

MONETARY POLICY CONTROLS AND BANKING SECTOR SOUNDNESS: EMPIRICAL EVIDENCE WITH AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) IN NIGERIA

Dr. Catherine Chimma Obasi, Kenneth Chukwudi Njoku PhD

Dr. Catherine Chimma Obasi is a lecturer in the Department of Marine Economics & Finance of The Nigeria Maritime University, Okerenkoko, Delta State in Nigeria. Email - drmma@yahoo.com

Kenneth Chukwudi Njoku PhD is a lecturer of the Department of Business Administration/Management of Imo State Polytechnic, Omuma, Imo State in Nigeria. Email - kennethphd78@gmail.com

KeyWords

ARDL, Banking, Control, Empirical, Finance, Monetary Policy, Money Supply, Soundness

ABSTRACT

This study assessed the impact of monetary policy tools on the soundness of Deposit Money Banks (DMBs) in Nigeria. Time series data was sourced from Central Bank of Nigeria Statistical Bulletin from 1990-2020. The dependent variable is banking soundness (FS) as proxied by return on assets in the Nigerian banking sector. The independent variables were: RR (Reserve requirements), MR (Discount rates proxied with monetary policy rates), DW (Discount window), OMO (Open market operation proxied with treasury bill assets of banks). Aggregate credit to the private sector was used as control variable. Autoregressive Distributed Lag (ARDL) and parsimonious vector error correction model were used to conduct the investigations and analysis. The empirical findings revealed that all the monetary policy tools had positive and significant impact on banking sector soundness. The study concludes that monetary policy has significant effect on the financial soundness of the Nigerian banking sector as measured by return on assets of deposit money banks both in the short and in the long run. From the findings, the study recommends that interest rates and liquidity policies should be the dominant policy tool in the monetary policy tool kit of the Central Bank of Nigeria.

I. INTRODUCTION

Monetary policy is the deliberate act of central bank authorities to influence the amount, cost and availability of money and credit in order to achieve the desired macroeconomic objectives. These are the direct steps taken by the Central Banks to control the amount, supply and cost of money in the economy for the purpose of achieving the objectives of the macroeconomic policy (CBN, 2011). Although there are many tools available for monetary policy, the combination of instruments to be used at any time depends on the objectives to be achieved and the efficiency of that instrument which to a large extent depends on the country's economic resources (Nnanna, 2001; Onoh & Nwachukwu, 2017). The tools available to achieve these goals include open market performance, central bank lending or discount window, policy rate, cash reserve ratio or reserve

requirement, and loan to deposit rate. These tools have been used by the Central Bank of Nigeria (CBN) which has set it as a regulatory barrier for banks.

Open market operations are used by central banks to change money supply levels through the purchase or sale of government securities by the central bank and the non-banking public for the purpose of managing liquidity (Ukeje, 2012; Onoh & Nwachukwu, 2017). Central Bank lending or discount window is a monetary policy tool used by central banks to provide short-term borrowings to eligible banks and other financial institutions to meet shortage of liquidity positions (Ukeje, 2012; Onoh & Nwachukwu, 2017). Monetary policy rates are the minimum lending rates of the Central Bank where it lends money to banks. (Afolabi, Adeyemi, Salawudeen & Fagbemi, 2018). High interest rates, as seen by Olatu, Aladesanmi and Mary (2014), translate into a monetary policy that may reduce the need for a loan and lead to a decrease in product. When the CBN sees the pressure of inflation on the economy, it raises the monetary policy rate. So by changing the level of monetary policy rate, central banks are able to influence the demand for money as well as inflation expectations. On the contrary, a depressed economy urges a Central Bank to reduce its lending rate, making it cheaper to borrow from it. Deposit money banks also reduce their lending rate, making it easier for entrepreneurs to borrow money (Jhingan, 2001).

