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DETERMINANTS OF DEPOSIT AND LENDING RATES IN NIGERIA: EVIDENCE FROM BANK LEVEL DATA

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Executive Summary

The financial intermediation process is critical in efficient allocation of resources for economic growth and development. Conventionally, central banks employ several monetary policy tools and instruments at its disposal to achieve this. The Central Bank of Nigeria (CBN) uses the monetary policy rate (MPR), as the anchor rate, to steer the inter-bank rate in a desired direction. The policy rate also influences the cost of funds to economic agents. In recent times, high lending rate, low savings culture and low deposit rate constitute the major hindrances to credit growth and expansion of economic activities in Nigeria.

This study investigates how macroeconomic and bank-specific factors individually or collectively influence the determination of deposit and lending rates in Nigeria. A panel autoregressive distributed lag (PARDL) procedure is employed to a two-model analysis using quarterly data on seventeen (17) Nigerian banks from 2010Q1 to 2017Q4. The methodology captures the cross-sectional and time variations among the banks, as well as, their idiosyncratic sensitivity to shocks.

Findings from the study show that concentration, profitability and inflation are the major drivers of deposit rate, while lending rates depended mainly on inflation, credit risk and total assets of banks. The study, therefore, recommends the tailoring of policy measures towards enhancing competition among banks, improving on the existing economic and social infrastructure to reduce the cost of borrowing, and ensure macroeconomic stability for optimal banks' performance.

In the credit market, the government should source its funds from the

capital market to reverse the upward pressure on interest rates so as to reduce crowding-in private sector credit.

Key Words: Deposit Rate, Lending Rate, Panel Autoregressive Distributed Lag (PARDL), Financial Intermediation.

JEL Classification: C23, E43, E52, E58

CHAPTER ONE

1.0 Introduction

1.1 Background and Problem Statement

Banks play a very important intermediation role in an economy by accepting deposits from the surplus spending economic agents and channeling same to deficit spending agents to finance their investments. This financial intermediation process and the efficiency of its implementation contribute to economic development (Turhani & Hoda, 2016). Banks derive, to a large extent, some benefits from the spread (loan margin) between the interest paid to depositors and charges on loans to borrowers. The size of loan margins, however, depends on several factors, including the banks' capital-to-assets ratio and the degree of interest rate stickiness. Sticky rates reduce the effects of monetary policy shocks, while financial intermediation increases the transmission of supply shocks (Gerali et. al., 2010).

In addition to facilitating economic growth through credit creation, interest rate is a key determinant of savings mobilisation and investments in the economy. Low interest rates create an enabling environment for the provision of low-cost funds for businesses and result in credit expansion. The determination of interest rate is one of the major investment decisions that banks take to maximise profit. Moreover, the manner in which banks determine their interest rates is important for effective monetary policy implementation. Specifically, proper analysis of key determinants of interest rate is necessary for understanding the operation, performance of banks and the channels through which monetary policy transmits.

Broadly, there are a number of factors that influence the determination of interest rates by banks. These include inflation, policy rate and the level of economic development. However, for

developing economies, such as Nigeria, other contributory factors include security and infrastructural challenges.

In Nigeria, the negative real interest rate, occasioned by high lending rates and abysmally low deposit rate, has severely inhibited investment and economic growth. The underlining consequence calls for an adequate understanding of the key drivers of deposit and lending rates, in order to guide policy and foster the much-desired economic growth and employment generation.

Previous studies on this issue explained numerous factors that determine commercial banks' interest rate, concentrating more on the volume of bank deposits and lending; or, on either deposit or lending rates. This study examines the determinants of both deposit and lending rates, employing a combination of bank-specific and macroeconomic variables. It also incorporates some institutional factors that affect banks' deposit and lending rates in Nigeria. The study also utilises quarterly data spanning 2010 to 2017, unlike previous ones, such as Eriemo (2014) and Hassan (2016), which uses annual data ranging from 1980 to 2010 and 2000 to 2013, respectively.

The broad objective of the study is to investigate the determinants of banks' deposit and lending rates in Nigeria. Specifically, it attempts to:

- Identify bank-specific and macroeconomic determinants of interest rate in Nigeria; and
- Examine the key drivers of interest rate both in the short and long-run horizon.

The study is structured into five sections. Following the introduction, section two provides a review of theoretical and empirical literature on interest rate determination. Section three discusses interest rate developments in Nigeria, highlighting the various interest rate regimes

and the structure of deposit and lending rates, while section four presents methodology of the study, estimation procedure, data analysis and discussion of major findings. Section five provides the summary, conclusion and policy recommendations.

CHAPTER TWO

2.0 Theoretical and Empirical Literature Review

2.1 Theoretical Literature

2.1.1 Classical Theory of Interest Rate

The classical theory of interest rate is one of the oldest theories on the determinants of interest rate. It was developed during the nineteenth and the twentieth centuries by a number of British economists and expanded by Irving Fisher in1930, (Mishkin, in 1986 and Marshall, 1990). According to the theory, equilibrium interest rate is determined by the forces of demand and supply under a perfect market competition. The supply of savings is determined by the household sector, while the business sector determines the demand for investment and capital. The theory considers the payment of interest rate as a reward for the delay of the current consumption for a greater consumption in the future. However, higher interest rate attracts more savings relative to consumption spending, encouraging more individuals to substitute current savings for some quantity of current consumption. This substitution effect allows for positive relationship between interest rate and the volume of savings.

2.1.1.1 Fisher's Theory

Fisher's theory, which was developed by Irving Fisher in 1930, attributes the change in the short-term interest rate to the change in expected rate of inflation. It assumes the expectations by the market agents about rate of inflation to be largely correct (as cited in Mishkin, 2010). The theory argues that competitive financial markets would establish the nominal interest rate on deposits that are positive in real terms, because savers must be encouraged to hold financial assets rather than real assets, and averagely, real assets grow in nominal terms at the rate of inflation. Therefore, the nominal interest rate must equal

the expected inflation rate in addition to a primary real rate. Lending rate will in turn be positive in real terms since they are based on the cost of deposits, plus a premium covering the cost of intermediation, reserve requirement, taxes and risk administration costs (Davies, 1986). Accordingly, if low nominal interest rates are desired, inflation must be kept low. The major criticism of the Fisher's theory was that, because it included partial equilibrium theory, it is confined to the analysis of the capital markets and works with the assumption that prices of goods and services are pre-determined (as cited in Mishkin, 2010).

2.1.2 Keynes Liquidity Preference Theory

Postulated by Keynes (1936), the liquidity preference theory states that investors are more disposed to short-term securities than long-term securities, and in the case of uncertainty, savings and investment are largely influenced by expectations and exogenous shocks rather than the underlying real forces. According to Keynes, this may cause risk-averse savers to change the form in which they hold their financial wealth and the average liquidity of their portfolios, depending on perceived expectations of asset prices.

Keynes considered the rate of interest as depending on the present supply of money and the demand schedule for the present claim on money in terms of deferred claim. In his view, the major way the level of aggregate output is affected by interest rates is through its effects on planned investment spending.

In addition to Keynes' view that interest rates play a major role in the investment demand schedule, he advocated that monetary policy be directed primarily at influencing the rate of interest. Futhermore, he, believed that "monetary policy" alone cannot achieve the desired levels of investment sufficient to maintain full employment and should be complemented by other policies that influence investment demand. Keynes omitted the fact that interest rates allocate available

funds not just for various investment purposes, but also for consumption purposes. However, to maintain a desired level of real interest rates below the market rate would inevitably require an increasing rate of monetary expansion over time.

2.1.3 Loanable Funds Theory

The loanable funds theory of interest is an expansion of the classical savings and investment theory of interest rate. It integrates monetary and non-monetary factors of savings and investment. The theory was developed by Dennis Robertson and Bertil Ohlin In 1930. The theory states that the level of interest rate in the financial market is determined by the supply and demand of loanable funds. Saunders and Cornett (2010) suggests that the determination of interest rate could be likened to how the demand and supply of goods determine the price of goods. Holding all other factors constant, the supply of loanable funds increase as interest rate rises, while the demand for loanable funds grows as interest rate falls, all other factors held constant. Saunders and Cornett (2010) further asserts that economic conditions and monetary expansion cause demand curve for loanable funds to shift.

