



**DETERMINANTS OF NET INTEREST MARGIN OF DEPOSITORY
INSTITUTIONS IN NIGERIA: EVIDENCE FROM AUTO REGRESSIVE
DISTRIBUTED LAG (ARDL) ESTIMATION MODEL**

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A B S T R A C T	K E Y W O R D S
<p>This research sought to empirically identify the factors that determine the net interest margin of deposit money banks in Nigeria. Exploring theoretical and previous empirical research on the subject matter identify numerous factors both at firm, industry and economy-wide levels that influence the banks' net interest margin. In this research, we focused on the industry and economic factors. Relevant variables within this category include: Real Gross Domestic Product (RGDP); Liquidity Ratio (LQDR); Money Supply (MNSP); Exchange Rate (EXCR); Total Bank Deposits (TBDP); Loans and Advances (LOAN); and Total Bank Assets (BKAS). Data was collected from the CBN and the NBS. For the purpose of the research, the Auto-Regressive Distributed Lag (ARDL) estimation technique was deployed on time series data for the period 1986 to 2024. Findings of the research revealed that RGDP, EXCR, TBDP and LOAN had a positive and statistically significant relationship with net the NIMG of DMBs in Nigeria while LQDR, MNSP had statistically significant negative relationship with net interest margin. Finally, Total Bank Assets (BKAS) had a positive but non-significant relationship with net interest margin. The research concluded that a wide spectrum of economic factors affect the net interest margin of deposit money banks in Nigeria. This research thus recommends that banks can maximize interest income by focusing strategic attention on those factors that have the most significant effect on net interest margin.</p>	<p>Net interest margin. Net interest spread. Deposit money banks. Interest rate.</p>

Introduction

Financial intermediation between surplus and deficit economic units is core function of deposit money banks in Nigeria. Understandably, revenue from financial intermediation constitute a major source of income for banks. Thus, financial resources generated from surplus economic units which - are rewarded with interest payment - are provided as loans and advances facilities to deficit economic units. The difference between what banks pay to depositors as saving/deposit interest and what they receive from those to whom they provide loans and advances in the form of lending interest rates is

what is referred to as net interest margin. In this margin is imbedded information relating to the efficiency and costs of financial services provided by banks around the world. For example, relatively wider interest margins are associated with countries with less developed financial services sectors as the cost of intermediation is relatively higher than in countries with better developed financial services sectors.

The net interest margin of banks also provides information about the operational costs within the financial services sector. For example, Nigeria is usually associated with high operational cost across all sectors but notably in the banking sector - where they incur huge costs in staff training, providing security at great costs, installing infrastructure which ordinarily should be the responsibility of the government and bear huge default risk from borrowers as a result of the instability associated with the general economy. Hussain (2014) opined by stating that "persistently high interest margins are reflective of higher intermediation costs to the society and might be indicative of systemic problems such as perceived credit and market risks, and high operating costs". Further, net interest margin also provide vital information to investors and potential investors regarding the profitability and efficient funds utilization at firm level in the sector.

For example, the net interest spread that is - difference between what is paid as interest to savers and what is received from income from borrowers give discerning investors and financial analysts a good about how profitable and/or safe it is to invest in a particular bank or other depository financial institution. As pointed out by Lestari, Chintia, and Akbar (2021) citing Pham, and Vo (2017), the net interest margin level, spread and dynamics in addition to other information imbedded therein indicates the efficiency of financial intermediation. This is critically important considering that as much 70% to 80% of bank revenue is generated through the interest margin (Lestari, Chintia & Akbar, 2021). However, the level and spread is a function of a plethora of factors both at the firm specific level, industry-specific factors and economy-wide factors all of which at varying degrees determine the final interest charges that banks transfer to customers.

Some of the determinants of net interest margins identified in previous in research include: level of productivity of the economy, level of inflation, central bank interest rate visaviz; monetary policy rate (MPR), central bank specified liquidity and cash research ratios, savings and investment conditions and culture with the specific economy, level and scope of economic activities, operational costs, average (expected) return on investments, level of risks, the demand of loanable funds and supply of savings and deposits among many others (Udom, et.al, 2016; Lestari, Chintia, & Akbar, 2021; Islam, & Nishiyama, 2016; Endri, Marlina, & Hurriyaturrohman, 2020). In this research we explore the economy-level factors that influence and determine net interest margins of deposit money banks in Nigeria.

