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# IMPACT OF MONETARY POLICY ON AGRICULTURAL OUTPUT IN NIGERIA

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***Abstract*****:** *This study investigated the impact of monetary policy on agricultural output in Nigeria, using data for the period of 1981-2020, the objective were to: Examine the effect of Inflation rate on agricultural sector output in Nigeria. Investigate the effect of monetary policy rate on agricultural sector output in Nigeria. Evaluate the effect of money supply on agricultural sector output in Nigeria. Examine how exchange rate affects agricultural sector output in Nigeria. Ordinary Least Squared (OLS) method of data analysis was adopted because of its Best Linear Unbiased Estimators (BLUE) properties. The data for the variables used was sourced from Central Bank of Nigeria Statistical Bulletin. The variables used were agricultural output as the dependent variable, while inflation, exchange rate, monetary policy rate and money supply were the independent variables. The study adopted the unit root test, co-integration approach, as well as Error Correction Mechanism to analyses the corrected data. E-View software were used for the analysis. The study found that inflation was statistically significant. It was also observed that monetary policy rate was statistically significant. It was also noticed from the regression analysis that money supply is positive and statistically significant, while exchange rate was insignificant with agricultural output. The study recommends that government should endevaour to ensure that there are available and sufficient credit allocated to the agricultural enterprise in Nigeria with reasonable or affordable lending rates. This will enable the agricultural sector in Nigeria to operate on their production possibility curve with full capacity.*

***Keywords:*** *monetary policy, agricultural output,* Inflation rate, monetary policy rate, money supply exchange rate.

## 1.1 Background of the Study

The significance of agriculture in bringing about economic growth and development of a nation cannot be underestimated. The reason why a nation possesses sustainable food security is because it produces enough food to feed her citizens and even export these goods to other needy countries thereby generating foreign exchange which in turn increases the national income in the long-run (Marafa, 2021). The agricultural sector serves all other sectors in the economy especially the industrial sector. The problem facing the Nigerian agricultural economy is inadequate capital and credit for start-up, investment and expansion. Monetary policy through its influence on the financial sector

of the economy plays a major role in making credit available to the agricultural sector (Omodero, 2021).

Agriculture has often been labeled crucial in economic development as well as one of the major windows out of Poverty of most developing countries. Previous studies on the causes of development and underdevelopment have identified investment in agriculture as the key to the economic emancipation of emerging economies of the world. The development of the agricultural sector is seen as the major determinants of ways out of poverty and achievement of long-term economic development of developing nations (Ndor, Obadiah, & Nasir, 2020). The Agricultural sector has been identified as the mainstay of the Nigerian economy since independence in 1960. Before the discovery and exploration of crude petroleum, the country depended on funds generated from agricultural export expansion for the development of other sectors of the economy. Owing to its important role in nation building, the agricultural sector has continued to be a target of government policies overtime (Ashamu, 2020).. The agricultural sector like any other sector remains largely affected by exchange rate fluctuations. This is usually in respect of the sector's importation of raw materials and other modern farm implements, and the exportation of its output. Changes in exchange rate policy, therefore, have significant consequences for a country's domestic relative prices and economic growth through their effects on the real exchange rate. The real rate is a measure of the terms of trade between the traded and non-traded sectors of the economy, which provides the signal for resource movements (Adongo, John, Zeph, & Muyima, 2020).

Problems to agricultural policy strength include policy instability, policy inconsistencies, weak policy formulation, poor policy implementation, and harsh institutional framework for policy coordination (Idachaba, 2005). With reference from the dual economy model, early writers predicted economic development as a growth process that needs the re-allocation of factors of production from a weak, low-productivity agricultural sector to a modern and commercialized industrial sector with higher productivity and more returns (Adongo, John, Zeph, & Muyima,. 2020). The possibility of restructuring traditional agriculture into a modern sector shows agriculture's capability as a growth sector and its effective role in emphasizing broader development (Adelman, 2001). The vital advantage of agricultural growth on rural development was found to be effective in countries (e.g. Nigeria and other developing countries) where small farms dominated agriculture (Idisi, Folorunsho, & Safugha). Monetary policy through its influence on the financial sector of the economy plays a major role in making credit available to the agricultural sector (Okwu, Obiakor, Falaiye. & Owolabi, 2011).

