Arigor *et al.,* Nigerian Journal of Agricultural Economics (NJAEC). Volume 11 (1), 2021: Pages 26- 40

EFFECTS OF MONETARY POLICY ON AGRICULTURAL GROSS DOMESTIC PRODUCT PERFORMANCE IN NIGERIA (1970-2018)

Arigor, A. J. [1,] *, Asuquo, I. A. [2] and Ibeagwa, O. B. [1]

[1] Department of Agricultural Economics, Federal University of Technology, Owerri, Imo State, Nigeria
[2] Department of Agricultural Economics, University of Calabar, Calabar, Cross River State, Nigeria
*Corresponding Author email: aarigor@yahoo.com

Abstract
The study analysed the effects of monetary policy on Agricultural Gross Domestic Product performance in Nigeria, 1970-2018. The specific objectives of the study were to determine the effect of; Exchange rate (EXR), monetary policy rate (MPR), Broad money supply (M2), Liquidity ratio (LIQ), Lending rate (LRT), Reserves deposit money bank (RCBN), Credit by commercial banks to Agric. sector (CREDIT), Inflation (INF) on the Agricultural Dross Domestic Product (AGDP) in Nigeria. Augmented Dickey-Fuller and Philip Peron unit root tests was conducted on the specified time series. It was observed that only two variables; inflation (INF) and liquidity ratio (LIQ) were stationary at levels while others; (CREDIT, DCBN, INT, M_2 and MPR) became stationary at first difference. The co-integration and error correction models (ECM) technique was employed in the analysis. The results revealed that in the long run; exchange rate and credit to the agricultural sector were positively signed and significant at the 1 & 5 % levels respectively, while inflation rate was significant at 10 %. In the short run, there exist a negative relationship with respect to lending rate, monetary policy rate and credit to the agricultural sector and are significant at 1%, 10%, and 10% respectively while inflation was positively related to Agric. GDP and is significant at 5%. The findings call for appropriate short- and long-term economic policy packages that should stimulate investment opportunities in the agricultural sector to increase agricultural GDP performance. Appropriate policy package to stabilize inflation rate in the country should be implemented.

Key words: Effect, Monetary Policy, Agricultural Gross Domestic Product, Performance

Introduction

Macroeconomic policies are aimed at controlling short run behaviour of economic aggregates via changes in prices and aggregate demand. Amassoma *et al*. (2018) explained that monetary policy is a vital tool which could be used to achieve price stability, and hence strengthen both private and foreign investors that guarantees economic progress in the long run. Ayodeji *et al*. (2018) defined monetary policy as activities intended to affect the behaviour of the monetary sector using direct or indirect instruments by regulatory bodies to get the economic stability of the country. Also, Idris *et al.* (2017) posited that robust and effective fiscal operations guarantee economic growth, since any slight distortion in fiscal operation in the form of deficit brings adverse effect on growth rate, which further substantiate the epistemology method of neo-

classical theory that posit growth-retarding effects on the general economic performance due fiscal deficit. Thus, various economies of the world from advanced to emerging and low-income countries make use of these policies in macroeconomic management of their economies (World Bank, 2017).

Macroeconomic policies in Nigeria have contributed significantly to the country's growth story especially over the past five decades. Ayodeji (*op cit.*) in their study revealed that, monetary policy has a significant impact in short rum, while the fiscal policy has a higher long-term impact. Isaac *et al*. (2018), opined that monetary policy plays key role in the prosperity of Nigerian economy. Result from their study indicated that Inflation rate has serious implication on the prosperity of Nigeria's economy, as against broad money supply and interests which do not have substantial influence on the development of Nigerian economy. Elakhe, (2018) observed that monetary and fiscal policies in Nigeria are interconnected. Interest rate, supply of money, and expenditures of government relate to each other, and a combination of these variables could have serious effect on the Gross Domestic Product (GDP) of the Nigeria's economy. Okonkwo *et al.* (2015), examined the impact of monetary policy on manufacturing in Nigeria, they found out that money supply (M2) and Credit to the private sectors (CPS) exert tremendous pressure on manufacturing. Ajudua *et al.* (2017) examined the effects of monetary policy variables on the agricultural gross domestic product in Nigeria. They employed the Ordinary Least Squares (OLS) method in analysing time series data from 1986 to 2013. The results of the granger causality test revealed that there is a unidirectional causality relationship from interest rates to agriculture gross domestic product, indicating that interest rates do influence agriculture output. The results further revealed that there is a positive and significant relationship between money supply and agriculture gross domestic product whiles a negative and significant relationship was observed against the interest rates. Chisasa and Makina (2015) investigated the relationship between bank credit and agricultural output in South Africa from 1970 to 2011 using an Error Correction Model (ECM) approach. The results revealed that there was positively relationship between bank credit and agricultural output in the long run.