Cash reserve ratio or reserve requirements are set by the central banks in the financial system for liquidity management and prudential regulation (Ukeje, 2012). Reserve requirements place limits on the amount of money that DMBs can provide as a loan to their clients. There are two types of requirements: cash and liquidity reserves. The cash

reserve requirement is usually called the Cash Reserve Ratio (Ukeje, 2012; Onoh & Nwachukwu, 2017; Afolabi, Adeyemi, Salawudeen & Fagbemi, 2018) or CRR while the liquidity requirement is called the liquidity ratios because it is measured in terms of total deposit liabilities of banks (Ukeje, 2012).

The Nigerian banking industry is dominated by commercial banks, and the Central Bank of Nigeria (CBN) is responsible for monetary policy conduct to pursue the objectives of the macroeconomic government (Akomolafe, Danladi, Babalola & Abah, 2015). The items in the balance sheet of commercial banks are influenced by the Central Bank of Nigeria (CBN) through specific monetary policy. The CBN sets the standard for monetary policy and contributes to the allocation of credits to the economy in terms of government objectives and economic plans.

Statement of the Problem

The existence of a successful banking industry is essential to the whole economy because it creates the conditions necessary for economic growth and development through its role to intermediate funds from surplus to deficit economic units (Okaro, 2016). One of the measures taken by the entire economy to make the banking sector more efficient is to use monetary policy management that relies on money control so that banks can influence financial and economic activities. Despite various monetary policy efforts to improve the soundness of banks in Nigeria, a look at the banking industry still shows that banking return on assets declines from 2.34% in 2015 to 1.30% in 2016. In addition, there have been several episodes of the banking crisis despite the regulatory framework for monetary policy. For example, after the merger of banks in 2005/2006, the number of sound banks was 4, Satisfactory 17, Marginal 2, and Unsound 1 (NDIC annual report, 2011). Apart from the use of the CAMELS model by the Nigerian banking regulatory authorities, eight (8) banks failed the pressure test conducted by the joint audit of the CBN / NDIC audit team (Onodi, Okoye & Amaechi, 2017). The stress test assessments revealed fundamental weaknesses in corporate governance and risk management, high levels of non-performing loans, misconduct and bank financial failures (Sanusi, 2009).

Several studies have been conducted on monetary policy in relation to Deposit Money Banks (Dare & Okeya, 2017; Punita & Somaiya, 2006; Ubi, Lionel & Eyo, 2012; Jegede, 2014; Udeh, 2015). Although Dare and Okeya (2017) found a positive relationship between monetary policy and sound banking in Nigeria, Punita and Somaiya (2006), on the other hand, found a negative correlation between monetary policy and banking profitability in India between 1995 and 2000. Existing documents show that there is a link between monetary policy and banking soundness; however, the results are inconclusive and vary from country to country. To the best of my knowledge, no study has investigated the relationship between monetary policy control and banking soundness with the impact of open market operations and discount windows in Nigeria. This study is therefore designed to fill this gap in determining the impact of monetary policy control on the soundness of banks in Nigeria.

Objectives of the study

The general objective of this study is to examine the effect of monetary policy controls on the soundness of banks in Nigeria (1990-2020).

Significance of the Study

This study is conducted to examine the impacts of monetary policy on banks soundness in Nigeria, the results and recommendations from this extended study will be beneficial to both policymakers on the type of policy to formulate. The study will be of immense benefits to the following:

- i. The banks will realize that proper implementation of Central Bank of Nigeria Regulation can ensure higher profitability of the banking industry and help to restore the eroded confidence in some of the banking customers.
- ii. For the regulatory authorities in Nigeria to determine future policies, regulations to be formulated and implemented towards improving and sustaining banking sector profitability and stability.
- iii. This work will serve as a reference material for students and other researchers who want to explore further study in the areas of banking profitability.

Scope of the Study

This study covers various monetary policy instruments and policy options as they affect banking operations. It is however delimited to Deposit Money Bank institutions in Nigeria. The monetary policy tools that would be involved in this study are Reserve requirements; Cash reserve ratio, Liquidity ratios, Discount rate, and Open market operations. Emphasis is clearly laid on applications and not on process of formulation of monetary policy. The study spans for a period of nineteen years, 1990 – 2019. This study is also limited in data use. The Nigerian banking sector has been unstable over the years but a collective report of the banking sector as produced by the CBN becomes most ideal to make better inferences, so a collective aggregate data for the banking sector will be used.