Monetary policy refers to the combination of measures designed to regulate the value, supply and cost of money in an economy. It can be described as the art of controlling the direction and movement of credit facilities in pursuance of stable price and economic growth in an economy (CBN, 1992). Monetary policy in the Nigerian context refers to the actions of the Central Bank of Nigeria to regulate the money supply which could be through discretional monetary policy instruments such as the open market operation (OMO), discount rate, reserve requirement, moral suasion, direct control of banking system credit, and direct regulation of interest.

The Central Bank of Nigeria (CBN) derives its mandate from the CBN Act of 1958. Section one of the CBN Decree No. 24 of 1991, stipulates that the principal objects of the Bank shall be to issue legal tender currency in Nigeria; maintain external reserves to safeguard the international value of the legal tender currency, promote monetary stability and a sound financial system in Nigeria, and act as banker and financial adviser to the Federal Government (CBN, 2006). Therefore the central bank is the principal monetary authority. The agricultural sector in the context of the economy is tied with the various sectors and is essential for generating broad based growth necessary for development (Olakunori, & Ejionueme, 2014). Agriculture is fundamental to the sustenance of life and is the bedrock of economic development, especially in the provision of adequate and nutritious food vital for human development. The sector is a catalyst and major source of raw materials for the industrial sector and provides most of the staple food consumed by over 200 million Nigerians. Monetary policy facilitates the establishment of agricultural businesses through availability of credit and finance for start-up, investments, and expansion. The CBN controls the availability of credit through monetary policy instruments. These instruments affect agricultural sector output through agricultural banks and other financial institutions. Therefore, in our study of agricultural sector output monetary policy is a very important factor.

### 1.2 Objectives of the Study

The broad objective of this study is to examine the effect of monetary policy on agricultural sector output in Nigeria. The specific objectives are to:

1. Examine the effect of Inflation rate on agricultural sector output in Nigeria.
2. Investigate the effect of monetary policy rate on agricultural sector output in Nigeria.
3. Evaluate the effect of money supply on agricultural sector output in Nigeria.
4. Examine how exchange rate affects agricultural sector output in Nigeria.

## REVIEW OF RELATED LITERATURE

### 2.1 Conceptual Framework

#### 2.1.1 Monetary policy

Monetary policy is the deliberate use of monetary instruments (direct and indirect) at the disposal of monetary authorities such as central bank in order to achieve macroeconomic stability. Monetary policy is essentially the tool for executing the mandate of monetary and price stability Ufoeze, Odimgbe, Ezeabsili & Alajekwe, 2018). Monetary policy deals with the discretionary control of money supply by monetary authority (CBN).

Monetary policy is mainly a series of actions taken by monetary authorities especially (CBN), to either increase or decrease the supply of money in circulation and the flow of credit in order to achieve targeted macro-economic objectives (Dwivedi, 2005). Monetary policy as explained by Ogunjimi (1997) is a form of Government's efforts to manage the money in its economy so as to realize specific economic goals. He further came up with three basic kinds of monetary policy decisions, which are: the amount of money in circulation, the level of interest rate and the functions of credit markets and the banking system.

The formulation and implementation of monetary policy is the primary focus of the Central Bank of Nigeria (CBN), as spelt out in the Central Bank of Nigeria Act 1958.The act has gone through different amendments and the 2007 Act still retained the power for formulation and implementation of monetary policies to Central Bank of Nigeria. The monetary policy in Nigeria has gone through different facet since 1958 when the formulation started. From 1959-1973, Nigeria operated exchange rate target, the Nigerian Pound in use was pegged against the British pound in line with widespread world economic conditions and indicators at that time. Along with exchange rate policy, CBN embarked on direct monetary target policy which lasted till 1986 and used credit ceiling, selective credit, unchanged cash reserve ratio as instruments (CBN, 2011).Indirect control of monetary policy was introduced in 1986 along with the short term monetary policy horizon and this led to deregulation of interest rate, rationalization of sectoral credit controls, and abolition of all mandatory credit allocation mechanisms and review of cash reserve ratio. The medium-term monetary policy horizon was introduced in 2002 and is in operation till–date (CBN, 2013).

### 2.1.2 Agricultural sector output

Agriculture has been defined as the production of food and livestock, and the purposeful tendering of plants and animals, (Ahmeed, 2013). He stated further that agriculture is the mainstay of many economies and it is fundamental to the socio-economic development of a nation because it is a major element and factor in national development. In the same view**, (**Okoro, 2014) described agricultural sector as the most important sector of the Nigerian economy which holds a lot of potentials for the future economic development of the nation as it had done in the past. Notwithstanding the enviable position of the oil sector in the Nigerian economy over the past three decades, the agricultural sector is arguably the most important sector of the economy. Agriculture's contribution to the GDP has remained stable at between 30 and 42 percent, and employs 65 per cent, of the labour force in Nigeria (Emeka, 2007). Generally, the agricultural sector contributes to the development of an economy in four major ways-product contribution, factor contribution, market contribution and foreign exchange contribution (Abdullahi, 2012).

