



Selected Macroeconomic Variables and Agricultural Sector in Nigeria

¹James Ese Ighoroje, ²Catherine, Ogheneovo Orife

1Department of Banking and Finance, School of Business Studies, Delta State Polytechnic, Ozoro, Delta State

2Department of Accountancy, School of Business Studies, Delta State Polytechnic, Ozoro, Delta State

Correspondence should be addressed to : **James Ese Ighoroje**

Received: 10, May, 2021

Accepted: 14, June, 2021

Published: 25 June 2021

Abstract

The study investigated effect of selected macroeconomic variables on agricultural sector output in Nigeria from 1987 - 2019. Annual Agricultural Output (AAO) represented the dependent variable for the study while gross domestic product, interest rate, money supply, and exchange rate represented the explanatory variables. Ex-post factor research design was employed for the study. Augmented Dickey Fuller Unit Roots test and Ordinary Least Square (OLS) Regression techniques were used to analyze data collected. The empirical investigation showed that gross domestic product as well as money supply has a positive and significant effect on agricultural output, while interest rate and exchange rate exerted a negative and insignificant effect on agricultural output. From the study, selected macroeconomic variables have positive effect on agricultural output in Nigeria and this has tremendously contributed to the country's growth and development. The study recommends amongst other; that government should accelerate the rate of economic growth by investing heavily on the agricultural sector so as to boost domestic production and enhance exportation in order to stabilize exchange rate while curbing inflation; give incentives to banks extending agricultural loans by lowering the lending rate on agricultural loans to ease access to funds for agricultural investment.

Key Words: Agricultural Output; Gross Domestic Product; Interest Rate; Money Supply; Exchange Rate

1. INTRODUCTION

A major goal of macroeconomic policy is to achieve sustainable economic growth and development. The performance of the national economy is influenced by the government of Nigeria through fiscal and monetary policies. For instance, altering the level of taxation, government spending, or the supply of money or credit to the economy. By adjusting these policies, the national income, prices, interest rates and exchange rates are affected thereby influencing economic development (Aroriode & Ogunbadejo, 2014). Macroeconomics is still an evolving science but the goals of macroeconomic policy have been uniform globally. These include price stability, foreign exchange stability, full employment, balance of payment equilibrium, economic growth and development.

Although these policies are very important, they could not be pursued simultaneously because some of them conflict with one another.

Nigerian neglected agriculture during the oil boom of the 1970s. This neglect in favor of a mono-cultural economy that relies on oil seems to be the root cause of the economic down turn in Nigeria. Before this period, the structure of the Nigerian economy was principally agrarian with agriculture, solid minerals and other metals forming the bedrock of the economy. Prior to the early 2000, agriculture in Nigeria contributed about 40% of the GDP (Yusuff, Afolayan and Adamu 2015). However, available statistics

show that agriculture contribution to the GDP averaged 21.91% especially from 2009 and 2019 while the average employment contribution of agriculture to total employment averaged about 44.18% between 1991 to 2019 (GlobalEconomy.com, 2019; O'Neill, 2021). The global ranking for agriculture contribution to total employment is 23.40% according to the same source.

With this poor contribution to the GDP, it would rationally be expected that the agricultural sector receives prime attention from government and private enterprises particularly in the area of funding. On the contrary, successive governments over the years ignored agriculture and depended on capital-intensive oil sector. Yusuff, Afolayan and Adamu (2015) argue that this has kept, Nigeria's agriculture at bay with subsistence agriculture the common practice. This has resulted to about 80 percent of agricultural output coming from rural farmers who live on less than a dollar per day, earned from farming less than one hectare (2.7 acres). In this regard, Nigeria has dropped from being a major net exporter of agricultural produce and a sole foreign exchange earner before the oil boom in 1970s to a huge net importer of agricultural products.

Agriculture has posited by Ekefere, (2012), is the systematic raising of useful plants and livestock under the management of man. Emanating from this, "agriculture" may be viewed as: the art and science of growing plants and other crops as well as the raising of animals for food, other human needs, or economic gain. Therefore, agriculture is both an art and a science and therefore

includes specialized disciplines; the words “growing” and “raising” are descriptive of enterprise, activity or practice. It is divided into two divisions namely; plant or crop production, and animal or livestock production. Meanwhile, its ultimate purpose is for food production, other human needs, or economic gain.