II. Literature Review

Financial Soundness: Concepts and Measures

Bank soundness is defined as the health or financial status of each bank, or as a group or banking system (IMF, 2006), and the sound banking system is defined by Lindgren, Garcia and Saal (1996) as one in which banks have adequately capitalized, profitable and efficiently managed so that it is able to withstand negative shock. Failed banks, on the other hand, are less likely to be bankrupt if they have been liquidated or have received assistance from a deposit insurance corporation. The purpose of the financial soundness indicators is to provide information on how strong the financial sector is. According to Roman and Şargu (2013), sound banking is the reflection of a bank's financial performance. Financial performance, which is the product of financial ratio analysis, is intended to identify the financial strengths and weaknesses of banks by establishing a relationship between the balance of assets and the profit and loss account. One of the most popular bank performance models is the CAMEL Rating System. The CAMEL Rating Framework is a system for evaluating local banking tests (IMF, 2006).

The CAMEL framework is initialism for capital adequacy, asset quality, management efficiency, earnings and liquidity and can be represented by the following metrics:

Table 1: CAMEL Framework

CAMEL Parameters	Codes	Measurements	Descriptions
Capital Adequacy	C1	(Tire-1 Capital+ Tire-2 Capital) /Risk-weighted Assets	Capital Adequacy Ratio
	C2	Total Equity /Total Assets	Total Equity Ratio
	C3	Total Debt/Total Assets	Total Debt Ratio
	C4	Government Securities/Total Investment	Government Securities to Investment Ratio
Asset Quality	A1	Financial Assets/Total Assets	Financial Assets Ratio
	A2	Total Investment/Total Assets	Total Investment Ratio
	A3	Non-performing Loans/Total Loan	Non-performing Loans Ratio
	A4	Fixed Assets/Total Assets	Fixed Assets Ratio
	A5	Loan loss provision/Total Loan	Loan Loss Provision Ratio
	A6	Total Loan/ Total Assets	Total Loans Ratio
Management Efficiency	M1	Profit/Employee	Profit Per Employee
	M2		Business Per Employee
	M3	Funds Borrowed/Total Asset	Borrowed Funds Ratio
	M4	Cost /Income	Cost-Income Ratio
	M5	Total Loan/Total Deposit	Loan to Deposit Ratio
Earnings	E1	Net Profit(Loss)/Total Assets	Return on Assets
	E2	Net Profit(Loss)/Total Equity	Return on Equity
	E3	EBIT/Total Assets	Operating Profit Ratio
	E4	Net Interest Income/Total Assets	Net Interest Margin
	E5	Non-Interest Income/Total Assets	Non-Interest Income Ratio
Liquidity Management	L1	Liquid Assets/Total Assets	Liquid Asset Ratio
	L2	Liquid Assets/Short-term Liabilities	Liquid Assets to Short-term Liabilities Ratio
	L3	Liquid Assets/Total Deposit	Liquid Assets to Deposit Ratio
	L4	Total Loan/Total Deposit	Loan to Deposit Ratio
	L5	Government Securities/Total Asset	Government Securities Ratio

Source: Rahman, Z. & Islam, S. (2018)

Capital Adequacy (C), as one of the most important indicators of the financial soundness of the banking sector, represents the ability of the banking sector to accommodate losses caused by exposure to certain risks or significant macroeconomic disturbances (Roman & Şargu, 2013). Asset Quality (A) is also an important indicator of bank soundness. Asset quality is a performance parameter for measuring a bank's exposure to asset risk. Asset quality indicators also take into account the perceived credit risk in the balance sheet by securities, contingent lending arrangements, and derivatives. Poor asset quality is the cause of many bank failures. Management quality (M) is an important part of the bank's operations that drive all resources to bring about the health and stability of banks (Roman & Şargu, 2013).