## 2.2 Theoretical Framework

This can also be referred to as the Analytical framework of this project, this will provide a basis for our empirical analysis. This section examines the theories that relate to the research questions and hypothesis in terms of the impact of monetary policy on agricultural sector output.

### 2.2.1 The study is anchored on the Keynesian theory of money and prices (1930).

The theory views monetary policy instruments as a reward for parting with liquidity (money). This provides interest rate as a determinant of demand and supply of money, hence, the theory opines that money supply is usually determined by monetary authority which is the central bank,; while, the demand for money is a function of income and interest rate. The theory further explains that transactionary and precautionary motives of liquidity preference depend on income, while speculative motive depends on interest rate. Thus, the Keynesian theory implies that low interest rate as a component of cost administered is detrimental to increasing savings; and, hence investment demand.

Proponents of this theory argue that increase in the real interest rate will have strong positive effect on savings which can be utilized in investment; because, those with excess liquidity will be encouraged to save subject to favourable interest rate. Therefore, banks will have excess money to lend to investors for investment purposes thereby raising the volume of productive investment and Increasing their profitability. This theory introduced the concept of liquidity trap, a situation where low interest rate discourages Savings and consequently reduces investments due to lack of Investable fund. Thus, agricultural productive activities are more centered, focused and more implemented in the less developed economies where there is pressing need for rural transformation, income redistribution, poverty reduction and socio-economic growth and development of monetary policy on agricultural sector output.

**2.4 Empirical Review**

Okafoforcha, Anumudu., Uwazie and Sule (2024) explored the effect of monetary policy on the Nigeria agricultural sector growth, from 1980-2020. The objectives are to: ascertain the significant effect of the Central Bank of Nigeria's monetary policy rate (MPR), open market operations and cash reserve ratio implementation on commercial banks' credit lending rate to Nigeria's agricultural sector, and examine the selective sectoral credit control policy of Central Bank of Nigeria and how it affects commercial banks' credit lending rate to Nigeria agricultural sector. The study employed the following advanced econometric and statistical techniques; Augmented Dickey-Fuller (ADF) tests, Co-integration Test, Vector Error Correction Model (VEC) and Granger Causality. Based on the above econometric and statistical techniques conducted, it was observed that the CBN monetary policy rate (MPR), open market operations and cash reserve ratio implementation have a significant effect on commercial banks' credit lending to the Nigeria agricultural sector. Our results indicated that there is a positive significant effect of the CBN selective sectoral credit control policy (Agricultural Credit Guarantee Scheme Fund (ACGSF) on commercial bank lending to Nigeria's agricultural sector within the period of the study 1980 to 2020.

Hezekiah and Enaberue, (2024) mirrored aggregated views of monetary decisions as it affects Nigeria agricultural sector from 1981 Q1. To Q4 of 2016. The four agricultural sub-sectors that were examined were crop production, forestry, fishery, and livestock. Other variables that were employed in this research were the over lending rate, benchmark interest rate, money stock, and forex rate. In addition, general level of prices and other economic activity in the economy as a whole were taken into account. The results show that the agricultural sector as a whole and its several subsectors have no effect on unexpected tightening of benchmark interest rate over the period; nonetheless, the agricultural sector is directly affected by shocks to monetary policy through the channels of interest rates and liquidity preference.

Idisi, Folorunsho and Safugha, (2023) assessed the effects of monetary policy on smallholder farmers in Nigeria, and it relied largely on current literature, oral interviews, and observations on the effect of monetary policies on smallholder farmers. According to the review, the government should consistently increase budgetary allocations to the agricultural sector, and the government should implement concessionary low-interest rate policies to encourage smallholder farmers to invest in large-scale agriculture.

Asaleye, Maimako, Lawal, Inegbedion, and Popoola, (2021) examined the impact of monetary policy channels on agricultural performance in Nigeria using structural vector auto-regression (SVAR) and dynamic ordinary least squares (DOLS). The study uses output employment and export as metrics for agricultural performance, and the channels of monetary policy considered are credit, interest rate, money and exchange rate. The SVAR variance decomposition findings show that the forecast error shocks of monetary policy channels affect agricultural performance. Likewise, the long-run equations from the DOLS show that output has a positive relationship with money supply, a negative relationship between employment and interest rate, and a negative relationship between exchange rate and export.