Statement of the Problem

As noted earlier, high interest margins are to some extent indicative of systemic problems including high operational costs, high risks within the industry, operational and regulatory inefficiencies, market distortion among others (Poghosyan, 2012; Islam, & Nishiyama, 2016; Hussain, 2014). In addition, several researchers have also associated high net interest margin and interest charges with lower borrowing and investment activities especially in lower income countries where higher interest margins are also associated with lower levels of development in the financial services industry (Obeid, & Adeinat, 2017). This has the knock-on effect of leading to lower economic activities and productivity

as financial resources necessary for productive economic activities may be perceived as being too costly. When this is considered in the light of the fact that net interest margin is the one major source of revenue for banks who themselves are characterized as critical to economic growth and productivity, the need to understudy the determinants of banks' net interest margins becomes clear. The focus of the present research is the industry-specific and economy-level determinants of net interest margin in Nigeria. This is considering the fact that very little research has been done on the subject matter in Nigeria. Also considered is the fact that the research on the subject matter in the country tend to focus on the firm-level determinants of net interest margin of banks (Udom, et. al, 2016; Isa, Mohammed, Isah, Salau, & Isah, 2016; Obeid, & Adeinat, 2017). Thus, this research will contribute to improving existing research knowledge on the phenomenon in Nigeria.

Aim of the Study

The purpose of this research is to identify the industry-level and economy-wide determinants of net interest margin of deposit money banks in Ngeria. This will be achieved by exploring several factors identified in previous theoretical and empirical researches including Real Gross Domestic Product; Liquidity Ratio; Money Supply; Monetary Policy Rate; Lending Rate; Exchange Rate; Total Bank Deposits; Loans and Advances (LOAN); and Total Bank Assets.

Loanable Fund Theory

The loanable funds theory revolves around the realistic price mechanism in determining the supply and demand for loanable funds. However, we concede that the theory's proviso of non-interference by government may not be practicable as regulation and intervention programs to redirect investment in desired directions is a given in countries with intermediation inefficiencies as a result of the less developed financial services sector(s). The Loanable Funds Theory of interest is an improvement on the Real (Classical) theory of interest. The Loanable Funds Theory of interest was developed during the age of classical economists like David Ricardo and Adam Smith who were of the opinion that economic activities were guided by the self-interest motive and the price mechanism (the invisible hand). They held that Government interference was unnecessary and should be minimized. They therefore described interest rates in terms of the demand and supply of loanable funds.

The demand for loanable funds comes mainly from business firms wishing to invest. Lower interests will lead to increase in the number of borrowers as the expected returns on investment will increase as a result of decrease in the cost of capital. Thus, the slope of the demand curve will tend downwards from the left to right. On the other side of the divide, the supply for loanable funds will come from savings of economic agents with surplus funds. The reward for saving being interest rates, higher interest rates will be an incentive for surplus economic units to save more. Thus, increase in interest rates will lead to more funds available for onward lending to firms wishing to invest. Hence, the supply curve of loanable funds slopes upwards. However, reduced interest rates on borrowing will increase the demand for loanable funds. To deal with the gap between demand and supply of loanable funds as a result of reduction in interest rate, the government can utilize special purpose lending schemes in order not to upset the balance in the wider economy. According to Saunders, (2010) interest rate in this theory is determined just -like the supply and demand of goods are determined. The supply of funds for onward lending increases as interest increases, other factors held constant. He further asserts that the demand for loanable funds is higher as interest rate fall, other factors held constant and identifies

two factors among others causing loanable funds demand curve to shift; economic conditions and the monetary expansion.

