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Monetary Policy and Commercial Banks Profitability in Nigeria

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Abstract

This study examines the impact of monetary policy on the profitability of commercial banks in Nigeria from 1988 to 2021. Data on credit-to-deposit ratio, return on asset, return on equity, Z-score, money supply, income per head, interest rate, interest spread, and inflation were obtained from the statistical bulletin of the Central Bank of Nigeria. Autoregressive distributed lag (ARDL) techniques were used to estimate the short and long-term dynamic equilibrium relationship between monetary policy and commercial banks' profitability in Nigeria. The analysis confirms mixed integration through unit root tests, which justifies using the ARDL approach for the four baseline models. The estimation results for these models provide evidence of a cointegrating relationship between monetary policy and commercial bank profitability in Nigeria, indicating that all the variables are bound in the long run. Among the indicators of commercial bank profitability, return on asset responds more quickly to changes in monetary policy compared to return on equity, credit-deposit ratio, and Z-score. The long-term disequilibrium adjustment further supports a cointegrating relationship among these variables. The estimated level equations demonstrate that money supply and inflation positively affect the bank credit-deposit ratio in the long run. Based on these findings, the study strongly recommends increasing the Z-score of the Nigerian banking sector by reducing the standard deviation of return on assets. The volatility of ROA in the Nigerian banking system contributes to a low Z-score. Therefore, bank management teams should maintain a relatively stable ROA over time. The government should work on reducing inflation, particularly inflation resulting from reckless spending of public funds, excessive quoting by public officers, and corruption-induced inflation. The interest spread is too wide, and any increase in this margin hurts the return on assets and equity. Accordingly, the study suggests meaningfully shrinking the margin between lending and deposit rates, aiming for a one-digit margin. Banks can achieve this by simply reducing lending rates to single digits.

Keywords: Monetary Policy, Interest Rate, Interest Rate Spread, Inflation, Money Supply, Return on Asset

1. Introduction

The success of monetary policy relies on a central bank's deep understanding of the connection between its actions and objectives. Traditionally, the central goals of promoting economic growth, maintaining price stability, and supporting monetary stability have been pursued through the targeting of monetary aggregates (Ndekwe, 2013). According to Bernanke and Gertler (1995), the impact of monetary policy on real economic variables remains a contentious topic in macroeconomics. Meanwhile, macroeconomic shocks occur when specific factors fluctuate within an economy, leading to changes in lending behavior of financial institutions in the short and long term (Iwedi, 2017). Nevertheless, banks are expected to strike a balance between maximizing shareholder wealth and fulfilling customers' liquidity needs. Monetary policy plays a crucial role in shaping the operating environment for banks, either enhancing or constraining industry activities (Udeh, 2015). Despite the comprehensive nature of monetary policy, it has specific objectives that are achieved through various monetary policy tools.

Over the years, the Central Bank of Nigeria has grappled with discrepancies between key macroeconomic policy targets and actual outcomes. Furthermore, the effectiveness of monetary policy tools in strengthening Nigerian banking institutions remains unresolved (Iwedi, 2019). Monetary policy influences the operations of commercial banks, and evaluating the banking system involves examining the performance of monetary policy tools (Jegede, 2014). The ultimate goal of monetary policy is to control inflation, maintain a favorable balance of payments, safeguard the external value of the national currency, and promote sustainable economic growth. Achieving these goals requires regulatory authorities to control the money supply in the economy.

The extent to which monetary policy affects financial and economic activities and, consequently, the financial performance of commercial banks has long been a subject of debate. There are divergent views on the effects of these policies and the channels through which they are established and achieved (Ekpung et al., 2015). This holds particular relevance in Nigeria, where the money and capital markets are underdeveloped, and the government has utilized various monetary policy instruments to regulate and control the cost, volume, availability, and direction of money, as well as the performance of commercial banks. Financial intermediaries often hesitate to allocate resources to productive investments despite lower interest rates. These factors are cited as limitations on the effectiveness of monetary policy in Nigeria. Consequently, it becomes crucial to assess how monetary policy targets impact bank performance in Nigeria. Banks naturally prefer investments with shorter returns, neglecting sectors that may be the government's focus.

Nevertheless, the banking sector's financial intermediation functions emphasize the need to achieve the sector's ultimate goals. Like other private enterprises, banks pursue profitability, liquidity, and solvency. Policymakers' desire to achieve economic objectives often leads to manipulation of the banking sector, which can suppress the sector's performance. Additionally, changes in monetary policy targets prompt the central bank to adjust money supply, interest rates, security prices, credit availability, and liquidity creation through commercial banks. These factors can create monetary imbalances or shocks that influence investment levels, consumption, imports, exports, government spending, total output, income, and the price level in the economy (Mishra and Pradhan, 2008). Evidence also demonstrates that monetary policy changes affect the loan supply of less liquid banks and their deposit base, ultimately impacting the banks' ability to fulfill their expected role in the financial system. Despite the consistent use of monetary policy and

guidelines, Nigeria has experienced several banking crises in the past 30 years, raising questions about the effectiveness of monetary policy in not only regulating the banking industry but also ensuring the profitability of banks. This study aims to examine the combined effects of monetary policy and macroeconomic shocks on the profitability of Nigerian banks.