Anthony et al. (2022) examined monetary policy channels, agriculture sectoral outputs and sustainable growth in the ECOWAS region: a rigorous analysis and implications for policy. Data from the World Bank and International Monetary Fund over 2013–2019 were sourced for thirteen member countries. The study adopted the Driscoll–Kraay fixed-effects ordinary least squares regression (OLS) estimator. The findings revealed that while the effect of monetary policy channels on the agricultural sector value added is largely heterogenous and significantly in-elastic, the ones on the industrial and services sectors are overwhelmingly homogeneous and negative, but insignificant for the services sector. Moreover, the effect of monetary policy channels on sustainable economic growth is also homogeneously asymmetric, with imminent stagflation while the interactive effects of monetary policy channels are heterogeneous on sustainable economic growth and economic sectors.

Umeh, Ugwo and Ochuba (2021) investigated on impact of monetary policy on commercial banks' supply of agriculture credit in Nigeria for the period of 1985-2020. Secondary data was employed, autoregressive-distributed lag model was used to estimate the mode. The major findings of the study: (1) monetary supply has positive insignificant effect on commercial banks' supply of agriculture credits in Nigeria (t – statistics (1.3511) < t0.05 (1.684); (2) cash reserve ratio has positive significant effect on commercial banks' supply of agriculture credits in Nigeria (t – statistics (3.2824) > t0.05 (1.684); (3) interest rate has no insignificant effect on commercial banks' supply of agriculture credits in Nigeria (t – statistics (1.2053) < t0.05 (1.684); (4) there is no long-run relationship between monetary policy variables and the commercial banks' supply of agriculture credits in Nigeria and (5) the cash reserve ratio was the monetary policy variable that is more relevant to the commercial banks' supply of agriculture credits in Nigeria. The study concluded that monetary policy has significant effect on commercial banks' supply of agriculture credits in Nigeria.

ˇCermáková, and Filho, (2021) evaluated the effect of selected monetary policy measures on the prices of three selected agricultural commodities: soy, corn and sugar. Secondly, the study analyzes the price formation of these commodities during a period of expansionary monetary policy, in order to better understand how they are influenced by unconventional instruments. The central hypothesis is that the excessive liquidity created by the FED spills over to emerging economies, boosting investment and consumption there and, lastly, causing a commodity cycle. Our data (January 2000–December 2019) support this hypothesis and prove that expansionary monetary policy is capable of impacting agricultural commodities' prices, but by different channels, due to the specificities of each commodity. The fact that people have more capital due to the credit

obtained from loans seems to influence the price of sugar; soy is highly influenced by exchange rates of emerging markets, and corn is not very responsive to the used variables, which might be due to the high production rates of this commodity in the U.S. and the protectionist policies adopted by the government.

Ehiwele & Ewododhe (2023) examined the effect of monetary policy variables on agricultural production for sustainable economic growth in Nigeria covering time period of 1997 to 2022. It specifically examined the influence of broad money supply, credit to the private sector, interest rate and exchange rate on agricultural production (proxy for economic growth) for sustainable growth in Nigeria. Secondary data were obtained from Central Bank of Nigeria Statistical bulletin. The statistical tool employed was fully modified least squares (FMOLS) and outcome revealed that money supply (M2) and exchange rate have significant influence and positive relationship with agricultural gross domestic product (AGDP) proxy for sustainable economic growth, while credit to private sector and interest rate have negative relationship with agricultural gross domestic product.

Nnebe, Nkechukwu & Atueyi, (2020). investigated the effect of monetary policy rate on agricultural sector output in Nigeria between the period of 1981and 2018. Ordinary Least Square (OLS) method of data analysis was adopted. The data used were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin. The variables were agricultural sector output as the dependent variable, while monetary policy rate is the independent variable. The study employed unit root test, to determine the stationarity of the variables, co-integration approach to determine the long-run equilibrium relationship of the model and error correction model to determine the short-term effect of the model. The findings shows among others that Monetary policy rate has significant effect agricultural sector output in Nigeria**.** The study concludes that The special interest of government in the agricultural sector is due to it's relevance in the provision of raw materials for industries and most importantly the provision of food for the teaming Nigeria population and also serving as a source of foreign exchange for the economy. The study reveals that the monetary policy rate impacted on agricultural sector via reduction on, interest rate. The study recommends monetary policy rate must be allowed to operate through market mechanism to ensure that interest rate is determined by demand for loanable fund and the supply of loanable fund.