The theory also explains that the sum of money offered for lending and demanded by consumers and investors in a given period, as well as the interest rate is determined by the interaction between potential borrowers and savers. According to the theory, economic agents seek to make the best use of the resources available to them over their lifetime and borrow funds to take advantage of investment opportunities in the economy in their bid to increase real income. This would only work if the rate of return available from the investment is higher than the cost of borrowing. Borrowers would be unwilling to pay a higher real rate of interest than the rate of return available to capital. On the other hand, savers would be willing to save and lend

only if there was an assurance of real return on their investment that would make it possible for them to earn more in the future than they would otherwise be able to do. In other words, time preferences determine the extent to which individuals are willing to delay consumption (Saunders & Cornet, 2011).

2.2 Determinants of Interest Rates

Most literature on the determinants of deposit and lending rates generally assume that banks function in an oligopolistic market, meaning that they do have the market power to set their loan rates based on the behaviour of demand for loans and deposits. Thus, they are not price-takers. The determination of the short-term money market rates is linked mainly to the response to changes in the official interest rate, which is fundamental to monetary policy implementation by central banks.

2.2.1 Demand for Loans and Deposits

Melitz and Pardue (1973) opined that increase in permanent income has a negative effect on the demand for banks' loans. As money market rate increases, consumers demand for alternative forms of financing which makes lending more attractive. This approach also improves loan demand and raises the interest rate on loans. Similarly, since treasury bills (T-bills) is an alternative investment option for banks and individuals, higher T-bills rate is likely to discourage savings in banks, except banks that are willing to pay more on deposits. On the other hand, lending rate is also expected to go up in tandem with a rise in T-bills rate to encourage banks to lend to borrowers rather than invest in less risky assets with a higher return. Accordingly, a positive association is expected between policy rate and interest rates.

Increased economic growth is naturally accompanied by a rise in income, greater marginal propensity to save and increased supply of

deposits, which is likely to lower deposit rates of banks. Also, economic growth generates an expansion in the demand for loans, which raises banks' loan rates, but banks will at the same time be willing to pay more on deposits to support long-term assets. For depositors, an increase in inflation reduces the value of savings and this could generate a demand for more compensation. Apparently, the expected effects of inflation on both deposit and lending rates would be positive.

2.2.2 Banking Industry Structure

Literature has shown that there are two possible impacts of concentration on the pricing behaviour of banks. The first is that a more concentrated banking industry would behave oligopolistically (structure-performance theory), which results in lower competition and higher spreads. On the other hand, concentration is about more efficient banks taking over less efficient counterparts causing a negative impact on the spread as a result of decrease in administrative costs, owing to improved efficiency (efficient-structure theory).

The impact of competition on banks' pricing behaviour is generally explained by two theories, namely: the "structure-conduct hypothesis" (SCH) and "efficient-structure-hypothesis" (ESH). The former holds that a highly concentrated market leads to collusion that raises market power to extract rents from depositors and borrowers. Banks are, therefore, more likely to expand the spread between lending and deposit rates. The latter hypothesis suggested that concentration could lead to increased number of efficient banks that tend to price their services more competitively. More competitive banking system is expected to pay more on deposits and charge less on lending. Market structure is measured with the Herfindahl-Hirschman index (HHI). A rise in the Herfindahl-Hirschman Index (HHI) is indicative of a

concentrated and less competitive market. Accordingly, we expect a negative (positive) relationship between deposit (lending) rates and HHI.

Also, banks with a large share of the market, either in terms of branch network or proportion of industry assets, deposits or loans are more likely to operate differently. They negotiate credits at lower terms and more likely to gather and process information cheaply than marginal players, among others. In other words, market control, measured by total assets (TA) or concentration ratios (CR) in assets and deposits, is expected to vary negatively with deposit and lending rates, due to reduced pressure for deposits and a large pool of loanable fund, compared with smaller, weak banks. Such big banks may, however, charge higher lending rates as a result of monopoly power.

2.2.3 Bank Specific Factors

The bank capital channel is based on three assumptions. Firstly, that the market for bank equity is imperfect, as banks cannot issue new equity easily due to high agency costs and taxes (Myers & Majluf, 1984; Cornett & Tehranian, 1994; Calomiris & Hubbard, 1995; & Stein, 1998). Secondly, banks face interest rate risk due to the higher maturity nature of their assets with respect to liabilities (maturity transformation). Thirdly, the supply of credit is limited by regulatory capital requirements (Thakor, 1996; Bolton & Freixas, 2001; & Van den Heuvel, 2001a; 2001b).

The mechanism is that after an increase of market interest rates, a lower portion of loans can be re-allocated with respect to deposits. Due to this maturity mismatch that reduces profits and capital accumulation, banks are therefore, burdened with a cost. Banks also minimise lending and broaden their interest rate spread if equity is adequately low and issuance of new shares is expensive.

Bank liquidity is a buffer against market fluctuations, enabling the bank to fund assets and meet its obligation without incurring losses. Banks with liquidity levels beyond regulatory requirements are less likely to be aggressive in deposits mobilistaion, as empirically validated in different studies[1]. The deposit rate is expected to vary negatively with the excess liquidity ratios (Lrx). In the same vein, highly liquid banks may more likely offer cheaper loans than banks with liquidity problems.

2.2.4 Changes in the Policy Rate

Monetary Policy also affects banking interest rates. A monetary tightening or loosening determines the movement of reservable deposits and market interest rates. Frequent changes in policy rate influences the determination of banks' interest rates, as banks go to the money market to manage their liquidity positions when they encounter un-aligned demand and supply for loans and deposits (Gambacorta, 2004). This has implications on bank interest rates, through the interest rate channel. However, the growth in the cost of financing could have a different impact on banks based on their unique features. The "bank lending channel" and the "bank capital channel" are the main channels through which differences among banks can cause a diverse effect on lending and deposit rates.

A monetary tightening has an effect on bank loans because the decline in reservable deposits cannot be counter-balanced totally by issuing other forms of funding. Kashyap and Stein (1995, 2000), Stein (1998), and Kishan and Opiela (2000) suggested that the market for bank debt is imperfect and since non-reservable liabilities are not insured and there is an asymmetric information problem about the value of banks' assets, a premium is paid to investors. According to these authors, small banks pay a higher premium because the market

[1] De Graeve et al. 2007; Gambacorta, 2008; Bikker and Gerritsen (2018)

sees them as riskier. Since these banks are more exposed to asymmetric information problems, they have limited ability to safeguard their credit relationships in case of a monetary tightening; thus, they should reduce their supplied loans and raise their interest rate. Moreover, these banks have a lower capacity to issue money market instruments, therefore they could try to contain the drain of deposits by raising their rates.

2.2.5 Institutional Factors and Financial Intermediation Cost

2.2.5.1 Financial Intermediation Cost

In Nigeria, deposit money banks mobilise funds from short-term and long-term sources. The banks incur both direct and indirect costs in the process of mobilising funds and this constitute major elements in the determination of banks' lending rates. Expenses like overhead costs (salaries and wages), cost of providing security, handling funds and electricity bills, among others, are classified as indirect costs (Nwaoba, 2006; Accenture, 2008). These costs of financial intermediation affect the interest rate on loans positively, while it has a negative effect on deposits rate. As banks often recoup part of these cost by transferring the burden to their customers in form of higher interest rates on loans and lower interest rates on deposits.

In Nigeria, poor physical infrastructure, such as electricity and access roads increase the cost of banking operations. This increases operational cost, leading to high lending rate by banks. Rising cost on energy for the banking and other businesses requires that there should be combined efforts of the Bank and Government to facilitate infrastructural development particularly, power, and the oil and gas sector.The security situation remains a challenge in Nigeria. Insecurity, particularly the incessant spate of organised crime, kidnapping, assassination, repeated invasion and vandalism of business installations in Nigeria affects the performance of businesses. The combination of

all these challenges make Nigeria's business environment hostile, and consequently affects the determination of interest rate.

2.3 Empirical Literature

The literature on interest rate determination contains a wide range of empirical findings across regions. In Europe, Gambacorta (2004) employed error correction Model (ECM) to investigate banks' behaviour in interest rate setting in Italy, using quarterly data spanning 1993:Q3 to 2001:Q3 from a sample of banks. The results showed an existence of heterogeneity in the banking rates pass-through in the short-run, while interest rates on short-term lending of liquid and well-capitalised banks responded less to a monetary policy shock. Similarly, banks with high proportion of long-term lending tended to change their prices less. Heterogeneity in the pass-through on the interest rate on current accounts depended mainly on banks' liability structure, while bank's size was found to be irrelevant.

