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# Effect of the Nigerian Monetary Policy: An Empirical Investigation on the Nigerian Agricultural Output (2005-2020)

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**ABSTRACT**
This study attempted touncover the Nigerian monetary policy instruments effect on the agricultural output in Nigeria, between 2005 -2020. Agricultural output (proxy by Agricultural Gross Domestic Product,GDP), is the dependent variable, while exchange rate(EXC), Inflation rate(INF), Interest rate(INT), MS Money supply(MS) and Agriculture credit(AGCR) are the independent variables. Data were sourced from the Central Bank ofNigeria, Nigerian Bureau of Statistics(NBS) and World . The The Granger causality test results, indicate a unidimentionalrelationship from AGDP to EXC. While a bidirectional causality was seen running from INF to AGDP and AGDP to INF. The stationarity test (ADF unit root ) statistics reveled that all tested variables were at first differences shows stationarity. The result of this estimate clearly shows that MS has a positive effect on Agricultural Output indeed, the coefficient are positive and significant in the model. The level of Money Supply(MS),Exchange Rate (EXC) and Interest Rate(INT) are positively realated to agricultural gross domestic product(AGDP).
From this regression result, the Adj.$R^2$ of 0.82429 implies that the explanatory variables explain 82.4% of the rate of change of total factor productivity. The remaining 17.6% is explained by variables not captured in the model.The study recommends that programs aimed at availing affordable credit to farmers should be prioritized to cushion the agricultural sector against adverse monetary policy shocks in the short to medium term, specifically interest rate to ensure continuousproducts.

**Keywords**: monetary, policy, agriculture, output, stationarity

## I. INTRODUCTION

### 1.1 Background of the Study

Agriculture as significantly contributesenormously to the economic growth and development of the nation, especially the developing countries (Nigeria inclusive).Agricultural sector is the major feeder of the industrial sector of the economy.Prior to oil discovery in Nigeria, agriculture was the mainstay of the nation.Nevertheless, discovery oil in the 1970s lead to neglect of agricultural sector for oil and gas industries. This development in no small measure affected agricultural GDP adversely(NBS,2014). Due to the failing agricultural sector, the Nigerian government became directly involved in boosting the agricultural sector, with several large scales agricultural projects and programmes launched and established while concessionary interest rate structure was employed with direct cheap credit to agricultural sector.

Many scholars agreed that agricultural sector of the Nigeria economy witness financial setback and therefore a decreasing productivity, food security and poverty.Enoma (2010),argued that In the global world, that food security has been deteriorating and the resultant effect is high price level of food prices.Monetary policy is the combination of measures aim at regulating the value supply and cost of money in an economy.According(CBN, 1992),monetary policy described the art of controlling the direction and movement of credit facilities in other to stabilize price and economy growth in an economy.

The Nigerian Monetary policy instrument play a vital role in providing financial assistance/credit to boost agricultural productivity, as to improve agricultural output of the economy. According to Iyoha, (2002) 'Monetary policy in the

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Nigerian could be described as 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 rate.

During the pre-SAP era, government employed various measures to holistically improve agricultural output and also to battle poverty through certain institutional mechanisms, such as Operation Feed the Nation (OFN),Free and Compulsory Primary Education (FCPE),Green Revolution Programme (GRP),River Basin Development Authorities (RBDA),National Agricultural Land Development Authority(NALDA),Agricultural Development Programs (ADP),Agricultural Credit Guarantee Scheme(ACGS),Strategic Grains Reserves Program (SGRP),Rural Electrification Scheme (RES),Rural Banking Programs (RBP), Peoples' Bank of Nigeria (BPN),National Accelerated Food Production program (NAFP),Nigeria Agricultural, Cooperative and Rural Delopment Bank (NACRDB),and the recent National Poverty Eradication Program (NAPEP). The main focus of pre-SAP poverty programs was to address the employment generation, reduction in rural-urban drift, and improvement in agricultural productivity and income.. Iroegbu (2009) echoed that influential people hijacked the Green revolution Programme that was primarily designed to benefit the poor. Likewise, in the SAP period various programs were put in place to tackle poverty and its attendant scourge; such program includes;Directorate for Food, Roads and Rural Infrastructure (DFRRI), National Directorate of Employment (NDE), People's Bank of Nigeria (PBN); Community Banks Program, Family Support Programs (FSP), and the Family Economic Advancement Programs (FEAP).Unsurprisingly the seemingly laudable and heartwarming programs cannot see the light of the day as usual in the Nigeria context.