The role of agriculture in any economy is indeed significant and requires no debate. Apart from being the dominant sector, it is also a major source of livelihood for citizens. Agriculture has shifted from only providing food for the population, it is the unique source of raw materials that other sectors depend on for their production to take place (Aroriode, & Ogunbadejo, 2014). Aroriode and Ogunbadejo equally posited that Animal husbandry provides agro-allied products for industrial growth and development, employment opportunities especially to the rural dwellers; market for the industrial sector; the needed linkage between the traditional sector and the modern sector; ensures food security and thus serves as a catalyst for the growth of the entire economy.

Muftaudeen and Hussainatu (2014), posited that the increasing production in agriculture is regarded as the most vital attendant for achieving industrialization. It accounts for about 70 percent of the sectors that generate employment for the working population (Ojede & Daigyo, 2013). In Nigeria, the mainstay of the economy before the 1970s was the agricultural sector.

Finance has been attributed as a major factor hampering agriculture production (Sunday, Ini-mfon, & Daniel, 2012). This has led to the establishment of a series of programmes, polices as well as institutions that aimed to provide easy finance to the sector with Commercial Banks at the center. Over the years, Agricultural credit has been a measure source of financing for the development of Nigerian agricultural sector (CBN, 2013). Both micro and macro sources of finance have been used.

Commercial bank financing constituted the micro sources while agricultural funding through capital mobilization and allocation by government through such agencies as rural banking development programmes, Nigerian Agricultural Cooperative and Rural development Bank (NACRDB) and the Central Bank of Nigeria (CBN) constituted the macro sources (Aroriode, Ogunbadejo, & Kehinde, 2014).

1.1 Statement of the Problem

Nigeria is endowed with agricultural resources, but still suffers from a slow and steady plummeting contribution to the total output of the nation's economy. For instance, prior to the 2000, agriculture in Nigeria contributed about 40% of the GDP (Yusuff, Afolayan, & Adam, 2015) However, available statistics show that agriculture contribution to the GDP averaged 21.91% especially from 2009 to 2019 (Aroriode, Ogunbadejo, & Kehinde, 2014; O'Neill, 2021)

Aroriode, Ogunbadejo, & Kehinde further posited that after contributing 65-70% of total exports in the 1960s and about 40% in the 1970s, it dropped drastically to less than 20% of total export in the late 1990s. Although a lot has been done in terms of various policies to attend to agricultural problems in Nigeria, many of the policies have not adequately attended to agricultural problems and extant studies including Chris and Mbat (2016); Nwaolisa and Ananwude (2016); Chandio et al. (2016) on the subject have produced inconclusive results. The problem may be emanating from the fact that policies used were not holistic and far reaching enough. The present study has incorporated a broad spectrum of macroeconomic variables in its model to critically examine macroeconomic policy instruments that might be significant in proffering a practicable solution to agriculture in Nigeria.

1.2. Significance of the Study

The findings of this study will be beneficial to the society considering Agricultural productivity is said to be one of the most important sectors that can really contribute to economic growth and development of the nation

For the researchers, the study will help us to uncover critical areas that many researchers were not able to explore. The implication is that better policies may be formulated based on the recommendations of the study.

To the academia, this study hopes to assist in the knowledge and provide help for other researchers to complete their study. Thus, it will be of immense benefit to students who intend to do more research in this area and thus serve as reference material in the areas

1.3 Objectives of the Research

The major objective of this study thus evaluate the impact of selected Macro economic Variables on Agricultural Sector in Nigeria covering the period 1987 - 2019 . The study is specifically aimed at achieving the following objectives: To determine the impact of; Gross Domestic Product ;, and interest, Money Supply, and Exchange Rate on Agricultural output in Nigeria.

1.4 Research Hypothesis

The study is guided by the following null hypothesis:

- H1: There is no significant relationship between Gross Domestic product and agricultural output in Nigeria
- H2: There is no significant relationship between Interest Rate and agricultural output in Nigeria
- H3: There is no significant relationship between Money Supply and agricultural output in Nigeria
- H4: There is no significant relationship between Exchange Rate and agricultural output in Nigeria

1.5 Methodology and Data

An ex-post facto research design will be adopted for this study because the data are time series since data were sourced from, Central Bank of Nigeria Statistical Bulletin, CBN Annual Reports and Statement of Accounts. The independent variables are gross domestic product, interest rate, money supply and exchange rate (x) while agricultural sector is the dependent variable (Y) which will be proxied by agricultural output (AOT)

1.6 Literature Review

1.6.1 Conceptual Framework of Economic Variable:

GDP is a measure of the annual improvement in the standard of living of the average citizen/resident of a country and it takes into account all the production inside a country, independent of whose, domestic or foreign, owns the production site. What is important is that the production takes place inside the territory of the country (Idoko, Eche, & kpeyol, 2012)..