2. Literature Review

As banks' profitability can be assessed through factors like profit and liquidity, this study examines existing literature on monetary policy's impact on bank profitability, as outlined below:

In a study conducted by Ogbeifun and Akinola (2019), the authors examined the impact of various monetary policy tools on the performance of deposit money banks in Nigeria. The findings revealed that most monetary policy variables had a positive correlation with the performance of Nigerian Deposit Money Banks, with the exception of Money Supply and Liquidity Ratio. Ultimately, it was concluded that these monetary policy instruments have a significant influence on the financial performance of commercial banks in Nigeria. In another study by Osakwe (2019), similar patterns were observed. The research demonstrated that factors such as monetary policy rate, liquidity ratio, and broad money supply had positive and substantial effects on return on equity (ROE). Conversely, interest rates exhibited a negative impact on ROE but did not prove to be statistically significant during the period analyzed. As a result, this study also supports the notion that monetary policy can be effectively utilized to shape and mold deposit money bank performance within Nigeria. In a study conducted by Adediran, George, Alege, and Obasaju (2019), the impact of monetary policy tools on the performance of bank credit in Nigeria was examined. The researchers utilized annual data spanning 36 years from 1980 to 2015. To analyze their findings, they employed the Cobb-Douglas production function and estimated a specific model using the autoregressive distributed lag co-integration approach. The results revealed that cash reserve requirement, which is a form of credit policy easing, plays a significant role in fostering economic growth in Nigeria compared to the monetary policy rate. This suggests that when implemented effectively, credit policy easing has the potential to counteract adverse external shocks related to credit.

In their research, Adesina, Nwidobie, and Amadi (2018) investigated the monetary policy tools utilized by the Central Bank of Nigeria (CBN) during and after the bank consolidation process from 2000 to 2016. Their objective was to determine the impact of these policies on the financial performance of deposit money banks (DMBs) in Nigeria. Using an Autoregressive Lag Model (ADL) and secondary data from the CBN Statistical Bulletin in 2016, they discovered that CBN's monetary policies had a noteworthy short-term influence on DMBs' performance, but no significant long-term effect. In a study conducted by Adeniyi, Kayode, Sakirat, and Olamide (2018), the correlation between monetary policy instruments and the credit performance of Deposit Money Banks in Nigeria was examined. The researchers gathered annual time series data from 1981 to 2016, spanning a period of 36 years, which was obtained from the Central Bank of Nigeria for their analysis. The findings of the study revealed that changes in the structure of the monetary policy system had a positive and significant impact on loan disbursement and advances made by Deposit Money Banks in Nigeria. Furthermore, it was discovered that there existed a bidirectional relationship between Monetary Policy Rate (MPR) and loan disbursement and advances provided by Deposit Money Banks in Nigeria. Specifically, MPR emerged as an influential factor causing

changes in loans provided by these banks within Nigeria. However, other variables such as broad money supply (LM2), liquidity ratio (LR), inflation rate (IFR), and cash reserve ratio (CRR) were found to have no granger causality effect on loans disbursed by Deposit Money Banks during the study period. In conclusion, this study highlights that both structural changes within the monetary policy system as well as variations in Monetary Policy Rate significantly impact loan disbursement activities undertaken by deposit money banks operating within Nigeria's financial landscape.

In their 2018 study, Bawa, Akinniyi, and Njarendy explored how the profitability of deposit money banks (DMBs) in Nigeria is influenced by cash reserve ratio and money supply. The researchers collected data from the annual reports and accounts of DMBs between 2002 to 2012. Using descriptive statistics and regression analysis techniques, they analyzed the data. The findings indicated that cash reserve ratio has a negative and insignificant impact on the earnings of DMBs in Nigeria. On the other hand, money supply had a positive significant effect on various aspects such as volume of loans and advances, interest rate, and interest income for deposit money banks. Based on these results, it is recommended that the Central Bank of Nigeria (CBN) redefines monetary policy instruments like Cash Reserve Ratio (CRR). By setting CRR at an equilibrium level, more funds would become available to DMBs for advancing loans as well as investing in the economy to foster growth and development. In their research, Kimani and Koori (2018) investigated the impact of monetary policy on the financial performance of commercial banks in Kenya. The study utilized annual panel data and specifically focused on Commercial Banks in Kenya from 2012 to 2016. The results revealed several key findings. Firstly, it was found that the Central Bank Rate had a negligible and negative effect on the financial performance of commercial banks in Kenya. Secondly, the study demonstrated that money supply exhibited a significant positive influence on the financial performance of these banks. Thirdly, there was evidence indicating a notable negative impact of Cash Reserve Ratio on their financial performance as well. Additionally, inflation was shown to have an inconsequential and adverse effect on commercial banks in Kenya according to this study's findings. Lastly, it was found that bank size played a significant moderating role in shaping the relationship between monetary policy and the financial performance of commercial banks in Kenya.

In his research, Zimmermann (2017) adopted a comprehensive approach to examine the impact of monetary policy on the profitability of banks. The study utilized a newly created dataset encompassing retail and central bank interest rates, as well as bank profitability figures for nearly all industrialized nations from 1870 to 2015. By analyzing short- and medium-term effects of changes in policy rates on banking spreads and overall bank performance, Zimmermann shed light on noteworthy insights. One such observation is that an increase in the policy rate leads to an upsurge in the spread between lending and deposit rates. This effect primarily stems from a widening of the deposit-to-market spread while maintaining stability in the lending-to-market spread. On average, after implementing a policy rate hike, there is a decline in bank profitability; however, this effect varies depending on specific circumstances within each state. Specifically, it increases when there is a higher proportion of mortgage credit within an economy but decreases when there is less reliance on deposit financing for bank liabilities. These findings hold true both across various countries over time and among individual banks operating within the United States Olaoluwa and Shomade (2017) analyzed the impact of monetary policy on lending behavior of

commercial banks in Nigeria. They applied the Keynesian model, which considered money supply as a measure for interest rates to encourage the public to hold more money. The study used annual time series data from the Central Bank of Nigeria's Statistical Bulletin from 1980 to 2014. Estimation techniques included Ordinary Least Square (OLS), Augmented Dickey-Fuller test (ADF), co-integration test, and Error Correction Model (ECM).

