Performance of Nigeria Deposit Money Banks and Macroeconomic Imbalances: A VECM Approach

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Abstract: **The study examined the effect of selected macroeconomics indicators on the performance of deposit money banks (DMB's) in Nigeria. The study covered a period of 1985 to 2019. The study variables include return on asset (ROA) as the dependent variable, while the independent variables are interest rate (INT), money supply (MSS), inflation rate (INF), and real gross domestic product (RGDP). The ROA was used as a measure of deposit money banks performance. The study adopted vector error correction method (VECM). As such, the vector error correction estimate revealed that the coefficient of interest rate (INT) and inflation rate (INF) exhibits positive association with the dependent variable (ROA). While, the coefficients of money supply and real gross domestic product exerts a negative association with the dependent variable. This showed that interest rate and inflation rate stimulate bank performance (ROA) in the long term than money supply and real gross domestic product. Whereas, money supply and real gross domestic product are long term predictors of bank performance. The study concluded that macroeconomic variables impacts the performance of DMB's in Nigeria. The study recommended that government and monetary authorities should endeavour to adopt required tools that will aid in efficient management of macroeconomic indicators, with the hope of creating a healthy business environment that would guarantee improved performance of DMB's in Nigeria.**

Key words: **Deposit Money Banks, Inflation rate, Interest rate, Return on Asset, Money Supply, and Vector Error Correction Method**

I. INTRODUCTION

Deposit money banks (DMBs) plays a pivotal role in economic growth and development of any economy. It is however seen as the central nervous system of a market economy. Its focal role of deposits mobilization, enhances the transfer of surplus fund from household unit to the productive sector of the economy. Consequently, achieving a higher performance by the sector has been a major concern for stakeholders, economists and policy makers alike. Nonetheless, the performance of the deposit money bank is proportionally influenced by macroeconomic shocks. The macroeconomic variables such as; interest rate, money supply, inflation, exchange rate and gross domestic product, have positive effect on the performance of the deposit money bank (Enyioko (2012). Incidentally, deposit money banks operate in a turbulent macroeconomic environment. Weak macroeconomic performance has the capacity of endangering deposit mobilization and credit allocation by DMBs in the economy which can negatively affect its performance. Hence, Alaba (2002) opined that macroeconomic variables such as interest rate has the aptitude of intensifying or diminishing lending behaviour of banks. This is expounded in the variation between the lending rate and deposit rate denoted as interest rate spread. Therefore, for DBMs to remain in bustiness, Interest rate spread which facilitates the generation of sufficient revenue to cover their marginal cost and other associated costs of running day-to-day business has to be stimulated. With this in sight, Mirzaei, Moore and Liu (2003), opined that emerging banks can stimulate their profit through interest rate spread. Being a critical factor, this variable will decide the capacity and inclination of banks to demand and network funds to the productive sector. Consequently, DMBs would adjust interest rate in order to raise revenue especially in emerging economies.

I this regard also, Uboh (2005) opined that the banking sector crises of the 1980s and 1990s were blamed on the weak macroeconomic performance and the tough business environment of the period. Incidentally, studies have also shown that the profitability of the DMBs can also be influenced by inflation. In a study carried out by Revell (1979), he noted that salaries and other operating cost of the banks is a function of how inflations affect its profit margin. Thus, as inflation rate increases, salaries and operating costs may rise, which therefore diminishes bank's profitability. Conversely, banks can modify interest rates appropriately to drive profit if the inflation rate is fully anticipated. According to Calza, et al (2006) and Bolt, et al (2012) real gross domestic product (RGDP) growth positively impacts on DMBs performance. They established that this happens via three major networks: net interest income, loan losses improving, and operating costs. They opined that during economic boom, profitability is increased and diminished in recession period. Therefore, firms' loans and deposits are increased with increase in RGDP, the multiplier effect of this is enhanced banks net interest income and loans losses. Additionally, a higher RGDP growth denotes a higher disposable income, reduced unemployment and decreased defaults on consumer loans.