For the Dutch savings market, Vink (2010) employed panel data fixed effects, with AR(1) model, covering 1995 to 2009. The results showed that the independent variables (bank size and operational inefficiency) had significant and negative effect on the retail deposit rate in the market. Bikker and Gerritsen (2018), in another study on Netherland's banking sector, examined how macroeconomic, bank-specific and account specific characteristic affect the interest rate. Panel data sets were estimated using fixed effect, GLS and error correction model techniques. The study found that market rate and its volatility, inflation rate and market stress influenced interest rates positively, while economic growth and concentration index affect interest rate negatively. The findings are robust across different specification techniques used in the study.

In the Asian region, Bhattarai (2015) investigated the determinants of lending rate of Nepalese commercial banks based on data from a

sample of 6 banks over a 6-year period (2010 to 2015). The study conducted the pooled OLS, fixed effects and random effects estimations. The estimates from these three regression models revealed that operating costs to total assets ratio, profitability (ROA) and default risk had significant positive impact on the commercial bank lending rate, while deposit rate had negligible impact on lending interest rate. Thus, the study concluded that the major determinants of commercial banks' lending rate are operating costs to total assets ratio, profitability (ROA) and default risk.

Moore and Craigwell (2003) examined the relationship between commercial banks' interest rates and loan sizes in the Barbadian banking industry for the period 1986Q1 to 1997Q4. The result showed that the smaller the loan size, the greater the interest rate applied, and vice versa. Using a fixed effect panel data framework, the study further established that the interest rate differences among loan sizes can be mainly explained by the borrower's characteristics for local banks, while for foreign banks, operating characteristics were the most important factors.

In the African region, Larbi-Siaw and Lawer (2015) investigated the influence of selected macroeconomic and financial level variables on bank deposits in Ghana, employing quarterly data spanning 2000Q1 to 2013Q4. The study applied co-integration analysis and Fully Modified Ordinary Least Square (FMOLS) estimation technique. The results revealed that inflation and growth of money supply variables were significant in explaining the short-run dynamics of bank deposits. The result further established that inflation, proxied by consumer price index (CPI), negatively impacts on bank deposits in both the short- and long run, while the growth of money supply was found to have both negative and positive impacts on the level of bank deposits in the short- and long-run.

Uzeru (2012) studied the determinants of lending rates in Ghana. The study utilised annual data from 2005 to 2010. A correlative causal design approach and multiple regression models, otherwise called the best subsets method, were employed. The results showed that, for bank specific factors, lending rates in Ghana increases with increasing interest expense, while for industry specific factors, lending rates decrease with increasing T-bill rates. For macroeconomic factors, inflation and gross domestic product impacted on lending rates. Lending rate was found to increase with increasing inflation and gross domestic product.

The determinants of commercial bank lending in Ethiopia, using panel data on eight commercial banks, was examined by Malede (2014) for the period 2005 to 2011. Ordinary least square (OLS) was applied to determine the impact of explanatory variables on commercial bank lending. The result indicated a significant positive relationship between bank lending and gross domestic product, while credit risk and liquidity ratio had significant but negative relationship with commercial bank lending. However, deposit, investment, cash required reserve and interest rate did not affect Ethiopian commercial bank lending for the defined sample period.

In Nigeria, Eriemo (2014) examined the macroeconomic determinants of bank deposits using annual data ranging from 1980 to 2010. The study applied the Error Correction Model (ECM) and established that bank investment, bank branches, interest rate and the general price level are important determinants of bank deposit in Nigeria.

Using the Ordinary Least Square (OLS) multiple regression method, Hassan (2016) examined the effect of interest rate on commercial bank deposits in Nigeria. The study made use of secondary data between 2000 and 2013 and established an inverse relationship between the interest rates and the commercial bank deposits.

This suggests that interest rates is not a driver of customers' deposits in Nigeria, while the GDP has a positive relationship with commercial bank deposits.

Olusanya et.al. (2012) investigated the determinants of commercial banks' lending behavior in Nigeria using a co-integration analysis. The study adopted the Error Correction Model technique using secondary data between 1975 and 2010. The study found that loans and advances have positive relationship with volume of deposit, exchange rate, gross domestic product and cash reserve ratio, but a negative relationship with lending rate and investment portfolio. However, there was a long-run relationship between loans and advances and all the explanatory variables in the study which signaled that commercial banks have huge impact on their lending behavior. The study concluded that banks should try to create more deposit to enhance their lending behavior.

As observed in the review, these previous empirical studies on Nigeria applied diverging methodologies to conduct related studies. Eriemo (2014), for example, employed the Error Correction Model (ECM) to examine the macroeconomic determinants of bank deposits, while Hassan (2016) used the multiple linear regression to study the effect of interest rate on commercial bank deposit. Olusanya et al. (2012) also used the Error Correction Model (ECM) method to determine commercial banks' lending behaviour in Nigeria. The current empirical investigation differs from these studies by employing a panel autoregressive distributed lag (PARDL) model to investigate how macroeconomic and bank-specific factors have individually or collectively influence the determination of deposit and lending rates and utilised the pooled mean group estimator (PMGE) to obtain the study outcome.

CHAPTER THREE

3.0 Interest Rates Developments in Nigeria 1980 to 2017

3.1 Interest Rate Regimes in Nigeria

Interest rate regime in Nigeria, like many other developing and emerging market economies, has evolved over the years in tandem with the prevailing economic situation of the country at the time. The country has undergone two different interest rate regimes during the review period. These are the regulated and deregulated regimes[2].

3.1.1 Regulated Regime

Prior to financial liberalisation, and the introduction of the Structural Adjustment Programme (SAP) in 1986, the level and structure of interest rates in Nigeria was regulated by the monetary authority. At the time, both deposit and lending rates were administratively controlled by the CBN, with the aim of achieving optimum resource allocation, engendering a systematic development of the financial sector, curbing inflation and reducing the burden of interest debt servicing by government. For purposes of lending, the monetary authority classified the economy into preferred (such as agriculture and manufacturing), less preferred and "others" sectors (CBN, 2016). Also, direct tools, such as credit ceilings and controls; interest and exchange rate controls, special deposits and cash reserve requirements were employed to achieve price stability, and allocated financial resources in the economy at concessionary interest rates to the preferred sectors.

This administratively controlled policy regime produced adverse consequences, with nominal interest rates declining at an average of 3.0 per cent and high inflation peaking at about 47.5 per cent in

[2]Education in Economics Series No.3, Research Department, CBN 2016.

1984Q2 (see Figure 2). The fixed interest rates trailed inflation rate, resulting in negative real interest rate, which caused financial disintermediation evident by low level of investment, savings, and growth, coupled with misallocation of resources. Therefore, the interest rate policy objective of improving investment and growth in the real sector was not attained (CBN, 2016).

3.1.2 Deregulated Regime

Following the adoption of the Structural Adjustment Programme (SAP) in 1986, the CBN introduced a market-based interest rate policy in August 1987. Interest rates became market-determined and rose relative to the controlled-regime, while inflation rate moderated with a resultant positive real interest rate. The deregulation of interest rates allowed banks to determine their deposit and lending rates in tandem with market conditions, through negotiation with their customers. Other policies adopted include the management of excess liquidity through the withdrawal of public sector funds from banks and the ban on foreign currency deposits as collaterals for naira loan facilities. However, significant expansion in monetary aggregates, due to the monetisation of oil receipts caused a decline in the savings and inter-bank rates and widened the spread between the lending and deposit rates. Nonetheless, the policy rate (MRR), which influences other interest rates, continued to be determined by the CBN in line with changes in overall economic conditions (CBN, 2016).

In pursuant to the need to continuously review policy implementation aimed at achieving price stability, the CBN introduced a new monetary policy implementation framework in December 2006, with the monetary policy rate (MPR), replacing the Minimum Rediscount Rate (MRR) as the anchor rate. The new monetary policy framework hinges on an interest rate corridor, providing for the CBN lending facility as well as the acceptance of overnight deposit from operators at specified rates. Under the new framework, the CBN discount

window could be accessed by DMBs in need of funds to meet liquidity shortages and those with excess liquidity could deposit the funds overnight. The utilisation of the standing facility is aimed at ensuring orderly market operations in the banking system by ensuring that interest rate volatility was curtailed to the barest minimum and stability[3] in market rates guaranteed.

