Non-Performing Loans and Profitability of the Nigerian Commercial Banks

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Abstract

This study examined the extent to which non-performing loans affect commercial bank profitability, and to suggest measures toward mitigating their impact on the banking sector in Nigeria. Data on a sample of 18 commercial banks, covering first quarter of 2014 to fourth quarter of 2018 were analysed using the panel fixed effect and auto-regressive distributed lag models. Empirical results showed a negative, and statistically significant impact of non-performing loans on banks' profitability. Most of the coefficients of other determinants of bank profitability were in line with apriori expectations. The study showed that lower bank profitability can be explained by higher volume of non-performing loan, increased liquidity ratio and inflation, while higher profitability could be as a result of increase in bank size and capital adequacy ratio. Based on the findings, the study advised the need for the risk management team of banks to strengthen their credit management strategies, and consider offering professional advice to the loan customers on passible ways of efficiently investing their loan to ensure the needed return on investment is attained.

Keywords: Non- Performing Loans, Profitability, Commercial banks

JEL Classification: C23, G21

I. Introduction

An efficient and sound financial system is critical to enhancing sustainable economic growth in any country, as it provides a balance between those who have funds to invest and those in need of the funds (Rajaraman and Visishtha, 2002). Credit creation is a source of revenue for banks, just as it makes up the majority of banks' assets. However, it is also a risky output, as there is the risk of insolvency if less return is earned from its credit portfolio. Rajha (2017) opined that the interest derived from loans contributes significantly to interest income of banks, and about 85 per cent of banks' total income, thus exposing banking business to credit risk (Kargi, 2011; Njanike, 2009). Hence, a decline in interest income from the provision of loans could potentially impact adversely on the overall income and profit of the banks. The adverse impact could become worse if the loans are not repaid as and when due. A loan is deemed non-performing if the interest or principal that is due are unpaid for 90 days or more.

Rising non-performing loans threaten the financial performance of banks, as it reduces both the bank's profit and its intermediation capacity. According to Bhattarai (2017) "The immediate consequence of large amount of non-

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performing loans (NPLs) in the banking system is bank failure". Considering that the banking industry is a pillar of the economy, any shock to the industry would certainly affect the financial system and the economy as a whole.

Furthermore, the stability of any banking industry facing a high level of NPL is threatened, as it can affect their profitability, hence the need to pay attention to the lending portfolio of banks.

From the 1990s up till the early 2000s, a large number of banks in emerging economies collapsed, owing to high non-performing loans and worsened cost of efficiency (Podpiera & Weill, 2008). This was observed in the balance sheets of banks in both emerging markets and advanced economies, where NPLs were found to be major bottlenecks to their profitability. The failure to effectively monitor non-performing loans or reduce high levels exceeding set thresholds may lead to insolvency (Abiola & Olausi, 2014; Richard et al., 2008). Furthermore, when a relatively large number of banks have NPLs surpassing their capital, banking crisis can follow, which in the long run leads to a financial crisis (Biabani et al., 2012; Karim et al., 2010). For these reasons, most bank managements are placing more emphasis on managing credit risk, like in Nigeria where banks currently maintain a cautious approach towards lending to the private businesses, by channeling most of their funds to safer investments like government securities in a bid to lower their NPLs and improve profitability.

Adebola et al. (2011) noted that the 2007/2008 Global Financial Crisis was a typical example of banks' exposure to the harmful effect of non-performing loans, causing most banking failures and affecting even the most developed economies, like the USA and emerging economies, as well. Several economies with flourishing banking sectors during pre-crisis period were forced to a sudden credit growth halt in 2008 (IMF, 2012). Nigeria was not left out as the decline in oil price during the period gave rise to capital outflows, decreased economic activities and dampened returns on investment particularly in the oil sector. The asset quality of Nigerian banks was adversely affected as non-performing loan ratio of the banks rose significantly to 37.3 per cent in 2009 from 9.9 in 2007. Banks profit measured by their returns on asset fell from 3.0 per cent in 2007 to 2.5 per cent in 2009.

As an aftermath of the crisis, the increasing non-performing loans and its adverse effect on bank revenue are sources of concern to policy makers. Some empirical studies have tried to examine this adverse effect of bad loans on banking profitability in Nigeria. While Gabriel et al. (2019) used industry-wide data, Ozurumba (2016) and Ugoani (2016) used bank-level data that covered

only three commercial banks in assessing the impact of non-performing loans on financial performance in Nigeria. This paper, therefore, extends earlier works on the subject, using panel data of eighteen commercial banks in Nigeria, as well as more recent bank-specific and macroeconomic factors driving commercial bank profitability.

The rest of the paper is organised as follows: Section II reviews related literature on NPLs and profitability, while section III focused on trend analysis of non-performing loans and profitability in the Nigerian banking sector. Section IV presents the research methodology and preliminary data analysis, while section V discusses the findings and policy implications. Section VI concludes the paper.