Borio, Gambacorta, and Hofmann (2017) explore the impact of monetary policy on bank profitability. Their study examines data from 109 large international banks based in 14 major advanced economies during the period 1995–2012. Overall, the findings indicate a positive correlation between short-term interest rates and the slope of the yield curve, on one hand, and bank profitability measured by return on assets, on the other. This suggests that the positive effect of the interest rate structure on net interest income outweighs the negative impact on loan loss provisions and non-interest income. The study also reveals that the effect is more pronounced when interest rates are lower and the yield curve is flatter, indicating the presence of non-linearity. Consequently, persistently low interest rates and a flattened term structure gradually diminish bank profitability over time. Dare and Okeya (2017) empirically assess the influence of monetary policy on the performance of commercial banks in Nigeria, with a specific focus on United Bank for Africa (UBA) Plc. They utilize panel cross-sectional data from 2009 to 2014 and employ multiple linear regression analysis using Statistical Package for Social Sciences (SPSS), Version 20. The model estimates banks' operating performance based on the Monetary Policy Rate (MPR), Cash Reserve Requirement (CRR), and Liquidity Ratio (LR), while using Return on Assets (ROA) as a proxy for banks' credit performance. The study reveals a positive but statistically insignificant relationship between MPR and ROA in the selected bank. Furthermore, the analysis shows negative and statistically insignificant relationships between CRR, LR, and ROA. The study concludes that the lack of statistical significance observed in the relationships may be attributed to the low level of compliance by commercial banks with the monetary policy guidelines.

Nguyen and Le (2017) examined the impact of monetary policy on profitability of Vietnamese commercial banks. Data were collected from 20 banks operating in Vietnam's market from 2007 to 2014, employing panel data regression. Monetary base (MB), discount rate (DIS), and required reserve ratio (RRR) served as proxies for monetary policy, while pre-tax profit represented banks' performance. Results indicated a positive correlation between banks' profits and monetary policies. Omini, Ogbeba, and Okoi (2017) utilized the VAR (VECM) model and Granger causality test to assess the influence of monetary policy shocks on Nigeria's industrial output from 1970 to 2015. The dependent variable was the contribution of manufacturing and solid minerals subsectors to GDP. Explanatory variables included monetary policy rate, exchange rate, and bank credit to the industrial sector. Findings revealed that the manufacturing sub-sector displayed a positive impact on monetary policy rate, commercial bank credit to the industrial sector, and exchange rates. Furthermore, the contribution of the solid minerals sub-sector to GDP responded positively to shocks in commercial bank credit to the industrial sector and exchange rate after the first year. The causality test demonstrated a unidirectional relationship, with monetary policy rate and exchange rate influencing the contribution of the manufacturing sector to GDP, and commercial bank credit to the industrial sector and exchange rate affecting the contribution of the solid mineral sector to GDP.

Onodugo, Amujiri, and Onodugo (2016) investigated the influence of different monetary policy Regimes on the performance of commercial banks in Nigeria. The study employed both Descriptive and Ex-post Facto Research Design, utilizing time series data obtained from the Central Bank of Nigeria Bulletin. The research was divided into two periods: SAP Period (1986-1999) and Post SAP Period (2000-2013). A total of eight Research Questions and eight Hypotheses were formulated. The data collected was analyzed using regression and Pearson Product Moment Correlation techniques, with the hypotheses tested using the t-test statistic. Monetary Policy Rate served as the independent variable, while Total Assets Value, Deposit Mobilization, Loans and Advances, and Credit to the Private Sector were considered the dependent variables in separate regression equations. The study revealed that Monetary Policy Regimes during the SAP Period had no significant impact on the Total Assets Value, Deposit Mobilization, Loans and Advances, and Credit to the Private Sector. However, the study found that Monetary Policy Regimes during the Post SAP Period had a significant impact on the Total Assets Value, Deposit Mobilization, Loans and Advances, and Credit to the Private Sector, respectively.

3. Methodology

The study uses secondary data since the variables investigated are quantitative. These variables include return on assets, return on equity, credit-to-deposit ratio, z-score, interest rate, inflation, interest spread, nominal income, and money supply. The data for these variables were obtained annually from the Central Bank of Nigeria (CBN) statistical bulletin from 1988 to 2021. This period was chosen as it corresponds to the implementation of policy measures that influenced the interaction between monetary policy and bank profitability in Nigeria. Pre-1988, when the banking sector was not computerized as it is today, was excluded. Stationarity of the variables was assessed using the Augmented Dickey Fuller (ADF) unit root technique due to the presence of structural breaks. After confirming the mixed integration nature of the variables, they were transformed to first order and modeled using the linear Autoregression Distributed Lags (ARDL) approach. The optimal lag length for the ARDL model was determined using the Schwarz Information Criterion (SIC). Maximum likelihood estimation was performed, followed by Wald's test to examine the existence of a level relationship between monetary policy targets and bank performance. Additionally, a restricted ARDL model was evaluated to estimate the long-run adjustment parameter and the parameters of the short-run dynamic changes.

3.1 Model Specification

This study takes its source from the linear specifications of Ubi, Lionel and Eyo (2012), Udeh, (2015) Onodugo et al., (2016) and Ndubuaku et al., (2017) However, these specifications are replicated using different variables as stated in my baseline equations as follow.

