DETERMINANTS OF BANK PROFITABILITY IN NIGERIA: A DYNAMIC PANEL GMM APPROACH

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Abstract

Given that the Nigerian banking sector has undergone rounds of far-reaching reforms in recent times, examining the impact of some key variables on bank profitability in Nigeria would help to evaluate the extent of success recorded by these reforms. This study examines two efficiency ratios: cost to income ratio and net interest margin, and their relative impacts on bank profitability measured by returns on both average equity and average assets using the dynamic panel GMM framework. The empirical analysis is based on panel data obtained from 11 listed banks covering the period from 2010 to 2019. The results show that both cost to income ratio and net interest margin are negatively related to bank profitability. Although, the coefficients associated with these variables are not statistically significant, they are quite substantial, suggesting that they have economic implications. Also, the results show that profitability of banks in Nigeria has been quite persistent, indicating to a large extent that the degree of competitiveness among them is relatively low. However, judging from the standpoint of asset base, our results also indicate that larger banks are less profitable than smaller ones, though the associated negative coefficients are relatively low signifying weak explanatory power.

Key words: *Return on average equity, Return on average assets, Cost to income ratio, Net interest margin, Panel data framework*.

Introduction

Profitability is of great interest to managers, shareholders and other major stakeholders in the banking industry. Within the context of this paper, profitability can be seen as the ability of managers to generate income that exceeds costs. A profitable bank therefore can easily meet all its legal and contractual obligations and reward its shareholders fairly or adequately. Bank managers maximize shareholders' return on investment by making profits through revenue maximization and cost minimization (Bikker & Bos, 2008). Hence, profitability of a bank depends on how efficient its financial resources are utilized.

In recent years, the banking sector in Nigeria has undergone various rounds of far-reaching reforms. Beginning with the recapitalization policy in 2004 that led to a significant reduction in the number of banks from 89 to 25 mega banks and later to 24, the Central bank of Nigeria (CBN) has put in place a number of measures to address the poor risk management attitude of bank managers including the introduction of strict prudential measures in 2010 and further raise the minimum capital adequacy ratio to 15%. In addition, Asset Management Corporation of Nigeria (AMCON) was setup primarily to resolve the issue of high non-performing loans that were prevalent in the banking sector. All these initiatives were aimed at creating a robust, profitable and stable banking system that can withstand both local and global financial shocks and drive government developmental programmes through the mechanism of efficient intermediation. Hence, examining the key determinants of bank profitability in Nigeria is both timely and would help to evaluate the extent of success recorded by these reforms.

Empirically, several studies have examined various aspects of bank profitability in both developed and

developing countries. However, there is little agreement regarding what exactly determines bank profitability. While some studies (for example, Alhassan, Tetteh and Brobbey (2016) and Ahmad and Noor (2011)) use the data envelopment approach (DEA) to measure and evaluate bank performance, others for example, Belkhaoui, Alsagr and Hemmen (2020), Chidozie and Ayadi (2017) evaluate bank efficiency using accounting ratios. This study follows neither of the groups in the literature rather it considers accounting measures as mechanism for determining bank profitability.

One accounting measure of efficiency within the context of bank management that has appeared in several empirical studies is cost to income ratio. This ratio relates operating expenses to operating profit. According to Gunter, Krenn and Sigmund (2013), banks can improve their efficiency by reducing their cost to income ratio or by lowering their staff costs and other expenses. Thus, lower cost to income ratio indicates higher cost efficiency.

Another accounting measure of efficiency that has equally attracted considerable scholarly attention is net interest margin. A bank's net interest margin is the ratio of net interest income to average interest-earning assets. It can also be defined as the ratio of net interest income to total interest income. According to Busch and Memmel (2015), net interest margin has a large impact on bank profitability. However, it appears that there is a trade-off between profitability and competitiveness regarding whether net interest margins should be kept high or low. While high interest margins are required to increase both bank profitability and capital as well as protect the individual banks from unexpected external shocks, low margins may be indicative of relative competitiveness

of the banking system (Saunders & Schumacher, 2000; Sensarma, & Ghosh, 2004). Hence, interest margin can determine both profitability and competitiveness of the banking sector.