II. 0 Literature Review

II.1 Theoretical Review

The link between NPLs and profitability has been established by a number of theoretical expositions and hypotheses. Some of the theoretical foundations include the information asymmetry theory, alternative hypothesis and bad management hypothesis.

II.1.1 Information Asymmetry Theory

The concept of information asymmetry was first posed in the seminal work of Akerlof (1970), in which the paper claimed that the existence of uneven dissemination of information between transacting parties resulted in an imperfect market. According to Stiglitz (1981), "Information is imperfect and obtaining information can be costly". He further noted that there are information asymmetries, and that the extent of information asymmetry is affected by the actions of firms and individuals. In every market, the sellers usually have more knowledge about items than the buyer; thus, the buyer takes a risk buying the item. In line with this reasoning, Kemei and Kerongo (2014) attributed high non-performing loans in banks to lack of information. However, Dell'Ariccia (2001) noted that, if the banks could effectively determine the creditworthiness of borrower's, deserving borrowers would get the credit facilities, thereby reducing the high rate of loan defaults. Conversely, an adverse selection exposure whereby high-risk borrowers displace creditworthy borrowers could cause deterioration in the overall quality of bank loan portfolios, in the long-run, leading to a buildup of NPLs. Thus, there is the need for a delicate balance in order to reduce the high rate of loan defaults, declining profitability, erosion of capital, and the weak performance of the banking sector (Makri et al., 2014).

II.1.2 Bad Management Hypothesis

Bad Management hypothesis, proposed by Berger and De Young (1997), postulates that poor management in the banking institutions brings about bad quality loans and lower incomes, leading to an increase in the level of non-performing loans. This implies that if due diligence is carried out in loan administration, the value of bad loans would reduce, and profitability will increase. According to this hypothesis, in a bid to mitigate rising NPLs, poor managers usually allocate more resources to underwriting and monitoring bad loans. This causes an increase in the operating expenses over interest income, which in the long-run, lead to higher cost-to-income ratio (low-cost efficiency). A good number of empirical studies are founded on this hypothesis. For instance, Norden and Stoian (2014) and Louzis et al. (2010) noted that bank specific variables like performance and efficiency indicators influenced the level of NPLs significantly, thus, supporting the hypothesis. Based on this premise, a negative relationship between non-performing loans and Return on Asset (ROA) or Return on Equity (ROE) - as a proxy for profitability, is expected in the study.

II.1.3 Alternative hypothesis

Alternative hypothesis, also known as the "skimping" hypothesis, posits that a positive relationship exists between cost efficiency and non-performing loans. It suggests that the amount of resources that banks invest in monitoring loans affects both NPLs and productivity. Banks are saddled with the decision of a trade-off between short-term operating costs and future loan performance problems. Therefore, banks that focus on long-run profit would be rationally motivated towards reducing short-term operating costs by skimping on the resources allocated to loans underwriting and monitoring. This, in the future, leads to a greater volume of non-performing loans and increase the costs of solving the problem in the future. Skimping behaviour, thus, makes banks appear cost-efficient in the short-term because fewer operating expenses (inputs) can sustain the same quantity of loans or other outputs. Wood and Skinner (2018) explained further that "the link between cost efficiency and non-performing loans is opposed to the bad management hypothesis, that is, skimping implies that cost efficiency has a positive influence on bad loans".

II.2 Empirical Literature

Empirical evidence suggests that NPLs have an adverse effect on banks' profitability. Non-performing loans NPLs could possibly be the most significant barometer of financial stability, since it depicts credit risk, operational risk and

efficiency in resources allocation (Ikram et al., 2016).

In Bangladesh, Sufian and Habibullah (2009) investigated the impact of non-performing loans on bank profitability, as well as its bank-specific and macroeconomic determinants, employing the fixed effects model (FEM) for its estimation. Their findings suggested that the profitability of banks in Bangladesh was positively and significantly influenced by bank specific characteristics, such as loans intensity, credit risk, and cost. Karim et al. (2010) employed the Tobit simultaneous equation model using data for commercial banks in Singapore and Malaysia during the period 1995-2000. The results indicated that higher NPLs reduces cost efficiency and lower cost efficiency increases non-performing loans. However, a study by Adebisi and Matthew (2015) revealed that non-performing loans has no significant relationship on return on assets, meaning that the level of firms' assets was not affected by the level of NPLs. Conversely, there was a significant relationship with return on equity. The analysis, carried out, using T-test and correlation analysis examined the impact of non-performing loans on the profitability of banks in Nigeria, using data from 2006 to 2012. Gizaw et al. (2015) used a panel data regression model to assess the impact of non-performing loans on commercial bank profitability in Ethiopia. They found that all the credit risk measures employed, have significant impact on commercial bank profitability.