Net interest income and loan losses are therefore pro-cyclical with RGDP growth. Though, the association between DMBs

operating costs and RGDP growth is hazy. Bolt et al. (2012) opined that uncomplimentary economic environment, such as lower RGDP growth rates may diminish deposits and loans and its managing costs as well. These conditions could possibly increase the costs of garthering payments on loans. Toby (2006) postulated that the performance of some DMBs can be tracked to failure of the banking institution to adjust to the macroeconomic variable shocks. For illustration, Nigerian economy is typified by macroeconomic policy instability, high risk concentration and liquidity crisis, a situation that threatens the existence of the commercial banks. Consequently, the central bank of Nigeria between 1994 and 2015 shuts down 49 DMBs. This was largely due to inability of the affected banks to meet up with the minimum paid up capitalization. This was further downsized to 25 by CBN (World Bank Group, 2016). Presently, the number of DMBs stood at 23. Despite government efforts to maintain a viable macroeconomic environment, weak banks profitability continues to persist in Nigeria. The deposit money banks assets to GDP was reported at 22.76% in 2008, 24.74% in 2009 and later declined to 19.25% in 2017. In 2018, it was reported at 24.99%. These fluctuations could be attributed to macroeconomic variable shocks, which pose a serious threat to DMBs performance. The poor performance of DMBs adversely affect economic growth, and worsening unemployment situation in Nigeria. Essentially, the objective of this study is to examine the effect of macroeconomic imbalance on deposit money banks performance in Nigeria.

II. LITERATURES REVIEW

Theoretical Literature Review

Frictional theory of profits:

In elucidation, this theory holds that a normal rate of profit is a profit paid on capital as an incentive for investment (in this case, loan and advances). Additionally, it opined that in long run equilibrium a firm would earn normal profit on their capital where no unforeseen changes in demand or cost conditions occur in an immobile economy. Furthermore, the theory opined that shocks (in this case macroeconomic variables) seldomly arise in an economy due to unforeseen changes in demand and cost conditions which triggers disequilibrium. Thus, it is this disequilibrium that brings into effect positive or negative economic profit for some firms. Consequently, frictional theory expound that economic profits is not always steady due to frictional factors which prevent prompt adjustment of the system to the new conditions.

Friction theory further states that when economic profits are realized in the short run, the industry will experience new entrant, when all economic profits diminished to zero, firms can only make normal return on investment. In contrast therefore, when firms are incurring losses, some firms will leave the industry or be acquired by other firm. This will ultimately cause price of the product to rise so that losses are liquidated. This study is anchored on this theory because it hypothesized the nexus between macroeconomic variables and deposit money banks performance.

Empirical Literature Review

In a study carried out by Riaz and Mehar (2013). The macroeconomic indicator on the profitability of commercial banks in Pakistan for the period of 2006 to 2010. The study selected 32 commercial banks and adopted multiple regression model. The study revealed a significant impact of macroeconomic indicator on commercial banks profitability (ROE), while credit risk and interest rate also exhibit significant impact on ROA. Similarly, a study previously conducted by Amer, Masyhuri and Mohd (2012) on determinant of commercial banks return on assets, using panel evidence from Malaysia, showed that interest rate and gross domestic product exert positive impact on all commercial banks return on assets. The study also indicated that interest rate appears to exert positive influence on foreign banks profit, but showed no impact on domestic banks performance. The study utilized an unbalanced panel dataset of 16 commercial banks and panel data regression technique over the period of 2004 to 2011.

Sufian (2011) examined the impact of banks specific and macroeconomic variables on the performance of Korean banking sector during pre and post Asian financial crisis. The study sampled a total of 251 bank year observations consisting of 11 commercial banks for a period of 1993 to 2003. The study adopted panel fixed and random effect regression technique. The findings showed that inflation exhibits positive relationship with banks return on assets. Similarly, Alper and Anbar (2011) evaluated bank specific and macroeconomic determinants of commercial bank profitability in Turkey. The study covers a period of 2002 to 2010, using return on asset and return on equity as proxies for bank profitability. In addition, the study adopted balanced set of panel data and fixed effect model. The findings emanating from the study revealed that only real interest rate exhibit positive association with profitability with regard to macroeconomic determinants. This denoted that an increase in interest rate would stimulate increase in commercial banks profitability in Turkey.

More so, Ramadan, Qais and Thair (2011) evaluated the determinants of banks performance in Jordan. The study sampled a total of 10 banks over the period of 2001 to 2010. The study found that inflation and economic growth exert insignificant negative effect on both return on asset and return on equity of the banks. Amaliawiati et al. (2013) examined the relationship between Bank interest rate, and the conventional commercial banks profitability registered on the Indonesia Stock Exchange between 2005 to 2012. The study employed ROA and NIM as proxies to measure profitability. The study revealed that bank interest rate exerts significant negative effect on ROA, although it does not exhibit a statistically significant impact on NIM. In addition, the semi-partial correlation coefficients proved that bank interest exert great

influence in determining ROA ranks, whereas in determining NIM of commercial banks in Indonesia, Operational Cost of Operational Income is critical.

