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MODELING COMMERCIAL BANK EARNINGS IN NIGERIA'S POST CONSOLIDATION ERA

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Abstract: This paper empirical investigated into the earnings of commercial banks in Nigeria under the post consolidation era with a view to identifying whether bank-specific factors and macroeconomic variables influences the performances of Commercial banks in Nigeria. With a sample of 11 listed Commercial banks drawn from 2009 to 2019, the study used both static and dynamic models within the context of the panel data framework to estimate net interest margin as a proxy for bank earnings. The results show that there is no significant dynamic effect on the earnings of commercial banks under the period. However, the bank-specific factors affecting net interest margin are management efficiency (cost to income ratio), liquidity (both liquidity ratio and loan to deposit ratio) and capital (equity to total assets ratio), while short-term interest rate (treasury bills rate) is the only macroeconomic variable that has significant impact on net interest margin. Overall, the adjusted R squared with coefficients of 0.6001 and 0.5672 explain the indifference in the levels of interactions between the two models showing as much as 57 to 60 percent variations of commercial bank earnings attributable to the joint influence of bank specific factors alone and bank level with macroeconomic variables regressed together respectively. Essentially, these findings imply that Nigerian banks are operating within rules and principles that promote efficiency and economy as well as reflect effective supervisory and regulatory regime.

Keywords: *Net interest margin, management efficiency, liquidity, capital adequacy, macroeconomic variables, static panel data model, GMM framework.*

Introduction

The importance of the banking sector in the growth and development of a nation cannot be Over-emphasized especially in developing countries like Nigeria where capital markets are largely inefficient and low financial awareness. Accordingly, the sector plays a dominant role in the mobilization of savings from surplus units and channeling them as funds to deficit units that engage in productive activities, Akani (2020). Banks also serve as one of the main channels through which monetary and other government policies find their ways into the real sector of the economy.

In Nigeria, deposit money banks (DMBs) dominate the financial system with industry total assets of ₦40.33 trillion, aggregate credit of ₦17.57 trillion and industry total deposits of ₦24.07 trillion as at December 2019, Sarakiri (2020). In the same year, the industry liquidity ratio stood at 45.6 percent and the industry capital adequacy ratio averaged 14.5 per cent thereby exceeding the 10 percent benchmark for those designated as national banks though slightly below the 15 percent benchmark prescribed for the banks with international authorization (Central Bank of Nigeria, 2019).

The country's banking sector has also recorded a few significant reforms in recent times. The first reform was initiated in 2004 when the existing 89 banks were mandated by the Central Bank of Nigeria (CBN) to

boost their capital base from ₦2billion to ₦25billion. This regulatory requirement led to a significant reduction of the number of banks to 25 by the end of 2005. In 2009, the CBN introduced the second round of reforms which particularly focused on addressing the problem of high non-performing loans that characterized banks' credit portfolio. Consequently, the Asset Management Corporation of Nigeria (AMCON) was established in 2010 to specifically deal with the poor risk management behavior of banks. These two reforms were particularly aimed at repositioning the banking system and make it robust and more responsive to the developmental challenges of the country.

A very important concept in modern bank management is net interest margin (NIM) which is the focus of this study though has appeared in many studies as a measure of both efficiency and profitability. In his study, Hanzlík (2018) defined it as the ratio of net interest income to average interest-earning assets. Individual banks maintain a trade-off between efficiency and profitability since better efficiency carries with it some level of opportunity cost which adversely affects bank earnings. In a nutshell, high interest margin implies that there is likely to be an improvement in bank earnings but with a tendency towards reducing efficiency of financial intermediation, which in turn has the capacity to adversely affect the economic growth process of a nation (Udom, et al 2016). There are however a good number of other indicators of efficiency and profitability though not limited to banks, such as return on average equity, return on average assets and cost to income ratio, just to mention a few.