An important contribution to the related literature was from Mwinlaaru et al. (2016) who evaluated the impact of NPLs on universal banks' profitability in Ghana from 2000Q1 to 2014Q4. The study used the ARDL bounds test co-integration technique in the estimation and found that NPLs had a negative and significant impact on universal banks profitability in both the short- and long-run. Laryea et al. (2016) found evidence of bank-specific factors as well as macroeconomic factors, when determining NPLs and their impact on bank profitability. A fixed effect panel model was employed on a sample of 22 banks in Ghana covering 2005 to 2010. Their results indicated that NPLs influence both the ROE and ROA negatively and that highly capitalised banks undertake more credit risk in the form of NPLs while increased bank size leads to lower levels of NPLs.

Ozurumba (2016) examined the impact of non-performing loans on the performance of some selected commercial banks in Nigeria. The study used secondary data for three banks from 2000 to 2013 and multiple regression techniques for its analysis. The outcomes of the study revealed that return on asset and return on equity have an inverse relationship with non-performing loans and loan loss provision, respectively. A similar study was done by Etale et al.

(2016) for some banks in Nigeria for the period 1994-2014, using descriptive statistics and multiple regression techniques to analyse the impact of NPLs on Bank Performance. Findings revealed that high level non-performing loans diminishes the performance of banks, and that its occurrence was particularly in the long-run. Ugoani (2016) also studied non-performing loans portfolio and its effect on bank profitability in Nigeria for selected commercial banks, using descriptive and regression analysis. The findings showed that nonperforming loans portfolio have a negative effect on bank profitability.

In an attempt to find out the time series scenario of growth of NPLs, and its relationship with banks profitability in Bangladesh, Akter (2017) employed multiple regression techniques on data of 30 listed commercial banks listed on the Dhaka Stock Exchange (DSE). The results showed that NPLs is one of the major factors influencing banks profitability and it has statistically significant negative impact on net profit margin (NPM). Panta (2018) used fixed effect regression model to evaluate the relationship between non-performing loans and bank efficiency in the Nepalese banking sector, using secondary data of 7 joint venture from 2006 to 2017. Findings showed that the increase in the non-performing loan erodes the interest income, thus, reducing the profitability.

Kingu et al. (2018) and Nyarko-Baasi (2018) evaluated the impact of non-performing loans on profitability of some selected commercial banks in Tanzania and Ghana, respectively. Both studies used the fixed effects panel regression model. Their results were similar to those obtained by Laryea et al. (2016) and Etale et al. (2016), which showed that non-performing loans is negatively associated with the level of profitability in the banks. The results further corroborated the information asymmetry theory and bad management hypothesis.

A recent study by Patwary and Tasneem (2019) made use of Vector Auto Regression (VAR) model in their study of Banks in Bangladesh. The findings revealed a statistically significant relationship between the non-performing loan ratio and the return on asset (ROA). Likewise, Gabriel et al. (2019) assessed the effect of Non-Performing Loans on the financial performance of commercial banks in Nigeria from 1985 to 2016, using multiple regression techniques. The outcomes of the study revealed that NPLs and Cash Reserve Ratio (CRR) had statistically significant and negative effect on Return on Asset (ROA), thereby reducing the financial performance of the banks.

Empirical reviews and results from these studies follow a similar pattern, suggesting that nonperforming loans (NPLs) have adverse effects on bank

profitability. This study adds to a few, but growing literature on the effects of NPLs on banks' profitability in Nigeria. Unlike Ozurumba (2016) and Ugoani (2016) that covered only three commercial banks in their papers, this study examined eighteen commercial banks that accounts for more than 95 per cent of the total assets and deposits of commercial banks in Nigeria. The study also employed quarterly data, with a different methodology of Panel Autoregressive Distributed lag model for a more robust result.