Younus et al. (2009) assessed the impact of monetary policy instrument on bank credits in Bangladesh. The study adopted descriptive analysis techniques. The study showed that Statutory Liquidity Requirement (SLR) exert a negative impact on bank credits and investments notably prior to the 1990's. they also found that Statutory Liquidity Requirement (SLR) and Cash Reserve Requirement (CRR) were significant tools of reducing inflation. They however, concluded that due to market proclivity, Bangladesh Bank depended on open market operations (OMO) than Statutory Liquidity Requirement (SLR) and bank rate as instruments of monetary policy. In a similar study carried out by Zaman et al. (2014), they examined the causal relationship between interest rate by Pakistan central bank and banking sector performance between 2007 and 2011. Adopting the same approach, the study replaced monetary policy with interest rate, while ROA and ROE were used as proxies for banking sector performance. The empirical result showed that interest rate exerts significant negative impact on banks performance.

Ajayi and Atanda (2012) assessed the impact of monetary policy instruments on banks performance in Nigeria between 1970 and 2008. They attempted to establish the existence of long-run relation. The study adopted Engle-granger two step cointegration method. The model regressed banks total loan and advances on minimum policy rate, cash reserves ratio, liquidity ratio, inflation and exchange rate. The established that bank rate, inflation rate and exchange rate improves total credit, while liquidity ratio and cash reserves ratio stimulate negative effect on banks total credit. Akomolafe et al (2015) examined the impact of monetary policy on commercial banks performance between 2003 and 2013. In carrying out the study, they employed interest rate and money supply as proxies for monetary policy, while profit before tax was used to represent commercial banks performance. Using micro panel analysis, the study established a positive association between banks performance and monetary policy in Nigeria.

Enyioko (2012) studied the performances of banks and macroeconomic performance in Nigeria looking at the interest rate policies of the banks. The findings revealed that the interest rate policies have not generally enhanced the performance of banks significantly, based on the data and publication of the central bank of Nigeria (CBN) that twenty (20) out of twenty-five (25) banks audited accounts emerged from the consolidated exercise. Though marginally, it contributed to the economic growth.

Okoye and Eze (2012) examined the impact of bank lending rate on the performance of Nigerian Deposit Money Banks between 2000 and 2010. The study utilized secondary data econometrics in a regression, where time- series and quantitative design were combined and estimated. The result confirmed that the lending rate and monetary policy rate have significant and positive effects on the performance of Nigerian deposit money banks.

Amenawo et al (2016) examined the effect currency fluctuation has on commercial banks profitability in Nigeria. The study adopted balanced panel methodology. The data were sourced from 12 banks, and found that foreign currency exerts a 6 to 11 percent inverse effect on commercial banks profitability. The study recommended that banks should modify their trading choices to the less volatile currency as a means of mitigating currency risk in times of chronic currency vacillation. Ogunbiyi and Ihejirika (2014) examined effect of interest rate on the profitability of deposit money banks in Nigeria. The study covered a period of 1999 to 2012 based on a annual time series data. They employed multivariate regression analysis model. The study was investigated for stationarity using Augmented Dickey Fuller unit root test. The estimated result revealed that lending rate, real interest rate and saving deposit rate exhibits inverse and significant effects on the profitability of Nigerian deposit money banks as measured by return on assets at the 5% level of significance. More so, the study showed that real interest rate has significant and inverse association with return on Equity of deposit money banks in Nigeria. However, the study found that interest rate variables showed no significant association with net interest margin of deposit money banks in Nigeria.

In the study conducted by Akani, Nwanna and Mbachu (2016), they examined the effects of selected macroeconomic variables on commercial banks performance in Nigeria. The study employed multiple regression model, using annual time series data spanning between 1980 to 2014. The models were formulated with Return on Investment (ROI), Return on Assets (ROI) and Return on Equity (ROE) as regressors, while the explanatory variables are inflation rate, gross domestic product, real interest rate, exchange rate, broad money supply, and unemployment. Model 1 showed that inflation rate, real gross domestic product, exchange rate and broad money supply exerts insignificant positive effects on ROI, while interest rate and unemployment rate exert insignificant negative effect on ROI. Model 2, revealed that inflation rate, interest rate, exchange rate exerts significant positive effects on ROA, while gross domestic product, money supply and unemployment rate exert insignificant negative effects on ROA. Model 3, showed that inflation rate, interest rate, and exchange rate exert insignificant positive effect on ROE, while real gross domestic product, broad money supply and unemployment rate exert insignificant negative effect on ROE. In conclusion, the study reported a significant positive association between selected macroeconomic variables and commercial banks performance in Nigeria. They however, recommended that macroeconomic policies should be used for the purpose of enhancing banks performance.