Net Interest Margin

According to Bloomenthal (2020), net interest margin is a financial and accounting measure that compares the net interest income a financial organization such as a bank generates from credit creation products such as loans and advances and mortgages, with the interest payments it makes to holders of savings and deposit. Net interest margin is a profitability indicator - especially for banks - which is expressed as a percentage that captures the likelihood of a bank to survive and thrive in the long term. Information imbedded in net interest helps prospective and potential investors make better informed investment decisions relating to the specific organisation. Banks actively their net interest margins as they can accurately measure their expected return on loanable funds (all things being equal) and also monitor other key performance indicators that depend on generated income. As noted by Isa et. al, (2016), net interest margin differs from bank to bank on the basis of the volume and demands for its lending and deposits products and activities. Banks whose products are in high demand will tend to have wider spreads and thus more income from their lending activities. THus, Deposit moeny banks in Nigeria take keen interest in their net interest margin considering that it is their most important source of income.

Empirical Review

A recent research on the subject matter by Lesmana (2021) in Indonesia evaluated the effect of business cycle and bank specific measured on net interest margin for 200 to 2015 post-financial crisis period. The research utilized the system generalized method moment (SYS-GMM) implemented on panel data of Indonesian banks. Findings of the research provided evidence that in the periods after the financial crisis, business cycle effect had a positive relationship with net interest margin. Furthermore, growth in gross domestic product (GDP) did not have a statistically significant effect on net interest margin whip bank specific factors including size and capital adequacy ratios had a negative significant effect on net interest margin while the negative effect of market concentration and liquidity of banks was not statistically significant. Finally, the quality of banks credit had a positive but insignificant effect on net profit margin.

To identify the major determinants of net interest margins of banks, Cruz-García and DeGuevara (2020) adapted the Ho and Saunders (1981) model by explicitly including both deposit insurance premium and capital requirement of banks. Using panel data comprising of OECD countries for the period 2000 to 2014, findings of the research revealed that there is a positive relationship between interest margins and both deposit insurance premium and banks' capital requirement. From the findings, the researchers concluded that the most important factors that determine net interest margins in banks are the deposit insurance premium; capital stringency; efficiency; average operating costs; implicit payments, and the intensity of competition but not necessarily in that order.

Endri, Marlina, and Hurriyaturohman (2020) investigated the effect of internal and external factors on the net interest margin of banks in Indonesia. The research focused on the period 2008 to 2018. Banks' level data were collected from annual reports and the Financial Services Authority while an OLS panel regression technique was adopted for data analysis. Findings of the research revealed that loan to deposit ratio; non-performing loans, return on assets, and exchange and interest rates affect net interest

margin. The findings also showed that while exchange rate had a significant effect, the effect of non-performing loans was not significant.

Starting off from the premise that banks' net interest margin was a gauge of financial institutions' health and stability, Angori, Aristei, and Gallo (2019) sought to identify the factors that exert the most influence and determine the net interest margin of banks in the Euro area in periods during and after the global financial crisis in 2007. Findings of the research indicated that the increase in non-traditional activities as well as the heterogeneous efficiency levels characterizing banking systems across the Euro Area, where operating costs remain generally high have significantly contributed to the reduction in banks' interest margins normal banking activities. It was further concluded that regulatory environment also plays an important role in the net interest margin of banks in the region.

Underscoring that firm, industry and economy specific factors cause remarkable variations in net interest margins across different countries, Jima (2017) conducted a research to identify the most relevant determinants of net interest margins of banks in Ethiopia. The research conflated data from firm-level (from banks' annual reports) and economy-level (time series macro-economic statistics) for the period 1997 to 2014. Findings of the research led to the conclusion that both bank-level and industry-level factors play an important role in determining bank's net interest margin in the country. The research emphasized that operational efficiency and business growth were the most important factors that banks ought to focus on in order to determine the optimal interest margin that will maximize returns.

Islam, and Nishiyama (2016) adopted the Ho and Saunders (1981) dealership model (but expanded to include bank size) to investigate the determinants of net interest margins in four South East Asian countries namely; Bangladesh, India, Nepal, and Pakistan for the period spanning 1997 to 2012. Using panel data from a sample of 230 banks from across the four countries, Variables of the study were classified into bank specific variable, industry specific variables and, macro-economic specific variables. Findings of the research revealed that bank liquidity, reserve requirements, equity positions, all had statistically significant positive effect on banks' net interest margins while relative size, market power and gross domestic product had a negative effect on net interest margins of banks in country.