A considerable number of studies have examined banks' net interest margin whether in the developed or developing countries and such studies are of two strands. The ones in the first strand are those that focus on the impact of net interest margin on other profitability measures such as return on assets and return on equity, while those in the second strand examine the determinants of net interest margin. It is interesting to note that the studies in the second strand can further be divided into two groups. The first focuses only on bank-specific factors such as liquidity, management efficiency, capital adequacy and size, while the second considers both bank-specific factors and macroeconomic variables.

This study contributes to the literature in a number of ways. Annual panel data for 11 listed banks in Nigeria from 2009 to 2019 are observed and used to examine the impacts of both bank-specific factors and macroeconomic variables on net interest margin. This strategy is twofold in that it covers the post consolidation era as well as accounts for the business background of sampled banks. Furthermore, we adopt both static and dynamic panel data frameworks thereby making the empirical analysis more robust compared to previous Nigerian studies which are largely based on static models.

The remainder of this study has the following structure: The next section reviews the literature on the determinants of net interest margin in developed and developing countries. Section 3 describes the data, variables and model specifications, while section 4 contains the main empirical analysis leaving section 5 for the concluding remarks of the study.

Literature Reflections

Kasman,et al (2010) examine whether financial reforms have a significant effect on the determinants of net interest margin among banks in the new EU member countries and candidate countries between 1995 and 2006. They use unbalanced panel data comprising 10,364 observations on 1431 commercial banks from 29 countries (354 banks from 12 new EU members, 3 candidate countries and 1077 banks from 14 old EU members) over the period from 1995 to 2006. However, the sample period is divided into two sub-periods: consolidation (1995 to 2000) and post consolidation (2001 to 2006) periods. Their study also seeks to determine whether there are significant differences between old and new EU members in terms of the determinants of net interest margin within the same

sample period. They find that for the two sub-sample periods, management efficiency and bank size both have a negative and significant relationship with net interest margin. However, none of the macroeconomic variables is found to be a determinant in the net interest margin model.

Using the fixed effects regression framework, Memmel and Schertler (2011) examine whether market-wide bank rates and banks' balance sheet positions can explain changes in net interest margin of all universal banks in Germany using a panel sample of 22,239 bank year observations for a 12-year period from 1999 to 2010. Their findings show amongst others, that market-wide factors have much more explanatory power for changes in net interest margin than banks' balance sheet positions.

In a master's thesis that focuses on both US and EU banks, Hanzlík (2018) employs the GMM approach to investigate the impact of low and negative interest rate regime on banks' net interest margin. Based on annual data on 629 European banks and 526 US banks for a 6-year period spanning 2011 to 2016, the study finds that the relationship between net interest margin and short-term interest rate is positive and concave, and that there are significant differences between US financial markets and EU financial markets resulting from institutional factors as well as market concentration. It is also found that equity to total assets ratio exerts a significant positive effect on net interest margin.

Angori, Aristei and Gallo (2019) employ the GMM system estimator suggested by Arellano and Bover (1995) and Blundell and Bond (1998) to investigate the determinants of net interest margin in the Euro Area between 2008 and 2014. They specify net interest margin as a dynamic process incorporating both bank-level drivers with regulatory and institutional factors as additional explanatory variables. The results show that banks' interest rate margin exhibits persistence behavior and that non-traditional activities, heterogenous efficiency levels and operating costs all are among the important explanatory factors for bank margins apart from traditional activities. The results also show that both regulatory environment and macroeconomic conditions play important roles in determining net interest margin.

Hanzlík and Teplý (2019) examine the effects of market interest rates on net interest margin of European Union banks in a low-interest regime within the panel GMM framework using annual data. Their empirical analysis is based on a balanced panel data on 629 banks from 28 EU member countries from 2011 to 2016. They find, amongst others, that short-term interest rates, market concentration proxied by Herfindahl index, are positively related to net interest margin. However, the relationship between market interest rate and net interest margin is non-linear and concave.