3.1.1 Return on Asset-Monetary Policy Relationship

$$roa_t = c_0 + c_2 incotarget_t + c_3 inftarget_t + c_4 intsprdtarget_t + c_5 intrtarget_t + c_6 m2target_t + u_t \quad 3.1$$

The ARDL form can be given as:

$$roa_t = b_0 + \sum_{i=1}^{q^1} b_i roa_{t-i} + \sum_{i=1}^{q^2} h_i incotarget_{t-i} + \sum_{i=1}^{q^3} g_i inftarget_{t-i} + \sum_{i=1}^{q^4} f_i intsprdtarget_{t-i}$$

$$+ \sum_{i=1}^{q^5} a_i intrtarget_{t-i} + \sum_{i=1}^{q^6} c_i m2target_{t-i} + w_t \qquad 3.2$$

$$q^1 = q^2 = q^3 = q^4 = q^5 = q^6$$

$$i = 1, 2, ..., q^1$$

Where roa-return on asset, incotarget-nominal income target, inftarget-inflation target, intsprdarget interest target, intrtarget interest target and m2target money supply target, q is the lag length,.

3.1.2 Return on Equity-Monetary Policy Targets Relationship

$$roe_t = c_0 + c_2 incotarget_t + c_3 inftarget_t + c_4 intsprdtarget_t + c_5 intrtarget_t + c_6 m2target_t + u_t \qquad 3.3$$

The ARDL form is given as

$$roe_t = b_0 + \sum_{i=1}^{q^1} b_i roa_{t-i} + \sum_{i=1}^{q^2} h_i incotarget_{t-i} + \sum_{i=1}^{q^3} g_i inftarget_{t-i} + \sum_{i=1}^{q^4} f_i intsprdtarget_{t-i}$$

$$+ \sum_{i=1}^{q^5} a_i intrtarget_{t-i} + \sum_{i=1}^{q^6} c_i m2target_{t-i} + w_t \qquad 3.4$$

Where roe-return on equity and other variables are as defined above

3.1.3 Credit to Deposit Ratio -Monetary Policy Targets Relationship

$$creddepratio_t = c_0 + c_2 incotarget_t + c_3 inftarget_t + c_4 intsprdtarget_t + c_5 intrtarget_t + c_6 m2target_t + u_t \qquad 3.5$$

The ARDL form is given as:

$$creddepratio_t = b_0 + \sum_{i=1}^{q^1} b_i roa_{t-i} + \sum_{i=1}^{q^2} h_i incotarget_{t-i} + \sum_{i=1}^{q^3} g_i inftarget_{t-i} + \sum_{i=1}^{q^4} f_i intsprdtarget_{t-i}$$

$$+ \sum_{i=1}^{q^5} a_i intrtarget_{t-i} + \sum_{i=1}^{q^6} c_i m2target_{t-i} + u_t \qquad 3.6$$

Where creddepratio-credit to deposit ratio and other variables are as defined above

3.1.4 Zscore -Monetary Policy Targets Relationship

$$zscore_t = c_0 + c_2 incotarget_t + c_3 inftarget_t + c_4 intsprdtarget_t + c_5 intrtarget_t + c_6 m2target_t + u_t \qquad 3.7$$

The ARDL form is given as

$$zscore_t = b_0 + \sum_{i=1}^{q^1} b_i roa_{t-i} + \sum_{i=1}^{q^2} h_i incotarget_{t-i} + \sum_{i=1}^{q^3} g_i inftarget_{t-i} + \sum_{i=1}^{q^4} f_i intsprdtarget_{t-i}$$

$$+ \sum_{i=1}^{q^5} a_i intrtarget_{t-i} + \sum_{i=1}^{q^6} c_i m2target_{t-i} + v_t \quad 3.8$$

Generally, y is assumed as a dependent variable and x as a vector of regressors, the proposed ARDL (q^* q) specification can be defined as.

$$y_t = con + \sum_{i=1}^{q^*} \alpha_i y_{t-i} + \sum_{j=1}^{q} \phi_j x'_{t-j} + w_t; \qquad w_t \sim N(0, h_w) \quad 3.9$$

Where x_t' is $kx1$ vector of multiple regressors, α_i are the autoregressive coefficients, ϕ_j are the symmetric coefficients of the autoregressive distributed lag process and w_t is error term assumed to be Gaussian. From equation 3.5, I consider unrestricted ECM equation under the ARDL as.

$$y_t = \alpha y_{t-1} + bx'_{t-1} + \sum_{i=1}^{q^*} \delta_i \Delta y_{t-i} + \sum_{j=1}^{q} \chi_j \Delta x' + \varepsilon_t \quad 3.10$$

In view of the above, the linear error correction term ε_t can be expressed as.

$$z_t = y_t - (\alpha y_{t-1} + bx'_{t-1}) \quad 3.11$$

Then the restricted ECM equation is given by equation 3.8 above.

$$y_t = \gamma z_{t-1} + \sum_{i=1}^{q^*} \delta_i \Delta y_{t-i} + \sum_{j=1}^{q} \chi_j \Delta x' + \varepsilon_t \quad 3.12$$

Where γz_{t-1} is the long run component and $\sum_{i=1}^{q^*} \delta_i \Delta y_{t-i} + \sum_{j=1}^{q} \chi_j \Delta x'$ is the short run component

4. Results and Discussion

4.1. Unit Roor Test Result

Table 1. Unit Root Test Result

Variable	ADF-Stat	5% Critical Value	P-value
Credit to Deposit Ratio	-4.02	-2.96	0.00
Income per Head	-0.60	-2.96	0.86
D(Income per Head)	-3.74	-2.96	0.01
Inflation	-3.74	-2.96	0.03
Interest Rate	-2.75	-2.96	0.08
D(Interest Rate)	-6.80	-2.96	0.00

Interest Spread	-3.85	-2.96	0.01
Money Supply	-1.03	-2.96	0.73
D(Money Supply)	-4.45	-2.96	0.00
ROA	-6.02	-2.96	0.00
ROE	-3.42	-2.96	0.02
Z-score	-2.08	-2.96	0.25
D(Z-score)	-7.94	-2.96	0.00

Source: Author computation.