III.0 Profitability and Non-performing Loans in the Nigerian Banking Industry

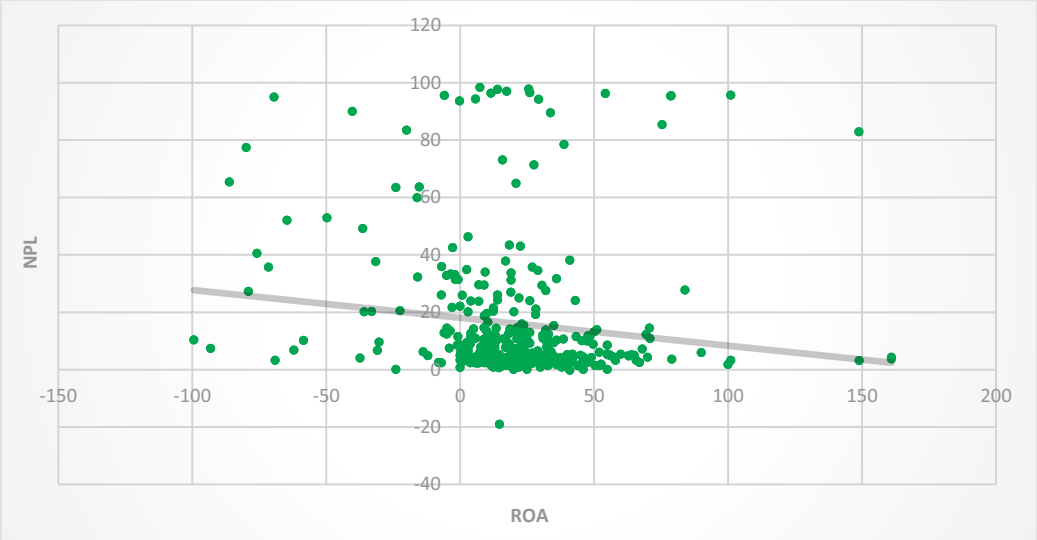
Historically, the incidence of banking sector failure, resulting from insolvency has often been associated with massive accumulation of non-performing loans (Fofack, 2005). Over the years, the Nigerian banking system has transformed in ownership structure, size and operational coverage. Prior to 2005 banking system consolidation in Nigeria, eighty-nine (89) banks existed under a universal banking system (UBS)—a framework that placed no restrictions on banks' share capital investments in other financial service sectors. The UBS led to the proliferation of other financial institutions having banks as minority or majority shareholders and created supervisory bottlenecks for the regulating institution, due to subsidiaries' interconnectedness. Despite these investments, and considering the population of Nigeria, huge capital market and the overall economic activities, the banking system was rated very marginally, relative to its potential (CBN, 2009); hence, the banking system consolidation in 2005. The effect of the consolidation exercise was felt almost immediately, as there was a huge decline in non-performing loans, from 21.6 per cent in 2005 to 9.3 per cent in 2006. Similarly, return on assets declined from 2.1 per cent in 2005 to 1.8 per cent in 2006, although it rose moderately to 3.0 per cent in 2007.

The advent of the 2007/2008 Global Financial Crisis (GFC) gave rise to the decline in oil price, with significantly dampened returns on investment in the oil sector. The attendant capital outflow exposed the banking system to a high credit risk position. The asset quality of Nigerian banks decreased significantly, as non-performing loans skyrocketed with adverse economic consequences. The lingering effect of the GFC worsened the situation, raising the non-performing loan (NPL) ratio of the banks to an all-time high of 37.3 per cent in 2009. The banks were choked with toxic assets and faced serious liquidity challenges that impaired their ability to extend credit to the real sector. Many of the banks had to downsize and tighten expenditure to scale through the challenges.

According to Richard et al. (2008), failure to effectively reduce levels of non-performing loans may lead to bank failure. In a bid to address these challenges,

the Asset Management Corporation of Nigeria (AMCON) was introduced in 2010 to absorb NPLs of banks. In relation to liquidity, the juxtaposition of the industry's pre-2010 and post-2010 liquidity positions underscore the role of securitisation on the performance of Nigerian Banks. In 2009, average liquidity ratio was 44.45 per cent, while it was 68.01 per cent at December 31, 2012 (NDIC Annual Report, 2009 & 2012). This showed that AMCON operations impacted positively on the liquidity of Nigerian banks. The picture is similar to the impact of securitisation on asset quality of banks in Nigeria. While the ratio of non-performing loans to total loans was 37.3 per cent in 2009, it fell to 3.71 per cent, as at December 31, 2012. Likewise, ROA increased from about 2.52 per cent in 2009 to 3.0 per cent in 2012.

Figure 1: Non-performing loans and return on asset of banks



Source: Authors' computation

The purchase of the non-performing loans of the then deposit money banks (DMBs) by AMCON, and the enhanced credit risk management by DMBs, were responsible for the improvement in asset quality of banks. The oil price hike in 2013 impacted hugely on the reduction of NPLs in the banking system, as the ratio declined to 3.39 per cent in 2013 and a further reduction to an all-time low of 2.96 in 2014. This was also accompanied by a marginal increase in ROA from 2.04 per cent in 2013 to 2.09 per cent in 2014. Notwithstanding, the 2016/2017 economic recession caused NPLs to rise sharply to 12.8, 14.8 and 16.8 per cent in 2016, 2017 and 2018, respectively. This was due to the heavy oil dependence nature and exposure of the economy. It can be observed from this investigation that an inverse relationship mostly exists between non-performing loans and return on asset of banks in Nigeria (Figure 1).

