Model, as reported in Table 13, only the efficiency ratio and the credit risk pose a significant effect on the bank profitability after bank capitalization in Nigeria at 5 percent level of significance. The efficiency rate affects the level of profitability in a positive direction while the credit risk affects the bank performance in a negative manner. In addition, the credit risk has the highest significant magnitude with a coefficient of about 21.71. However, explanatory variables such as one year lag of net interest margin, market concentration, real gross domestic product, inflation rate, liquidity risk, business mix indicator, and capital adequacy do not significantly influence the level of profitability at 5 percent level of significance.

5.6 Sargan Test

In order to test for the validity of the instrumental variables utilized in the GMM estimator, Sargan Test is conducted. Based on Table 14, the null hypothesis that instruments are valid fails to be rejected with a probability

value of about 0.99 in ROA model, ROE model, and NIM model. This implies that the instrumental variables employed in this study are uncorrelated with the disturbance term. In addition, this indicates that instrumental variables are exogenously determined.

6. Conclusion and Policy Implications

This study sets out to examine the determinants of banks' profitability in Nigeria using an annual panel dataset for the period 2001-20015. The analysis was conducted for the full sample as well as the sub-sample period in order to capture the effect of the 2005 Bank Capitalization in Nigeria. The empirical analyses consisted of unit root, cointegration, fixed effect, random effect, pooled regression and dynamic models. The findings of this study have a number of implications for macroeconomic policies especially monetary measures. First, the significance of efficiency ratio in both ROA model and NIM model suggests efficiency ratio is a crucial factor among bank-specific variables that can influence the level of profitability. Therefore, each of commercial banks in the country needs to make adequate strategies on the level of efficiency ratio. Similarly, more attentions are also required for other bank-specific factors such as the credit risk, the business mix indicator (used to capture business strategy) and capital adequacy both in the short term and long term. Second, external factors such real gross domestic product and market concentration (as a proxy for market power) do not significantly influence the level of profitability in the short run period. Therefore, any policy measure designed to improve the bank performance in Nigeria's commercial bank needs to consider the influence of bank-specific factors especially in the short term.

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