The study conducts an ADF test on each of the variables of interest. Based on this test the absolute value of ADF statistics for ratio of credit to deposit, inflation, interest spread, return on asset and return on equity at level or raw are larger than the absolute value of the critical statistic (2.96), meaning that these variables are integrated to order 0. To the contrary, the absolute ADF statistics for income per head, interest rate, money supply and Z-score are respectively smaller the corresponding absolute critical value. This suggests that these variables are stationary at raw. Thus, the researcher repeated the test on these variables at first difference. The results show that the absolute ADF statistic in each of the variables is larger than the associated absolute critical value. This means that the variables are stationary at first difference. This means there is evidence that the variables of interest are mixed integrated of orders o and 1 only, marking the researcher to apply bound test to co integration in this study.

4.2 Test of Co-integration

One of the objectives of this study is to examine whether long run relationship exists between commercial bank profitability and monetary policy targets. The study achieved this objective by conducting ARDL co-integration test for each of the four baseline models. The results of this co-integrating test are reported in tables 4.2 through 4.5.

Table 2 Co-integrating Test on Credit to Deposit Ratio and Monetary Policy Relationship

Test Statistic	Value	Asymptotic: n=1000			Actual Sample Size: n=30		
			I(0)	I(1)		I(0)	I(1)
F-statistic	4.917738	10%	2.08	3	10%	2.407	3.517
k	5	5%	2.39	3.38	5%	2.91	4.193
		2.5%	2.7	3.73	1%	4.134	5.761
		1%	3.06	4.15			

***Source*: Author computation**

The bond test results presented in table 2 reveal F statistic of 4.92 approximately at 25 degree of freedom. Using the asymptotic sample size at 5 percent critical value, which corresponds to lower bound of 2.39 and upper bound of 3.39 respectively, we could see that F value is larger than upper

bound, leading to the rejecting of the null hypothesis that there is no co-integration. Alternatively, the output based on the actual sample, shows lower bound of 2.91 and upper bound of 4.19 values at 5 percent significant level. This also leads to the rejection of the null hypothesis of no co-integration. This means the study has confirmed long run relationship between credits to deposit ratio, inflation target, interest rate target, interest spread target, money supply target and nominal income per head target.

Table 3: Cointegrating Test on Return on Asset-Monetary Policy Relationship

Test Statistic	Value	Asymptotic: n=1000			Actual Sample Size: n=30		
			I(0)	I(1)		I(0)	I(1)
F-statistic	8.211304	10%	2.08	3	10%	2.407	3.517
k	5	5%	2.39	3.38	5%	2.91	4.193
		2.5%	2.7	3.73	1%	4.134	5.761
		1%	3.06	4.15			

Source: Author

Table 3 above shows F statistic of 8.21. The lower bound and upper bound for the asymptotic sample are 2,39 and 3.38 at 5 percent significant level. In the same vein, the lower bound and upper bound based on actual sample are 2,91 and 4,19 respectively at 5 percent alpha value. This implies the rejection of the no co-integration assertion for both sample sizes. Thus, there is strong evidence to claim that return on asset as a measure of bank performance maintains long run relationship with inflation, interest rate, interest spread, money supply and income per head targets.

Table 4 Cointegrating Test on Return on Equity-Monetary Policy Relationship

Test Statistic	Value	Asymptotic: n=1000			Actual Sample Size: n=30		
			I(0)	I(1)		I(0)	I(1)
F-statistic	3.558200	10%	1.81	2.93	10%	-1	-1
k	5	5%	2.14	3.34	5%	-1	-1
		2.5%	2.44	3.71	1%	-1	-1
		1%	2.82	4.21			

The associated statistics at 5 percent lower bound and upper bound for the asymptotic sample size are 2.14 and 3.34 respectively, while the critical F statistic is 3.56 approximately. This makes the researcher to reject the null hypothesis and infer that long run co-integrating relationship exists between return on equity, inflation, interest rate, interest spread, income per head and money supply targets in Nigeria.

Table 5: Co-integrating Test on Z-score-Monetary Policy Relationship

Test Statistic	Value	Asymptotic: n=1000			Actual Sample Size: n=30		
			I(0)	I(1)		I(0)	I(1)
F-statistic	3.868020	10%	2.75	3.79	10%	3.157	4.412
k	5	5%	3.12	4.25	5%	3.818	5.253
		2.5%	3.49	4.67	1%	5.347	7.242
		1%	3.93	5.23			

From the asymptotic sample, the upper and lower bound statistics at 10 percent alpha value are 3.79 and 2. 75 respectively, while the upper and lower bound statistics in the actual sample are 4.41 and 3.82 respectively at 10 percent level of significance. Given that the critical F statistic is approximately 3.87, it implies that no co-integration relationship based on the actual sample; but using the stimulated sample, the researcher witnesses a long run relationship between Z-score, inflation, interest rate, interest spread, money supply and nominal income per person. Therefore, my investigation based on long-run relationship reveals that a level relationship exists between bank profitability and monetary policy in Nigeria. The monetary policy laws to reform the macroeconomic factors invariably influences the profitability of a bank in the long run.

4.3 Test of Causation or Causal Influence

The specific objectives of this paper focus on the influences (dynamic short-run and long-run causations) from the monetary policy to commercial bank profitability. To achieve these objectives, the study estimates a scaled down or restricted ARDL for the four baseline equations in section three. The results are presented in tables 4.6 to 4.9.