Olowo, Edewusi and Dada (2020) examined the effects of selected macroeconomic variables on commercial banks performance in Nigeria. The study covered a period of 2000 to

2018, using annual time series data. The study employed ordinary least square (OLS) and formulated return on asset as dependent variable, while real gross domestic product, inflation rate, interest rate and money supply were the explanatory variables, denoting the sampled macroeconomic variables. The study found that all the macroeconomic variable positively impacts commercial banks performance. Whereas, money supply and interest rate showed a significant impact, inflation and gross domestic product exhibited insignificant impact. Therefore, they concluded that there is a positive relationship between macroeconomic variables and banks performance in Nigeria. They however recommended that macroeconomic policies that will promote sustainable growth, business friendly and conducive environment that will enhance capacity utilization of industries so as to allow for high level of credit demand and absorption in the economy.

III. METHODOLOGY

Model Specification

The econometric model for this study is specified as;

$P = \alpha 0+\alpha 1\delta+\varepsilon$ ……. (1)

Here p, represent the dependent variable which is the performance property (profitability, measured with ROA), while, α denotes the regression constant. δ contains the explanatory variables affecting the performance of the deposit money banks. These explanatory variables are the macroeconomic variables (interest rate (INT), money supply (MSS), inflation rate (INF), and real gross domestic product (RGDP)). ε is the stochastic error term, it takes into account other possible factors affecting banks performance. Consequently, equation (1) can then be specified in a functional form as:

ROA= f (INT, MSS, INF, RGDP) …… (2)

To obtain regression equation, equation 2 is transformed as;

$ROA = \alpha_0+ \alpha_1INT + \alpha_2MSS + \alpha_3INF + \alpha_4RGDP + \varepsilon t_1$ …….. (3)

Where; α's are the regression coefficient

ROA represent Return on Assets

INT represent Interest Rate

MSS represent Broad money supply (M^2)

INF represent Inflation Rate

RGDP represent Real Gross Domestic Product

εt represent Error term (unexplained variations)

Therefore, the a priori expectation is that ($\alpha_1> \alpha_2> \alpha_3> \alpha_4> \alpha_5 >0$ and $\lambda_1> \lambda_2> \lambda_3> \lambda_4> \lambda_5 >0$)

Estimation Technique

To achieved the aim of this study, co-integration and Vector Error Correction Model (VECM) framework were adopted from Xiaohua, (2018). Essentially, the VECM can be arrived at via VAR model. Hence, it can be thought that the VECM is a VAR model with cointegration constraints (Xiaohua, 2018). Moreover, the VAR model was established in 1980 by Sims as a framework that could be employed in evaluating dynamic behavioral influence of macroeconomic variables without calling for strong restrictions. Additionally, based on the statistical properties of the time series data, VECM framework is usually applicable than VAR. this is because, time series models for integrated series are typically anchored on applying VAR to first difference. However, this practice of differencing excludes critical evidence about the nexus among integrated series. Based on this, vector error correction model is applicable. Consequently, to avoid spurious regression results and examine whether the time series are co-integrated, augmented Dickey fuller (ADF) unit roots tests and the Johnansen (1990) cointegration techniques were employed. This is imperative to avoid arriving at a significant relationship from unrelated variables. Moreover, VECM can limit long-term comportment of the dependent variables and converge to their cointegration relation when there is a large range of short-term dynamic vacillation. Nonetheless, in co-integration framework, it is required to first and foremost estimate the co-integration equation.