## METHODOLOGY

### 3.1 Research Design

The type of research design for this study is Ex-post facto research. This is because the data are already collected, obtaining permission to conduct the study is less involved than enrolling participants, and less time is involved in conducting the study than by creating new data. Kerlinger,. (1986).

### 3.2 Nature and Sources of Data

Data for the study are obtained from secondary sources notably from publications of the Central Bank of Nigeria (CBN), Statistical Bulletin, between 1981 and 2020. The following data were sourced: Agricultural output, money supply, interest rate, exchange rate and cash reserve ratio

### 3.3 Model Specification

The study modified the work of Igbinedion and Ogbeide (2016) who studied the effect of monetary policy on manufacturing sector performance in Nigeria. The model is stated thus:

MOP= (BSC, REXR, LINTR, MS) ---------- (1)

Where

MOP = Manufacturing Performance
BSC = Banking Sector Credit
REXR = Real Exchange Rate
LINTR = Lending Interest Rate
MS = Money Supply

**The model was modified to enable us look at the topic from another dimension. Thus we state our modified model as:**

AGO= f (INF, MPR, LOG MS, EXCH) ---------- (2)

AGO = Agricultural output
INF= Inflation rate
MPR=Monetary policy rate
MS = Broad Money supply (M2)
EXCH = Exchange rate
μ= error term

The above equation can be put in an econometric form as;

$lAGO=b_0 + b_1 LINF + b_2 LMPR + b_3 LMS + b_4 LEXCH + \mu$ ---------- (4)

Where;

$\beta_0$ and μ are the constant and error terms respectively while $\beta_1$, $\beta_2$, $\beta_3$, ,, and $\beta_4$ are the coefficients of agricultural sector, interest rate, inflation and money supply respectively
F= functional notation.

### 3.4 Method of Data Analysis

The study will use multiple regression technique to analyse the effect of the variables in each of the six models. The steps involved in the data analyses process are three. It includes the descriptive statistics, test of stationarity of the time series variables, the tool for data analyses.

#### 3.4.1 Test of Stationarity

The stationarity of the variables was determined using the Augmented Dickey-Fuller (ADF) test. This is suitable because the use of time series data in a regression analyses can cause spurious results. Thus, test of stationarity is a recommended prerequisite for regression analyses. As time series data are often assumed to be non-stationary and it is necessary to perform a preliminary test to ensure there is a stationary relationship among the variables in order to avoid the problem of spurious regression whereby a significant relationship is found between variables in the regression model even though no such relationship exists between them (Kelly, 2000).

The ADF approach controls for higher-order correlation by adding lagged difference terms of the dependent variable to the right-hand side of the regression. The Augmented Dickey-Fuller (ADF) test is specified here as follows:

$$\Delta Yt = b0 + \beta Yt\text{-}1 + \mu 1 Yt\text{-}1 + \mu 2 Yt\text{-}2 + \ldots + \mu p Yt\text{-}p + \varepsilon t - \quad (4)$$

Where, Yt represents time series to be tested, b0 is the intercept term, β is the coefficient of interest in the unit root test, μi is the parameter of the augmented lagged first difference of Yt to represent the pth-order autoregressive process, and εt is the white noise error term. In carrying out the unit root test, we seek to test the following hypothesis:

H0: α=0 (non stationary)

H1: α≠0 (stationary)

If the null hypothesis is rejected, this means that the time series data is stationary. The decision criteria involve comparing the probability value with 0.05 level of significance. If the p.value is less than 0.05, the null hypothesis is rejected.

**3.4.2 Tool of Analyses**

The evaluation technique applied in this study is the use of econometric estimation method of the ordinary least square which Koutsoyannis (1997) remark as the best linearly unbiased estimator (BLUE). The estimates of the model were obtained through the statistical package of E-view version 8.0. Therefore, diagnostic statistics like the coefficient of determination, adjusted R-square, t-statistic, Durbin Watson statistics and standard error test shall be employed to test the plausibility of our parameter, Unit root test was also conducted to check the stationary of our variable before the regression will be concluded.

**1. Coefficients of determination ($R^2$)**

This is the summary measure that tells how well the simple regression line fits the data. It is a non-negativity quantity. Its limits are $0< r^2 < 1$ An $R^2$ of 1 means a perfect fit on the other hand an $R^2$ of zero means that there is no relationship between dependent and independent variables.