Focusing on mainland China, Zhou and Wong (2008) examine whether bank-specific factors are the plausible determinants of net interest margin of 81 banks for the period from 1996 to 2003. The study is also based on Ho and Saunder's (1981) dealership theoretical model which allows banks to act as risk-averse dealers in the credit market. They find that average operating costs, degree of risk aversion, implicit interest rate, management efficiency, opportunity cost of reserves, market competition structure and transaction size are among the significant determinants of banks' net interest margin in China.

In India, the empirical study by Kannan, Narain and Ghosh (2001) focuses on the factors that affect net interest margin of scheduled commercial banks between 1999 and 2000. Their empirical analysis is based on a sample of 86 banks consisting 31 private banks, 27 public sector banks and 28 foreign banks. They find that bank size has no explanatory power for bank spread, while fee-based activities and regulatory variables such as bank capital and non-performing loans are the main determinants of spread.

Using a panel sample of 39 commercial banks in Lebanon, Saad and El-Moussawi (2012) employ the fixed effects method to examine both internal and external factors that affect banks' net interest margin

within the theoretical framework of Ho and Saunders (1981). The study covers the period of 11 years and is based on annual data. Their findings show that seven factors: namely, credit risk, capitalization, opportunity cost, market structure, off balance sheet activities, bank size and economic growth, significantly explain the observed changes in net interest margin of the sampled banks.

In Honduras, Nassar, Martinez and Pineda (2017) examine the effects of both bank-level factors and macroeconomic variables on net interest margin using quarterly panel data from 1998 to 2013. For a sample of 17 banks (7 local banks and 10 foreign banks), they find that operating costs, liquidity risk, funding risk, credit risk and concentration are important drivers of net interest margin. However, while inflation has a significant effect on net interest margin, the role of economic growth is statistically negligible.

Wani, Haque and Raina (2019) examine whether both bank-specific and macroeconomic conditions are plausible determinants of banks' net interest margin in India within the classical multiple regression framework. Their analysis is based on a balanced panel data consisting of 225 bank-year annual observations for 15 public sector banks (selected based on market capitalization) observed for 15 financial years from 2001 to 2015. They find that both bank-specific factors (lending rate, capital adequacy ratio and non-performing loans) and macroeconomic variables (GDP and inflation) are significant determinants of net interest margin of Indian public sector banks.

Using the GMM framework, Khalil and Farooq (2019) examine the determinants of net interest margin in emerging markets focusing on leverage risk, credit risk, management efficiency, implicit interest payment and non-interest-bearing reserves. The sample comprises 88 banks selected from three emerging markets of Pakistan (33 banks), Bangladesh (18 banks) and India (37 banks) while the study period covers from 2005 to 2015. They find that all the factors are significant determinants of banks' net interest margin and that lagged dependent variable has a positive and highly significant impact on net interest margin.

In Nigeria, Owoputi, Olawale and Adeyefa (2014) analyze the determinants of bank profitability between 1998 and 2012 within the panel data framework using the random effects approach. The panel sample consists of 150 observations involving 10 deposit money banks. While profitability is proxied by ROA, ROE and net interest margin, the explanatory variables fall into three groups: namely, bank-specific (capital adequacy, asset quality, bank size, liquidity, productivity, operating expenses management and deposits), industry-specific (concentration and industry growth) and macroeconomic variables (economic growth, inflation and interest rate). They find that all bank-specific variables are significant determinants of bank profitability. However, while the coefficients on inflation and interest rate both are significant and have a negative sign, there is no evidence suggesting that real GDP growth as well as industry-specific variables are significant determinants of bank profitability.

Ozili (2015) investigates the determinants of bank profitability measured by net interest margin and return on assets. The specified profitability models include as explanatory factors four bank-specific variables (capital adequacy ratio, cost to income ratio, asset quality and bank size) and two macroeconomic variables (growth in real GDP and inflation). A BASEL capital regulation regime dummy is also included in the regression models as a control variable. Based on annual panel data comprising 6 banks and 8-year period from 2006 to 2013, he finds amongst others, that capital adequacy and asset quality are the main determinants of net interest margin of the sampled banks. However, the results show no evidence that BASEL capital regime has a significant impact on bank profitability.