In this paper, we employ the dynamic panel GMM approach to examine bank profitability in Nigeria, focusing on 11 listed banks and seeks to determine the extent to which changes in accounting measures (cost to income ratio and net interest margin) can explain changes in bank profitability using bank-level unbalanced panel data for the period from 2010 to 2019. The relative strength of this study is that it accounts for the possibility that the relationship between efficiency and profitability can be a feedback process. To our knowledge, previous studies in Nigeria conspicuously ignored this potential source of endogeneity bias even when there is sufficient documented evidence suggesting that the causal link from efficiency to profitability can be reversed. Secondly, the study focuses on both cost to income ratio and net interest margin as measures of efficiency, which is novel in the Nigerian literature given that most of the reviewed studies considered only cost to income ratio as efficiency measure.

The remaining part of this study is organized into four sections. Literature review is presented in the next section. Section 3 describes both the data and the empirical strategy we employ. In section 4, we present the empirical results and findings, while the study is summarized and concluded in section 5.

Literature Review
Theoretical Framework

The relationship between banks' efficiency and profitability has been considerably explored in the finance literature. As a result, different theoretical

views for evaluating bank efficiency and its impact on profitability have emerged from the literature. Among the popular theoretical views that have appeared in the literature is the efficiency structure hypothesis developed by Demsetz, (1973). This hypothesis explains the causal link between bank efficiency and profitability by contending that because more efficient firms incur lower production costs, they have the incentive to lower their prices, which makes them more competitive through increase in sales and market share leading to higher profitability. Therefore, there is a causal direction from efficiency to profitability.

Review of Empirical Studies

Ahmad and Noor (2011) examine the link between bank efficiency and profitability in the context of Islamic Banks in 25 countries. They fit both regression and the fixed effect models to data collected from 78 Islamic banks observed from 1992 to 2009, while examining the impact on profitability of efficiency components, measured using the non-parametric Data Enveloping Approach (DEA). The results show that bank profitability is positively correlated with technical efficiency, while operating expenses ratio to total assets is among the significant determinants of profit efficiency.

Olson and Zoubi (2011) compare accounting-based explanatory factors for bank profitability with economics-based factors for both cost and profit efficiency using data collected from 83 banks across 10 MENA (Middle East and North African) countries from 2000 to 2008. They find that while banks in the MENA region performs below optimal level, economics-based efficiency measures perform better than accounting-based measures in determining bank profitability. Their results also reveal that although, accounting variables can influence both cost and profit efficiency, cost efficiency, however, has low explanatory power for both profitability and profit efficiency.

Francis (2013) employs the static panel data framework to examine the factors that affect bank profitability focusing on sub-Saharan Africa. Both bank-specific factors; operational efficiency, capital adequacy, bank liquidity, growth in bank assets and deposits, and macroeconomic factors such as economic growth and inflation, are considered in the analysis. The empirical analysis is based on unbalanced panel data obtained from 216 banks in 42 countries over the period from 1999 to 2006. The results based on the random effects method show that bank-level variables are significant determinants of bank profitability, with operational efficiency, measured by cost to income ratio, having a negative coefficient. They also find that both inflation and GDP growth have a negative and significant effect on bank profitability.

Using the dynamic panel GMM framework, Pervan, Pelivan and Arnerić (2015) examine both profit persistence and factors that determine bank profitability in Croatia using annual data. Their empirical analysis is based on unbalanced panel data consisting of all active banks in Croatia between 2002 and 2010. They find that banks with higher profits are less likely to record profit persistence, and that lagged profitability, bank size and operating expenses are among the significant determinants of bank profitability.