Revenue (E) and bank profit profile reflect their ability to support current and future transactions. Clearly, this defines the potential for absorbing losses by contributing to creating sufficient capital base, financing its expansion and paying adequate dividends to its shareholders. Earnings and profitability of the banks are usually based on the following indicators: Return on assets and Return on equity, among others. Return on Assets (ROA) emphasizes how profitable bank assets are generating revenue. Liquidity (L) management in banks is a very important aspect of banking and has a significant impact on its financial performance (Roman & Şargu, 2013).

Financial soundness is the result of evaluating or measuring the results of firm operations and policies during a financial period. It identifies the financial strengths and weaknesses of a bank by establishing a relationship between the items in the financial position and income statement. The purpose of monetary policy tools is to

limit the activities, operations and exposures of banks to macroeconomic fluctuations in order to achieve price stability and economic growth. However, the process of using these monetary policy instruments affects DMB's profit-making capabilities. But, like all other private businesses, profit growth is a very important goal of deposit money in banks (Raheman & Nsar, 2007; Ongore & Kusa, 2013).

Return on Asset (ROA), being a major measure of bank profit, measures the revenue on all its assets (Ongore & Kusa, 2013; Nyawira, Jagongo & Ndede, 2017). It measures the ability of bank executives to generate revenue using the banks' assets they own. In other words, it shows how bank's resources are used to generate revenue. It also demonstrates the efficiency of bank management in generating revenue for all institutional resources (Ongore & Kusa, 2013; Nyawira, Jagongo & Ndede, 2017).

In this study, financial performance will be measured by the return on goods (ROA). The ROA measures the income relationship between a company's total assets. It demonstrates the bank's ability to use its assets to maximize profits (Adesina, Nwidobie & Amadi, 2018), so profitable pre-tax profits will be used. It is generally agreed that interest rates affect the bank's profits through net interest rate and are an important factor in obtaining total bank benefits and soundness (Adesina, Nwidobie & Amadi, 2018).

Theoretical Framework

Public Interest Theory of Regulation

According to the public interest theory, government regulation is a tool to overcome the disadvantages of undesirable market results, missing markets, unbalanced market operation, and imperfect competition (Nyawira, Jagongo & Ndede, 2017). The public interest is that governments control banks in order to enhance the efficiency of banks by eliminating market failures, for the benefit of society at large.

Differences in the intentions of economic agents and the costs involved in interaction between them may make it possible for other agents to pursue their own interests, perhaps at the expense of public interest. Economic theories derived from these recent considerations are often referred to as private interest theories of regulation (Nyawira, Jagongo & Ndede, 2017). Central to public perceptions are market failures and effective government interventions. According to these theories, control increases social well-being. Private interest theories explain the theory based on the conduct of the interest group. The transfer of wealth to successful profit groups often undermines social welfare. Interested parties may be firms, consumers or consumer groups, regulators or their employees, legislatures and unions.

Keynesian Economic Theory

Before Keynes (1936) responded to the Great Depression, an experience in Great Britain, he wrote in his book, "The General Theory of Employment, Interest and Money", the classical economists argued that in the capitalist market, the economy under occasional shock, the market, called the invisible hand, it will work quickly and effectively to restore full economic equilibrium. They believe that government intervention to stabilize the economy was unnecessary and undesirable (Adesina, Nwidobie & Amadi, 2018). According to Snowdon and Vane (2005), it was the Great Depression experience that led Keynes to write his most important book on economic theory, "The General Theory of Employment, Interest and Money". In Keynes' book he stressed the role of expectations and uncertainty in his definition of aggregate instability.

A central theme of Keynes' analysis is his argument that "capitalist market economy is naturally unstable. (Keynes (1936) quoted in Snowdon and Vane (2005). In Keynes' view, this volatility has been the result of volatile demand and the Great Recession resulting from a sharp decline in investment costs caused by a shift in the efficiency of small business.