The endogenous growth theory was the theory adopted for this study. This theory states that, the growth of economy is dependent on the economic system of countries and not as a result of influence of external factors. Nyoni *et at,* 2018, in support of this statement stated that, Nigerian economic development depends on the efforts of its government, effective use of resources, progress in technology, and the application of appropriate economic policies aimed at stimulating growth. Within the Nigerian agricultural sector, several macroeconomic policies have been implemented following the years after independence with the aim of attaining agricultural targets. Some of these policies according to Dayo *et al.,* (2009) have however generated economic distortions; for instance, since the rate of domestic prices and interest rates were institutionally controlled, a large divergence usually occurs between them and their market-determinant equivalent.

The Nigerian government, having recognized that the economy is likely to remain on a path of steady and steep decline if nothing is done to change the trajectory, developed the Economic Recovery and Growth Plan (ERGP), a medium-term plan for 2017 – 2020 for the purpose of restoring economic growth while leveraging the ingenuity and resilience of the Nigerian people (CBN, 2021). The Plan focuses on achieving macroeconomic stability and economic diversification by undertaking fiscal stimulus, ensuring monetary stability, and improving the external balance of trade. In Nigeria, monetary policy relates to all actions taken by the Nigerian apex bank, the Central Bank of Nigeria, to control the value, supply, and costs of legal tender (naira-₦) with the aim of achieving the country's macroeconomic goals of full employment,

price stability and sustained economic growth. The institutional arrangement for the control of monetary policy is embedded in a monetary Policy Committee (MPC) headed by the Central bank Governor. Members of this committee usually meet quarterly to review and come up with acceptable monetary policy measures. For example, in a bid to ensure monetary stability, the Monetary Policy Committee of the Central Bank of Nigeria in her last meeting held in May 2022 retain the MPR at 13.0 %; Retain the Asymmetric Corridor of +100/-700 basis points around the MPR, Retain the CRR at 27.5% and Retain the Liquidity Ratio at 30%. (CBN, 2022).

Nigeria is the most populous country in Africa, with huge reserves of crude oil, natural gas and other natural resources in abundance. Oil export accounts for about 95 percent of foreign exchange earnings and 80 percent of budgetary revenues in the country. However, recent growth in the domestic economy was driven by the agricultural sector which contributed 41 percent of Nigeria's GDP in 2011 but suddenly declines to 21% in 2018 (CBN Statistical Bulletin, 2020) and it has an average of 25% contribution to the GDP of Nigeria. Agriculture employs over 60 percent of the workforce and is a major means of livelihood for most of the rural dwellers (50 percent of the population). Although endowed with abundant agro-resources and ecological diversity, Nigeria has become a significant food importer. Indications from recent studies show that there is a decline in agricultural productivity compared with manufactured goods trade for today's developing countries (Desai and Rudra, 2018). Nigeria has neither improved its agriculture nor improved manufacturing for export (Ikenwa *et al,* 2017). The assertion on the historical evolution of agriculture in Nigeria was brought to the fore by Oluwaseyi, 2017. The Nigeria's agricultural sector performance has remained dismal, characterized by years of inertia and unpredictability in production and marketed volume. Even though the sector employs about 70% of the population, in the fourth quarter of 2015, agriculture's contribution to overall GDP in real terms was 24.18%, a marginal increase from its share in the fourth quarter of 2014, and lower than the figure attained in the third quarter of 2016 by 2.61% points (National Bureau of Statistics – NBS, 2016). Nigeria agriculture's contribution to GDP is on the increase despite economic decline, the agricultural sector contributed 24.6 per cent of the GDP in the second quarter of 2020, doing better than the previous quarter and the same quarter last year. (NBS, 2020).

The sector is not only strategic in itself but has been deemed a major pivot of other sectorial growth in Nigeria (Brownson *et'al* (2012). The sector has implications for achieving key macroeconomic objectives – employment, price stability, economic growth and favourable balance of payments to a major source of raw materials for building of the industrial sector (Obasaja *et al.,* 2014). To buttress this fact, Oluwatayo and Ojo, 2016 posited that, the rate of agricultural productivity and growth in Nigeria directly affects its economic development, food security and poverty reduction. Despite these potential, the sector's productive outcomes and overall contributions to the GDP has been declining over the years and in cases where decline does not occur, fluctuating growth spurts are observed. In the 1970s for instance, the share of Nigeria agricultural to the GDP fluctuated between 15 percent and 40 percent. The share declined from 35 percent in 1980 to 16 % in 1990 and further to only 6 percent by 2000. A decade after this, the decline has worsened by a whopping 60 percent to 4 percent by 2010, and of recent, the average contribution of the sector to the nation's GDP is only at about 3 percent (CBN, 2017).