The operating principle of the MPR is to facilitate inter-bank trading and transfer of balances at the CBN by managing the supply of settlement balances of banks and motivating the banking system to achieve zero balances at the CBN. The operationalisation of the MPR and other related policy reforms have been successful at managing the rates in the banking system. Some of these reforms include Open Market Operations (OMO) for liquidity management; the use of standing facilities to encourage inter-bank transactions; and special sales of foreign exchange (CBN, 2016). The MPR was reduced from 10.3 per cent in May 2008 to 6.0 per cent in August 2009, following the global financial crises of 2008/2009. The MPR however, rose steadily between 6.0 to 12.0 per cent, from September 2009 to June 2016. In response to the tapering of the quantitative easing programme in the US, the MPR was increased to 14.0 per cent in September 2016, to attract capital from abroad. It was retained at this level all through to end-December 2017.

3.2 The Structure of Deposit and Lending Rates

Interest rates charged by banks and paid to customers are referred to as the lending and deposit rates, respectively. The deposit rate consists of rates on deposits of various maturities ranging from 7 days to over 12 months. The average of the 7 day to over 12 months deposit rates represent the average term deposit rate. Typically, lending rates

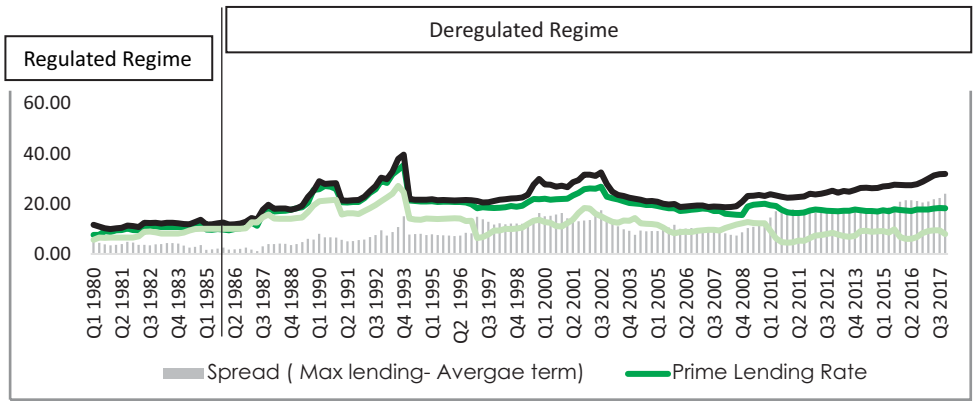
[3]Central Bank of Nigeria Communique No. 48 of the Monetary Policy Committee, 28th November, 2006. https://www.cbn.gov.ng/OUT/PUBLICATIONS/PRESSRELEASE/GOV/2007/PR2A-3-07.PDF

by banks in Nigeria are generally categorised as prime and maximum lending rates. Prime lending rate is the average rate of interest that Deposit Money Banks (DMBs) charge on loans extended to their most secure and credit-worthy customers, while the maximum lending rate is the average rate that banks lend to their less credit-worthy customers. The difference between the lending and deposit rates constitute the interest rate spread or net interest margin of banks.

3.3 The Behavior of Lending and Deposit Rates (1980-2017)

Figure 1 is the plot of prime lending rate (PLR), maximum lending rate (MLR), average term deposit rate (AvTD) and the interest spread between MLR and AvTD. Prior to 1986, when the regulated regime of interest rate was operational (characterised by low fixed interest rates) in the country, the margin between both the PLR and MLR, and the AvTD, represented by the bar, was low. For instance, in 1980Q1, the interest rate spread between the PLR and AvTD stood at 2.0 per cent, while that between the MLR and AvTD was 6.0 per cent.

Figure 1: PLR, MLR, Average Term Deposit Rate and Spread (MLR - AvTDR)



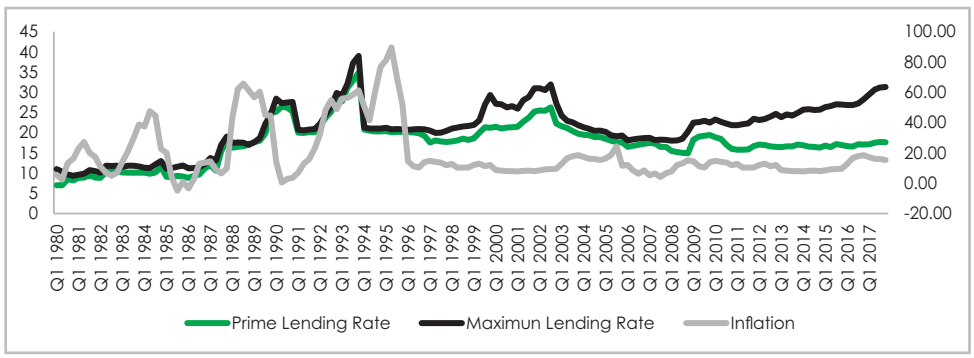
Source: Authors' chart based on data from CBN

Banks' profitability at that time was also low, since the difference between what they pay to depositors and what they earn as interest on loans was low. However, after the liberalisation of interest rates

during the SAP era in1986, the PLR, MLR and AvTD all exhibited upward trends, with the PLR, MLR and AvTD at 34.87 per cent, 38.99 per cent and 23.99 per cent, respectively, in 1993Q4 (see Figure 1).

The interest rate spread also widened significantly during this period. The average term deposit rate was at its peak at 26.5 per cent in 1993Q3. This period also saw the PLR and MLR around their historical peaks of 38.5 per cent and 39.0 per cent apiece in 1993Q4. The deregulated regime is generally characterised by narrowing spread between the PLR and MLR, except for 2011Q1 to 2017Q4 where the difference began to widen, with the spread at historical high of 13.6 per cent in 2017Q4. The regime also witnessed rising margin between the lending rates (PLR and MLR), and the AvTD (see Figure 2).

Figure 2: Prime, Maximum Lending Rates and Inflation (Per cent)

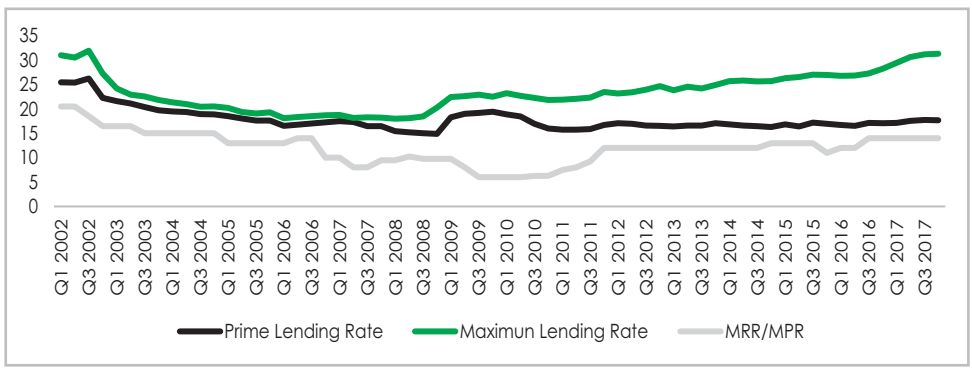


Source: Authors' chart based on informaton from CBN database

Figure 3 shows that the prime and maximum lending rates move in tandem with the MRR/MPR. This reinforces the fact that the MPR serves as an anchor rate, which other rates mimic. It could also be observed that the prime lending rate tends to move closely with the MRR/MPR than the maximum lending rate. In 2002Q1, the MRR stood at 20.5 per cent, while the prime and maximum lending rates were 25.5 and 31.0 per cent, respectively.

The MPR was fixed at 10.0 per cent when it became operational in 2006Q4. At the time, the MLR and PLR were17.3 and 18.7 per cent, respectively, with the spread between the two rates at 1.44 percentage point. To ameliorate the adverse effect of the global financial crisis, which occurred around 2007Q3, the MPR was reduced to 8.0 per cent to encourage banks lend to the real sector of the economy; however, banks' PLR and MLR were still high at 16.5 and 18.3 per cent, respectively. From 2011Q4 to 2017Q4, the PLR tends to converge with the MPR with the spread narrowing from 8.3 to 3.7 percentage points. Conversely, the spread between the MLR and the MPR widened from 14.4 to 17.3 percentage points from 2011Q4 to 2017Q4, owing to banks cautious lending behaviour towards high-risk customers (figure 3).