Empirical Review

Ndubuaku, Ifeanyi, Nze and Onyemere (2017) examined the impact of monetary policy on the performance of commercial banks in Nigeria. The paper used Descriptive and Ex-post Facto Research Design. The study found that the Monetary Policy rate during the SAP period did not have a significant impact on Total Asset, Deposits, Loans and advances and Credit to the Private Sector. On the other hand, the Level of Monetary Policy rate during the Post SAP period had a significant impact on Total Asset, Deposits Mobilization, Loans and Advances and Credit to the Private Sector, respectively.

Ekpung, Udude and Uwalaka (2015) examined the effect of monetary policy on the performance of the banking sector in Nigeria during the period 1970 to 2006. The results showed that monetary policy had a significant impact on bank deposit liabilities. However, it has been found specifically that Deposit Rate (DR) and Minimum Discount Rate (MDR) have a negative impact on Nigerian bank deposit liabilities, while the Exchange Rate (EXR) has had a positive and significant impact on Nigerian bank deposit liabilities.

Nguyen, Vu and Le (2017) are investigating the impact of monetary policy on the profitability of commercial banks in Vietnam. Monetary base (MB), required reserve ratio (RRR) and discount rate (DIS) were used as

representatives of monetary policy. The results showed that there is a positive relationship between monetary policies and banking and profits.

Okaro (2016) investigated the effects of Monetary Policy and money supply controls of Deposit Money Banks (DMBs) in Nigeria from 1999 to 2013. The findings reveal, among other things, that; quasi money has a positive non-significant relationship with DMB profits, while currency in circulation has a negative non-significant relationship with DMB profit in Nigeria.

Oganda, Mogwambo and Otieno (2018) examined the comparative impact of cash reserves on performance of National Bank and Equity Bank Kenya Limited. The study found that cash reserves had a strong negative correlation with the return on equity that provided a critical negative relationship with the performance of Equity Bank.

Abidi and Lodhi (2015) examined the relationship between the Reserve Requirement Ratio and the Profitability of Banks in Pakistan. The findings of this study revealed that CRR, which is considered a measure of Reserve Requirement, has a distinctly significant impact on the financial performance of banks, measured by ROA and ROE.

MacCarthy (2016) examines the impact of cash reserve ratio on the financial performance of banks and their level of participation in public liability. It has been found that the cash reserve ratio strongly predicts the financial performance of commercial banks in return on investment.

Armantier, Ghysels, Sarkar and Shrader (2015) evaluated the impact of discounted window during the 2007-2008 financial crisis. They provided strong evidence of the presence, magnitude, and economic costs of the discrimination associated with the borrowing of banks from the Federal Reserve's Discount Window (DW) during the 2007-08 financial crisis. The study found that banks were willing to pay a 44-point premium on all sources of funding (126 points after the collapse of Lehman Brothers) to avoid DW borrowing. The study concludes that DW's discrimination is economically viable as it has increased bank's borrowing costs to by 32 points for its pre-tax return (ROA) in the event of a crisis.

III. Research Methodology

The research design adopted in this study falls within the Ex-post facto design paradigm a form that describes the flexibility of the monetary policy used by the CBN between 1990 and 2019 and the soundness of the banks to ensure their trend and pattern during that period. The study covers all 21 deposit banks forming a Nigerian banking system but only from 1990 to 2019. Also, as it is not possible due to lack of data to make a review of all policies that have taken place in the banking system in Nigeria, research is limited to monetary policy principles from 1990 to 2019.

Model Specification

In determining the link between monetary policy controls and bank soundness, this section specifies an appropriate model for the analysis. The monetary policy tools are the explanatory variables and on the right-hand side, while bank soundness (proxied by ROA) represent dependent variable and on the left-hand side.