Interest rate is the cost of borrowing money (Quadir, 2012). Rising interest rate signals an expanding economy and when already high interest rate begins to rise even further and faster, it is a sure sign of the onset of inflation.

Inflation

Inflation in an economy can be associated to increase in aggregate demand that is without an increase in aggregate supply. An increase in any component of aggregate demand can amount to demand-pull inflation. Inflation can as well be recorded as decrease in aggregate supply which occurs as soon as businesses find that production inputs prices have risen. Such occurs when labour cost and the price of raw materials have risen Barakat, Elgazzar and Hanafy (2016). Money supply is the injection of money into the financial system. It is an important macro-economic tool for stabilizing the economy when there is recession

Exchange Rate

According to Fabozzi and Peterson (2003) Exchange rate is the rate at which one nation's currency is exchanged with another country's currency. If one nation's exchange rate is higher than another one, it affects the purchasing power of the lower exchange rate of a particular country. For example, if the naira rate is lower in comparison to American dollar an American will have a higher purchasing power than a Nigerian.

Exchange rate plays a major role in international economic transactions since no nation can remain in isolation due to varying factor endowments and following the theory of comparative advantage. Exchange rate volatility may have ripple effects on other economic variables such as interest rate, inflation rate, import, export, output, etc (Osiegbu and Onuorah, 2012).. These, underscore the significance of exchange rate to the economic stability and health of every country that opens its doors to international trade in goods and services.

It can therefore be seen that exchange rate is a key connection between the domestic economy and other economies in the world. This explains why exchange rate becomes extremely important because it connects the price systems of two different countries enabling international trade to make direct comparison of traded goods. In international transactions where countries require commodities and services for development purposes, they have to settle bills by paying for their purchases and balance for their sales. To effect such transactions, an international acceptable mode of payment is required and this brought about the idea of foreign exchange. Thus, it links domestic prices with international prices and coupled with its effects on the volume of imports and exports, exchange rate seems to exert a enormous influence on a country's balance of payments position (Fabozzi & Peterson, 2003).

Although the Naira exchange rate seemed to have witnessed sporadic relative stability since when the Structural Adjustment Programme (SAP) was implemented in 1987, it has in general, continued to steadily depreciate at a rate that has marred the economic performance of the country. The effect of oil price increase as well as exchange rate volatility on macroeconomic stability and economic growth could be hazardous to an oil producing nation like Nigeria with huge oil revenue inflow resulting to expanded government spending and dwindling oil revenue resulting to government deficit (Aliyu, 2009).

Appreciation or depreciation of real exchange rate is an indicator of the strength or weakness of currency in relation to foreign currency and a standard for demonstrating the competitiveness of domestic industries in the world market. If a currency of a nation depreciates, it implies that it will require more of that currency to purchase a foreign currency and the reverse happens if the domestic currency appreciates (Jhingan, 2005) However, over appreciation of the real exchange rate may result to current account problems as this leads to overvaluation

Interest Rate

Interest rate is the rate at which interest is paid by a borrower (debtor) for the use of money that they borrow from a lender (creditor). High interest rate crowds out private investment leading to reduced economic growth. On the contrary, it may attract foreign capital inflows which may result into increased debts. It is measured in percentages but will be converted to decimal points for easier analysis.

In Nigeria, interest rate policy is among the key policy instruments employed by the central bank as they implement their monetary policy especially with regards to the mobilization of financial resources

In Nigeria, interest rate is one of the key monetary policy instruments meant for mobilization of financial resources with the goal of promoting economic growth as well as development. It can be viewed also as the price paid for the use of money, or in terms of the opportunity cost of borrowing money from a lender.