Figure 3: Prime, Maximum Lending Rates and MRR/MPR



Source: Authors' chart based on information from CBN database

Figure 4 shows that inflation has been largely higher than the deposits and savings rate in Nigeria. Apart from 1980Q1, around 1986Q4 and 1990Q4, inflation surpassed the savings and deposits rates throughout the sample period (1980-2017). This is intuitive, since it is expected that as inflation increases, the rates on deposits/savings must rise to lure customers to keep their monies in the bank. During 1995Q2, inflation was at its highest, coinciding with the period that savings and average term deposit rates were among the highest

in the sample period. Furthermore, when inflation plummeted around 1997Q2, savings and deposits rates fell and remained relatively stable through 2017Q3, since savers are more likely to keep their monies in banks.

Figure 4: Average Term Deposit, Savings Rate and Inflation (1980 – 2017)

Source: Authors' chart based on information from CBN database

CHAPTER FOUR

4.0 Model and Empirical Estimation

4.1 The Model

Banks' lending and deposit rates tend to reflect domestic monetary and fiscal policies, global factors and idiosyncrasies of banks. This study applied a panel autoregressive distributed lag model (PARDL) to relate deposit and lending rates to specified determinants. The PARDL relates the dependent variable to own lags, contemporaneous and lags of all other variables in the model. The basic structure of the model is adapted from Pesaran and Smith (2004). It is a dynamic regression model that takes the following form:

$$y_{it} = \sum_{j=1}^{p} \lambda_{i,j} y_{i,t-j} + \sum_{j=0}^{q} \delta'_{i,j} x_{i,t-j} + \phi_i' d_t + \mu_i + \varepsilon_{i,t} \qquad (1)$$

Where:

y_{it} is the dependent variable, and the cross-sections, $i=1,2,...,N$, introduce heterogeneity into the model. The panel is unbalanced, with cross sections less than the number of time periods ($N < T$). Yet, it is large enough for separate equations to be fixed for each of the cross-sections, making it amenable to the pooled mean group (PMG) estimation procedure. The number of periods, $t=1,2,...,T$; $X_{i,t}$ is the $K \times 1$ vector of explanatory variables that vary both across time and groups. d_t is a vector of fixed regressors, such as the intercepts and trends or those variables, which vary only with time.

The coefficients of the lagged dependent variables, $\lambda_{i,j}$ are scalars, while δ_i and ϕ_i are the $K \times 1$ and $S \times 1$ coefficients of unknown parameters for the explanatory variables and the fixed regressors, respectively; μ_i is the cross-section specific effects. $y_{i,t-j}$ and $x_{i,t-j}$ are *j* period lagged values of the dependent variable and the explanatory variables, respectively, which can be fixed or chosen based on any

lag selection criteria. The error terms, $\varepsilon_{i,t}$, are expected to be independently distributed across i and t, with expected zero means and constant variances, σ^2_i. They are also distributed independently of the regressors, $X_{i,t}$ and d_t - a requirement for consistent estimation of the short-run coefficients.

Where the variables in the model are integrated of order one or less, such that the error term from their long-run relationship is $I(0)$ for all I, it becomes necessary to work with the re-parameterised error correction representation of Equation 1, of the form:

$$\Delta y_{it} = \phi_i(y_{i,t-1} - \beta_i' x_{i,t}) + \sum_{j=1}^{p-1} \lambda^*_{i,j} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta'_{i,j} \Delta x_{i,t-j} + \chi_i d_t + \mu_i + \varepsilon_{i,t} \quad (2)$$

Where:

$$\phi_i = -(1 - \sum_{j=1}^{p} \lambda_{i,j}), \beta_i = \sum_{j=0}^{q} \delta_{i,j}, \lambda^*_{i,j} = -\sum_{m=j+1}^{p} \lambda_{i,m}, j = 1,2,...p-1 \text{ and } \delta'^*_{i,j} = -\sum_{m=j+1}^{q} \delta_{i,m}, j = 1,2,...q-i$$

The parameter θ_i ,is the error correction term that defines the speed of adjustment from short-run deviation to long-run equilibrium. It is expected to be negative and statistically significant. The vector β', contains the long-run coefficients relating the dependent and exogeneous variables in the model. λ^*_{ij} and δ^*_{ij} are short-run coefficients.

4.2 Description of Variables

The dependent variables used in the model are the average term deposit rate (ADR) and prime lending rate (PLR). The ADR is the average of saving deposits of various maturities, ranging from seven-days to over twelve months. This differed from prior studies, e.g. De Graeve et al. (2007), which estimated separate regressions for rates of different maturities. Thus, the model recognises the co-movement of deposit rates over time. The PLR is the rate on loans to prime customers, who account for the largest share of banks loans in value to the private sector.

Consistent with most studies, the determinants of deposit and lending rates are categorised into bank-level and macroeconomic factors. There are six (6) bank-specific and five (5) macroeconomic variables in the model. The choice of variables was guided by the dilemma of minimising interest expense and deposit retention by the banks on one hand, and profit maximisation against the risk of defaults by borrowers on the other.

The following bank-specific factors were considered in the study: total assets (TA), concentration ratios (CR); excess liquidity ratios (LRx); credit risk (CRs); cost of banks' funds (COF) and profitability, measured by the net interest margin (NIM). The macroeconomic factors are market competitiveness, measured by the Herfindahl Hirschman Index (HI); real GDP growth rate (rGDPg), yearly headline inflation (INF), the inter-bank rate (INR) and 91-day Treasury bill rate (TBR). The variables and their a priori expectations are described in Table 1.

Table 1: Variables Description

	Variable	Description	*A priori* Expectation
Dependent Variables	Average Term-Deposit Rate	The average of seven - days to over twelve months deposit rates. Average of saving deposits of various maturities, ranging from months	
	Prime Lending Rate	the rate on loans to prime (high net-worth) customers	
Bank-Specific Factors	Total Assets (TA)	Bank's Assets	Vary negatively with both deposit and lending rates
	Concentration Ratios (CR)	Each bank's share in the total banks' assets	indeterminate (+/-)
	Excess Liquidity Ratios (Lrx)	Actual liquidity ratio less prescribed liquidity ratios	Deposit and lending rates are expected to vary negatively with excess liquidity ratios

	Variable	Description	*A priori* Expectation
	Credit Risk (CRS)	Non-performing loans divided by outstanding total loans and advances.	A positive relationship between credit risk measure and banks deposit and lending rates is expected.
	Cost Of Banks Funds (COF)	COF includes interest expense, insurance premium, and overheads (salaries, administrative expenses, depreciation of fixed assets and other non-interest expenses).	A high-cost bank is expected to have a higher interest rate spread as a cost-saving measure.
	Net Interest Margin /Banks' Profitability (NIM)	The difference between total interest income (including commission received over loans) and interest expenses over deposits expressed as a ratio of total interest-earning assets	A positive relationship is expected on the coefficient of NIM on the deposit equation. We also expect such banks to charge competitively lower interests on loans
Macroeconomic Factors	Real GDP Growth Rate (Rgdpg)	Percentage change in real GDP	Vary Negatively with deposit rate and positively with lending rate.
	Headline Inflation (INF)	Year-on-year change of the Composite Consumer Price Index	Expected effects of inflation in both deposit and lending rates would be positive.
	Inter-Bank Rate (INR)	The interest rate at which banks access funds overnight from each other to square their books	A positive association is expected between policy rate and both interest rates
	Herfindahl Hirschman Index (Hi)	Herfindahl Hirschman Index is calculated as $HI = \sum_{j=1}^{n} (k)^2_j$; where K denotes each bank's share in the total	Negative (positive) relationship between deposit (lending)
	Treasury Bill Rate (TBR)	91-Day Treasury Bill discount rate	A positive relationship between the T-bill and both deposit and lending rates is expected.

Source: Authors' Compilation

4.3 Source of Data

Quarterly bank-level data were obtained from 17 banks' returns at the CBN, over 2010Q1 to 2017Q4. The period of study was chosen to avoid structural breaks in the data as the major reforms in the banks were carried out prior to the period. The 17 banks collectively account for over 80 per cent of assets and deposits in the market and so provide sufficient coverage for the industry. The bank-level data was meant to capture heterogeneous responses of banks interest rates to macroeconomic, global and bank-specific factors. Data on macroeconomic variables, including real GDP growth and inflation were sourced from the National Bureau of Statistics, Nigeria, while that on financial sector-based macro-variables were sourced from the CBN statistical database.