Udom, et. al, (2016) modelled deposit money banks' interest margins in Nigeria. The research applied the panel data analysis technique to determine the factors influencing interest margins in Nigeria using bank-specific, industry-specific and macroeconomic level data covering first quarter 2010 to second quarter 2014. Results generated from the generalized least square (GLS) estimation technique revealed that GDP growth rate, operational costs, loans and advances growth, credit risk and money supply growth rate were major determinants of interest margins of deposit money banks in Nigeria. The researchers further reported that operational costs associated with human resources exerted the most influence on interest margin. They suggested that the cost of borrowing could be reduced if banks were to re-strategize on better ways to handle the growing staff costs which is exerting unduly high influence on net interest margin.

Isa, et. al, (2016) investigated the determinants of net interest margin of deposit money banks listed in Nigeria. The research was conducted at the bank level and collected data from annual audited reports for the period 2007 to 2014 and adopted the general least squares (GLS) estimation technique. Findings of the research indicated that operating costs, liquidity risk, and size had significant effect on net interest margin. However, credit risk did not have a significant effect on net interest margin of banks.

The research thus suggested a need for regulators of the industry to incentivize banks to address issues of defective liquidity risk as this is the most important determinant of net interest margin in the industry. Hussain (2014) investigated the relationship between banking sector concentration in Pakistan and their net profit margin. Using banks as a unit of analysis, the research collected data from a sample of 26 commercial banks for the periods 2001 to 2010. The intent was to identify the determinants of commercial banks' net interest margins. The research employed the OLS regression estimation technique and found that several factors vis-à-vis; operating cost; previous periods' net interest margins, industry concentration; relative market share; bank soundness rate of inflation, depreciation and industrial growth rate all had statistically significant positive effect on net interest margin. On the other hand, diversification; bank size, level of stock market development; lagged liquidity had adverse effect on net interest margins while ownership structure, gross domestic product and credit market development were not statistically significant in their effect on net profit margin. Thus, the factors with statistically significant effects are the most important determinants of net interest margins of banks in the country.

Methodology

The focus of this research is industry-level and economy-level determinants of net interest margins of deposit money banks in Nigeria. The ex post facto design is adopted as it allows it allows working with historical data without necessarily interfering/modifying the data. Data for the research was generated mainly from the Central bank of Nigeria (CBN) Statistical Bulletin - 2025 edition. Variables of interest identified by previous empirical research as factors that affect net interest margin (NIMG) of banks in include: Real Gross Domestic Product (RGDP); Liquidity Ratio (LQDR); Money Supply (MNSP); Monetary Policy Rate (MPRT); Lending Rate (LNDR); Exchange Rate (EXCR); Total Bank Deposits (DPTP); Loans and Advances (LOAN); and Total Bank Assets (BKAS). The basic relation between the variable expressed econometrically is given as:

$$NIMG_{it} = \beta_0 + \beta_1RGDP_{it} + \beta_2LQDR_{it} + \beta_3MNSP_{it} + \beta_4MPRT_{it} + \beta_5LNDR_{it} + \beta_6EXCR_{it} + \beta_7TBDP_{it} + \beta_8LOAN_{it} + \beta_9BKAS_{it} + \mu_0$$

Other tests and analysis conducted for diagnostics and estimation include the Auto-Regressive Distributed Lag (ARDL); Augmented Dickey-Fuller (ADF) unit root test and Jarque Berra normality test. Variables in absolute values are transformed to log form prior to analysis

Data and Results

Table 1: Descriptive Statistics

Variables	Mean	Median	Max	Min	Std. Dev.	Jarque-Bera	Probability	Obs.
NIMG	9.0300	8.7000	17.5100	0.8375	4.6310	1.5543	0.4597	39
RGDP	2.3882	2.3464	2.8536	1.9709	0.2857	2.4197	0.2982	39
LQDR	47.6182	46.5000	75.8299	29.1000	10.6256	1.6171	0.4455	39
MNSP	2.9018	2.9437	4.5347	1.1605	1.1470	3.2582	0.1961	39
MPRT	13.0769	13.5000	26.0000	6.0000	4.0467	5.7962	0.0551	39
LNDR	22.1069	21.5500	36.0900	10.0000	6.1837	0.1791	0.9144	39
EXCR	96.8279	106.7111	306.9500	0.6356	95.9904	4.5224	0.1042	39
TBDP	3.0309	3.2320	4.6420	0.9872	1.1462	2.8551	0.2399	39
LOAN	2.6730	2.7061	4.2352	0.9336	1.1770	3.7602	0.1526	39
BKAS	3.0829	3.1956	4.6227	1.2895	1.1431	3.5648	0.1682	39