The functional relationship of the empirical model appeared as follows:

$$FS = f(RR, MR, DW, OMO, AGGC) \dots \dots (3.1)$$

The above equation is expanded and operationalized for the purpose of estimation into the following equation:

$$FS = \alpha + \beta_1 RR + \beta_1 MR + \beta_2 DW + \beta_3 OMO + \beta_4 AGGC + \mu \dots \dots \dots (3.2)$$

Equation 3.2 shows a regression model which seek to explain the relationship between monetary policy tools and bank soundness.

Where,

- FS - Bank soundness (proxied with ROA)
- RR - Reserve requirements
- MR - Discount rates (proxied with monetary policy rates)
- DW - Discount window
- OMO - Open market operation (proxied with treasury bill assets of banks)

- AGGC - Aggregate credit to the private sector by banks as control variable
- α - Intercept of the model
- $\beta_1 - \beta_4$ - Coefficient of variables
- μ - represents the residual.

Method of Data Analysis

The study adopted the Autoregressive Distributed Lag (ARDL) method. Pesaran, Shin and Smith (2001) developed a flexible integration test model known as the bounds test method or the Autoregressive Distributed Lag (ARDL) method based on three validations: first, the use of the ARDL to measure levels relationships; second, bounds testing allows a combination of I (1) and I (0) variables as regressors; and thirdly, this process is appropriate for small or limited sample size (Pesaran, Shin., and Smith, 2001).

The bounds test method involves measuring the following equation as set out by Nwachukwu, Adebayo, Shettima, Anigwe and Udechukwu-Peterclaver (2016):

$$\begin{aligned} \Delta FS_t &= \alpha_0 + \alpha_1 FS_{t-i} + \alpha_2 RR_{t-i} + \alpha_3 MR_{t-i} + \alpha_4 DW_{t-i} \\ &+ \alpha_5 OMO_{t-i} + \alpha_6 AGGC_{t-i} + \sum_{i=1}^a \beta_i \Delta FS_{t-i} + \sum_j^b \partial_j \Delta RR_{t-j} \\ &+ \sum_k^c \varphi_k \Delta MR_{t-k} + \sum_l^d \theta_l \Delta DW_{t-l} + \sum_m^e \pi_m \Delta OMO_{t-m} \\ &+ \sum_n^e \pi_n \Delta AGGC_{t-n} + \mu_t \dots \dots \dots (3.3) \end{aligned}$$

After estimating obtaining the presence of long-run relationship from (3.3), Pesaran, Shin and Smith (2001) advocated that we obtain the short-run dynamic parameters by estimating an ARDL error correction model associated with the long-run estimates. This is specified as follows:

$$\begin{aligned} \Delta FS_t &= \alpha_0 + \sum_{i=1}^a \beta_i \Delta FS_{t-i} + \sum_j^b \partial_j \Delta RR_{t-j} + \sum_k^c \varphi_k \Delta MR_{t-k} \\ &+ \sum_l^d \theta_l \Delta DW_{t-l} + \sum_m^e \pi_m \Delta OMO_{t-m} + \sum_n^e \pi_n \Delta AGGC_{t-n} \\ &+ \omega ECT_{t-1} + \mu_t \dots \dots \dots (3.6) \end{aligned}$$

Where,

ECT = error correction term derived from equation (3.10), and

ω = the speed of adjustment.

The error correction model shows the speed of adjustment needed to restore the long run equilibrium following a short run shock. The α_1 is the coefficient of the error correction term in the model and must be negative and significant for the return back to long-run equilibrium to hold (Pesara, Shin & Smith, 2001).

IV. Presentation and Discussion of Results

Data Presentation and Analysis

Data from this study were analyzed using descriptive statistics including mean, median, skewness, standard deviation, and kurtosis. Inferential analysis involves evaluating multiple regression models and the measurement method was based on unit root and co-integration testing.