Using quarterly data, Udom, et al (2016) examine the determinants of net interest margin focusing on bank-specific, sector-specific and macroeconomic factors. For data analysis, they employ a generalized form of fixed effect framework using a balanced panel data for

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8 banks covering a five year period beginning from 2010Q1 to end in 2014Q2. Their findings provide evidence that growth in loans and advances, operating cost and credit risk are important bank-specific variables for net interest margin while money supply, GDP growth and inflation are macroeconomic factors for banks' net interest margin. However, the effect of sector-specific factor measured by Herfindahl-Hirschman index is not statistically significant.

Methods

The data in this study consist of annual panel data observations on 11 listed banks in Nigeria covering an eleven year period from 2009 to 2019. The banks are ACCESS, FIDELITY, FCMB, GTB, ECOBANK, IBTC, STERLING, UBA, UBN, WEMA and ZENITH. The data are obtained from the annual reports, presented operating results and Factbooks of the individual banks downloaded from their official websites of Nigeria Stock Exchange.

The variables are selected based on those adopted in some previous studies and are described in Table 1 below;

Table 1: Description of variables and their expected signs

Variables	Proxy	Symbols	Sign
Bank Earnings	Net interest margin	NIM	
Bank-specific variables			
Management Efficiency	Cost to income ratio	CIR	-
Capital	BASEL II capital adequacy ratio	CAR	+
	Equity to Assets Ratio	TETA	+
Credit risk	Non-performing loan ratio	NPL	-
Liquidity	Liquidity ratio	LR	-
	Loan to deposit ratio	LDR	-
Size	Total Assets	TA	+
Macroeconomic variables			
Economic growth	Annual growth rate in Real GDP	GRWTH	+
Inflation	Year on year change in consumer price index	INFL	+
Short-term interest rate	Treasury bills rate	TBR	+
Oil prices	Average nominal price	OILP	+
Exchange rate	Average nominal exchange rate	AVEXR	-

Source: Nigeria Stock Exchange Website (2020)

Table 2 shows the descriptive statistics for the variables. As this Table clearly shows, net interest margin has a mean value of 7.04% with a standard deviation of 1.37%, suggesting that banks recorded high net interest margin are also most volatile. The large cross-sectional variance in net interest margin is also evident in the large difference between the minimum and maximum values$(10.42 - 3.72 = 6.7\%)$. Further, the Table shows that both bank-specific variables and macroeconomic factors recorded high cross-sectional variability, with the coefficient of variation (CV) being highest for non-performing loan ratio, total assets and GDP growth rate.

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Table 2: Descriptive statistics

Variables	$\bar{x}$	Max	Min	σ	S	K	CV
NIM	7.04	10.42	3.72	1.37	0.00	2.41	19.50
CIR	69.14	183.00	36.11	20.52	2.56	13.27	29.67
CAR	20.71	36.00	11.07	5.22	0.59	3.16	25.20
NPL	8.13	74.00	1.20	10.37	3.95	21.04	127.57
LR	51.29	115.40	26.30	17.13	1.49	5.62	33.39
LDR	64.68	100.40	0.53	16.36	-0.33	4.07	25.30
TETA	14.59	30.43	0.53	4.93	0.96	4.70	33.79
TA	1942.14	7147.00	150.94	1586.49	1.28	3.92	81.69
GRWTH	4.12	9.54	-1.58	3.15	0.02	2.27	76.53
INFL	11.73	18.60	8.00	2.96	0.91	3.40	25.20
TBR	10.18	13.99	3.72	3.02	-0.87	2.87	29.64
OILP	77.90	114.49	37.80	25.03	0.26	1.81	32.13
AVEXR	208.36	306.92	148.88	66.73	0.60	1.55	32.02

Source: Nigeria Stock Exchange Website (2020)

Figure 1 shows the bank-level net interest margin over the study period. We can see that the net interest margin varies considerably across banks, with GTB, ZENITH, UBN and FBNH having the highest mean values, while SIBTC, ACCESS, UBA and FIDELITY have the least mean values.