Supposing $m_t = (m1_t , m2_t, \ldots, mk_t)$ denotes k-dimensional stochastic time series, t= 1, 2, … , T and $m_t \sim 1(1)$, representing individual $m_{it} \sim 1(1)$. Where i = 1,2, … , k is influenced by dependent time series of v-dimensional $n_t = (n_{1t}, n_{2t}, \ldots, n_{qt})$. Therefore, the VAR framework can be represented as;

$$m_t = \gamma_1 m_{t-1} + \gamma_2 m_{t-2} + \ldots + \gamma_b m_{t-b} + \beta x_t + e_t \quad \ldots\ldots\ldots (1)$$

In the above equation, t represents stochastic time series t=1,2, …, T

If perhaps equ 1 (mt) is not influenced by independent time series of v-dimensional $n_t = (n_{1t}, n_{2t}, \ldots, n_{pt})$, m_t in equation (1) can then be prespecified as;

$$m_t = \gamma_1 m_{t-1} + \gamma_2 m_{t-2} + \ldots + \gamma_b m_{t-b} + e_t \quad \ldots\ldots\ldots\ldots (2)$$

However, if cointegration is discovered, VAR model in equ (2) can then be re-specified as;

$$\Delta m_t = \prod m_{t-1} + \sum_{i-1}^{p-1} r_i \Delta m_{t\cdot} + e_t. \quad (3)$$

Where $\prod = \sum_{i=1}^{p} \gamma_i - I$

$$r_i = -\sum_{k=i+1}^{p} \gamma_j \quad (4)$$

Conversely, supposing cointegration association is found in m_t, then $\prod m_{t-1} \sim 1(0)$. We therefore re-specified equation (3) as;

$$\Delta m_t = \alpha\beta' m_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \, \Delta m_{t-i} + e_t \quad (5)$$

Where $\alpha\beta' m_{t-1} = ecm_{t-1}$. Therefore, (ecm_{t-1}) denotes the long run association between dependent and independent variables, while, Γ_i expresses the short run dynamics. Based on this equation (5) is re-specified as;

$$\Delta m_t = \Delta ecm_{t-1} + \sum_{i-1}^{p-1} \Gamma_i \Delta y_{t-i} + e_t \quad (6)$$

Therefore, vector error correction model (vecm) is denoted equation (6).

Presentation and Analysis of Regression Results

Table 1: Descriptive Statistics

	ROA	INT	MSS	INF	RGDP
Mean	10127.38	21.55286	6801.859	19.42514	4.423343
Median	2766.880	21.34000	1599.490	12.00000	4.631000
Maximum	39904.55	36.09000	27885.35	76.80000	15.32900
Minimum	32.00000	11.75000	26.28000	0.200000	-2.035000
Std. Dev	12830.60	5.333423	8951.095	18.70661	3.830427
Skewness	0.985933	0.364387	1.100342	1.723483	0.464348
Kurtosis	2.532263	3.436889	2.764665	4.856235	3.426969
Jargue-Bera	5.989429	1.052893	7.143483	22.35215	1.523638
Probability	0.050051	0.590700	0.028107	0.000014	0.466816
Observation	35	35	35	35	35

Source: *Computed by the Author, eviews 9, 2020*

From the table 1 above, the average value for each series is defined by the mean. Whereas, the standard deviation reveals the measure of spread. The degree of deviation from the mean is defined by how tall/small the value is. Skewness examines the distribution of the series around the mean. A normal distribution is associated with zero skewness. A positive skewness implied a distribution that spreads to the right, while, a negative skewness denotes a distribution that spreads to the left. Also, Kurtosis, examines the pointedness (peakedness) of a series. Incidentally, the kurtosis for a normal distribution is 3. Consequently, a distribution is taken to be leptokutic if its greater than 3. On the other hand, a distribution is taken to be platykurtic if it's less than 3. Meanwhile, the null hypothesis for test statistic for normal distribution (Jarque-Bera) states that series is normally distributed. In line with this, null hypothesis is accepted when the p-value is higher than 0.10%, otherwise, we reject.

With respect to the above elucidation, the results of the descriptive statistics revealed that skewness appeared to be significantly higher than zero. The range is from 0.36, the lowest value, to 1.72 the highest value of the coefficient of skewness. The coefficient of kurtosis appeared to be either lower than the normally distributed data, or higher than the normally distributed data. However, this finding is in tandem with our suspicion that the data applied in this study may not be normally distributed. The implication of this outcome is that stationarity of the data considered in this study may not be possible. Hence, a formal test of data stationarity needs to be carried out.

Table 2: Unit Root Test (Augmented Dickey-Fuller) Test Statistics.