IV.0 Methodology
IV.1 Data Description and Source

This paper used the panel fixed effect and auto-regressive distributed lag models to analyse bank-level data on NPLs and profitability of commercial banks in Nigeria. The choice of these techniques is to account for variations in individual bank and how that may influence the profitability of the banks. We used quarterly time series data, spanning 2000Q1 to 2014Q4, comprising return on asset (ROA), non-performing loan ratio (NPL), Bank's total asset (BS), liquidity ratio (Lr) and capital adequacy ratio (CAR). The data were sourced from banks' quarterly returns submitted to the Financial Analysis (FinA) platform. The reason for the relatively limited scope is based on the fact that individual bank returns on the FinA platform started from 2014. Data on consumer price indices was obtained from the National Bureau of Statistics database. The study included all the commercial banks that have regular submission on the FinA platform within the period of study. Although as at end-December 2018, there were 21 commercial banks operating in the country, the required data was collected from only 18 commercial banks, which cover over 95.0 per cent of the total banking assets and 96.0 per cent of total banking deposits.

IV.2 Model specification

The study adapted the Panta (2018) model, which is generally specified as

$$Y_{it} = \alpha + \beta_1 X_{it} + \varepsilon_{it} \quad (1)$$

Where:
Y_{it} is the dependent variable, α is the constant term, β_1 is the coefficient of the bank specific variables that affect profitability, X_{it} is the independent variable, i is the cross-sectional dimension, t represent the time-series dimension and ε_{it} represent the random error term. The choice of the independent variables was informed by the reviewed literature.

Equation (1) is modified, following the panel data model methodology used by Laryea et al. (2016). Our model also included inflation as a control variable, thus, modified as;

$$ROA_{it} = \alpha + \beta_1 NPL_{it} + \beta_2 Lr_{it} + \beta_3 CAR_{it} + \beta_4 BS_{it} + \emptyset_1 INF_t + \varepsilon_{it} \quad (2)$$

Bank's profitability is proxied by return on asset (ROA), as evidenced in reviewed studies (Karim et al., 2010; Ikram et al., 2016). ROA measures how well the bank utilises its assets. It measures the efficient utilisation of a firm's assets to generate profit. Higher ROA is an indication of effective and efficient use of the firm's assets

to generate profits and vice versa.

'NPL' refers to non-performing loan ratio, which is one of the major indicators of credit risk as it measures the quality of credit. It is the proportion of total loans that are in default or overdue for more than 90 days to the total loans granted. NPL ratio is expected to impact negatively on bank's profitability (Gizaw et al. 2015).

'Lr' represents liquidity ratio, is the ratio of the liquid assets to the liabilities of a bank. The level of liquidity indicates the ability of the deposit-taking sector to withstand shocks to their balance sheets. Liquidity is associated with an increased capacity of granting loans (Kingu et al., 2018). However, a trade-off may exist between the loans volume and the liquidity volume, hence, it could exert both positive and negative impact on profitability.

'CAR' represents capital adequacy ratio which is measured as tier 1 plus tier 2 capital divided by risk weighted assets. It is meant to safeguard the proportion of total owners' equity and reserves that the banks are expected to hold against risky assets. According to Laryrea et al. (2016), CAR is expected to impact negatively on the profitability of banks. However, Kingu et al. (2018) later argued that banks with higher capital adequacy ratio tend to depend on their capital to fund asset growth thus, reducing their dependency on external funding capital, and leading to higher profitability.

'BS' represents bank size proxied by bank's total assets. This is used to capture the fact that bigger banks are better placed than smaller ones in taking advantage of economies of scale in transactions that they will tend to enjoy a higher level of profits. The higher the total asset, the greater its potential of income generation (Laryrea et al., 2016).

'INF' represents inflation, which is added as a control variable to capture the impact of price volatility on bank's profitability, in line with Panta (2018). It is expected that increase in inflation causes cash flow difficulties for borrowers, which in turn lead to early termination of their loan and less profit.

Table 1: Unit Root Test

Variable	With Intercept		With intercept and trend		
	LLC	IPS	LLC	IPS	Decision
ROA	-4.36***	-2.35***	-2.35**	-5.52***	I(0)
NPL	-3.85***	-4.378***	-3.85***	-4.378***	I(0)
CAR	-2.31**	-2.793***	-0.967	-1.79**	I(0)
BS	-5.69***	--6.04***	-4.66***	-4.98***	I(0)
LR	-1.90***	-2.92***	-1.47*	-0.89	I(0)
INF	-4.20***	-2.15***	-1.22*	0.94	I(0)

Source: Author's calculation.
Note: *, **, *** means statistically significant at 10%, 5% and 1%.

IV.5 Panel OLS

The panel OLS analysis utilised three-panel estimation methods-the Pooled Regression Model, Fixed Effects (FE) model, and Random Effects (RE) model. The pooled panel regression assumes that all the cross-sections are homogeneous, which discounts the heterogeneity (individuality or uniqueness) that might exist among different cross-section under study (Woodridge, 2010). The Fixed Effects model, on the other hand, takes into account heterogeneity or individuality among the cross-section by allowing each entity to have its intercept value that captures the differences across entities (Gujarati & Porter, 2009). The use of Random effects model is based on the assumptions that the unobserved individual heterogeneity is uncorrelated with the independent variable included in the model.