In Ghana, Alhassan, Tetteh and Brobbey (2016) employ the system dynamic panel framework to analyze the effects of market power and efficiency on bank profitability using annual data collected from 26 banks from 2003 to 2011. Three measures of bank profitability (ROA, ROA

and NIM) are considered, while scores of both scale and technical efficiency are estimated using the Data Envelopment Approach (DEA) or framework. Further, market share is measured by market share of total assets while market structure is measured using the Herfindahl-Hirschman Index. They find evidence of low profitability persistence in the Ghanaian banking industry. Also, their results show that market power (market structure and market share) has no significant effect on profitability, while the two efficiency measures enter the profitability model with significant coefficients. However, the signs are mixed, with scale efficiency having a negative coefficient which is an indication of diseconomies of scale in the Ghanaian banking industry.

In Nigeria, Chidozie and Ayadi (2017) employ the random effects framework to examine both bank-specific and macroeconomic determinants of bank profitability between 2005 and 2014. Banks' profit function includes six bank-specific variables; namely, lagged profitability, cost to income ratio(operational efficiency), loan to deposit ratio, bank size (total assets), loan to total assets ratio, market power and three macroeconomic variables; real GDP growth, inflation and oil prices. They find that oil price is the only macro-factor affecting bank profitability, while operational efficiency, market power and total assets all are significant bank-specific factors explaining bank profitability. However, cost to income ratio and market power both have negative coefficients.

Also, in Nigeria, Innocent, Ademola and Teryima (2019) employ the random effects framework to investigate the effect of capital adequacy and operating efficiency on bank performance, controlling for credit risk. Using annual panel data collected from

14 listed commercial banks over the period from 2008 to 2017, they find that operating efficiency, measured by operating expense to total assets ratio, has a negative and highly significant impact on bank profitability.

More recently, Belkhaoui, Alsagr and Hemmen (2020) empirically test, amongst others, the hypothesis linking bank efficiency to profitability using data obtained from Islamic banks in GCC countries. Bank efficiency is measured by cost to income ratio while profitability is measured by both return on equity and return on assets. The sample includes 30 listed Islamic banks in six countries: Bahrain, Kuwait, Qatar, Oman, UAE and Saudi Arabia. The study period spans from 2001 to 2015. They find that the efficiency indicator has a positive and highly significant effect on bank profitability.

To conclude, there is a well-established theory linking efficiency to profitability in bank management and considerable empirical evidence validating this causal flow. However, the literature suggests that although accounting ratios such as cost to income ratio and net interest margin can well serve as proxies for efficiency, the latter, however, has limited appearance in the empirical literature, especially those focusing on Nigeria. Therefore, considering the impact of efficiency on bank profitability being measured by net interest margin and cost to income ratio would fill an important gap in the literature.

Methodology
Data and Variables

In this study, we use 110 annual bank-year unbalanced panel observations for 11 listed banks extending to 10 years from 2010 to 2019. Thus, the study examines managerial efficiency and profitability in the

light of the recent banking sector reforms in Nigeria. The sampled banks are ACCESS, FBNH, FCMB, FIDELITY, GTB, STERLING, STANBIC IBTC, UBA, WEMA, UNION and ZENITH. All data were collected from published financial fact books, result presentations, financial statements and annual reports of the individual banks. The banks are selected based on data availability and accessibility. The description of the variables and their expected signs are given in Table 1.

Table 1: Description of variables and their expected signs

Variables	Symbols	Definition	Sign
Dependent variables			
Profitability	ROAE	Return on Average Equity	
	ROAA	Return on Average Assets	
Explanatory variables			
Efficiency	CIR	Cost to Income Ratio	-
	NIM	Net Interest Margin	+
Control variable	TA	Total Assets	+

Table 2: Descriptive Statistics

Variable	$\bar{x}$	Max	Min	σ	CV	S	K
ROAE	6.62	34.50	-428.00	48.49	7.33	-7.37	63.21
ROAA	1.78	7.50	-12.30	2.15	1.21	-2.62	20.57
CIR	68.26	183.00	36.10	19.63	0.29	2.68	15.17
NIM	7.10	10.42	3.72	1.40	0.20	-0.04	2.41
TA	2045.87	7147.00	199.35	1615.38	0.79	1.20	3.63