Table 6: Short-run Dynamic Influence of Monetary Policy on Credit-Deposit Ratio

Regressors	Coefficients	Std-error	T-value	P-value
D(CREDDEPRATIO(1)	0.792018	0.098851	8.012226	0.0000
D(INCOTARGET)	-0.000200	0.002701	-0.074027	0.9419
D(INFTARGET)	0.097355	0.041298	2.357385	0.0307
D(INTRTARGET)	-0.769769	0.210951	-3.649040	0.0020
D(INTSPRDTARGET)	-0.392332	0.333854	-1.175159	0.2561
D(M2TARGET)	0.796044	0.253064	3.145617	0.0059
ECM(-1)*	-0.568584	0.083315	-6.824505	0.0000

The ECM coefficient (-0.57) associates with probability value of 0.00. On the priori, the ECM has the right sign and significant at 1 percent. This suggests that the ratio of credit to deposit responds to temporal breaks in monetary policy. Therefore, any disequilibrium in this relationship can be adjusted or corrected within a year so that the acclaimed level relationship will always be sustained. The coefficients of changes in interest spread target and interest rate target are -0.39 and -0.77 respectively, while the corresponding probability values are 0.26 and 0.00. This formally implies that interest rate and interest spread targets have dynamic short run negative impact on credit-deposit ratio. However, only interest rate target has significant relationship with credit-deposit ratio. We have evidence that the target interest rate has influenced credit–deposit ratio negatively

significantly in the short run dynamics. Secondly, the coefficients of changes in inflation and money supply targets are 0.10 and 0.80 respectively. Both coefficients are significant at 5 percent. This means that short-run dynamic positive influence or causation runs from inflation and money supply targets of the CBN to credit-deposit ratio. Lastly, the coefficient of nominal income per head is approximately 0 percent and insignificant even at 10 percent. This implies that the researcher does not find any relationships (in terms of magnitude, direction and significance) between nominal income per person and credit-deposit ratio in Nigeria.

Table 7: Short-run Dynamic Influence of Monetary Policy on Return on Asset

Regressors	Coefficients	Std-error	T-value	P-value
D(ROA(-1))	-0.298082	0.112013	-2.661135	0.0165
D(INCOTARGET)	0.003677	0.001763	2.085278	0.0524
D(INFTARGET)	0.019604	0.027291	0.718343	0.4823
D(INTRTARGET)	0.071754	0.129756	0.552990	0.5875
D(INTSPRDTARGET)	-0.074777	0.246635	-0.303189	0.7654
D(M2TARGET)	-0.012463	0.155589	-0.080102	0.9371
ECM(-1)*	-0.945068	0.147174	-6.421428	0.0000

The ECM coefficient has the right theoretical sign and it is significant both at 1 percent and 5 value. This suggests that return on asset responds to temporal shocks or changes in monetary policy targets or in other words, temporal disequilibrium in the long run association between return on asset and monetary policy targets can be corrected within a year. Short run changes in money supply and interest spread targets have -0.01 and -0.07 coefficients respectively. Both coefficients do not have significant probability values. The researcher infers that no significant relationship between return on asset and money supply target in the short run. This same relationship holds for interest spread in the short run. However, based on influence, the two variables have indirect short run impact on return on asset. Interest rate, income per person and inflation targets, all have positive coefficients. The implication of this is that return on asset is positively driven by certain monetary policy targets, namely, income per head, inflation and interest rate in the short run dynamics.

Table 8. Short-run Dynamic Influence of Monetary Policy on Return on Equity

Regressors	Coefficients	Std-error	T-value	P-value
D(ROE(-1))	-0.201214	0.139484	-1.442561	0.1663
D(M2TARGET)	0.273453	0.423779	0.645274	0.5269
D(INTSPRDTARGET)	-0.037555	0.626440	-0.059950	0.9529
D(INTRTARGET)	0.207224	0.344040	0.602325	0.5545
D(INFTARGET)	-0.122263	0.077816	-1.571177	0.1336
D(INCOTARGET)	0.002249	0.004676	0.480866	0.6364
ECM(-1)*	-0.795958	0.152395	-5.222981	0.0001

The ECM term carries the theoretical coefficient sign (-0.80) with probability of 0 percent. This confirms the early position of existence of level relationship. Again, temporal breaks or disequilibrium can be adjusted with a year using the appropriate monetary policy tool. The coefficients of changes in inflation and interest spread targets are -0.12 and -0.04 respectively. We infer from this result that in the short run dynamics, inflation and interest spread targets influence or Granger cause return on equity negatively. The other variables of interest: Interest rates, income per head and money supply have positive coefficients (0.21, 0.00 and 0.21 respectively). This implies that while income per head does have any relationship with return on equity in the short run dynamics, money supply and interest rate positively influence return on equity in the short run.

Table 9. Short-run Dynamic Influence of Monetary Policy Targets on Z-score

Regressors	Coefficients	Std-error	T-value	P-value
D(M2TARGET)	0.091119	0.145174	0.627656	0.5381
D(INTSPRDTARGET)	0.136519	0.204785	0.666646	0.5135
D(INTRTARGET)	0.048772	0.115857	0.420969	0.6788
D(INFTARGET)	0.013576	0.025793	0.526343	0.6051
D(INCOTARGET)	0.002083	0.001790	1.163595	0.2598
ECM(-1)*	-0.782743	0.156750	-4.993565	0.0001

The ECM coefficient is -78 percent and it corresponds to 0 percent probability value. This implies that Z-score as a measure bank performance based on probability of default responds to intermittent breaks in monetary policy targets. Again, dynamics long run causation runs from the monetary policy target to z-score bank performance indicator. The coefficients of income per head, inflation, interest rate, interest spread and money supply targets are approximately 0.00, 0.01, 0.05, 0.14 and 0.09 respectively. It means there is a unanimous evidence that monetary policy targets influence Z-score. Positively in the short run dynamics. Any increase in these target variables leads to a rise in the Z-score of the banking industry. High Z-score is an indication of a low probability of default.