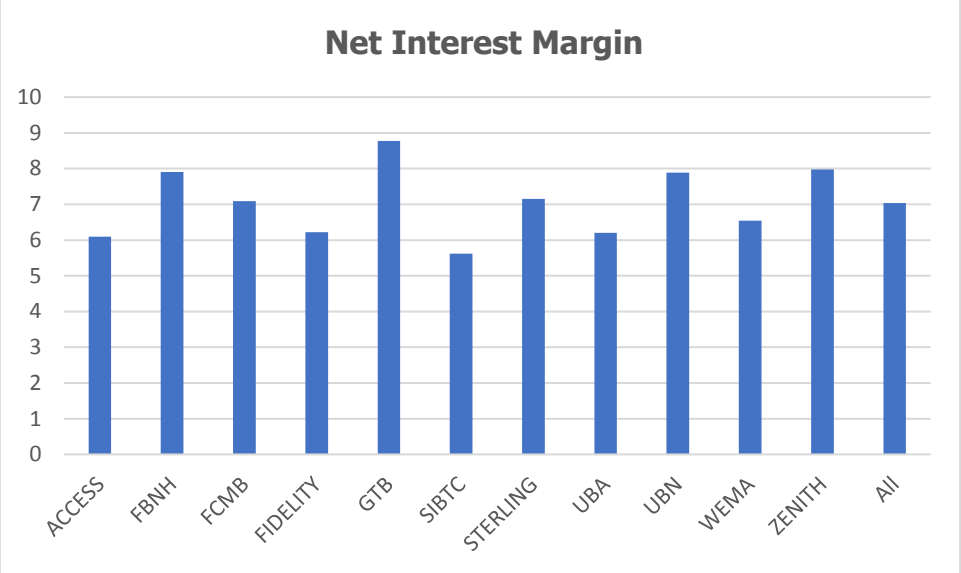

Figure 1: Mean Bank-level net interest margin

Models

We specify the econometric models for the determinants of banks' earnings in Nigeria as follows.

$$NIM_{it} = \beta_0 + \beta_1 X_{it} + \gamma_i + \epsilon_{it} \quad (1)$$

$$NIM_{it} = \lambda_0 + \lambda_1 X_{it} + \lambda_2 Z_{it} + \gamma_i + \varepsilon_{it} \quad (2)$$

For, $i = 1,2, \ldots 11$ representing the number of banks in our sample, $t = 1,2, \ldots ,11$ representing the number of years.

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The constant term, λ_0 represents the average estimate of net interest margin when all other right-hand side variables are zero, while the error term, ε_{it} is the regression residuals. Further, X_{it} contains bank-specific variables such as management efficiency (cost to income ratio), credit risk (non-performing loans ratio), liquidity (liquidity ratio and loans to deposit ratio), capital (capital adequacy ratio and equity to assets ratio) and size (natural logarithm of total assets). On the other hand, Z_{it} contains macroeconomic variables such as real GDP growth rate, inflation, short-term interest rate, oil prices and average exchange rate.

The unobserved bank-specific variables γ_i, is expected to vary only cross-sectionally, hence, there is no time index attached to it. We expect that the fixed effects assumptions hold so that unobserved cross-sectional differences would not only help to explain the observed cross-sectional variations in net interest margin but would also correlate with the observed bank-specific determinants of net interest margin, an approach consistent with Udom,et al (2016).