4.4 Estimation Procedure

The study applied a panel autoregressive distributed lag (PARDL) model and utilised the pooled mean group estimator (PMGE), popularised in Pesaran et al. (1995, 1997). The PMGE accommodates the stationarity challenges often associated with time series data and accounts for common and idiosyncratic factors, as well as, cross dependencies. It is an intermediate estimator between the mean group (MG) estimator (which averages the means of individual cross-sectional regressions) and the traditional fixed-effects and instrumental-variable estimators[4]. The technique allows intercepts to vary among cross-sections, but constraints all other coefficients and variances to be the same for all the units.

Pesaran and Smith(1995) further showed that where N and T are sufficiently large, such that a separate equation can be estimated for each N, the assumption of homogeneity of slope parameters does

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such as generalized method-of-moments (GMM) estimator Anderson and Hsiao (1981, 1982), (Arellano 1989), and Arellano and Bond (1991),

not hold and so the traditional fixed effects or instrumental variables estimator can produce misleading estimates of the average values of the parameters in dynamic panel data models. Although the groups may be heterogeneous, their structural similarities could allow for the long-run coefficients to be identically constrained, while short-run coefficients and error variances differ across the groups.

Equation 2 is utilised for estimating the long-run relationship of banks interest rates and their determinants, an error correction representation of equation 1. Except for inflation, economic growth and interest rate, all other variables were log-transformed in the model. Empirical estimates are presented in Tables 5 and 7. Lag length selection for all the equations was automatic and based on the Akaike information criterion (AIC).

4.4.1 Summary Statistics

Table 2 presents the summary statistics and Table 3, the cross-correlations matrix. The variables exhibited some variability in means, and several have their kurtosis lower than 3. The low probability values for the Jacque-Bera statistics suggests that the null of normality is rejected for all other variables. In addition, the cross-correlation matrix suggests that multi-collinearity is likely to be present among the variables which is expected in a panel regression. The dependent and independent variables appeared to be generally correlated with the expected signs. For instance, the average term deposit rate is positively correlated with the prime lending rate, and the average term deposit rate is positively correlated with the size variables. Nonetheless, these are bivariate relationships and may not necessarily be interpreted as constituting causation.

Table 2: Summary Statistics

	ADR	PLR	LRX	HI	NIM	CR	CRS	rGDP	IBR	INF	COF	TA	TBR
Mean	5.6	17.3	22.7	6.8	0.01	5.9	0.2	16.6	12.9	11.8	14.0	27.5	10.2
Med	5.7	17.0	18.3	6.8	0.01	4.4	0.07	16.6	14.2	11.8	12.5	27.6	10.6
Max	13.8	28.0	99.9	6.9	0.3	16.9	11.9	16.7	33.1	18.6	106.3	29.2	14.7
Min	0.03	0.2	-18.9	6.7	-0.02	1.3	-0.03	16.4	1.6	7.8	0.0	25.8	1.7
S.D.	3.2	4.3	20.2	0.04	0.03	4.2	0.7	0.1	6.7	3.3	10.7	0.8	3.5
Skew	0.08	-0.1	1.1	1.1	5.9	1.03	12.9	-0.3	0.6	0.5	4.7	0.02	-0.8
J-B	22.03	24.8	124.4	106.5	903.8	395.8	682.2	18.3	57.1	43.8	201.8	16.8	58.4
Prob	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Obs.	543.0	543.0	543.0	543.0	543.0	543.0	543.0	543.0	543.0	543.0	543.0	543.0	543.0

Source: Authors' Computation

Table 3: Cross Correlation Matrix

	ADR	PLR	LRX	HI	NIM	CR	CRS	rGDP	IBR	INF	COF	TA	TBR
ADR	1.0												
PLR	0.1	1.00											
LRX	-0.2	-0.23	1.00										
HI	-0.23	-0.06	0.15	1.00									
NIM	-0.03	-0.09	0.01	0.13	1.00								
CR	0.01	-0.29	-0.13	0.00	0.18	1.00							
CRS	0.09	0.20	-0.11	-0.01	-0.02	-0.10	1.00						
rGDP	0.21	0.10	-0.24	-0.61	-0.13	0.00	0.13	1.00					
IBR	0.15	0.09	-0.14	-0.43	-0.09	0.00	0.14	0.49	1.00				
INF	-0.02	0.07	-0.05	0.18	-0.01	0.00	0.21	-0.01	0.35	1.00			
COF	0.12	0.13	-0.08	0.00	0.00	-0.19	0.01	0.02	0.01	-0.04	1.00		
TA	0.23	-0.21	-0.23	-0.33	0.09	0.17	-0.02	0.35	0.26	0.06	-0.13	1.00	
TBR	0.16	0.04	-0.07	-0.56	-0.07	0.00	0.07	0.45	0.28	0.07	0.00	0.22	1.00

Source: Authors' Computation

4.4.2 Unit Root Test

The panel unit root test was based on the following dynamic structure:

$$y_{it}=\rho_i y_{it-1}+x_{it}\delta_i+\varepsilon_{it};i=1,2,...,N;t=1,2,...,T \quad (3)$$

where y_{it} is a stacked value of the series in the model, i=1,2,...,N represents the cross series that are observed over the period t=1,2,...,T, x_{it} is the exogenous variable in the model, including any fixed or individual time trends. The coefficient ρ_i is the autoregressive coefficients and ε_{it} is expected to be well-behaved errors with constant means and homoscedastic variances. y_i is trend stationary if $\rho_i<1$, but contains a unit root if $\rho_i=1$.

Unit root test of Levin et al. (2002), Breitung (2000) and Hadri (2000) assumes a common unit root process among cross-sectional variables, such that $\rho_i=\rho$ for all *i*, while test based on Im, Pesaran and Shin (IPS) (1997), Fisher-ADF and Fisher-PP tests allow ρ_i to vary across cross-sections. All tests are based on the ADF specification of the form:

$$\Delta y_{it}=\alpha y_{it-1}+\sum_{j=1}^{pi}\beta_{ij}\Delta y_{it-j}+X'_{it}\delta+\varepsilon_{it} \quad (4)$$

where for LLC and Breitung tests, the null and alternative hypotheses are $H_0:\alpha=0$ and $H_i:\alpha<0$ for all *i*, but the IPS test holds its null hypothesis: $H_0:\alpha=0$ for all *i*, and the alternative H_1: $\alpha_i=0$ for $i=1,2...,N_1$ and $\alpha_i=0$ for $i=N+1, N+2,...,N$. The average *t*- Statistic for αi from the ADF regression is

$$\bar{t}=1/N\sum_{i=1}^{N}t_{iT} \quad (5)$$

where t_{iT} is the ADF t-statistic for the cross-section *i*, with the *t*-Statistic assumed to be normally distributed.

Unit root test results from Levin, Lin & Chu (LL&C) (2002) and Im, Pesaran, and Shin (IPS) (1997) were generated, and the results are presented in Table 3. The decision was based on the associated probability values, providing grounds for rejection of the null

hypothesis of a unit root. The null of a unit root was rejected at level for most of the variables with LL& C and slightly less for the IPS tests. However, the nulls of a unit root could be rejected at first difference for all other variables. The combination of I(0) and I(1) variables requires a test for long-run cointegration. However, where there is a significant long-run relationship and the short-run adjustment coefficient is established, the presence of long-run cointegration among the variables is implied.