Table 2: Descriptive Statistics

	FS	RR	OMO	MR	DW
Mean	1.903300	1011.799	631.6410	13.80000	252.7325
Median	2.360000	132.4800	475.7050	13.50000	47.02212
Maximum	4.730000	5612.250	2141.680	26.00000	1278.450
Minimum	-9.820000	0.000000	6.190000	6.000000	0.047900
Std. Dev.	2.481323	1665.732	627.2140	3.925711	386.8908
Skewness	-3.600116	1.502516	0.884124	0.711240	1.616511
Kurtosis	17.92661	3.823714	2.732409	4.969118	4.242196
Jarque-Bera	343.3089	12.13590	3.997879	7.376094	14.99435
Probability	0.000000	0.002316	0.135479	0.025021	0.000555
Observations	30	30	30	30	30

Source: Author's computation

Financial soundness had a mean of 1.9033 and a median of 2.36. The maximum value was 4.73 while the minimum value was -9.82. reserve requirement had a mean of 1011.799 and a median of 132.48. The maximum value was 5612.25 while the minimum value was 0. Open market operations had a mean of 631.641 and a median of 475.705. The maximum value was 2141.68 while the minimum value was 6.19. Monetary policy rate had a mean of 13.8 and a median of 13.5. The maximum value was 26.00 while the minimum value was 6.00. discount window had a mean of 252.7325 and a median of 47.02212. The maximum value was 1278.45 while the minimum value was 0.0479.

Test for Stationarity Using the Augmented Dickey – Fuller Test

The stationarity tests level and first variables was estimated using the Augmented Dickey-fuller test. The result of the estimation is presented below.

Table 3: Stationarity Tests

Variable	ADF Tests: Levels			ADF Tests First Difference		
	Test Statistic with intercept	p-values	Order of Integration	Test Statistic with intercept	p-values	Order of Integration
FS	-6.6275	0.0000	I(0)			
RR	-0.0700	0.9438		-3.9239	0.0057	I(1)
OMO	-2.8640	0.0620		-6.8835	0.0000	I(1)
MR	-3.0830	0.0387	I(0)			
DW	-2.2993	0.1789		-4.882085	0.0005	I(1)

Source: Author's computation

Financial soundness (FS) and monetary policy rate (MR) were stationary at level with constant. This was significant at 5 percent. On the other hand, reserve requirements (RR), open market operations (OMO) and discount windows (DW) were stationary after first difference. This makes the series to be integrated at different orders of integration, which satisfy one very important requirement of using ARDL.

Autoregressive Distributed Lag (ARDL) Bounds test for Cointegration

The bound co-integration test conducted for the financial soundness model which includes variables with I(0) and I(1) order of integration showed that there was cointegration among the variables.

Table 4: ARDL Bounds test

F-Bounds Test		Null Hypothesis: No levels relationship			
Test Statistic	Value	Signif.	I(0)	I(1)	

Asymptotic: n=1000				
F-statistic	13.80522	10%	2.08	3.00
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author's computation

The F-statistics of 13.80522 is greater than the critical values of the upper bound for all levels of significance. Therefore, the null hypothesis which states that there is no co-integration among the variables was rejected. There is therefore a long run relationship among the variables. The study proceeded to estimate both a long run and a short run model using the Auto-Regressive Distributed Lag (ARDL) method.

Autoregressive Distributed Lag (ARDL) Long-run Estimation

The long run model is given as:

$$FS = -7.7972 + 0.4209 \cdot DW + 0.1227 \cdot AGGC + 0.2187 \cdot MR + 0.3543 \cdot OMO + 0.1970 \cdot RR$$

The long run model was estimated using the Auto-Regressive Distributed Lag (ARDL) method. The result is presented below.