4.4 Long-run Elastic Effects of Monetary Policy on Commercial Bank Profitability

Having established that there is existence of long run relationship between monetary policy targets and frontline bank performance indicators, the researcher extends the investigation to examine the long run multiplier effects of monetary policy targets on bank performance. The results are reported in table 4.10 through 4.13.

Table 10. Long-run Multiplier Effects of Monetary Policy on Credit-Deposit Ratio

Regressors	Coefficients	Std-error	T-value	P-value
INCOTARGET	-0.013822	0.003810	-3.628244	0.0021
INFTARGET	0.203583	0.101535	2.005062	0.0611
INTRTARGET	-2.280488	0.662060	-3.444533	0.0031

INTSPRDTARGET	-1.453806	1.234830	-1.177333	0.2553
M2TARGET	0.870633	0.497462	1.750149	0.0981
C	144.7992	18.00756	8.041023	0.0000

As shown in table 10, the coefficients of interest spread, interest rate and income per head are -1.45, -2.28 and -0.01 respectively and corresponding probability values are less than 5 percent except that of interest spread coefficient. This suggests that income per head; interest rate and interest spread have negative long run multiplier effects on credit-deposit ratio. The coefficients of money supply and inflation targets are positive and significant at 10 percent alpha value. In this regard, the researcher documents that money supply and inflation target positively influence the credit-deposit ratio in the long run.

Table 11. Long-run Multiplier Effects of Monetary Policy on Return on Asset

Regressors	Coefficients	Std-error	T-value	P-value
NCOTARGET	0.000770	0.000910	0.845530	0.4065
INFTARGET	-0.007038	0.023447	-0.300174	0.7667
INTRTARGET	0.059178	0.143684	0.411867	0.6843
INTSPRDTARGET	0.504015	0.276870	1.820405	0.0817
M2TARGET	-0.161580	0.119128	-1.356361	0.1882
C	-1.798994	3.560347	-0.505286	0.6182

The coefficients of money supply and inflation targets are -0.16 and -0.01 respectively. This finding supports that money supply and inflation targets are negative determinants of return on asset in the long run. However, interest spread and interest rate coefficients are positive, while income per head coefficient is approximately 0.001. This means the long run multiplier effects of income per head on return on asset is very weak. Interest spread has very strong multiplier effects on return on asset.

Table 12: Long-run Multiplier Effects of Monetary Policy on Return on Equity

Regressors	Coefficients	Std-error	T-value	P-value
M2TARGET	0.682754	0.671639	1.016550	0.3228
INTSPRDTARGET	2.296296	1.310189	1.752645	0.0967
INTRTARGET	0.028074	0.552538	0.050808	0.9600
INFTARGET	-0.371473	0.129744	-2.863122	0.0103
INCOTARGET	-0.007161	0.005273	-1.358164	0.1912

Table 12 shows that the coefficients of income per head and inflation targets are negative (-0.01 and -0.37 respectively); suggesting that return on equity is driven inversely by income per head and inflation target in the long-run. We have seen empirical evidence her that income per does not positive long run multiplier effects on return on equity. Money supply coefficient 68 percent, interest rate spread 229 percent and interest rate 2.8 percent. This implies that interest spread target has the strongest long run multiplier effects on return on equity.

Table 13: Long-run Multiplier Effects of Monetary Policy on Z-score

Regressors	Coefficients	Std-error	T-value	P-value
M2TARGET	-0.364259	0.220083	-1.655098	0.1174
INTSPRDTARGET	-0.639746	0.361295	-1.770702	0.0957
INTRTARGET	-0.173330	0.261457	-0.662937	0.5168
INFTARGET	-0.074206	0.050208	-1.477970	0.1588
INCOTARGET	0.000536	0.001137	0.471464	0.6437

As revealed in table 13, the coefficients of money supply, interest spread, interest rate and inflation target are -0.36, -0.64, -0.17 and -0.07 respectively. This confirms that there is existence of inverse long run multiplier effects of inflation, money supply, interest spread and interest rate targets on z-score. Income per head has 0.001 coefficients, meaning that income per head exhibit very weak multiplier effects on the Z-score of Nigerian deposit-money banks.

4.5 Discussion of Findings

After a thorough examination of the distribution pattern of the variables data series employed for the study. It is observed that all the variables: credit to deposit ratio, return on asset, return on equity, Z-score, money supply, income per head, interest rate, interest spread and inflation appear asymmetric and leptokurtic with outliers in their raw forms. In addition, the unit root test confirms mixed integration. This informs the use of ARDL approach to co-integration for four baseline models. The estimations of these models provide evidence that in the long-run all the variables are bonded, thereby establishing co-integrating relationship between commercial bank profitability and monetary policy targets in Nigeria. Among the indicators of commercial bank profitability, return on asset responds faster to temporal breaks in monetary policy targets than return in equity, credit-deposit ratio and Z-score. The long run disequilibrium adjustment or correction is a further evidence of co-integrating relationship among these variables. The estimated level equations reveal that in the long-run positive multiplier effects run from money supply and inflation targets to bank credit-deposit ratio. Meaning that in the long run, any target of the monetary policy that leads to a rise in money supply (broad money), consequently increases the ratio of credit to deposit. This could promote liquidity in the banking sector due to some phenomena long run expansion in deposit. Alternatively, when money supply reduces, inflation rate decreases, credit demand rises relative to a fall in deposit. The aftermath of this is that the sector could be forced to be operating with sup-optimal liquidity. There is evidence that interest rate, interest spread and income per head targets manifest negative long-run elastic effects on credit-deposit ratio. This suggests that increased interest rate, interest spread and income per head lead to reduction in credit-deposit ratio in the long-run. A high interest rate is a manifestation of high cost of credit, which could result in low credit-deposit ratio, and poor bank performance in the long-run in term of this ratio. There is presence of positive long run causation from interest rate, interest spread and income per head to return on asset. The monetary policy targets to increase interest rate or its margin and income per person facilitate increase in the rate of return on bank total asset. Meaning that bank asset could be rent out at a high rate, if the CBN monetary policy target leads to increase in interest rate. The convention is valid the high the rate, the high the rate of return on asset. The researcher observes that negative long run multiplier effects run from money supply and inflation to return on asset.