Variables	ADF Test Statistic	Critical Value			Trend and Intercept	Order of Integration	P-value
		1%	5%	10%			
In(ROA)	-4.144490	-4.262735	-3.552973	-3.209642	Trend	1(1)	0.0133
In(INT)	-3.327733	-3.639407	-2.951125	-2.614300	Intercept	1(0)	0.0213
In(MSS)	-7.711729	-4.262735	-3.552973	-3.209642	Trend	1(1)	0.0000
In(INF)	-5.309622	-3.670170	-2.963972	-2.621007	Intercept	1(1)	0.0001
In(RGDP)	-3.923416	-3.639407	-2.951125	-2.614300	Intercept	1(0)	0.0049

Source: Computed by the Author, eviews 9, 2020

Table 2 showed that the variable does not have uniform order of integration. Some of the variables (INT, and RGDP) were found to be stationary at their levels, denoted as 1(0), while (ROA, MSS, and INF) were not stationary at their levels, however, when first difference was applied, the variables were then found to be stationary. However, to avoid spurious regression, it is relevant to examine if long run relationship exists among the variables. This was done using Johansen cointegrating tests.

Table 3: Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Prob.**	Hypothesized No. of CE(s)	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	131.8532	69.81889	0.0000	None *	53.06026	33.87687	0.0001
At most 1 *	78.79291	47.85613	0.0000	At most 1 *	37.63575	27.58434	0.0018
At most 2 *	41.15716	29.79707	0.0016	At most 2 *	29.58889	21.13162	0.0026
At most 3	11.56827	15.49471	0.1788	At most 3	11.05601	14.26460	0.1514
At most 4	0.512266	3.841466	0.4742	At most 4	0.512266	3.841466	0.4742

Source: Computed by the Author, eviews 9, 2020

Following the unit root test results, Johansen cointegration technique was applied to verify the presence of cointegrating relationships among the variables. The Cointegration analysis revealed 3 cointegrating equations, as shown by Trace statistic and Maxi-Eigen statistic. This denotes the presence of long-run equilibrium relationships, though, in the short run, the three are in disequilibrium. Moreover, this short run imbalance and dynamic structure can better be expressed as VECM. Consequently, since the lag order of VAR is 4, VECM's lag order should be 3 (i.e 4-1).

Table 4: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-880.5822	NA	4.48e+18	57.13433	57.36562	57.20973
1	-777.0426	166.9994*	2.89e+16*	52.06726	53.45499*	52.51963
2	-757.1199	25.70668	4.60e+16	52.39483	54.93900	53.22417
3	-724.8042	31.27327	4.23e+16	51.92285	55.62346	53.12916
4	-681.4150	27.99303	3.24e+16	50.73645*	55.59350	52.31973*

* indicates lag order selected by the criterion
Source: Computed by the Author, eviews 9, 2020

An optimal lag of 4 was selected based on AIC and Hannan-Quinn (HQ) as shown in table 4 above.

Table 5: VECM Estimation Result

Error Correction:	D(INF)	D(INT)	D(MSS)	D(RGDP)	D(ROA)
CointEq1	-0.413857 [-2.20015]	0.159366 [2.14846]	-35.73095 [-2.27214]	-0.038926 [-0.79665]	-23.40678 [-1.01953]
D(ROA(-1))	0.001986 [0.74546]	0.000818 [0.77870]	0.799454 [3.59003]	-4.54E-05 [-0.06557]	0.508292 [1.56346]
D(ROA(-2))	0.001758 [0.52551]	0.000226 [0.17101]	0.187511 [0.67043]	7.44E-05 [0.08560]	-0.106235 [-0.26017]
D(ROA(-3))	0.001265 [0.33270]	-0.000464 [-0.30980]	0.469575 [1.47737]	0.000643 [0.65149]	0.609441 [1.31336]
D(INT(-1))	1.252025 [1.86638]	-0.071690 [-0.27100]	-25.32794 [-0.45162]	-0.505791 [-2.90258]	-62.37261 [-0.76179]
D(INT(-2))	-0.058288 [-0.07986]	0.128238 [0.44553]	-91.14649 [-1.49369]	-0.147590 [-0.77842]	-94.43690 [-1.06006]
D(INT(-3))	0.054795 [0.09566]	0.355696 [1.57477]	-38.11478 [-0.79596]	0.132943 [0.89352]	-97.05813 [-1.38835]
D(MSS(-1))	-0.004583 [-1.28842]	-9.66E-05 [-0.06887]	-0.778975 [-2.61969]	0.000804 [0.87015]	0.052560 [0.12107]
D(MSS(-2))	-0.004069 [-0.85182]	0.000293 [0.15552]	-0.449276 [-1.12504]	-0.001133 [-0.91291]	-0.270935 [-0.46472]
D(MSS(-3))	-0.002309 [-0.56881]	0.001390 [0.86813]	-0.557946 [-1.64410]	-0.001500 [-1.42260]	-0.656215 [-1.32449]
D(INF(-1))	0.469581 [1.92128]	-0.109118 [-1.13216]	36.98292 [1.80997]	-0.079003 [-1.24437]	23.45666 [0.78633]
D(INF(-2))	-0.523185 [-3.06642]	-0.069232 [-1.02900]	1.411277 [0.09894]	0.150791 [3.40234]	2.207659 [0.10601]
D(INF(-3))	0.389706 [1.58880]	-0.255292 [-2.63936]	35.66454 [1.73923]	-0.109027 [-1.71117]	19.80292 [0.66148]
D(RGDP(-1))	-0.601976 [-0.63062]	0.318981 [0.84739]	-34.25867 [-0.42929]	0.121740 [0.49096]	-57.13430 [-0.49039]
D(RGDP(-2))	-1.029665	0.176284	32.74576	0.486241	-44.29528