Table 4: Unit Root Test

	LL&C					IP & S W-Stat				
	Level		**First diff**		**Decision**	**Level**		**First diff**		**Decision**
Variable	Stat	Prob	Stat	Prob		Stat	Prob	Stat	Prob	
ADR	-0.93	0.18	-6.81	0.00	I(1)	-2.07	0.02	-14.04	0.00	I(1)
HI	-9.43	0.00	-	-	I(0)	-7.66	0.00	-	-	I(0)
LRX	-1.54	0.06	-	-	I(0)	-1.54	0.06	-	-	I(0)
NIM	-4.34	0.00	-	-	I(0)	-7.72	0.00	-	-	I(0)
CR	-1.65	0.05	-	-	I(0)	-1.08	0.14	-15.48	0.00	I(1)
CRE	-0.60	0.27	-7.55	0.00	I(1)	-0.77	0.22	-12.24	0.00	I(1)
rGDG	-1.00	0.16	-9.49	0.00	I(1)	0.36	0.64	-7.15	0.00	I(1)
IBR	-7.07	0.00	-	-	I(0)	-2.98	0.00	-	-	I(0)
INF	0.66	0.75	-6.73	0.00	I(1)	0.60	0.73	-4.51	0	I(1)
COF	-5.45	0.00	-	-	I(0)	-6.27	0.00	-	-	I(0)
NTB	-8.12	0.00	-	-	I(0)	-8.21	0.00	-	-	I(0)
PLR	-0.37	0.35	-9.63	0.00	I(1)	-1.25	0.11	-12.86	0.00	I(1)
CRS	0.86	0.81	-8.31	0.00	I(1)	0.85	0.80	-13.08	0.00	I(1)

Source: Authors' Computation

4.5 Estimated Results: Long-run and Error Correction Models (ECM)

The two dependent variables (deposit and lending rates) were specified to be sensitive to bank-specific and macroeconomic factors. Only variables, which met theoretical expectation and

exhibited statistical significance were reported and discussed. As shown in Tables 6 and 8, the exogenous variation from the steady state between the rates, corrected back towards equilibrium, exhibited similar dynamics at over 30.0 per cent. However, the speed of adjustment of deposit rates is slightly faster at 34.2 per cent.

4.5.1 Key Findings and Policy Implications

The study found the following statistically significant variables for deposit and lending rates in Nigeria both in the short- and long-run.

4.5.1.1 Deposit Rates

Market Competitiveness has a positive relationship with deposit rates contrary to the findings of prior studies (De Graeve et al., 2007; Bikker & Gerritsen, 2018). It was found, on average that deposit rates increased by 0.06 percentage point with a rise in competitiveness, which tends to support the market efficiency thesis of interest rates in Nigeria. Similarly, the relationship between deposit rates and **Market Concentration** was positive, suggesting that large banks tend to pay more on deposits, plausibly because of economies of scale and the ability to invest in cost reducing measures.

Excess Liquidity Ratio was found to be inversely related with deposit rates, signifying that banks with adequate liquid assets would be less aggressive in deposit mobilisation and so are more likely not to be keen in paying more on deposits. Similarly, **Bank Profitability** was found to be negatively associated with deposit rates, which confirms the significance of interest expense on deposits in the cost of banks funds. This evidence further suggests that banks would generally tend to cut interest expense to maximise profit. It is, however, likely that to sustain profitability from long-term assets, banks would be more inclined to raising deposits rates to attract more deposits.

The inverse relationship between **Bank Risk** measure and deposit rates is counter-intuitive, since depositors are likely to demand higher compensation to part with funds due to their risk perception on banks with high default rates. Literally, banks with high default risk would like to reduce their cost through low deposit rates when they are grappling with high non-performing loans.

The evidence on other macroeconomic variables was mixed. Results on the measure of economic growth suggests that deposit rates on average will go up by 0.01 per cent with a unit increase in real economic growth. While this is counter intuitive, the evidence suggests increased banks' quest for deposits under economic growth condition to acquire long-term assets, whose demand rises under good economic times. The inter-bank rate is positively related with banks' average deposit rates, indicating the impact of tight monetary policy on banks' liquidity, compelling them to mobilize deposits.

The impact of inflation on bank deposit rate was positive as expected and suggests overall risk aversion of depositors to inflation expectation. In the short-run, deposit rates are sensitive to the measure of competition, profitability and inflation expectation, and in the long run, deposit rates are sensitive to measures of competition, excess liquidity, profitability, market share, credit risk, economic growth, monetary policy and inflation. It is evident that the main forcing determinants of deposit rates in Nigeria are measures of competition, profitability and inflation, because they influence deposit rates both in the short and long run.

4.5.1.2 Lending Rates

The study found a positive effect of average term deposit rate on the average lending rate in a region of 0.018 per cent, which supports that deposit rates are indeed a key component of banks' cost of operation. The result is reinforced by the positive and significant

coefficient of the proxy for the cost of funds. The negatively signed and statistically significant coefficient of banks size, validates the expectation that large banks have capacity to price their loans more competitively. Also, the bank risk variable is negatively related to lending rates, which suggests a cautious approach in banks' lending policies. Thus, the main long-term bank-level drivers of lending rates are the cost of banks' funds, market size, and risk taking by banks.

Bank lending rates are positively related with the 3-months treasury bills rate, which confirms the theoretical expectation of asset substitution in the financial market. Essentially, a unit increase in the Treasury bill rate increases average lending rates by 0.03 per cent. This implies that treasury bills potentially create shortages of loanable funds in the market, leading to hike in rates. The positive coefficient of inflation is consistent with the theoretical expectation that banks tend to factor in inflation expectation in their lending policies and would normally place a premium for inflation risk.

Like the finding on deposit rate, the negative influence of economic growth on lending rate is counter-intuitive because economic growth is expected to be accompanied by a high demand for bank loans. A plausible explanation could be concerns over uncertainties about future economic growth and the need to mitigate the excessive risk of defaults[5]. Therefore, the main bank-specific drivers of lending rates in Nigeria are the cost of banks' funds, market share and risk apatite; and the main macro determinants are inflation and yields on government securities. Economic growth appears to reduce lending rates, which is puzzling. The main forcing determinants of lending rates in the country are obviously, measures of competition, profitability and inflation, affecting the rates in both short and the long run.

[5]Such may be the outcome of countercyclical measure to ward off buildup of risk to financial stability

Table 5: Long-Run Equation. Dependent variable: Deposit (ADR)

Variable	Coef.	S.E.	t-Stat	Prob.
HI	0.065	0.012	5.441	0.010
LRX	-0.025	0.007	-3.632	0.000
NIM	-0.011	0.003	-3.542	0.078
CR	0.190	0.080	2.382	0.000
CRS	-0.203	0.085	-2.381	0.000
LRGDP	0.011	0.003	4.436	0.001
IBR	0.23	0.057	4.032	0.000
INF	0.137	0.029	4.800	0.000

Source: Authors' Computation

Table 6: Short Run Equation

ECM	**-0.342**	**0.104**	**-3.282**	**0.001**
D(HI (-1))	-0.011	0.005	-2.153	0.082
D(NIM (-1))	-0.043	0.008	-5.240	0.020
D(INF (-1))	-0.011	0.001	-7.487	0.088
C	1.605	0.433	3.709	0.001

Source: Authors' Computation

Table 7: Long-Run Equation. Dependent variable: (PLR) Lending

Variable	Coef.	S.E.	t-Stat	Prob.
ADR	0.081	0.019	4.323	0.000
COF	0.046	0.006	7.362	0.000
LTA	-0.827	0.319	-2.588	0.010
CRS	0.727	0.310	2.347	0.000
TBR	0.036	0.018	2.036	0.043
INF	0.586	0.161	3.630	0.000
RGDP	-0.527	0.120	-4.394	0.005

Source: Authors' Computation

Table 8: Short Run Equation

ECM	**-0.333**	**0.095**	**-3.490**	**0.001**
D(PLR (-2))	0.187	0.092	2.034	0.043
D(TA)	-0.028	0.011	-2.546	0.042
D(RGDP)	0.256	0.085	3.003	0.020
C	1.175	0.457	2.571	0.001

Source: Authors' Computation

The average short-run adjustment processes of individual bank's interest rates to the long-run equilibrium, presented in Tables 9 and 10, confirmed the variation in the banks' responses to given shocks. The banks are arranged according to their market power with the top six banks accounting for over 50 per cent of the market in terms of assets and deposits. However, the speed of adjustments in interest rates to macroeconomic and bank-specific shocks showed disproportionate responses but with no regard to market share. For instance, the largest response of the largest banks in assets and deposits was 13 per cent while the fifteenth bank exhibited a faster adjustment of 3 per cent. It is also evident that the short run adjustment of lending rates appears to be very slow in larger banks than smaller banks. For instance, the short run response of lending rates to shocks was found to be 0.6 per cent in the largest bank while the twelfth bank's response is faster at 79 per cent.