Table 2 shows the descriptive statistics for the above variables. As we can see, compared to ROAA, ROAE recorded high cross-sectional variability over the period with a large negative skewness coefficient and excess kurtosis. At the same time, the cross-sectional variability of CIR is much higher than the variability recorded by NIM. However, while NIM has a negative skewness coefficient and a platykurtic distribution, the distribution of CIR is characterized by positive skewness and large excess kurtosis. Also, over the same period,

the total assets of the sampled bank averaged ₦2045.87billion with a standard deviation of ₦1615.38, which also indicates large cross-sectional variance.

Figures 1 and 2 show the mean plots of profitability and efficiency measures for the individual banks respectively. The graphs suggest that except for few cases, banks that are more efficient are also associated with higher profitability. Table 3 shows the pairwise Pearson's correlation coefficients among the variables. The results show a positive correlation between net income margin and profitability while the correlation between cost to income ratio and profitability is negative.
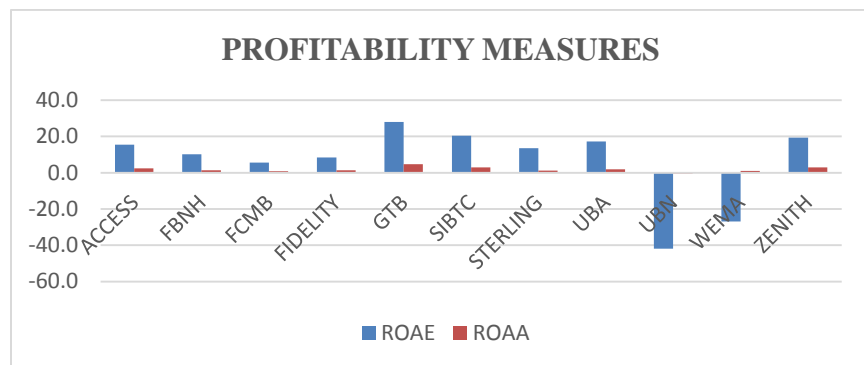

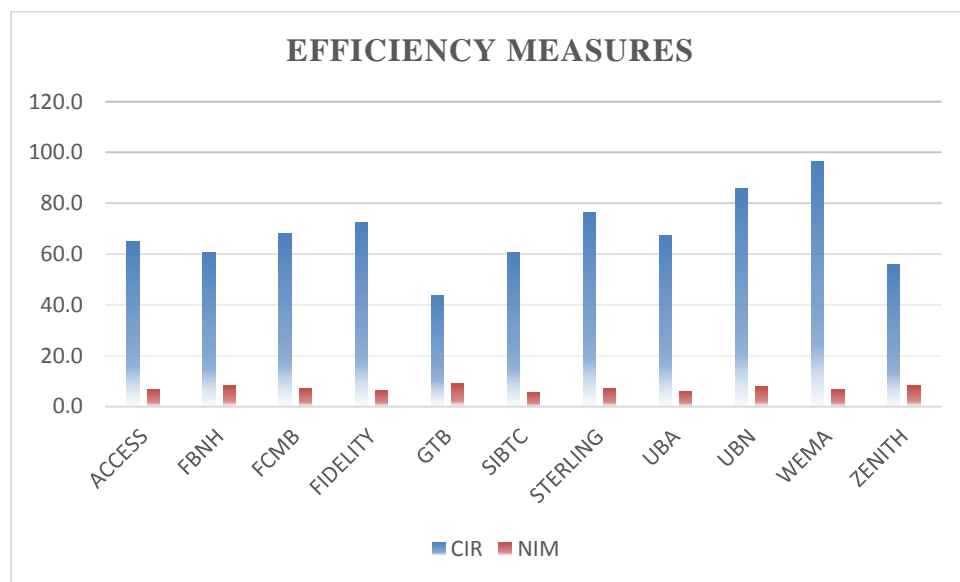**Figure 1: Mean Plot for Bank Profitability Measures**