Although, the fixed effects method is employed as our main empirical framework, the above models are static in nature and impose two restrictive assumptions: (1) profit is not persistent and (2) the relationship between net interest margin and its determinants has only one-way causal structure. However, it may be the case that net interest margin can be influenced by its own previous trend and failing to capture this possibility would induce endogeneity bias in the model. To control this possible specification bias, we consider the dynamic panel data method based on the Arellano-Bond first difference GMM framework. The models for this framework are given as follows:

$$\Delta NIM_{it} = \psi_1 \Delta NIM_{it-1} + \psi_2 \Delta X_{it} + \Delta e_{it} \quad (3)$$

$$\Delta NIM_{it} = \phi_1 \Delta NIM_{it-1} + \phi_2 \Delta X_{it} + \phi_3 \Delta Z_{it} + \Delta v_{it} \quad (4)$$

Where ψ_1 and ϕ_1 are dynamic coefficients which capture the degree of persistence in net interest margin. Although, the Arellano-Bond approach explicitly controls the heterogeneity bias through first difference operation, it however requires valid instruments to overcome the endogeneity bias induced by the lagged dependent variable. Consistent with previous studies, for example Altunbas, Binici and Gambacorta (2017), our selection of instruments is consistent with Blundell and Bond (1998) who argue that while endogenous explanatory variables (in first difference form) are instrumented by their lag levels, exogenous variables (also in first difference form) are their own instruments. The validity of our instruments would be tested using the Sargan test. However, the consistency of the GMM model also depends on the strength of the assumption that its residuals do not contain second-order serial correlation. We employ the Arellano-Bond residual-based test to address this problem.

Empirical Results

Static Fixed Effects Estimation Results

First, we impose an assumption of no dynamic effects and estimate a static fixed effects model without the persistence term or lagged net interest margin. This approach also does not consider the possible feedback effect between net interest margin and the explanatory variables. The static fixed effects results are presented in Table 3. Column 1 corresponds to a model with only bank-specific variables as regressors, while Column 2 corresponds to a model with both bank-specific variables and macroeconomic fundamentals as regressors.

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Table 3: Static Fixed Effects Results; parenthesis contains standard errors

*** Significance at 10% level; ** Significance at 5% level**

Explanatory Variables	Coefficients	
	1	**2**
CONSTANT	7.2606**	7.6365*
	(3.1354)	(4.4348)
CIR	-0.0218*	-0.0120
	(0.0115)	(0.0117)
CAR	-0.0269	-0.0257
	(0.0332)	(0.0345)
NPL	-0.0072	-0.0014
	(0.0176)	(0.0193)
LR	-0.0136*	-0.0163**
	(0.0078)	(0.0080)
LDR	-0.0140*	-0.0124
	(0.0082)	(0.0085)
TETA	0.0912*	0.1257**
	(0.0473)	(0.0511)
LTA	0.2957	0.3569
	(0.2983)	(0.5952)
GRWTH	–	-0.0080
		(0.0868)
INFL	–	0.0219
		(0.0584)
TBR	–	0.1252**
		(0.0507)
LOILP	–	-0.1334
		(0.4419)
LAVEXR	–	-0.5585
		(0.7451)
R^2	0.6793	0.6522
$\bar{R}^2$	0.6001	0.5672
F-ratio	8.5796***	7.6728***
DW	1.8755	1.6123

Source; Extracted from E-View

Management Efficiency and Net Interest Margin

The results show a negative relationship between management efficiency and net interest margin. As expected, the coefficient on cost to income ratio (CIR) has negative sign for both models, meaning that greater management efficiency explained by lower cost to income ratio provides better net interest margin which leads to higher profitability. However, as indicated by the p-values (asterisks), the results for the two models are mixed in terms of the statistical significance of the estimated CIR coefficient. The CIR coefficient is significant at 10% level only for the model with bank-specific variables. This result is consistent with Owoputi, Olawale and Adeyefa (2014) and also with Udom, et al(2016).