Another promising program is Poverty Alleviation Programs (PAP) in 1999, to fight poverty in a more comprehensive manner.Obadan (2001) affirmed that PAP was designed to provide gainfully job for 200,000 unemployed employable people; creation of a viable and vibrant credit system for farmers; increase adult literacy rate from 51 percent to 70 percent; raise health care delivery system from 40 percent to 70 percent; training and settlement of 60 percent of tertiary institution's graduates; increase children immunization from 40 percent to 100 percent, among others. Another program was introduced due to the failure of PAP, called National Poverty Eradication Programs (NAPEP). Structurally the NAPEP is aimed to target four main sector schemes, the Agricultural Credit Guarantee Scheme Fund (ACGSF); and the Small and Medium Enterprises Equity Investment Scheme among others, Natural Resources Development and Conservation Scheme (NRDCS): This programs aim at promoting, participation and sustaining agricultural development, mineral and water resources, Rural Infrastructural Development Scheme (RIDS): This is responsible for the rural development; in the area of transportation of agricultural produce, rural electrification, and communication. Olitan(2006)stated that, these policies have contributed to improving the livelihoods of farmers and entrepreneurs. . According to Manyong et al (2003), monetary policies that were of relevance to agriculture during the period before SAP (Structural Adjustment Policy) centered mainly on those designed to direct credit to the agricultural sector on concessionary terms.

Nzotta&Okereke (2009),submitted that monetary policy success in an economy is the function of the environment of operation,institutional framework as well as the stable relationship of the economic activities and the amount of money in the circulation.

**1.2 Statement of Problem**

Before oil boom Nigerian economy was predominantly an agrarian with more than 70% of the employed people, hence implying the importance of agriculture to the Nigerian GDP..It's worthmentioning that agricultural produce were exported for revenue generation.in the 70s . Sadly, the hitherto Nigeria that export agricultural produce, like cocoa, groundnut,coffee and palm oil, is known to be a major importer of agricultural produce. (Egwu, 2016 ).

Nigeria level of food insecurity is alarming and the agricultural GDP is nose-driving faster than necessary. Literature has it that the rural farmers as well as agribusiness enterprise have little or no access to fund/credit to run agricultural business equipment.Also financial institutions/ formal lenders are not willing to give out credits to farmers since from previous experience rate of defaulters of such credits is high..All these mentioned setbacks culminating to low contribution of agricultural sectors GDP to the Nigeria economy.Domestically,food supply is far below food demand, hence high level of food insecurity. Monetary policy instrument could be the

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'salvaging ingredient' through her influence on the financial institutions in providing financial assistance to agricultural sector.

It's on the background of the above, that this study attempts to uncover/investigate the effect of the Nigeria government monetary policy with regards to agricultural output.Objectively, the study captured the (i) the relationship between agricultural output and monetary( as proxied by the independent variables) (ii) effect of monetary policy variables on agricultural outputs between 2005 -2020 years.

## II. REVIEW OF RELEVANT LITERATURE

Monetary policy entails the process by which the monetary authority (CBN) of a country using monetary policy variables controls the supply, direction, availability and cost of money in an economy for the sole aim of attaining greater output through the use of monetary policy instruments.

Monetary policy is concern with the control of the volume, cost and liquidity direction of money in the economy .These are achieved in three different ways: (i) open market operations, (ii) the legal reserves ratio and (iii) the bank rate.