Table 9: Short-Run Model (ATD)

	Variable	Coef.	S.E.	t-Stat	Prob.
1	*ECM*	-0.13	0.003	-40.11	0.00
2	*ECM*	0.28	0.01	14.99	0.001
3	*ECM*	-0.99	0.04	-24.94	0.00
4	*ECM*	-1.27	0.02	-60.61	0.00
5	*ECM*	-0.52	0.01	-35.64	0.00
6	*ECM*	-0.001	0.006	-1.76	0.07
7	*ECM*	-0.42	0.008	-54.92	0.00
8	*ECM*	-0.03	0.004	-8.79	0.003
9	*ECM*	-0.08	0.002	-42.53	0.00
10	*ECM*	-0.09	0.01	-7.89	0.004
11	*ECM*	-0.20	0.003	-70.38	0.00
12	*ECM*	-0.47	0.03	-13.14	0.001
13	*ECM*	-0.40	0.03	-12.31	0.001
14	*ECM*	-1.13	0.05	-21.27	0.00
15	*ECM*	-0.03	0.001	-33.51	0.00
16	*ECM*	-0.11	0.003	-39.81	0.00
17	*ECM*	-0.14	0.006	-24.74	0.00

Source: Authors' Computation

Table 10: Short-Run Model (PLR)

	Variable	Coef.	S.E.	t-Stat	Prob.
1	*ECM*	-0.006	0.001	-7.881	0.006
2	*ECM*	0.03	0.006	6.041	0.009
3	*ECM*	-0.40	0.004	-108.09	0.000
4	*ECM*	-0.25	0.015	-16.88	0.001
5	*ECM*	-1.49	0.044	-33.52	0.000
6	*ECM*	-0.56	0.002	-240.05	0.000
7	*ECM*	0.06	0.001	37.94	0.000
8	*ECM*	-0.43	0.013	-36.45	0.000
9	*ECM*	-0.09	0.002	-34.77	0.000
10	*ECM*	0.03	0.002	24.08	0.000
11	*ECM*	-0.06	0.005	-15.96	0.001
12	*ECM*	-0.79	0.026	-29.86	0.000
13	*ECM*	-0.23	0.011	-25.47	0.000
14	*ECM*	-0.41	0.048	-10.06	0.002
15	*ECM*	-0.53	0.019	-29.13	0.000
16	*ECM*	-0.25	0.001	-318.71	0.000
17	*ECM*	0.004	0.002	2.61	0.079

Source: Authors' Computation

CHAPTER FIVE

5.0 Summary, Conclusion and Policy Recommendations

5.1. Summary

Interest rate determination is important to banks and policy makers, because interest rate is a major facilitator of financial intermediation and thus, fundamental to the effective allocation of resources and the overall growth and development of the economy. Central banks alter the policy rate to steer market rates in the direction that will aid achievement of monetary policy objectives, including low inflation, optimal employment and growth. A strong case has also been made for financial system stability as a key objective of monetary policy. In this regard, interest rate represents a major transmission channel for monetary policy. Undertaking an analysis of how interest rates are determined is therefore critical to the understanding of central banks' operation and performance, as well as their ability to efficiently influence economic activities through monetary policy.

This study recognises that, in the longrun, deposit and lending rates, are not only influenced by monetary and fiscal policies and banks characteristics, but also by the impact of developments in the global economy. Since the deregulation of interest rates in the mid-1980s, rates have evolved along the dynamics of economic developments, policies and banks' practices.

This study covered quarterly data from 2010Q1 to 2017Q4 on seventeen banks, selected based on their share of the market and availability of historical data. Two categories of factors that may influence banks' interest rate determination were identified to include macroeconomic and bank-specific factors. Both variables play

significant influence on banks' deposit and lending rates. For instance, the long run determinants of deposit rates are competition, banks' liquidity, profitability, market concentration and credit risks; and, the macroeconomic factors are inflation, the interbank rate and real GDP growth. Specifically, in Nigeria the main forcing determinants of deposit rates are measures of competition, profitability and inflation, since the variables influence the deposit rates more, both in the short and long run.

Lending rates are sensitive to bank-specific factors such as cost (proxied by the cost of funds variable and deposit rates), total assets and credit risks, while the main macroeconomic factors are the Treasury bill rates and inflation. Similarly, the main forcing determinants of lending rates in the country remain measures of competition, profitability and inflation, affecting the rates in both short and the long run.

5.2 Conclusion

Overall, findings from the study revealed the importance of both macroeconomic and bank-level factors in the process of interest rate determination by banks. Beyond the general influence of macroeconomic conditions, which accounts for some level of congruence in banks' behaviour, idiosyncratic factors also contribute to significant divergence in the interest rates decision making process by banks. Differences in the average short-run adjustment processes of individual banks to the long-run equilibrium underscore the variation in the banks' responses to given shocks.

5.3 Policy Recommendations

The implications of the research findings are clear:

- Although banks' interest rates are generally sensitive to bank-specific and macroeconomic factors, the individual bank's

responses to these factors is different.

- Monetary policy remains critical to the evolution of deposit and lending rates in the country, suggesting that the central bank can influence banks' deposit and lending rates by influencing the monetary policy target rates.
- Reducing lending rates and increasing bank deposit rates would require incentives that change the banks' operational environment. There is therefore, a need for structural policies that increase economic growth, reduce banks' cost and inflation. To that effect, improvement in existing infrastructures such as power, security, roads among others, would mitigate bank cost, improve the operational environment and lower lending rates.

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Appendix

Appendix 1: Studies on the Determinants of Interest Rate Setting Behaviour

Author	Jurisdictions	Methodology	Findings
Siaw and Lawer (2015)	Ghana (Quarterly data spanning 2000 to 2013)	Cointegration approach to consider the determinants of bank deposits	• Empirical finding shows a significant negative short -term impact of both inflation and growth of money supply on deposits bank in Ghana.
Olusanya et al (2012)	Nigeria (annual data 1975 to 2010)	Cointegration approach and Error correction model (ECM)	• There is positive relationship between Loan and advances and Volume of deposits, annual average exchange rate of the naira to dollar, Gross domestic product at current market price and c ash reserve requirement ratio except Investment portfolio and Interest rate (lending rate) that have a negative relationship. • The study further shows that there is a long run relationship between Loan and advances and all the explanatory variables in the m odel. This is an indication that commercial bank has a lot of impact of their lending behaviour.
Gambacorta (2004)	Italy (quarterly data spanning 1993:Q3 to 2001:Q3)	Employing Error Correction Model (ECM),	• Sample of Italian banks shows that heterogeneity in the banking rates pass-through exists only in the short -run, while interest rates on short -term lending of liquid and well-capitalized banks respond less to a monetary policy shock. Similarly, banks with a high proportion of long -term lending tend to change their prices less. Heterogeneity in the pass-through on the interest rate on current accounts depends mainly on banks' liability structure, while bank's size was found to be irrelevant

Bhattarai (2015)	Nepal (2010 to 2015)	The studies approached were: pooled OLS model, fixed effects model and random effects model.	• The estimated results of these three regression models reveal that operating costs to total assets ratio, profitability (ROA) and default risk have significant positive impact on the commercial bank lending rate. • Deposit rate has negligible impact on lending interest rate. • The major determinants of commercial banks' lending rate are: operating costs to total assets ratio, profitability (ROA) and default risk in Nepalese perspectives.
Onyango (2015)	Kenya (2002-2011)	Survey and econometric	• The findings indicated that lending interest rates are negatively related and significantly affect the total loans advanced. • With regard to the liquidity, this study revealed that banks with more liquid assets extend more credit to borrowers. • Furthermore, volume of deposit in commercial banks has a significant and positive effect on the total loan advanced and that the liquidity ratio also positively and significantly affects the total loans advanced. • This implies that as the Central Bank lending rate to commercial banks increases, the Commercial Bank lending rate to the private sector increases and vice versa.
Olokoyo (2011)	Nigeria (1980 – 2005)	fixed effects regression model	It was found out that a long-run relationship existed between banks' lending, deposits, interest rate; minimum cash reserve requirement, investment portfolio, and ratio of liquidity, foreign exchange and gross domestic product. Specifically,

			lending rates were found to influence banks' lending performance.
Malede (2014)	Ethiopia (2005 to 2011)	Ordinary least square (OLS) model	• The results of the study indicate a significant relationship between banks' lending and banks size, credit risk, gross domestic product and liquidity ratios. • On contrary, the study found out that deposit, investments, cash reserve ratios and interest rates had no significant effect on Ethiopian banks' lending activities.
Moore and Craigwell (2003)	Barbados	Fixed effect panel data framework	• The result shows that the smaller the loan's size, the greater the interest rate applied, and vice versa

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