Figure 2: Mean Plot for Efficiency Measures

Table 3: Correlation matrix

	ROAE	ROAA	PER	CIR	NIM	TA
ROAE	1.000					

ROAA	0.257	1.000			
CIR	-0.523	-0.704	0.034	1.000	
NIM	0.247	0.140	0.052	-0.329	1.000
TA	0.281	0.277	-0.188	-0.511	0.335	1.000

Source: Output from EViews based on bank-level panel data from 2010 to 2019

Empirical Model

The basic models expressing the empirical link between efficiency ratios and indicators of bank profitability are given by the following equations:

$$ROAE_{it} = \alpha + \theta_i + \beta_1 ROAE_{it-1} + \beta_2 CIR_{it} + \beta_3 NIM_{it} + \beta_4 TA_{it} + \epsilon_{it}$$
(1)

$$ROAA_{it} = \lambda + \psi_i + \gamma_1 ROAA_{it-1} + \gamma_2 CIR_{it} + \gamma_3 NIM_{it} + \gamma_4 TA_{it} + \mu_{it}$$
(2)

where $i = 1, 2, \dots, 11$ is the bank and $t = 1, 2, \dots, 10$ is time. Also, α and λ are the model intercepts, ϵ_{it} and μ_{it} are error terms, θ_i and ψ_i are heterogeneity parameters reflecting the differences among banks in terms of unobserved factors such as organizational culture and leadership styles.

The dynamic coefficients: β_1 and γ_1 capture the effects of lagged dependent variables. These parameters have been used as measures of profit persistence in the literature. Small values of these coefficients (values close to zero) indicate low persistence of profit, while large values (close to 1 or above 1) indicate high persistence of profit.

Further, β_2 and γ_2 capture the contemporaneous effect of cost to income ratio on ROAE and ROAA respectively, while β_3 and γ_3 capture the contemporaneous effect of net interest margin. Theoretically, high cost to income ratio indicates cost inefficiency, hence, we expect, *apriori*, that both β_2 and γ_2 would be associated with a negative sign so that lower cost to income ratio (cost efficiency) would lead to higher profitability. Also, high net interest margin indicates high profit efficiency. Therefore, we expect *apriori*, that both β_3 and γ_3 would be associated with a positive sign so that higher net interest margin (profit efficiency) would lead to lower profitability.

Also, β_4 and γ_4 capture the effect of total assets, a proxy for bank size which enters our profitability models as a control variable. Evidence from the literature suggests that bank size has a positive effect on profitability, hence, we expect, apriori, that these coefficients would be associated with a positive sign.

To estimate the above models, we employ the dynamic panel GMM method. This method helps to minimize the endogeneity problem arising from the possible reverse causation from bank profitability to efficiency. As described in Holtz-Eakin, Newey and Rosen (1988), Arellano and Bond (1991) and Blundell and Bond (1998), this estimation approach involves differencing the above equations and is based on moment conditions as well as instrumental variables. The GMM representation of our models is given as follows:

$$\Delta ROAE_{it} = \beta_1 \Delta ROAE_{it-1} + \beta_2 \Delta CIR_{it} + \beta_3 \Delta NIM_{it} + \beta_4 \Delta TA_{it} + \Delta \epsilon_{it}$$
(3)

$$\Delta ROAA_{it} = \gamma_1 \Delta ROAA_{it-1} + \gamma_2 \Delta CIR_{it} + \gamma_3 \Delta NIM_{it} + \gamma_4 \Delta TA_{it} + \Delta \mu_{it}$$
(4)

Where Δ = the first difference operator. It can be observed that differencing has effectively removed both the model intercepts and the heterogeneity parameters. Consistent with previous studies, we use lag levels of the regressors as instruments. The validity of our instruments would be tested based on Sargan test. The GMM estimator is both efficient and consistent if all instruments used are valid. Judging from the literature as indicated by Altunbas, Binici & Gambacorta (2018), the specified GMM model has no specification problem if the residuals have no second order serial correlation.