The study of Muroyiwaet al. (2014), on the effect of monetary policy actions on agricultural output in South Africa from 1970-2011 showed that agricultural GDP has a negative but significant relationship with the consumer index.Also the interest rate as well as exchange rate has a positively significant relationship with the agricultural GDP in the long run.This implying that monetary policy variables have effect on the agricultural output.According to study on the relationship between bank credit and agricultural output by Chisasa and Makina (2015),in South Africa, thestatistics demonstrated a positive and significan influence of bank credit on agricultural output in the long run.. However an indirect relationship was revealed at the short run between bank credit and agricultural GDP.

Ajuduaet al. (2015), empirical investigation on the effect of monetary policy variables on the agricultural(GDP) in Nigeria, from 1986-2013 the results indicate a positive and significant relationship between agricultural GDP and intrest rate. 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. Also a positive and significant relationship between money supply and agriculture gross domestic product was observed.

A study conducted on the impact of macroeconomic variables on agricultural output in Malaysia by Kadir and Tugaal (2015),from 1980-2014,from the results it was deduced that a a negative and siginificant relationship occurred between agricultural output and echange rate at the long run,while the short run relationship showed a positive and siginificant influence between agricultural GDP and interest rate. Busari et al. (2006) examination on the implications of the exchange rate regime on the ability of monetary policy to stabilize the economy. The study argued that economy is enhanced by monetary policy which could stabilize economic growth.Though the study suggested using monetary policy as to target inflation,this will stimulate economic growth better.

Okonkwo, Egbulonuand Emerenini (2015) probed into the monetary impact on the manufacturing in Nigeria.The results of their finding both money supply and finanacial assistance to manufacturing industries has a significant influence on the growth of the industries.

Analysis of monetary transmission in Croatia by Vizek (2006). The findings showed that monetary policy affects industrial output through changes in the exchange rate and money supply, while interest rate changes do not have any influence.

The role of monetary policy on economic activity in Sudan for the period 1990 to 2004 by Abdurrahman (2010) argued that monetary policy had little impact on economic activity.

Saygin and Evren (2010) in their study ofsectoral growth cycles and the impact of monetary policy in the Turkish manufacturingindustry.They opined that the manufacturing sectors respond to monetary policy shock and reduction in absolute output.

Onyeiwu (2012) investigated effect of monetary policies on selected macroeconomic variables (GDP, inflation rate and balance of payment), 1981 and 2008. He found that monetary policyhas a positive and significant effect on GDP growth and Balance of Payment but a negative and significant effect on rate of inflation.

Ditimi, Nwosa and Olaiya (2011) in the study of effect of monetary policy on macroeconomic variables in Nigeria for the period 1986 to 2009. The study showed that monetary policy had a positive and significant influence in maintaining price stability within the Nigeria economy.

Nwosa and Saibu (2012) explored transmission channels of monetary policy impulses

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on sectoral output growth in Nigeria for the period 1986 to 2009.,the statistics showed that interest rate channel was most effective in transmitting monetary policy to Agriculture and Manufacturing sectors.Imoughele and Ismaila (2014) investigate relationship between manufacturing sector output and monetary policy variables,they argued that there was a long run relationship between manufacturing sector output and monetary policy variables.

Muftaudeen and Hussainatu (2014), examined effects of macroeconomic policies on agricultural output in Nigeria,between 1978-2011.They submitted that government expenditure positively and significantly effect on agricultural productivity whiles credit to agriculture had a negative significant effect on agricultural productivity in the short-run.

## III. RESEARCH METHODOLOGY

### 3.1 Type and Sources of Data

Secondary data obtained from the Nigerian Bureau of Statistics (NBS), World Bank and Central Bank of Nigeria(CBN) between (2005-2020).