This receding trend of the nation's pivotal sector has been a major concern to policy makers, economists, and various monetary authorities for years and this concern seems not to be waning given the nation's present economic situation especially with the global oil crisis. This therefore underscores the importance

of carrying out an empirical investigation using Nigerian data on the impact of monetary policy on agriculture GDP performance. This study seeks to provide precisely answer to the research question below; has monetary policy impacted positively and significantly on agricultural GDP performance in Nigeria. The study seeks to analyse the effect of monetary policy on agricultural Gross Domestic Product performance in Nigeria, 1970-2018. The specific objectives of this study were to determine the effect of; Exchange rate (EXR), monetary policy rate (MPR), Broad money supply (M2), Liquidity ratio (LIQ), Lending rate (LRT), Reserves deposit money bank (RCBN), Credit by commercial banks to Agric. sector (CREDIT), Inflation (INF) on the Agricultural Dross Domestic Product (AGDP) in Nigeria.

Methodology

Data Source:

The research made use of annual time series data spanning the period 1970 to 2018, which covered both direct and indirect forms of macroeconomic policies regimes in Nigeria. The data were sourced from both local and international statutory organisations. These are the Central Bank of Nigeria (Statistical books and statement of accounts for 2011, 2013 and 2015 respectively) and the National Bureau of Statistic (NBS) statistical fact sheets. The Gross Domestic Product (GDP) data were sources from international sources such as the World Bank (WB). The monetary Policy variables were used to form the monetary policy model. This model is made up of nominal exchange rate (EXR) which is the nominal rate of exchange of the Nigeria Naira (₦) to the US dollar ($) (of which its increase signifies devaluation and decreases signifies appreciation), monetary policy rate (MPR), broad money supply (M2), Liquidity ratio (LIQ), lending interest rate (LRT) (which are commonly used by the Central Bank of Nigeria as instruments for stabilization);, commercial bank credit to the agricultural sector (CREDIT) and Inflation (INF).

Analytical Technique:

Monetary Policy Model:

The monetary policy model was specified based on the objective of the study as follows:

$ARGDP = f\ (EXR, MPR, M2, LIQ, LRT, RCBN, CREDIT, INF)$ (1)

The equation (1) was transformed into an econometric format to make it amenable for estimation:

$$LogARGDP_t = \alpha_0 + \alpha_1 LogEXR_t + \alpha_2 LogMPR_t + \alpha_3 LogM2_t + \alpha_4 LogLIQ_t + \alpha_5 LogLRT_t + \alpha_6 LogRCBN_t + \alpha_7 LogCREDIT_t + \alpha_8 LogINF_t + \varepsilon_t \quad (2)$$

Where:

$LogARGDP_t$ = the log of agricultural sector contribution to GDP at time t

$LogEXR_t$ = log of exchange rate of naira (₦) to US dollar ($) at time t

$Log\ MPR_t$ = log of monetary policy rate also known as the rediscount rate at time t

$LogM2_t$ = broad money supply at time t

$LogLIQ_t$ = liquidity ratio at time t

LRT_t = log of interest rate on lending at time t

$LogRCBN_t$ = log of reserves deposit money banks (DMBs) keeps with the CBN on lending at time t

$LogCREDIT_t$ = log of aggregate credit by the commercial banks to the agricultural sector at time t

$LogINF_t$ = log of inflation rate at time t

ε_t = error term assumed to be normally and independently distributed with zero mean and constant variance, which captured all the other explanatory variables which influence economic growth but were not captured in the model.

With regards to the signs of the coefficient in monetary policy model, it is hypothesized that α_1, α_2, α_3, α_4, α_6, $\alpha_7 > 0$ while, it is expected that α_5, $\alpha_8 < 0$.