**2. T- statistics**

These tests show the significance of the parameter estimates. The obtained value of the T- ratio will be compared with the tabulated value the decision rule is that when the calculated value of t-statistics is greater than the t value at 5% level of significance and n-k degree of freedom, the null hypothesis will be rejected and the alternative accepted.

**3. F-statistics**

This measures the overall joint significance of the entire regression plane. It aims at finding if the entire influences of the explanatory variations do actually have any significant influences on the dependent variables. When the tabulated F is more than the

calculated F at 5% level of significance and n-k degree of freedom the null hypothesis is rejected and the alternative accepted (koutsoyiannis, 1997).

### 4. Auto Correlation Test

The term autocorrelation may be defined as the correlation of a time series data with its own past and future values. The classical model ensures that disturbance term relating to any observation is not influenced by the disturbance term relating to any other observation. Autocorrelation can be caused by several factors such as specification bias (excluded variables case), manipulation of data, data transformations and non-stationarity of data. The most celebrated test for detecting autocorrelations is developed by statistician Durbin and Watson it is popularly known As Durbin- Watson d- statistics.

## PRESENTATION AND ANALYSIS OF DATA

### 4.1 Unit Root Test

The first stage of co-integration and Error Correction Model is to test for unit root, the whole analysis then proceed from it. Konya (2004) maintains that there exists unit root in most macroeconomics time series. Therefore, it is necessary to analyze whether the series are stationary or not whenever time series data are involved. The presence of unit root implies that the time series under investigation is non-stationary, the absence of a unit roots shows that stochastic process is stationary. The augmented Dickey-Fuller (ADF) test would be employed in this test

**Tables 4.1 Unit Root Result**

| Variable | ADF | Integration | Significance |
|---|---|---|---|
| AGO | -4.039230 | I (1) | 1% |
| INF | -7.034807 | I (1) | 1% |
| MPR | -5.270995 | 1 (1) | 1% |
| MS | -4.662953 | I (1) | 1% |
| EXR | -5.178786 | I (1) | 1% |

**Source:** Author's computation using e-view version 10

Following the result of ADF test above it is observed that none of the variables are stationary at level, but the entire variables become stationary at 1st difference.

### 4.2 Co-integration analysis

The aim of co-integration analysis is to determine the long-run equilibrium relationship between the variables. Co-integration exists among the variables if they are integrated of the same order. The implication of this analysis is that deviation or drift may occur between the variables but this is temporary as equilibrium hold in the long run for them. In this study we used the Johansen co integration approach to examine the existence of long-run relationship between the variables of interest. Below is the summary of co integration results

**Table 4.2 co-integration result test**
**Unrestricted Co-Integration Rank Test (Trace)**

| Hypothesized No of CE(s) | Eigen value | Trace static | 0.05 critical value | Prob** |
|---|---|---|---|---|
| None * | 0.950059 | 168.0452 | 88.80380 | 0.0000 |
| At most 1* | 0.779244 | 84.13182 | 63.87610 | 0.0004 |
| At most 2* | 0.541304 | 41.83230 | 42.91525 | 0.0639 |
| At most 3* | 0.333855 | 20.01000 | 25.87211 | 0.2254 |
| At most 4* | 0.265375 | 8.635061 | 12.51798 | 0.2041 |

**Source:** Author's computation using e-view version 10
Trace test indicates 3 co-integrating equ(s) as the 0.05 level* denotes rejection of the hypothesis at the 0.05 level ** mackinnon-Haug-Michelis (1999) P – value

**Unrestricted co-integration Rank Test (Maximum Eigen value)**

| Hypothesized No of CE(s) | Eigen value | Trace static | 0.05 critical value | Prob |
|---|---|---|---|---|
| None * | 0.950059 | 83.91337 | 38.33101 | 0.0000 |
| At most 1* | 0.779244 | 42.29951 | 32.11832 | 0.0021 |
| At most 2* | 0.541304 | 21.82230 | 25.82321 | 0.1548 |
| At most 3* | 0.333855 | 11.37494 | 19.38704 | 0.4754 |
| At most 4* | 0.265375 | 8.635061 | 12.51798 | 0.2041 |

**Source:** Author's computation using e-view version 10
Max-Eigen value test indicates 2 co-integrating equ(s) at the 0.5 level* denotes rejection of the hypothesis at the 0.05 level **mackinnon-Haug-michelis (1999) P-values. Max-Eigen value and trace test indicates 4 & 5 co-integrating equations respectively at the 0.05 level. This suggests a long run equilibrium relationship among the variables. Co-integration is a pre-requisite for error correction mechanism following the result of co-integration, there is a long-run equilibrium relationship among the variables, hence, we can move over to error correction mechanism.