Capital Adequacy Ratio and Net Interest Margin

The results show that capital adequacy ratio has a negative relationship with net interest margin. The coefficient on CAR maintains a negative sign for both models, indicating that higher capital adequacy ratio is associated with lower net interest margin. However, as indicated by the p-values (asterisks), the effect of CAR on NIM is statistically not significant for both models. Hence, capital adequacy ratio does not significantly determine banks' net interest margin in Nigeria. This result contradicts much of existing empirical evidence as provided by previous studies such as Ozili (2015), Owoputi, Olawale and Adeyefa (2014), Wani, Haque and Raina (2019), and Mesfin and Ram (2019).

Non-Performing Loans Ratio and Net Interest Margin

The results show a negative relationship between non-performing loans ratio and net interest margin. In agreement with apriori expectation, the coefficient on NPL has negative sign for both models, implying that low credit risk is associated with high bank earnings. However, like capital adequacy ratio, the effect of NPL on NIM is not statistically significant for both models. Therefore, credit risk is not a significant determinant of banks' net interest margin in Nigeria. Although, this finding disagrees with previous Nigerian studies like Owoputi, Olawale and Adeyefa (2014) and Udom, et al (2016)), it clearly reflects the intervening role of the

Asset Management Company of Nigeria (AMCON) in reducing the burden of high non-performing loans in the banking sector and its negative consequences.

Liquidity Ratio and Net Interest Margin

The results show that liquidity ratio has a negative and significant relationship with net interest margin. The LR coefficient has a negative sign and is significant for both models (though at different levels), indicating that higher liquidity leads to lower profitability. Therefore, liquidity is a significant determinant of banks' net interest margin in Nigeria. This negative effect is unsurprising as it may not be unconnected to the high liquidity ratio which the individual banks have consistently maintained over time. As reported earlier in Table 2, the average liquidity ratio of these banks stood at 51.3% which is far above the 30% regulatory standard, hence its adverse effect on profitability. This finding is consistent with the liquidity-profitability trade-off theory of finance as well as several previous studies including Owoputi, Olawale and Adeyefa (2014).

Loan to Deposit Ratio and Net Interest Margin

The results show that loan to deposit ratio has a negative relationship with net interest margin. The LDR coefficient has a negative sign for both models, indicating higher loans relative to deposit leads to lower net interest margin. However, as indicated by the p-values (asterisks), the results have mixed statistical significance, with the LDR coefficient being significant at 10% level for the model that deals with bank-specific variables only. This finding is another source of confirmation of the liquidity and profitability trade-off theory. Hence, extending more loans without the corresponding increase in deposits has a deleterious effect on bank earnings.

Equity to Assets Ratio and Net Interest Margin

The results show that equity to assets ratio has a significant relationship with net interest margin. As expected, the coefficient on TETA enters the two models with a positive sign, indicating that higher equity relative to assets leads to higher net interest margin. This implies that banks issue more capital to fund assets (loans) because it helps them to improve profitability. This is consistent with Hanzlik (2018) but contrary to Donaldson (1961) and Myers(1984) in their studies to introduce and popularize the pecking order theory respectively.

Bank Size and Net Interest Margin

The results show that the relationship between bank size and net interest margin is positive but not significant. Although, the coefficient on LTA is relatively sizable, it is not statistically significant even at 10% level. In contrast with previous findings such as Owoputi, Olawale and Adeyefa (2014), and Ozili (2015), this finding implies that size is not among the significant determinants of banks' net interest margin. So the size of a bank does not matter for its earnings in Nigeria.

Macroeconomic Factors and Net Interest Margin

Looking at the macroeconomic factors, we can see that only treasury bills rate has a positive and significant relationship with net interest margin. The higher the treasury bills rate, the higher the net interest margin. This is consistent with the conventional view that net interest income responds positively to changes in short-term interest rates. Also, this finding agrees with Hanzlik (2018). On the contrary, economic growth, inflation level, oil prices and exchange rate; none is a significant determinant of net interest margin. This appears contradictory to what one would expect, given that these macroeconomic variables recorded high volatility during the period under review. These results are also not consistent with the findings of Udom, Agboegbulem, Atoi, Adeleke, Abraham, Onumonu and Abubakar (2016). However, they agree with Ozili (2015).