Error Correction Model for Agricultural GDP Performance in Nigeria:
Following the Granger Representation Theorem, we specify the ECM model for the co-integrating series in the study. The primary reason for estimating the ECM model is to capture the dynamics in the agricultural GDP performance equation in the short-run and to identify the speed of adjustment as a response to departures from the long-run equilibrium. The general specification of the ECM that was estimated for the agricultural productivity in Nigeria is shown below:

$$lnARGDP_t = c_0 + \sum_{i=0}^{q1} \delta_1 lnM2_{t-1} + \sum_{i=0}^{q2} \delta_1 lnEXR_{t-1} + \sum_{i=0}^{q3} \delta_1 lnLRT_{t-1} + \sum_{i=0}^{q4} \delta_1 lnCREDIT_{t-1} + \sum_{i=0}^{q5} \delta_1 lnMPR_{t-1} + \sum_{i=0}^{q6} \delta_1 lnLIQ_{t-1} + \sum_{i=0}^{q7} \delta_1 lnIN_{t-1} + \psi D_t + \varepsilon_t \quad (3)$$

The ECM coefficient which captures the dynamics in the Agricultural GDP performance to show the speed of adjustment as a response to deviation to long run equilibrium is negative and statistically significantly.

Results and Discussions

In a bid to ascertaining the unit root properties of the series that formed the variables of the model, we commenced the analysis by carrying out the Augmented Dickey Fuller (ADF) and Philip Peron (PP) tests to determine the stationarity properties of the variables. These properties of the variables were ascertained by comparing the calculated values of the respective variable's ADF and PP statistics against their critical values at the 1, 5 and 10 percent levels.

Unit Root Test:
The results of the ADF in Table 1 showed at levels, that is 1(0) both with intercept and no-trend and intercept and trend showed the null hypothesis of no unit root cannot be rejected at both 10 percent and 5 percent levels of significance except in the case of the rate of inflation (INF) and Liquidity Ratio (LIQ) that were found to be integrated of the order 1(0). At first difference however, all the series became stationary. That is, they were found to be integrated of order 1(1) (both with intercept and no trend and with trend and intercept). The PP test reported in Table 2 reveals that except for rate of inflation (INF), with trend and intercept which was found to be stationary at level (i.e., 1(0) at intercept and no trend) all the other variables

became stationary after first differencing at both 5 percent and 10 percent level of significance (both with intercept and no trend and with trend and intercept). Thus, we conclude that the variables are 1(1) process.

Cointegration (Bound test):
After establishing the stationarity of the variables from the model, the bounds test analysis to cointegration were carried out. This gave room for the determination of both long and short run relationships between the monetary policy model and agricultural GDP performance for Nigeria. The Autoregressive Distributed Lag (ARDL) technique developed by Pesaran, Shin and Smith (2001) was applied as a general VAR model since the unit root properties of the variables have been identified. Adama and Danjuma (2015) employed the Granger causality tests and VAR methodology to determine the effects of macroeconomic policies on agricultural growth using time series data from 1986-2011. The result showed that; inflation rate, exchange rate and government expenditure had positive effect on the Agric. GDP while interest rate and loans to the agricultural sector had a negative effect on Agric. GDP.

The next step is to establish the existence of long run relationships among the variables in the model. Table 3 indicates the summary of the results for the ARDL model via the Bounds test procedure for cointegration which shows the connection between agricultural GDP and monetary policy variables. Since the Bounds test procedure for cointegration is sensitive to lag length, this study followed the prescription of Perasan, Shin and Smith (*op cit.*) by employing the SIC criterion to select the appropriate Lag lengths. The order of the variables based on the respective models are presented in Table 4. The hypothesis that the Wald test of the significant variables is equal to zero (0) is invalidated at the 5 percent level of significance from the results. This is because the calculated F-statistics $F_{lp}(.) = 6.21$ for the monetary policy model is greater the upper critical bound (UCB). Based on this evidence, we reject the null hypothesis and accept the alternative at both 10 percent and 5 percent levels of significance leading us to conclude that there is a unique long-run association between the variables; thus, the monetary policy variables can be adjudged to be long run determinants of the behaviour of agricultural GDP in Nigeria.

Lag length selection of variables in the model:
It is feasible that the different variables used in the models have differing number of lags as this is the case with Johansen cointegration analysis. Since the ARDL model is sensitive to lag length, it is then imperative to select the optimal lag length that would best befit the combination of the respective models. To determine the optimal lag length for the model, the research made use of the Vector Autoregressive (VAR) Lag Length Test/Structure. The result of the analysis reveals that the optimal lag length of the monetary policy model is four (4) using the Schwarz Information Criterion (SIC), the Akaike Information Criterion (AIC) and the Hanna-Quin Information Criterion (HIC). This can be seen in Table 5.