Analysis and Discussion

Table 4 reports the estimated panel GMM results for the impact of efficiency on bank profitability. All variables were converted into logarithms to mitigate the undesirable effects of data extremes or outliers.

Table 4: Impact of variables on bank profitability

Variable	ROAE	ROAA
y_{it-1}	1.1520	0.7306
	(0.3611)	(0.1498)
CIR	-0.1672	-0.0582
	(0.3441)	(0.1284)
NIM	-0.7333	-0.5006
	(0.5340)	(0.3374)
$SIZE$	-4.1229	-2.8313
	(0.5195)	(0.4031)
Instrument	5	5
p-value (Hansen test)	0.5961	0.8176
p-value (AR(2) test)	0.4906	0.4178

Source: Output from E Views based on bank-level panel data from 2010 to 2019

From Table 4, the Sargan test (J-statistic) is not significant which indicates that the selected instruments are all valid. So, all moment conditions are met. Also, the auto regression test indicates that the residuals

are free from second order serial correlation. This implies that the fitted GMM model satisfies all diagnostic tests.

The results show that although, the persistence parameter is positive for both ROAE and ROAA models, it is statistically not significant. However, the relatively high value of the lagged profitability indicates a high degree of short run profit persistence. This also implies that the banking sector in Nigeria has been relatively less competitive. This finding does not agree with Pervan, Pelivan and Arnerić (2015).

The results also show that in statistical sense, the two efficiency ratios are not significantly related to bank profitability. However, in terms of the economic importance of the estimated coefficients, we can see that cost to income ratio has the expected negative sign, while the negative sign associated with net interest margin is in as high as 7.1% (see Table 2), the negative coefficient may be suggesting that Nigerian banks keep high net interest margins to meet regulatory capital constraints and not necessarily to improve profitability. Hence, keeping high margins, which confirms the low degree of competition in the Nigerian banking sector, is costly for both banks and bank customers (Saunders & Schumacher, 2000), which explains the negative impact of net interest margin on bank profitability.

Furthermore, the coefficient of natural log of total assets is associated with a high p-value in the two profitability models, indicating signs of not statistically significant. This may suggest that size is irrelevant in the bank profitability model. However, the bank size coefficient is quite substantial in magnitude, suggesting that it is economically significant. The negative sign associated with this coefficient indicates that banks with

contrast with theoretical prediction. On the one hand, the negative sign associated with CIR shows that higher cost to income ratio is associated with lower profitability, and vice versa. This implies that the high average cost to income ratio at 68.28% recorded by the sampled banks (see Table 2) is not healthy for the profitability and stability of the Nigerian banking sector. This explains the low profitability recorded by banks as average cross-sectional ROAE and ROAA which stood at 6.62% and 1.78% respectively ((see Table 2). The result is consistent with the findings of Frances (2013) and Chidozie and Ayadi (2017) but contradicts the findings of Belkhaoui, Alsagr and Hemmen (2020).

On the other hand, the negative sign associated with NIM indicates that higher net income margin is not associated with higher profitability. However, since the average cross-sectional net interest margin is

relatively large assets are less profitable than banks with small assets. This result contradicts our apriori expectation as well as the theoretical view that larger banks enjoy economies of scale, hence they are more profitable. This result also contradicts most of the previous studies including Pervan, Pelivan and Arnerić (2015) and Chidozie and Ayadi (2017).

Conclusion

In this study, we examine the effects of cost to income ratio and net income margin on two measures of bank profitability: ROAE and ROAA using the dynamic Panel GMM approach. Based on the sample of 11 listed banks, we find that both cost to income ratio and net interest margin are negatively related to bank profitability. We, therefore, conclude that Nigerian banks keep high net

interest margin not necessarily to improve profitability.

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