To establish the best model for the relationship between the independent and the dependent variables, both pooled regression and fixed effect models were estimated. A fixed effect redundant cross-section and period effect test, together with the Hausman test were conducted (see Appendix 1) to ascertain the appropriate panel estimation method for the analyses. The former is to ascertain the preference of the fixed-effect panel model to the pooled OLS model, while the latter is to consider which is preferred between the fixed-effect and random-effect static model.

The likelihood ratio test of the redundant fixed effect for cross-sectional effect shows that the use of fixed-effects estimation is adequate. The null hypothesis of redundant cross-section effect was rejected at 1 per cent level of significance,

while that of redundant period effects failed to reject the null hypothesis of fixed-period effect. This implies that no time effect is needed in the fixed-effect regression, but that the cross-section effects among the banks are not redundant. Hence, the effect of individual banks cannot be ignored. Hausman's test was applied to the estimated random effect model to determine whether the random effect estimator would be preferred to the fixed-effect estimator. The Hausman test (Appendix 2) shows the chi-square of 10.1 with the p-value of 0.07, leading to the rejection of the null hypothesis that the preferred model is random effects. Given the different estimation test to ascertain the appropriate model, the results and discussion on the panel OLS focused on the outcome provided by the fixed effects model.

IV.6 Panel Autoregressive Distributed Lag Model

The panel autoregressive distributed lag (PARDL) model was also used to assess the impact of non-performing loans on bank profitability as a robustness check. This is to ascertain if the findings of the study are dependent on the particular empirical methodology adopted. The PARDL utilised the pooled mean group estimator (PMGE) proposed by Pesaran et al. (1999) that allows for short-run coefficients, including the intercepts, the speed of adjustment to the long-run equilibrium values, and the error variances to be heterogeneous bank by bank, while the long-run slope coefficients are restricted to be homogeneous across banks. It allows the short-term parameters to differ between groups, while imposing equality of the long-term coefficients between banks. This is quite useful if we have reasons to expect that the long-run equilibrium relationship between the variables is similar across banks; the short-run adjustment is allowed to be bank-specific as a result of individual bank differences. Lag selection for all the equations is based on the Akaike information criterion (AIC).

The general form of the empirical specification of the PMG panel model can be written as

$$P_{it} = \sum_{j=1}^{p} \tau_{ij} P_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} X_{i,t-j} + \mu_t + \epsilon_{it} \quad (3)$$

Where i = 1, 2,….,18 is the number of cross sections and time t = 1, 2, 3 …. T. X_{it} is a vector of regressors, τ_{ij} is a scalar, μ_i is a group-specific effect.

V.0 Data Estimation and Analysis

V.1 Descriptive Statistics

Table 2 describes the variables collected from the 18 commercial banks in the study sample. The descriptive statistics are based on central tendency and

dispersion. Individual bank's ROA ranged from negative 15.20 per cent to 2.4 per cent, with a mean value of 0.13 per cent and standard deviation of 1.03 per cent from its mean value. This indicates that the commercial banks earn an average of 0.13 per cent return from their asset.

The NPL ratio ranged from 19.04 per cent to 98.36 per cent, averaging 16.11 per cent over the study period. The standard deviation of 23.26 per cent indicates that there is much variation among banks in credit risk exposures. Interestingly, from the descriptive statistics and the observation of the trend on NPL in Nigerian banks over the years, NPL ratio increased steadily from 7 per cent in 2014 to 25 per cent in 2018, which is higher than the NPL threshold of 5.0 per cent of the total loans. The increasing NPL is an indication of the degradation of the quality of loans due to default.

Table 2: Summary Statistics

Variable	No of observations	Mean	Std. Dev.	Max	Min
Return on Asset (ROA)	**360**	0.13	1.03	2.4	-15.2
Non-performing loan ratio (NPL)	**360**	16.11	23.26	98.36	19.04
Capital adequacy ratio (CAR)	**360**	18.63	7.13	36.77	-14.80
Bank Size (BS)	**360**	1540	0.86	5050	24
Liquidity ratio (Lr)	**360**	44.7	20.02	102.1	1.14
Headline Inflation (INF)	**360**	12.33	3.65	18.55	7.78

Source: Authors' compilation

The minimum and maximum CAR are negative 14.80 and 36.77 per cent, respectively, with a mean CAR and a standard deviation of 18.63 per cent and 7.13 per cent, respectively. The bank-level data shows that provisioning for some banks' NPLs wiped off their balance sheet, resulting in a negative equity, hence a negative CAR in some cases. Bank size proxied by its total assets, ranged from ₦24.40 billion to ₦5,050.00 billion. The average asset size at ₦1,540.61 billion showed a huge difference in asset of the different banks, as some of the banks have International licenses, while others are National banks. The relatively high and varying inflation rate with a maximum of 18.55 per cent makes it difficult for loan assessment decisions.