Diagnostic Tests of Monetary Policy Variables:
The study also carried out diagnostic tests ranging from Lagrange Multiplier (LM) tests through to auto correlation, normality, and stability tests. The Breusch-Godfrey Test is used by econometricians and statisticians to determine the presence of serial correlation among the variables of the model that have not previously been included of which if present would lead to inconclusive deductions from analysis. The results of the LM tests indicate absence of auto correlation among the variables that make up the models of the study as presented in Table 6.

The Autoregressive Conditional Heteroscedasticity (ARCH) which determine the presence of autoregressive conditional heteroscedasticity is insignificant indicating that the model is homoscedastic. The same applies for the Jargue-Bera tests indicating that the series are normally distributed. The Ramsey Regression Equation Specification Error Tests (RESET) designed by James B. Ransey in 1968 is a test of model. It determines whether non-linear combinations of the explanatory variables explain variations in the dependent variables. From the results indicated in Table 5, we can infer that the series of the model is well specified showing that the model intended to test for the effects of monetary policies on agricultural output performance at the aggregate levels are well specified and robust.

Long-run effect of Monetary Policy on Agricultural GDP Performance:
The long run impact of the monetary policy variables on agricultural GDP model based on the ARDL framework is reported in Table 6. The results of the monetary policy model indicate that exchange rate and credit to the agricultural sector are positively signed and are significant at the 1 and 5 percent levels respectively at one year lag value of agricultural GDP, while inflation rate was found to be significant at 10 percent level. In specific terms, a 10 percent increase in credit, exchange rate and inflation rate to the agricultural sector would lead to a more than proportionate response in output performance of the agricultural sector by 1.2, 2.3 and 0.6 percent respectively. These were all found to be positive implying that there exists a positive long run relationship between exchange rate, credit to the agricultural sector, inflation rate and output performance of the agricultural sector. The Coefficient of Multiple Determination indicated that in the long run, the monetary policy variables (model) accounted for 38.03 percent of the changes in agricultural output performance.

Short-run effect of Monetary Policy on Agricultural GDP Performance:
To determine the short-run effects of monetary policy variables on agricultural output performance in Nigeria from 1970 to 2018, the study estimated an over-parametrized model based on four lags of the determinants of exchange rate (EXR), monetary policy rate (MPR), money supply (M2), liquidity (LIQ), lending rate (LRT), credit to the agricultural sector (CREDIT) and inflation rate (INF). Reserves with CBN (RCBN) was excluded from the model since the ADF and PP unit root tests found it to be integrated of order 2 that is I(2). To further eliminate the insignificant coefficients and their lags, the study estimated a parsimonious version of the over-parametrized model showing the short run effects of monetary policy rate (MPR), lending rate (LRT), credit to the agricultural sector (CREDIT) and inflation (INF) as presented in Table 7.

The model shows a significant negative relationship between CREDIT and Agricultural GDP performance of the Nigerian agricultural sector both currently and one year after. Specifically, the study inferred that when government increases credit allocation to the agricultural sector by 10 percent, output performance of the sector reduces by 1.4 percent and 1.1 percent in the current and one year later respectively. The study also established that LRT and MPR lagged by two years are significant but negative determinant of Nigerian agricultural sector output performance. An increase in LRT and MPR by 10 percent would reduce agricultural sector output performance (ARGDP) by 3.1 and 1.7 percent after two years respectively. This indicates that, interest rate and monetary policy rates in Nigeria has a negative effect on agricultural output two years after implementation.

This result is in line with the findings of (Ali *et al*., 2017) who examined the effect of interest rates on access to agro-credit by farmers in Kaduna State, Nigeria reported that higher interest rates affect farmers' decision towards applying for and accessing credit which, thus limiting the operations in farm production. These consequences lead to declining agricultural output and income. The current value of the inflation rate (INF) also was significant and positive at 5 percent level, implying that a 10 percent increase in inflation would lead to a proportionate increase in output performance of the Agricultural sector by 0.6 percent The results of the above analysis coincided with the findings of Crawford (2007) who examined the effects of monetary policy shocks by applying the FAVAR model to a broad range of monetary policy variables such as employment, inflation rate, credit to the agricultural sector and monetary policy rate in India and Pakistan on agricultural sector productivity in both countries, However, inflation has surged in both countries over the past several years. Also, lagged values of ARGDP ($ARGDP_{-1}$ and $ARGDP_{-2}$) were found to be positive and significant determinants of output performance of the Agricultural sector in Nigeria.