## 4.3 Presentation of Regression Result

**Table 4..3 Error Correction Model Result**

| Variable | Coefficient | Std Error | T-statistics | Prob |
|---|---|---|---|---|
| C | 1.329684 | 0.160529 | 8.283145 | 0.0000 |
| INFL | 0.045380 | 0.032745 | 1.385877 | 0.1785 |
| MPR | -0.001844 | 0.007411 | -2.248843 | 0.0056 |
| LMS | 0.807644 | 0.046312 | 3.743903 | 0.0000 |
| EXR | -0.059950 | 0.064302 | -0.932329 | 0.3605 |
| ECM(-1) | -0.830707 | 0.124143 | -6.691554 | 0.0000 |

**Source:** Author's computation using e-view version 8.1

| | |
|---|---|
| R –Square | 0.876137 |
| Adjusted R-squared | 0.865332 |
| F-Statistics | 123.7751 |
| Durbin-Watson stat | 1.91990 |
| Prob (F-statistics) | 0.000000 |

### 4.4 Interpretation of the Regression Result

The value of the R-square and the adjusted R-square in table 4.3 show that the explanatory variables are robust in explaining variation in the dependent variables (AGO), given their values as 0.876137 and 0.865332 respectively.

The F-statistics measures the overall significance of the explanatory parameter. From the result report in table 4.3 above, our computed value of f-statistics is 123.7751, while its probability is 0.0000, given this value we reject the null hypothesis and accept the alternative hypothesis which state that there is a significant relationship between the variance of estimated regression model.

A' priori criteria which is used to determine the existing economic theories and indicates the sign of the economic parameter under consideration. From the estimated regression model it was obtained from the coefficient Column that all the variables conform to a'priori expectation ranging from monetary policy rate, money supply, and exchange rate all have positive sign as expected, while inflation did not have expected negative sign. This further suggests that increase in any of former variables increase the agricultural sector output while an increase in inflation would lead to a decline in agricultural sector output, all at a given percentage respectively.

T-statistics, this is the measure used to determine the individual statistical significance of the variables in the model. From the model it was obtained that the monetary policy rate and money supply in Nigeria were statistically significant at 5%, inflation rate and exchange rate were statistically insignificant, however, this implies that the monetary policies contribute significantly to agricultural sector output in Nigeria.

The Durbin-Watson statistics is used to test for the presence or otherwise of autocorrelation in our model. When the value of Durbin-Watson is closer or a little bit above 2, it means the absence of autocorrelation amongst the explanatory parameter (Koutsoyannis 1997) from the table 4.3 above, it was obtained that our Durbin-Watson result is (1.9), this satisfy the above stated condition. This means the absence of autocorrelation among the explanatory variables.

The error correction model term ECM (-1) of about -0.83% is significant with the expected negative sign. A significant error term with the right sign indicates strong feedback effect of deviation of agricultural output from its long-run growth path. The coefficient of the error term is -0.830707 this shows that about 83% of the discrepancies between the actual and the equilibrium value of the agricultural output is corrected in each period (annually)

### 4.5 Hypothesis Testing

The researcher in this study formulated hypotheses and this has to be verifying in order to find out the validity of otherwise of such proposition. The research hypothesis is based on relevant statistics from the regression result. We use the null hypothesis for this analysis

**Hypothesis One**

**Ho: Inflation rate does not have significant effect on agricultural sector output in Nigeria**

From the regression result we discovered that in the t-statistics inflation is 1.385877 while its probability is 0.1785. Since its probability is greater than 0.05 desired level of significance we reject the alternative hypothesis and accept the null hypothesis, we

therefore conclude in favor of null hypothesis which states that inflation rate has no significant impact on agricultural sector output in Nigeria.

**Hypothesis Two**

**Ho: Monetary policy rate has no significant effect on agricultural sector output in Nigeria**

From the regression result we discovered that in the t-statistics interest rate is -2.248843 while its probability is 0.0056 Since its probability is less than 0.05 desired level of significance, we reject the null hypothesis and accept the alternative hypothesis, we therefore conclude in favour of alternative hypothesis which states that monetary policy rate has significant effect on agricultural sector output in Nigeria.

**Hypothesis Three**

**Ho: Money supply has no significant effect on agricultural sector output in Nigeria**

From the regression result we discovered that in the t-statistics money supply is 3.743903 is while its probability is 0.000 Since its probability is less than 0.05 desired level of significance, we reject the null hypothesis and accept the alternative hypothesis, we therefore conclude in favour of alternative hypothesis which states that money supply has significant effect on agricultural sector output in Nigeria.