V.2 Correlation Analysis

The correlation analysis is a useful tool in measuring the degree of association between two variables. It also ensures that independent variables are not

correlated with each other to avoid multicollinearity. The results from the pair-wise correlation show that there was no multicollinearity between selected determinants (Table 3).

Table 3: Correlation Analysis

Correlation Matrix						
		ROA	**NPL**	**CAR**	**BS**	**LR**	**INF**
ROA		**1**	**-0.201**	**0.067**	**0.110**	**0.125**	**-0.084**
			(0.000)	(0.204)	(0.037)	(0.018)	(0.112)
NPL			**1**	**-0.195**	**-0.305**	**-0.219**	**0.147**
				(0.000)	(0.000)	(0.000)	(0.005)
CAR				**1**	**0.238**	**0.223**	**0.132**
					(0.000)	(0.000)	(0.012)
BS (natural log)					**1**	**0.041**	**0.092**
						(0.443)	(0.083)
LR						**1**	**-0.03**
							(0.59)
INF							**1**

Source: FinA and NBS. Probability are in parenthesis.

NPL was found to be significant and negatively correlated with ROA, indicating that as the rate of default increases, there will be a decline in the interest income, which will reduce the profitability, thus, affecting ROA negatively. Also, the statistically significant negative relationship with inflation rate indicates increases in inflation rate will likely raise salaries and operating costs, and therefore, decrease bank's profitability. CAR is positively correlated with ROA, demonstrating that the higher the capital levels, the larger the bank's profitability. Likewise, liquidity ratio and bank size were found to be positively correlated with ROA. The positive relation with bank size is due to the fact that as the banks are bigger, so does the opportunity of diversification of risk; thus reducing the NPL and increasing profit.

V.3 Regression Analysis

Based on the theoretical relationship among variables and the result of the unit root test, a panel OLS and panel ARDL were estimated.

Table 4: Model Estimation Results

	OLS (Fixed Effect)	PARDL
C	24.95	
	(0.004)	
	[2.053]	
NPL	-1.82	-1.373
	(0.000)	(0.000)
	[-28.179]	[16.759]
CAR	0.216	0.158
	(0.000)	(0.008)
	[11.65]	[2.657]
BS	1.22	0.500
	(0.006)	(0.006)
	[2.75]	[4.032]
LR	-0.27	-0.278
	(0.000)	0.000
	[-7.371]	[-3.329]
INF	-0.677	1.701
	(0.000)	(0.000)
	[-12,526]	[18.724]
R2	*0.88*	
F-Statistics	*108.86*	
	(0.00)	
Breusch Pagan (LM)	*7.40*	*189.11*
	(1.00)	*(0.03)*
Pesaran CD	*-0.32*	*0..004*
	(0.75)	*(0.99)*

V.3 Discussion of Findings and Policy Implications

The result of the impact of non-performing loans on banks' profitability based on the analysis from eighteen commercial banks from 2014Q1 to 2018Q4 showed that the coefficients of most of the variables of interest are in conformity with the *apriori* expectations and propositions of other empirical research. The p-values

for almost all variables are less than 0.05, which indicated a significant relationship between the dependent variables and the independent variables at the 5 per cent level of significance. In Table 4, the fixed effect panel regression and panel ARDL approaches gave similar results in terms of the signs of the coefficients. This shows that the results are consistent, irrespective of the methodology used.

The estimated results from all the models indicate that non-performing loans ratio show a statistically significant negative effect on bank profitability. This implies that an increase in NPL will cause a decrease in the profitability of the banks under review, supporting the bad management hypothesis that increased exposure to credit risk is usually associated with an increase in operating costs, which leads to decreased profitability. The result is consistent with Gizaw et al. (2015) who found that increases in NPL reduce profitability in banks and vice versa. NPLs have opportunity costs, in that the non-interest-earning assets (mainly in the form of money) could have been invested elsewhere for earnings. Besides this, banks are also required to make provisions for losses on non-performing assets, which in turn affect profitability, and there is a cost associated with bad loans recovery.

The empirical results showed that Bank Size positively affect banks' profitability in all the models in line with the findings of Laryea et al. (2016). Banks that are bigger have the resources and better ability in their selection and diversification of credit. This is true because as the bank size increases, so does its ability to invest and make profit.

The CAR exerted a positive effect on banks' profitability, implying that holding all other variable constant, an increase in CAR will bring about an increase in banks' profit, supporting Kingu et al. (2011) findings. The reason is that higher CAR may induce higher profitability, if the higher capital reduces risk-related barriers to expansion into some profitable product.

Liquidity ratio exerted a negative effect on bank's profitability; this is expected, because holding assets in a highly liquid form tends to reduce income, as a liquid asset, for example, cash is associated with lower rates of return. It can also be argued that when banks hold high liquidity, they do so at the opportunity cost of other investments, which could have generated high returns.

The effect of inflation on profitability was negative and significant. The explanation for this could be that, as inflation increases, interest rates and subsequently the bank's costs of funds increases, thus, reducing their profit.