Error Correction Model for Agricultural GDP Performance in Nigeria:
Following the Granger Representation Theorem, we specify the ECM model for the co-integrating series in the study. The ECM coefficient which captures the dynamics in the Agricultural GDP performance to show the speed of adjustment as a response to deviation to long run equilibrium is negative and statistically significantly. In specific terms, the coefficient reveals that 49.43 percent of disequilibrium in the current period would be corrected for in the long run. The adjusted coefficient of determination (R^2) indicates that cumulatively, the variables explained about 52.73 percent of the total variations in output performance of the Agricultural sector. The Durbin Watson (D.W) which is a tests for autocorrelation in the residuals of a regression runs between 0 and 4. Values that tends towards zero (0) that is. 0 to <2 indicates positive autocorrelation while those that tends towards 4 that is. >2 to 4 indicates negative correlation. The findings of this statistics indicate a value of 2 implying that there is no auto correlation among the variables of the model.

Conclusion and Recommendations

The study established the relationship between agricultural GDP and key monetary policy variables in Nigeria from 1970-2018 using short and long run model methodologies. The empirical result from the estimation of the long run agricultural GDP performance equation in the country revealed significant relationship with respect to exchange rate (EXR), credit to the agricultural sector (CREDIT) and inflation rate (INF). On the other hand, short run model for agricultural GDP performance reveals significant negative relationship with respect to lending rate, monetary policy rate and credit to the agricultural sector while inflation had a positive influence. 10 percent increase in CREDIT, LTR, MPR will reduce Agricultural GDP performance by 1.4, 3.1 and 1.7 percent respectively while the same level of increase in INF will increase agric. output by 0.6 percent. With R^2-adjusted of 0.5273 and ECM of -0.4943 gotten from the estimates of the parsimonious version of the monetary policy model, it clear that 52.73 percent of the variations in the Agricultural GDP performance is explained by the model and 49.43 of disequilibrium in the current period will be corrected for in the long-run.

Results of the analysis found out that credit to agricultural had a negative effects agricultural GDP. Hence it is recommended that instead of the government alone trying to meet up with the credit requirement of the agricultural sector, the long-term credit market should also be opened for non-institutional sources (such as money lenders) who can come in and cushion the short fall in government financing. Also, efforts to mitigate corruption and prevent credit diversification must include transparency, awareness, accountability, prevention and make sure that offenders are dealt with through an institutional process. Secondly, the central bank and should ensure that the parity between interest rate on lending and savings should not be too large such that people would be encouraged to save to get the needed cash for loans in the agricultural sector. Interest on loan should be low, possibly a one-digit interest rate is recommended.

References

Ajudua, E. I., Davis, O. J. P. and Okonkwo, O. N. (2015). A review of monetary policy and the Nigerian agricultural sector performance. *International Journal of Academic Research in Progressive Education and Development*, 4(3): 70-86.

Ali, R., Ali, A. K., Ariff, E., and Fatah, F. (2017). Determining the linkages of macroeconomics indicators and agricultural variables in Malaysia. *Prosiding Perkem* V, JILID 2: 455 – 459.

Ayodeji, A., and Oluwole, A. (2018). Impact of monetary policy on economic growth in Nigeria. *Open Access Library Journal*, 5(2), 1-12.

Brownson, S., Vincent, I., Emmanuel, G. and Etim, D. (2014). Agricultural productivity and macroeconomic variable fluctuation in Nigeria. *International Journal of Economics and Finance.* 4 (8): 114-125.

Central Bank of Nigeria (2017). *Statistical Bulletin of Central Bank of Nigeria.* http/www.cbn.org/out/publication. 9th September 2017. Accessed on 09/09/2017.

Central Bank of Nigeria (2021). *Statistical Bulletin of Central Bank of Nigeria.* http/www.cbn.org/out/publication. 3rd April 2021. Accessed on 03/04/2021.

Central Bank of Nigeria (2020). *Statistical Bulletin of Central Bank of Nigeria*. http/www.cbn.org/out/publication. 26th March 2020. Accessed on 28th /03/2020.

Central Bank of Nigeria (2022). *Central Bank of Nigeria Monthly Economic Report*, http/www.cbn.org/out/publication. 27th May 2020. Accessed 28th /05/2020.

Crawford, C. (2007), "The Sectoral Impact of Monetary Policy in Australia: A Structural VAR Approach". Thesis submitted in partial fulfilment for Honours in the B. Commerce (Liberal Studies) University of Sydney.

Chisasa, J. and Makina, D. (2015). Bank credit and agricultural output in south Africa: Cointegration, short run dynamics and causality. *The Journal of Applied Business Research*, 31(2): 489- 500.