Dynamic Generalized Method of Moments (GMM) Estimation Results

For the purpose of checking the robustness of our empirical analysis, we relax the assumption of static relationship and estimate the dynamic model using the Arellano-Bond first difference approach under the

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GMM framework. As stated previously, this approach not only incorporates persistence parameter in the net interest margin model, but it also controls both the heterogeneity in panel data caused by differences across banks, and endogeneity bias induced by the lagged dependent variable. The results are shown in Table 4. Again, Column 1 corresponds to a model with only bank-specific variables as regressors, while Column 2 corresponds to a model with both bank-specific variables and macroeconomic fundamentals as regressors.

Table 4: Dynamic GMM results; parenthesis contains standard errors

*** Significance at 10% level; ** Significance at 5% level**

Explanatory Variables	**Coefficients**	
	1	**2**
NIM(-1)	0.2992	0.6068
	(0.4918)	(0.4174)
CIR	-0.0216	-0.0607
	(0.2691)	(0.1192)
CAR	0.2644	0.2200
	(0.6072)	(0.2630)
NPL	-0.0787	-0.1258
	(0.1726)	(0.2835)
LR	-0.0831	-0.0168
	(0.1460)	(0.0635)
LDR	-0.0473	0.0082
	(0.0951)	(0.0761)
TETA	0.2071	0.1398
	(0.5350)	(0.5496)
LTA	-0.3929	3.3344
	(2.6328)	(6.8721)
GRWTH	–	-0.0368
		(1.0540)
INFL		0.0486
		(0.4924)
TBR	–	0.1815
		(0.4671)
LOILP	–	0.1715
		(1.3510)
LAVEXR	–	-2.6640
		(6.6529)
Instrument Rank	9	14
P-value (J-statistic)	0.6048	0.8268
P-value AR(2)	0.7696	0.4244

Source: EViews Output Based on Research Data; Standard errors in Parenthesis

*** Significance at 10% level; ** Significance at 5% level**

First, the two model diagnostic tests suggest that our GMM models have no specification problems. The J-statistic (Sargan test) is not significant, showing that all the selected instruments are valid. The Arellano-Bond residual test is also not significant, showing that second-order autocorrelation is not contained in the residual series. Therefore, the reported panel GMM results are consistent as expected.

The coefficient on the lagged dependent variable is not significant and it has a positive sign. This indicates that net interest margin does not depend on its previous value, hence its data are not generated by a persistence process. In other words, bank profit among the Nigerian listed banks is not persistent. This result contradicts the findings of Hanzlik (2018) and Angori, Aristei and Gallo (2019).

Also, most of the bank-specific and macroeconomic variables have signs that are consistent with those of the fixed effects in Table 4, although, none of them is statistically significant. The firm-specific variables whose coefficients retain their initial signs are cost to income ratio, non-performing loan ratio, liquidity ratio, loan to deposit and equity to total assets ratio, while oil price is the only external variable that have mixed signs. The consistency of most of these signs confirms that our static fixed effects results are robust. Therefore, the relationship between net interest margin and almost all its determinants has no significant dynamic effect.

Conclusion and Recommendations

This study examines the determinants of earnings of banks in Nigeria's post consolidation era using both the static fixed effects and dynamic GMM frameworks. The data used comprise a panel of 11 banks covering from the year 2009 to 2019. We find that net interest margin is not persistent based on the results from the dynamic model except for the influence from oil price. The bank-specific factors affecting net interest margin are management efficiency (cost to income ratio), liquidity (both liquidity ratio and loan to deposit ratio) and capital (equity to total assets), while short-term interest rate (treasury bills rate) is the only macroeconomic variable whose impact on net interest rate margin is significant. Therefore, banks' efficiency and profitability are determined by both bank-specific factors (both observed and unobserved) and monetary policy shocks with changes in short-term interest rates showing very significant statistical effect.

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