VI.0 Summary and Conclusion

The objective of this study was to investigate the effect of NPL on banks' profitability in Nigeria, although some bank-level and macroeconomic variables are selected as control variables. The study used the fixed effect and the panel ARDL models on quarterly data, spanning the period 2014 to 2018. Our findings showed that when the profitability of all banks was assessed, the coefficients of most of the explanatory variables were statistically significant. The non-performing loan ratio, liquidity ratio and inflation have a negative impact on the profitability, as expected, while the bank size and CAR positively influenced profitability of all banks taken together.

Furthermore, observations from the findings indicated that commercial bank profitability is challenged by the increasing non-performing loans, which affects their ability to meet the regulatory minimum requirement by the central bank. Hence, the risk management teams of the banks need to strengthen their credit management strategies, as the lesser the risk of loan default, the greater the bank profitability. Noting the fact that banks carry out their due diligence before granting loans, they may also consider offering professional advice to the loan customers on passible ways of efficiently investing the loan to ensure the needed return on investment is attained. The regulators may also wish to reward banks with NPLs that are lower than the regulatory threshold in as much as the banks meet up with their loan-to-deposit ratio.

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Appendices

Appendix 1: Redundant Fixed Effects Tests
Equation: EQ04
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.874968	(17,338)	0.0000
Cross -section Chi -square	64.100947	17	0.0000

Redundant Fixed Effects Tests
Equation: EQ04
Test period fixed effects

Effects Test	Statistic	d.f.	Prob.
Period F	0.874831	(19,336)	0.6149
Period Chi-square	17.382567	19	0.5640

Appendix 2: Correlated Random Effects -Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	10.009892	5	0.0750

Cross -section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
NPL	-0.019539	-0.012079	0.000010	0.0181
CAR	0.002159	0.001605	0.000005	0.8117
BS	0.228751	0.08 1340	0.013896	0.2111
INF	-0.004129	-0.011838	0.000011	0.0218
LR	-0.005155	0.000018	0.000008	0.0734

Appendix 3
Dependent Variable: D(RAO)
Method: ARDL
Sample: 2014Q3 2018Q4
Included observations: 324
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): NPL CAR BS INF
LR
Fixed regressors: C
Number of models evaluated: 4
Selected Model: ARDL(2, 2, 2, 2, 2, 2)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		Long Run Equation		
NPL	-1.373425	0.081948	-16.75977	0.0000
CAR	0.157956	0.059444	2.657224	0.0087
BS	0.500003	0.124009	4.032000	0.0001
INF	1.701283	0.090856	18.72497	0.0000
LR	-0.278392	0.083611	-3.329610	0.0011
		Short Run Equation		
COINTEQ01	-0.827753	0.220084	-3.761078	0.0002
D(RAO(-1))	-0.043461	0.115825	-0.375227	0.7080
D(NPL)	-0.269933	3.299777	-0.081803	0.9349
D(NPL(-1))	1.746078	1.423960	1.226213	0.2220
D(CAR)	0.158968	0.813611	0.195386	0.8453
D(CAR(-1))	-1.620038	1.925698	-0.841273	0.4015
D(BS)	58.80686	45.37291	1.296079	0.1969
D(BS(-1))	27.97703	41.93683	0.667123	0.5057
D(INF)	-3.444604	3.694044	-0.932475	0.3525
D(LR)	-0.584214	0.434890	-1.343362	0.1811
D(LR(-1))	0.246855	0.569456	0.433493	0.6653
C	185.7815	56.38642	3.294791	0.0013
Mean dependent var	-0.983391	S.D. dependent var		146.8 677
S.E. of regression	59.94562	Akaike info criterion		8.585045
Sum squared resid	564175.9	Schwarz criterion		10.77638
Log likelihood	-1342.308	Hannan -Quinn criter.		9.456360

*Note: p-values and any subsequent tests do not account for modelselection.

Appendix 4: Auto correlation Test
Sample: 2014Q1 2018Q4
Included observations: 306

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|. |	.|. |	1	0.025	0.025	0.1996	0.655
.|. |	.|. |	2	0.011	0.010	0.2363	0.889
.|. |	*|. |	3	-0.065	-0.066	1.5553	0.670
.|. |	.|. |	4	0.044	0.048	2.1699	0.705
.|* |	.|* |	5	0.150	0.150	9.2237	0.100
.|* |	.|* |	6	0.192	0.185	20.820	0.002
.|. |	.|. |	7	-0.039	-0.044	21.304	0.003
*|. |	*|. |	8	-0.078	-0.072	23.253	0.003
.|. |	.|. |	9	-0.053	-0.044	24.137	0.004
.|. |	.|. |	10	0.070	0.034	25.714	0.004
.|. |	*|. |	11	-0.021	-0.084	25.853	0.007
.|* |	.|* |	12	0.134	0.119	31.646	0.002