#### 3.1.1 Methods of Data Analysis

#### 3.1.2Stationality Test

Determination of the variables stsbility was ensured through the use of Augmented Dickey-fuller (ADF) test of stationarity of the variable s, as to avoid spurious results.If the Augmented Dickey-Fuller test statistic is greater than the critical value at the prescribed significance level of 5%, the variable is said to be stationary; otherwise, it is not stationary.

#### 3.1.3 Variables used

(i)Dependent variables
Agricultural gross domestic product (AGDP)
(ii) Independent variable
Exchange Rate(EXC), Inflation Rate(INF) Interest rate(INT) Money Supply(MS) Agricultural Credit(AGCR).

#### 3.3.4 Model Specification

The economic model for the study is adapted from Muroye et al.(2014) is been specified below:AGDP = F(AGDPt-$_i$ , EXC, INF, INT, M2, AGCR)
Logging the above equation we obtained:

$$\Delta LNAGDP = X_0 + \beta_1 LNAGDP_{t-i} + \beta_2 \Delta InEXC_{t-i} + \beta_3 \Delta INF_{t-i} + \beta_4 \Delta INT_{t-i} + \beta_5 \Delta LNMs + \beta_6 \Delta LN\ AGCR_{t-i} + U_{t-i}$$

Where
AGDP = Agricultural Gross Domestic Product
EXC= exchange rate
INF= Inflation rate
INT=Interest rate
MS = Money supply
AGCR= Agriculture credit

## IV. RESULTS AND DISCUSSION

### 4.1 Unit Root Test

Om table 1 below, the ADF unit root test results should that all the tested variables were not stationary at the their levels but became stationary at the first differencing.i.e. these variables were integrated at order(1).

**Table 1 : Unit Root Table**

| | At levels | | | at first differences | | |
|---|---|---|---|---|---|---|
| Variables | intercept | trends& | none | intercept | trend & | none |
| Constconst | | | | | | |
| LNAGDP | -0.57 | -2.27 | -1.12 | -9.34 | -9.61*** | -9.11*** |
| LNEXC | -0.36 | -6.58 | -1.27 | -3.61 | -5.42*** | -4.15*** |
| INF | -2.48 | -3.89 | -1.87 | -7.18 | -9.33*** | -9.41 |
| INT | -4.36 | -4.75 | -1.07 | -4.43 | -4.72*** | -4.84*** |
| LNMS | -0.33 | -0.99 | -2.94 | -6.15 | -5,66*** | -9.50*** |
| LN AGCR | -1.96 | -3.78 | -0.17 | -9.13 | -1.70*** | -8.30*** |

Note: probability significant level; ***= 1%
,**=5%
and * = 10%

### 4.1 Co-integration Test

Table 2 indicate long run relationship between dependent variables and independent variables. The Johansen co-integrations test results revealed presence of two co-integrations equation in the model (P<0.05%) while using maximum Eigen value criteria. It reveal that there is more than one co-integration equation (P<0.01% ).

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**Table 2: Co-integration Table**

| Eigen value | Likelihood ratio | 5% critical value | 1% critical value | Hypothesized No of C.E (s) |
|---|---|---|---|---|
| 0.8928 | 120.680 | 66.51 | 70.82 | none |
| 0.4535 | 54.680 | 46.31 | 52.66 | at most 1 |
| 0.5235 | 47.603 | 29.41 | 34.35 | at most 2 |
| 0.6284 | 28.504 | 15.55 | 35.06 | at most 3 |
| 0.4472 | 14.448 | 44.68 | 21.06 | at most 4 |
| 0.2168 | 12.137 | 4.74 | 6.69 | at most 5 |

Note: probability significant level; ***= 1%
,**=5%
and * = 10%

**4.2 Granger Causality Test**

Table 3 below depictsThe Granger causality test results, it reveals that at 5% significant level, there was a unidirectional causal relationship running from AGDP to EXC; however, bidirectional causality running from INF to AGDP and AGDP to INF, also observed.

Unidirectional causal relationship was seen running from AGDP to INT and AGDP to MS. Log AGCR does not Granger Cause Log MS but significant with 0.033 at 5%.