The probability of the Jarque-Bera statistics in Table 1 above gave values of 0.4597; 0.2982; 0.4455; 0.1961; 0.0551; 0.9144; 0.1042; 0.2399; 0.1526; and 0.1682 respectively for Real Gross Domestic Product (RGDP); Liquidity Ratio (LQDR); Money Supply (MNSP); Monetary Policy Rate (MPRT); Lending Rate (LNDR); Exchange Rate (EXCR); Total Bank Deposits (TBDP); Loans and Advances (LOAN); and Total Bank Assets (BKAS). The above results confirm that the variables are all normally distributed (after log transformation) as none of the probability statistics are statistically significant.

Table 2: Augmented Dickey-Fuller Unit Root Test Results

Variables	T-stat (5%)	Prob.	Order of integration
NIMG	-2.9458	0.0000	I(1)
RGDP	-2.9434	0.0000	I(1)
LQDR	-2.9678	0.0428	I(0)
MNSP	-2.9434	0.0028	I(1)
MPRT	-2.9411	0.0238	I(0)
LNDR	-2.9458	0.0000	I(1)
EXCR	-2.9434	0.0001	I(1)
TBDP	-2.9511	0.0134	I(0)
LOAN	-2.9434	0.0001	I(1)
BKAS	-2.9484	0.0247	I(1)

The ADF unit roots test results in Table 2 shows that Liquidity Ratio (LQDR); Monetary Policy Rate (MPRT); and Total Bank Deposits (TBDP) were stationary at level I(0) while Real Gross Domestic Product (RGDP); Money Supply (MNSP); Lending Rate (LNDR); Exchange Rate (EXCR); Loans and Advances (LOAN); and Total Bank Assets (BKAS) attained stationarity after first differencing I(1). The above implies that the data is healthy for further analyses at I(1) order of integration. However, the use of the OLS regression method will not be appropriate. For this purpose, the ARDL estimation technique is implemented.

Table 3: Auto-Regressive Distributed Lag (ARDL) Summary Result

Dependent Variable: NIMG

Method: ARDL

Selected Model: ARDL(1, 2, 1, 2, 1, 2, 2, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
NIMG(-1)	-0.155312	0.154431	-1.005705	0.3279
RGDP	8.048159	8.420465	0.955786	0.3518
RGDP(-1)	-12.95755	7.786444	-1.664116	0.1134
RGDP(-2)	25.78741	7.749925	3.32744	0.0037
LQDR	-0.068379	0.04841	-1.412488	0.1749
LQDR(-1)	-0.178454	0.046395	-3.84637	0.0012
MNSP	-25.79712	13.69411	-1.883812	0.0758
MNSP(-1)	25.40119	11.8433	2.144773	0.0459
MNSP(-2)	-30.19191	10.04558	-3.005492	0.0076

EXCR	-0.002368	0.019258	-0.122975	0.9035
EXCR(-1)	0.043343	0.018876	2.296217	0.0339
TBDP	-5.774638	3.962437	-1.457345	0.1622
TBDP(-1)	1.646896	5.249608	0.313718	0.7573
TBDP(-2)	12.3449	4.252962	2.90266	0.0095
LOAN	-0.255725	6.006463	-0.042575	0.9665
LOAN(-1)	-4.146196	6.459601	-0.641866	0.5291
LOAN(-2)	14.46867	5.818764	2.486554	0.0229
BKAS	7.640333	10.61872	0.719515	0.4811
C	-15.56922	15.87289	-0.980869	0.3397
Adj. R2 0.8480; F-stat 12.1546; Prob.(F-stat) 0.0000; D-W. stat 2.3245				