	[-1.15497]	[0.50144]	[0.43936]	[2.09969]	[-0.40709]
D(RGDP(-3))	0.464990 [0.51867]	-0.328612 [-0.92952]	93.83407 [1.25198]	-0.353702 [-1.51884]	20.59123 [0.18819]
C	1.609178 [0.44440]	-2.070071 [-1.44972]	689.9121 [2.27904]	0.378008 [0.40188]	853.9718 [1.93228]
R-squared	0.735360	0.678857	0.739601	0.808276	0.610380
Adj. R-squared	0.432914	0.311836	0.442002	0.589163	0.165099
Log likelihood	-105.7183	-76.87142	-242.9260	-63.93043	-254.6560
Akaike AIC	7.917307	6.056221	16.76942	5.221318	17.52620
Schwarz SC	8.703687	6.842601	17.55580	6.007698	18.31258

Source: Computed by the Author, eviews 9, 2020

From table 5 above, the speed of adjustment (ECM) to equilibrium is negative (-0.41) as required, and statistically significant. The adjusted R^2, Akaike AIC and Schwarz SC are relatively small, indicating that the estimation is realistic. Consequently, the adjusted R^2 implies that 43% of the variations in bank performance are accounted for by interest rate, money supply, inflation rate, and real gross domestic product for the period under study.

Diagnostic Tests

Diagnostic test helps to verify the reliability of the estimate we have in table 5 above. Firstly, the VEC residual serial correlation LM tests revealed that the parameters included in the model do not exhibit any sign of serial correlation. Hence, the probability of LM statistics at lag of 3 implies the acceptance of the null hypothesis, that there is no serial correlation.

Table 6: Serial Correlation LM Test

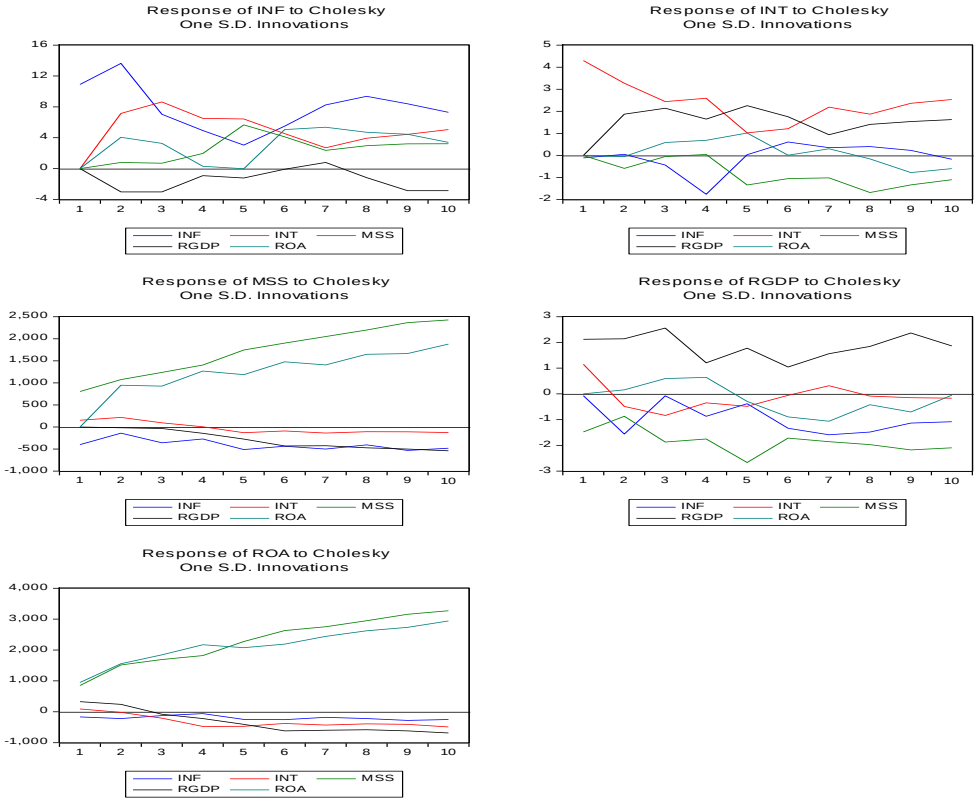
Lags	LM-Stat	Probability
1	22.04771	0.6330
2	29.62310	0.2387
3	21.86371	0.6436