Dayo, P., Nkonya, E., Pender, J. and Oni, O. (2009). Constraints to increasing agricultural productivity in Nigeria: A Review. *International Food Policy Research Institute*. IFPRI, NSSP 006.

Desai, R. M., Rudra, N. (2018). Trade, poverty, and social protection in developing countries. *European Journal of Political Economy*, 4(3), 101-117.

Elakhe, E. (2016). GRIN - Fiscal and Monetary Policy and Economic Growth in Nigeria. A comparative analysis. Retrieved April 3, 2020, from: https://www.grin.com/document/375716

Idris, M., Bakar, R. and Ahmad T. (2017). The effects of fiscal deficits in developing countries: Implications on the economic growth of Nigeria. *International Journal Social Science,* 2(9):4497–4520

Ikenwa, K. O., Sulaimon, A. A., Kuye, O. L. (2017). Transforming the Nigerian Agricultural Sector into an Agribusiness Model–The role of government, business and society. *Acta Universitatis Sapientiae, Economics and Business*, 5(1), 71–115

Isaac John, E. I. J., and Udoye, O. N. (2018). *Effect of Monetary Policy on Nigerian Economy* (pp. 190–216)

National Bureau of Statistics, (2016). A report by the National Bureau of Statistics, Thursday,14 February 2017. National Bureau of Statistics, Abuja, Nigeria.

National Bureau of Statistics. (2020). A report by the National Bureau of Statistics, Monday, 24 August 2020. National Bureau of Statistics, Abuja, Nigeria.

Okonkwo O. N., Egbulonu K. G., and Emerenini F. M (2015). Monetary policy and the manufacturing sector in Nigeria, *SSRG International Journal of Economics and Management Studies*, 2(1): 2393 – 9125. www.internationaljournalssrg.org.

Oluwaseyi, A. B. (2017), The prospects of agriculture in Nigeria: How our fathers lost their way-a review, *Asian Journal of Economics, Business and Accounting*, 4(2): 1 – 30

Oluwatayo, I. B. and Ojo, A. O. (2016). "Is Africa's dependence on agriculture the cause of poverty in the continent? An empirical review". *The Journal of Developing Areas*, 50, (1), 93-103

Pesaran, M., Shin, Y. and Smith, R. (2001). Bounds testing approaches to the analysis of level relationship. *Journal of Applied Economics* 16: 289-326.

World Bank, (2017). Agriculture for development. *World Development Report 2008*. Washington D. C.

Table 1: Augmented Dickey Fuller (ADF) unit root tests for stationarity of variables in the models

Variables	Levels		1st Difference		Decision
	Intercept and no Trend	Trend and Intercept	Intercept and no Trend	Trend and Intercept	
CREDIT	5.4118	4.0235	4.0088	2.9624	1(1)
RCBN	2.2922	1.6655	6.9322	8.2359	1(1)
LIQ	-4.6072**	-4.3470**	7.6339**	-7.6809**	1(0)
INT	-1.6313	-1.4930	-10.5234**	-10.4994**	1(1)
M2	1.6413	1.3768	-4.7394**	-5.5019**	1(1)
MPR	-2.2739	-2.3760	-7.0334**	-7.0553**	1(1)
EXCH	0.3537	-1.8291	-6.1624**	-6.3004**	1(1)
INF	-3.3636**	-3.4341*	-6.8597**	-6.8262**	1(0)

Note: ***, **, * denotes rejection of the null hypothesis at 1% , 5% and 10% levels respectively. The ADF tested the series that they contain a unit unit for the null hypothesis against the alternative that they do not.

Source: Author's Computation from E-Views 7.0.

Table 2: Philip Peron (PP) unit root tests for stationarity of the variables in the models

Variable	Levels		1st Difference		Decision
	Intercept and No Trend	Trend and Intercept	Intercept & No Trend	Trend & Intercept	
CREDIT	10.0167	8.1138	-5.9072**	-7.3253**	1(1)
RCBN	6.8575	3.8911	-1.2863	-2.7942	1(2)
LIQ	-4.6194**	-4.3263**	-9.9465**	-12.7111**	1(1)
INT	-2.0896	-2.6659	-10.5990**	-10.7238**	1(1)
M2	6.2373	3.2340	-1.8644	-3.6215**	1(1)
MPR	-2.0748	-2.2014	-8.6856**	-8.5258**	1(1)
EXCH	0.3232	-1.8473	-6.1612**	-6.3004**	1(1)
INF	-3.2788**	-3.3213*	-11.7150**	-13.0113**	1(0)

Note: ***, **, * denotes rejection of the null hypothesis at 1% , 5% and 10% levels respectively. The ADF tested the series that they contain a unit unit for the null hypothesis against the alternative that they do not.