**Table 3: Granger Causality Table**

| Null hypothesis | obs | f-stat | Probability |
|---|---|---|---|
| Log EXC does not Granger cause Log AGDP | 32 | 0.3084 | 0.6461 |
| Log AGDP does not Granger cause log EXC | | 4.0813 | 0.0054** |
| Log INF does not Granger Cause log AGDP | 32 | 4.5372 | 0.0019** |
| Log AGDP does not Granger Cause log INF | | 2.6513 | 0.0102** |
| Log INT does not Granger cause log AGDP | 32 | 0.5839 | 0.506 |
| Log AGDP does not Granger cause log INT | | 3.3491 | 0.028*** |
| Log Ms does not Granger cause log AGDP | 32 | 1.03034 | 0.343 |
| Log AGDP does not Granger cause log Ms | | 2.6859 | 0.042*** |
| Log AGCR does not Granger cause log AGDP | 32 | 0.7813 | 0.232 |

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| | | | |
|---|---|---|---|
| LOG AGDP does not Granger cause log AGCR | | 3.1434 | 0.078 |
| Log EXC does not Granger cause log INF | 32 | 5.6831 | 0.872 |
| LOG INF does not Granger cause log EXC | | 0.4304 | 0.152 |
| Log INT does not Granger cause log Ms | 32 | 0.9192 | 0.056 |
| Log Ms does not Granger cause log INT | | 4.0984 | 0.472 |
| Log AGCR does not Granger cause log Ms | 32 | 0.7831 | 0.033** |
| Log Ms does not Granger cause log AGCR | | 1.7844 | 0.103 |

Note: probability significant level; ***= 1%
,**=5%
and * = 10%

**4.3 Regression Test**

Regression results below showed that three varaibles are positively and significantly influenced agricultural outputs. These are Money supply(MS),Interest rate(INT) and Exchange rate(EXC).The implication of this statistics is that agricultural productivity is enhanced by these factors, hence a worthwhile production efficiency.

From this regression result, the Adj.$R^2$ of 0.82429 imply that the explanatory variables explain 82.4% of the rate of change of total factor productivity(agricultural output). The remaining 17.6% is explained by variables not captured in the model..

**Table 4: Regression Table**

| Variable | Coefficient | Standard error | P. value |
|---|---|---|---|
| Log intercept | 5.3425 | 0.0782 | 0.0216** |
| Log MS | 1.0653 | 0.0215 | 0.0000** |
| Log INT | 0.1571 | 0.0024 | 0.0000** |
| Log INF | -0.0098 | 0.0029 | 0.6820 |
| Log EXC | 0.0069 | 0.0022 | 0.0000** |
| Log AGCR | -0.0462 | 0.0077 | 0.3129 |

$R^2$= 0.83429
Adj.$R^2$ = 0.82410
F-statistic = 82.13
Prob (F-statistics) = 0.000001
DurbinWatson = 1.805328m
Note: probability significant level; ***= 1%
,**=5%
and * = 10%

## V. SUMMARYAND CONCLUSIONS

The study examines the impact of monetary policy variables on the agricultural sector in Nigeria from 2005-2020.Augumented Dickey Fuller(ADF) to check variables stationarity was used and multiple regression equation was employed to ascertain the economic relationship between Agriculture Gross Domestic Product (AGDP) as the dependent variable, and Money Supply (MS), Interest Rate (INT), Agricultural

credit (AGCR), Exchange rate(EXC) and Inflation Rate (INF) as independent variables was carried out. The unit root test to check for stationarity of variables and the Johansen co-integration test to establish long run equilibrium relationship between the dependent and explanatory variables were employed. The study revealed that there exist a relationship between monetary policy and agricultural output in Nigeria.

with an increase in the budgetary allocation to agricultural output, and the effective utilization of these allocated funds, an effective and prudent management of monetary policies with concessionary low interest rate to encourage investment in the sector all proffered as recommendations to improve the agricultural output.

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