Source: Computed by the Author, eviews 9, 2020

Impulse Response Function Analysis and Variance Decomposition

To analyze the dynamic behaviour of the model reacting to certain shocks as well as the nature of the effects amongst the variables considered in the study. this analysis was done through impulse response function and variance decomposition based on VECM, and the results for 10 periods are presented below.

Fig 1: Impulse Response Graph



Source: Eviews 9 Output, 2020

Variance Decomposition Analysis

Table 7: Response of Bank Performance to Explanatory Variables

Variance Decomposition of ROA (Bank Performance):

Period	S.E.	INF	INT	MSS	RGDP	ROA
1	4.298429	1.579163	0.476944	40.84860	6.099486	50.99581
2	5.744932	1.166877	0.133202	45.85286	2.501377	50.34569
3	6.637750	0.713998	0.397933	45.60094	1.326960	51.96017
4	7.552514	0.452068	1.307928	43.36286	1.035733	53.84141
5	8.123256	0.507268	1.609722	46.14931	1.241717	50.49198
6	8.484894	0.513903	1.484592	48.97731	1.770893	47.25331
7	8.882584	0.444603	1.442556	50.12765	1.959797	46.02539
8	9.347827	0.412142	1.335758	50.96624	1.990444	45.29542
9	9.887493	0.415312	1.253432	51.79015	2.018654	44.52246
10	10.41313	0.398095	1.243037	52.04558	2.078469	44.23482

Source: Eviews 9 Output, 2020

From table 7 above, the forecast error variance of return on asset in the first period are accounted for by its own shock. from the second period, a unit shock in the money supply (MSS) is able to explain about 45.8% the forecast error variance of return on asset (ROA). In the same period, a unit shock in real gross domestic product (RGDP), interest rate (INT) and inflation rate (INF) respectively account for 2.50%, 0.13% and 1.17% the forecast error variance of return on asset (ROA). The contribution of real gross domestic product and inflation rate appears to diminish over time after period two, up till period ten, while the contribution of money supply appear to improve over time, though unstable from period five. The contribution of interest rate began to improve from period three over the forecast horizon. The results above further indicate that money supply is a better predictor of bank performance (ROA) in the short run while real gross domestic product, interest rate and inflation rate are long term predictors of bank performance in Nigeria for the period under investigation. Furthermore, the result clearly showed that there is a prompt feedback mechanism between bank performance (ROA) and money supply (MSS) in Nigeria.

IV. CONCLUSION AND RECOMMENDATIONS

The results presented in this study showed that there is a prompt feedback mechanism between bank performance (ROA) and money supply (MSS) in Nigeria. As such, money supply is a better predictor of bank performance in the short run for the period under study in Nigeria. Moreover, the vector error correction estimate revealed that the coefficient of interest rate (INT) and inflation rate (INF) exhibits positive association with the dependent variable (ROA). While, the coefficients of money supply and real gross domestic product exerts a negative association with the dependent variable. This showed that interest rate and inflation rate stimulate bank performance (ROA) in the long term than money supply and real gross domestic product. Whereas, money supply and real gross domestic product are long term predictors of bank performance.

Going by the submission above, this study recommends that since money supply is a better predictor of bank performance in Nigeria based on variance decomposition analysis, government should endeavour to create a business-friendly environment through efficient management of macroeconomic indicators so as to stimulate productivity. A such, any increase in money supply when the economy is full employment would be absorbed into higher prices. Consequently, in the classical sense, as price rises, real wage will decrease, employment will increase and the level of productivity will also increase. Incidentally, as productivity is stimulated, real gross domestic product will improve to stimulate bank performance.

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