Increase in money supply is economically inflationary, leading to a reduction in the international value of asset. This preposition is valid based on my finding that negative long run relationship exists between inflation and return on asset. Bank asset depreciates relative to international asset with increase in inflation and money supply.

In the long-run level relationship, the researcher confirms evidence that money supply, interest rate, interest spread and income per head have positive elastic effects on return on equity; to the contrary, inflation maintains negative impact. Any monetary policy target that prompts increase in money supply, income per person, interest rate and spread significantly increases return on equity, while persistent increase in inflationary rate reduces the rate of return on equity. There is a different position with bank performance in term of Z-score. My finding shows that money supply, inflation, interest rate and spread targets yield a negative long run multiplier effects on Z-score performance indicators. This suggests that Z-sore decreases (which is a bad signal of bank performance) with any upward increase in money supply, inflation, interest rate and interest margin, meaning that a decrease in these variables leads to an increase in Z-score or a reduction in probability of default in the banking sector. However, income per head has very weak long run multiplier effects on Z-score. Increasing the income per head of Nigerian Citizen Granger causes Z-score performance indicator to rise up in the long-run.

The estimation of the short-run dynamic equations reveals that short-run changes in income per head does not have any relationship with bank performances, either in term of credit-deposit ratio, return on asset, return on equity and Z-score respectively. This connotes that in the short-run dynamics, income/out distribution does not have any significant link with the indicators of bank performance in Nigeria. Short-run dynamic changes in money supply, inflation, interest rate and interest margin have positive relationship with Z-score. This implies short-run targets leading to increase in the changes of these variables increase Z-score performance, which invariably reduce risk of default in the banking system. Changes in money supply in the short run have positive impact on credit-deposit ratio and return on equity but negative impact on return on asset. Thus, there is clear empirical evidence that dynamics of money supply drives return on equity positively and return on asset negatively in Nigeria. Inflation dynamics have positive effects on credit-deposit ratio and return on asset, while return on equity is negatively influenced by short-run changes in inflation. Furthermore, there is sufficient evidence to claim that short-run dynamic changes in interest margin have reducing effects on credit-deposit ratio, return on asset and equity. This implies that in the short run, credit to deposit ratio, return on asset and equity decline with any increase in inflation target of the CBN monetary policy committee. Changes in interest rate have positive impact on both return on asset and return on equity, but inverse relationship with credit-deposit ratio. This inverse short-run dynamics of interest rate and credit-deposit ratio postulates that when the formal increases, the later decreases with impulse of short-run situation.

5. Conclusions

The study investigates the nexus between monetary policy and commercial banks profitability in Nigeria. From the foregoing, the study concludes that the relationship between monetary policy and commercial bank profitability indicator quickly adjust within a short period to the equilibrium position. Likewise, long run causality or influence runs from inflation, interest rate, interest spread and credit-deposit ratio to bank performance. In this manner, bank performance can be predicted

based on the changes that result from inflation, interest rate, interest spread, income per head and money supply. Since there is, evidence that long run influence runs from inflation, interest rate, interest spread, income per head and money supply to bank performance. Therefore, there is need to answer the question which of these variables has the strongest multiplier effects on bank performance? Money supply has the strongest long run impact on credit-deposit ratio, followed by inflation. Interest spread is more sensitive to return on asset than the other performance indicators. So also, the most sensitive factor to return on equity is interest rate spread followed by money supply. The research established that interest margin has the strongest negative impact on Z-score. Thus, the paper submits that one of the ways to increase Z-score ratio is to reduce interest margin of the banking sector. The study subversively concludes against the convention that in the short run dynamics, historical income per head influences bank performance positively by concluding that changes in income per head does have link with bank performance indicators in Nigeria, but rather short-run dynamics exist between money supply, interest rate, interest spread and bank performance variables. Lastly, the paper concludes that in the short-run, interest rate has positive influence on return on asset and equity, while interest spread drives both returns on equity and asset negatively. Inflation is a negative determinant of return on equity but a positively influences return on asset. The major findings of this study are logically in line with its specific objectives. In this regard, the following recommendations are made, which are set in order of priority:

1. Income per head of an average Nigerian citizen is very low and Nigerian income is negatively skewed. This has not encouraged significant bank savings; depositors save meagerly and withdraw frequently due to poor or low income distribution. This is why income per head does not have any link with bank performance indicators. In the light of this, the researcher recommends that government should initiate a more veritable media of optimal income distribution. This could be achieved by objectively instituting an efficient tax system that redistributes wealth to the poor. A substantial amount of wealth should be taken from the rich, redistributed to the poor; by using such tax proceeds in providing social goods that reduce the cost of living to the poor. When cost reduces, income per head increases and people could increase their saving preference.
2. The paper recommends strongly that the Z-score of Nigerian banking sector should be increased by reducing the standard deviation of return on asset. ROA of the Nigerian banking system appears to be too volatile, leading to low Z-score. The bank management teams of various executive powers should ensure that ROA is relatively stable over time. Government should reduce inflation, especially inflation due to reckless spending of public funds, excessive quotation by public officers and corruption induced inflation. Such reduction in inflation associates with increased Z-score.
3. Interest spread is too wide and any increase in this margin affects return on asset and equity negatively. Therefore, the study recommends that the margin between lending rate and deposit rate should be shrunk meaningfully. A one-digit margin is recommendable. To achieve this, bank should simply reduce lending to one digit.

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