Table 5: ARDL Long-run Model Estimate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DW	0.420911	0.137329	3.064984	0.0135
AGGC	0.122671	0.038982	3.146852	0.0118
MR	0.218711	0.042170	5.186417	0.0006
OMO	0.354259	0.042890	8.259634	0.0000
RR	0.196952	0.033596	5.862363	0.0002
C	-7.797186	1.280733	-6.088067	0.0002

Source: Author's computation

Table 6: ARDL Short-run and Error Correction Model Estimate

ARDL Error Correction Regression				
Dependent Variable: D(FS)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FS(-1))	2.2906	0.2434	9.4112	0.0000
D(DW)	-0.2772	0.2534	-1.0940	0.3024
D(DW(-1))	-1.1329	0.2827	-4.0080	0.0031
D(AGGC)	3.7407	0.3532	10.5904	0.0000
D(AGGC(-1))	0.3287	0.1388	2.3690	0.0420
D(AGGC(-2))	0.7079	0.1409	5.0223	0.0007
D(MR)	-0.9276	0.1436	-6.4609	0.0001
D(MR(-1))	-0.8856	0.1294	-6.8456	0.0001
D(OMO)	0.6515	0.0965	6.7482	0.0001
D(OMO(-1))	-1.0120	0.1009	-10.0278	0.0000
D(OMO(-2))	-0.2423	0.0599	-4.0471	0.0029
ECT(-1)*	-5.6005	0.4413	-12.6910	0.0000
R-squared	0.9669			
Adjusted R-squared	0.9427			
Durbin-Watson stat	2.2870			

Based on long-term model estimates, all explanatory variables including discount windows, monetary policy rate, open market operations and ratio of reserve requirement were all important in explaining the changes in the financial soundness of the Nigerian banking sector over time. Thus the impact of changes on discount windows, monetary policy rate, open market operations and ratio of reserve requirement as used by the Central Banks of Nigeria have a positive impact on the financial soundness of deposit money banks in Nigeria.

Considering the short-term dynamics in Table 6, the adjusted R^2 indicates a good fit proportion of the model with a value of 96.69 percent. Durbin Watson, with a value of 2.287 greater than 2, indicates that the model does not have the first order autocorrelation. Table 6 also shows that the coefficient of ECT (-1) is significant at the 1 percent level. This shows that the speed of the short-run adjustment to reach the long run is significant. In addition, the error correction term is 5,6005 with the expected sign, which suggests that if the financial soundness model is above or below its equilibrium level, it corrects approximately by 560.05 percent to its equilibrium.

Discussion of Findings

The above analysis showed that monetary policy could have a positive impact on the Nigerian banking system. Evidence has shown that the profitability of banks has improved over time in the review period especially with the discount window, reserve requirement, monetary policy rate implementation and Treasury bill in the banking system. The study also found that private sector credits favour a growth in the profitability of banks during this period. These findings suggest that a good combination of policy tools can improve the positive return on assets in the banking system.

Monetary policy management was a great success in protecting the financial health of the banking system. As the results show, monetary policy rate (MR), reserve requirements (RR), open market performance (OMO) and discount windows (DW) are very effective in improving the soundness of banks in Nigeria. These policies have been effective in reducing credit losses in the system, and their implications are statistically significant. A positive impact will not be a one-off event. Further evaluation is required and balances to minimize the impact of financial crisis on the system.

V. Conclusion and Recommendations

Conclusion

Monetary policy has a significant impact on financial soundness measured as return on assets of banks in both the short and long term. The Monetary policies of the past years are very important. Even aggregate credit to private sector has had a significant impact on the financial soundness of Nigerian banks.

Recommendations

The results of our study provide a sound guide for the implementation of monetary policy for the stability of the financial sector in Nigeria. The study noted that, throughout the study period, the monetary policy rate (MPR) appears to be very effective in maintaining the soundness of the banking system in line with expectations. This suggests that the effective implementation of monetary policy in Nigeria should focus on managing interest rates and liquidity policy variables (or precise monetary policy rate, reserve requirements, open market operations and discount window services) in regulating the soundness of the banking system. This means that interest rates and liquidity policies should be the leading policy tool in the monetary policy tools kits. Other policy tools may work at different levels and targets. Therefore, we recommend caution in implementing these policies as they may result in undesirable consequences in some areas. Overall, it is suggested that monetary policy conduct has been successful in improving the soundness of banks in Nigeria. The economic impact of the analysis of this study is that monetary policy is still important in regulating the financial system for high service delivery in the wider global economy.

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