From the selected model as shown in Table 3, it is observed that Real Gross Domestic Product (RGDP); Exchange Rate (EXCR); Total Bank Deposits (TBDP); and Loans and Advances (LOAN) had a positive and statistically significant relationship with net the interest margin (NIMG) of deposit money banks in Nigeria - implying that increase in these increase in this variables is predicted to lead to increase in net interest margins of the banks. On the other hand, Liquidity Ratio (LQDR); and Money Supply (MNSP) had statistically significant negative relationship with net interest margin while Total Bank Assets (BKAS) had a positive but non-significant relationship with net interest margin with the implication that the size of banks' assets did not have much effect on their net interest margin. In all, the selected variables in the above model are shown to account for 84.80% of the variations in the net interest margin of deposit money banks in Nigeria.

Discussion of Findings

This research sought to empirically identify the factors that determine the net interest margin of deposit money banks in Nigeria. Exploring theoretical and previous empirical research on the subject matter identify numerous factors both at firm, industry and economy-wide levels that influence the banks' net interest margin. In this research, we focused on the industry and economic factors. Relevant variables within this category include: Real Gross Domestic Product (RGDP); Liquidity Ratio (LQDR); Money Supply (MNSP); Exchange Rate (EXCR); Total Bank Deposits (TBDP); Loans and Advances (LOAN); and Total Bank Assets (BKAS). Data was collected from the Central Bank of Nigeria (CBN) statistical bulletin and the annual abstract of statistics published by the National Bureau of Statistics. For the purpose of the research, the Auto-Regressive Distributed Lag (ARDL) estimation technique was deployed on time series data for the period 1986 to 2024.

Findings of the research revealed that Real Gross Domestic Product (RGDP); Exchange Rate (EXCR); Total Bank Deposits (TBDP); and Loans and Advances (LOAN) had a positive and statistically significant relationship with net the interest margin (NIMG) of deposit money banks in Nigeria - implying that increase in these variables is predicted to lead to increase in net interest margins of the banks. In essence, increase in demand for loans and advances, and bank deposits lead to banks increasing their net interest margin in order to earn more from the higher demand for loans and advances which is one of their core banking activities. Further, better economic performance indicated in real gross domestic product spurs even higher economic activities and higher demand for loanable funds by economic units to which banks responds by widening their net interest margin. This finding is consistent with those of Ascarya and Yumanita (2010) but contradict the findings of Islam, and

Nishiyama (2016) who averred instead that it was reserve requirements, equity positions and gross domestic product that had a negative effect on net interest margin.

Further, our findings revealed that Liquidity Ratio (LQDR); and Money Supply (MNSP) had statistically significant negative relationship with net interest margin. This finding indicates that increased money supply dampens demands for loanable funds by economic units to which banks respond by reducing lending rates thus tightening their net interest margin in the process. Conversely, increasing liquidity ratio is predicted to lead to reduction in net interest margin. Finally, Total Bank Assets (BKAS) had a positive but non-significant relationship with net interest margin with the implication that the size of banks' assets did not have much effect on their net interest margin. In a similar research, Islam, and Nishiyama (2016) opined that bank liquidity was negatively related to net interest margin. Underscoring that firm, industry and economy specific factors cause remarkable variations in net interest margins across different countries, Jima (2017) asserted that the factors of interest on which banks should focus on were operational efficiency and business growth.

Conclusions and Recommendations

This research concluded from findings that a wide spectrum of economic factors affect decisions relating to the net interest margin of deposit money banks in Nigeria. These include economic productivity vis-à-vis: real gross domestic product (RGDP) whose influence lead to increase in the net interest margin spread of deposit money banks. In addition, other factors including exchange rate, bank deposits and banks' loans and advances portfolio also play a major role in determining via an increasing effect the net interest margin of deposit money banks in Nigeria. Money supply and liquidity ratio also play important roles in net interest margins of banks. However, these factors help to drive down the net interest margin of banks. Finally, banks' assets appear to have negligible effect on banks' net interest margins. This research thus recommends that banks can maximize interest income by focusing strategic attention on those factors that have the most significant effect on net interest margin. However, regulators should also consider these factors and find ways to curb the widening spread between monetary policy rates and banks' lending rates.

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