**Hypothesis Four**

**Ho: Exchange rate has no significant effect on agricultural sector output in Nigeria**

Drawing inference from the t-statistics Column for exchange rate which is -0.9323329 while its probability is 0.3605 since its probability is greater than 0.05 desired level of significance, we accept the null hypothesis and reject the alternative hypothesis, we therefore conclude in favour of null hypothesis which states that exchange rate has no significant effect on agricultural sector output in Nigeria.

## RECOMMENDATIONS AND CONCLUSION

### 5.1 Conclusion

The study concluded that inflation rate has no significant affects the agricultural output most directly through the cost of inputs. Compared with any other major sector in the economy, because it is highly competitive and most of the output is perishable, consequently, farmers suffer loss of income/profits during inflation. As agriculture had been the mainstay of the Nigerian economy before the oil boom, it is in the national interest that agriculture should be given adequate attention now, so as to ensure a stable economy when the oil market collapses. It is high time that the government critically analyses the problems confronting the sector and develop policies that would have direct impact on farmers productivity Thus, in Nigeria, the government's agricultural pricing policy objective is to ensure attractive producer prices for agricultural commodities in order to encourage farmers to produce more.

Based on the second objective the researcher concludes that monetary policy rate has insignificant effect on agricultural productivity in Nigeria. There is persistent fluctuation in monetary policy rate which makes it difficult for farmers to acquire or apply for agricultural credits and also to know how it has affected the volume of credit to agricultural sector during the periods under review and the agriculture contribution to the gross domestic product in Nigeria. The change in monetary policy rate over the period under review have a strong influence or effect on the volume of credit to agricultural sector (on the supply

side) and a weak effect on agricultural GDP contribution. . The special interest of Government in the Agricultural sector is due to its relevance in the provision of raw materials for industries and most importantly the provision of food for the teaming Nigeria population and also serving as a source of foreign exchange for the economy. The Nigerian Agricultural sector is not alone in government intervention in terms of regulation. Accordingly to Akiri and Adofu (2007), opined that the banking industry owing to its natural role, and the function it performs in the economy, is also one of the widely and heavily regulated sector in both developing and developed countries of the world. As financial intermediary, banks help in channeling funds from surplus economic regions to the deficit one's in order to facilitate business transaction and economic development in general. The Agricultural sector is not left out in benefits of surplus fund from the surplus spenders in the economy.

The study concludes that the effect of money supply is significant on agricultural output in Nigeria. In countries where the level of monetization is quite low and has not reached a critical level, such as in Nigeria and some rapidly growing countries in Africa, the increase of money supply is necessary to stimulate agricultural output. The government fiscal policy should be expansionary, and monetary policy should be aimed at eliminating the shortage of money as long as there are unutilized resources available to be engaged in economic circulation in a short horizon. Countries that have reached the saturation limit of a money market, risk with a further increase in the level of the economy's monetization will have the opposite effect and lead to the deployment of cost-push inflation, in accordance with the postulates of neoclassical synthesis.

However, a real depreciation of the real exchange rate was associated with improved agricultural prices and in particular for agricultural exports. It was observed that the real exchange rate exerts no positive influence on the agricultural price incentive structure and particularly in relation to agricultural export prices. As expected the real agricultural exports respond to changes in foreign income. However, the response of real agricultural exports to foreign income is inelastic as its regression coefficient is less than unity which is less than 0.05. It can also be concluded that the exchange rate, influences agricultural productivity.

**5.2 Recommendations**

In line with these findings and being mindful of the Peculiar factors militating against the growth of agricultural sector output in Nigeria, the researcher has the following recommendations.

i. The government should endeavour to ensure that there are available and sufficient credit allocated to the agricultural enterprise in Nigeria with reasonable or affordable lending rates. This will enable the agricultural sector in Nigeria to operate on their production possibility curve, which is full capacity.

ii. Monetary policy rate must be allowed to operate through market mechanism to ensure that interest rate is determined by demand for and the supply of loanable fund.

iii. Government should control inflation rate since it inversely affects interest rate in Nigeria. If the amount charged on investible loans is high, it will manifest negatively on the growth of agricultural sector output.

iv. This study recommends that measures be put in place to ensure exchange rate stability as it is yet a major concern in agricultural sector development via the procurement of advanced technological aids that makes farming easier and at the same time increases output of the sector.

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