Source: Author's Computation from E-Views 7.0.

Table 3: The bounds tests for cointegration

F-Statistics critical value bounds: Case V (intercept with Trend)

K	90 percent level		95 percent level		99 percent level	
8	1(0)	1(1)	1(0)	1(1)	1(0)	1(1)
	2.26	3.34	2.55	3.68	3.15	4.43
6	1(0)	1(1)	1(0)	1(1)	1(0)	1(1)
	2.53	3.59	2.87	4.00	3.60	4.90

Calculated Statistics: F_{lp} (ARGDP| CREDIT EXCH INF LIQ LNT M2 MPR) 6.21**

Note: ** indicates cointegration at 5 percent level of significance; k is the number of regressors Critical values are obtained from Narayan (2005)

I (0) *critical* value (or *lower* "*bound*")

I (1) *critical* value (or *upper* "*bound*")

Source: Author's Computation from E-Views 7.0.

Table 4: Lag length selection criteria for monetary policy variables included in the model (ARGDP CREDIT EXCH INF LIQ LNT M2 MPR)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2559.062	NA	1.69e+43	122.2411	122.5721	122.3624
1	-2294.318	416.0265	1.26e+39	112.6818	115.6607	113.7737
2	-2218.807	89.89438	1.02e+39	112.1337	117.7604	114.1961
3	-2092.538	102.2177	1.51e+38	109.1685	117.4431	112.2015
4	-1555.012	230.3684*	4.63e+29*	86.61961*	97.54210*	90.62313*

* Indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Author's Computation from E-Views 7.0.

Table 5: Diagnostic tests for the specified ARDL models

Tests	BG	ARCH	Jargue-Bera	RAMSEY-RESET
	18.5764 (0.000003)	4.2955 (0.000353)	5.5107 (0.063584)	12.7656 (0.000065)**

Note: ∗∗∗, ∗∗, and ∗denote significant at 1, 5, and 10 percent levels, respectively
Numbers in parenthesis connotes F-statistics probability values.
Source: Author's computation from E-Views 7.0.

Table 6: Long-run ARDL estimates: Monetary model **(**Dependent Variable: ARGDP)

Variables	Coefficient	Std. Error	T-stats	P-value
C	3.0299**	1.1818	2.5638	0.0148
@TREND	0.0191	0.0280	0.6826	0.4993
ARGDP(-1)	-0.3336***	0.0866	-3.8515	0.0005
CREDIT(-1)	0.1202**	0.0568	2.1153	0.0416
EXCH(-1)	0.2284***	0.0528	4.3272	0.0001
LIQ(-1)	-0.0216	0.1058	-0.2036	0.8398
LNT(-1)	-0.1240	0.1437	-0.8628	0.3941
M2(-1)	-0.0203	0.1382	-0.1471	0.8839
MPR(-1)	-0.1072	0.1193	-0.8984	0.3751
INF(-1)	0.0578*	0.0297	1.9430	0.0601
R^2	0.507018		F-statistic	3.9996
R^2(adjusted)	0.380251		Prob(F-statistic)	0.0014
DW	1.841416			

Note: ∗∗∗, ∗∗, and ∗denote significant at 1, 5, and 10 percent levels, respectively.
Source: Author's Computation from E-Views 7.0.

Table 7: Estimate of parsimonious Version of the Monetary policy Model.
Dependent Variable: ARGDP
Sample adjusted: 1970-2018
Included Observations: 123 after adjustments.

	Lag order		
Variables	**0**	**1**	**2**
ARGDP		0.3977***	0.2418*
		(3.4898)	(1.8650)
CREDIT	-0.1360*	-0.1088	
	(-1.9016)	(-1.5365)	
LRT			-0.3100***
			(-3.6094)
MPR			-0.1693*
			(-1.9728)
INF	0.0640**		
	(2.7392)		
Constant	0.1969**		
	(3.3548)		
Trend	0.0024		
	(-1.6248)		
ECM(-1)	-0.4943***		
	(-5.1236)		

Note 1: Number within the parentheses beneath the coefficients is the absolute value of *t*-ratio. The R^{-2} *adj.* *=0.*527263 and DW =2.023663

Note 2: ***, ** and *denote significant at 1, 5 and 10 percent, respectively.

Source*:* Author's computation from E-Views 7.0.