It can also be seen as the return being paid to the provider of financial resources. It is an important economic price irrespective of whether it is viewed as cost of capital, or as an

Opportunity cost of funds. Whichever way, interest rate would always have fundamental implications for the economy either by impacting on the cost of capital or by influencing the availability of credit, by increasing savings (Babajide, Lawal & Somoye, 2016).

Interest Rate Spread: this is the variation between Nigerian deposit rate and that of their lending rate. In most cases it is considered to equals the difference between Central Bank Monetary Policy Rate and the actual rate at which commercial banks otherwise known as Deposit Money Banks lends to their customers (Anthony , Uzomba & Olatunji, 2013).

Money Supply

Money supply here is represented by broad money supply, generally denoted by M2 (broad money) and connotes the total money supply in the Nigerian economy as defined by the Central Bank. Logic demands that an increase in money supply would invariably bring about an increase in liquidity in the economy and subsequently leading to an increase in the purchasing power of Nigerian citizens. This implies that more money is available for consumption, and secondly, for investment. A positive relationship should therefore be expected between money supply and agricultural output as more money means more consumption and more investment, while more investment results to higher output. There is excess money supply when the amount of money in circulation is higher than the level of total output of the economy. This situation if it persists for long may result to inflation which is defined as a persistent increase in the prices of goods without a corresponding change in the value of those goods Barakat, Elgazzar & Hanafy, (2016)..

Economists and policy makers conduct valuation and analysis of the money supply to enable them frame or alter the existing policy by increasing or reducing the supply of money. This exercise would ultimately affect the business cycle and invariably the economy at large. The Central Bank of every economy periodically publishes the money supply data based on preset monetary aggregates. The Central Bank controls money supply by employing the monetary policy rate (MPR). . MPR is the interest rate the Central bank charges commercial banks as she lends money to them. It is a major and one of the most usable monetary policy instruments at the control of Central Bank to control money

supply and thus inflation rate. If the Central Bank wishes to curb money supply, it will increase the MPR, and vice versa. Therefore, money supply is an important macroeconomic factor that affects economic activities and this justifies its control by the central monetary authority of any given economy (Mohamed & Sri, 2016).

Theoretical Framework

This study anchored upon the Solow Growth Model or Neo-classical Growth Theory. This model asserted that an economy's growth rate is dependent on two factors. The main work on neo-classical growth theory model was done by Robert and Trevor in 1946 and was extended in 1956 by Harrod-Domar model. The work of Harrod-Domar was extended and expanded by Solow who adds labour as a factor of production and making capital labour ratios flexible unlike in the Harrod-Dommar model where they are fixed. The Solow growth model shows how an increase in capital and labour force and advancement in technology can influence entire economic growth and development. The model specification is that output is a function of capital and labour that is

$$V=f(K,L)$$

Where V= output, K=capital and L=Labour.

Some of the assumptions of the models are;

All savings in the economy are channeled to investment opportunities and augmentation of physical capital stock (Kuleratne, 2001)

Depreciation of capital rate is assumed to be zero No technical progress

Population growth rate assumed to be fixed.

The summary of the Solow growth model shows that an increase in output is dependent on a higher rate of savings via higher stock of capital (Mankiw, 2002). The model indicates that a long run increase in labour will reduce the level of output if there is no improvement in technological progress that will enhance the efficiency of labour. The theory therefore concludes that the long run equilibrium growth rate depends on two exogenous variables: the rate of population growth and rate of technological change (Froyen, 2007). Froyen (2007) further posits that the theory provides little reference to the importance of finance in economic growth other than making reference to savings which does not affect the growth at long run. This theory has bearing to the study because financial development comes in form of technical innovations into the financial system that spurs growth of the system and enhances services to the economy and agricultural sector in particular

1.6.2 Previous Studies

Eneji, Dimis and Rose (2017) examined the impact of economic recession on macroeconomic stability and sustainable development in Nigeria. The study used multiple regression analysis of time series data on selected macroeconomic variables in two econometric models. The results showed negative impact of these variables on economic growth and sustainable development. The recession impacted on socioeconomic and political lives in Nigeria, needed to be studied in other to find the root causes and proffer solutions so as to ensure economic sustainability and development of the Nigeria economic.

Using exponential general autoregressive conditional heteroskedasticity estimation techniques Babajide, Lawal and Somoye (2016) examined the relationship between macroeconomic

variable volatility and stock market return within the context of Blanchard (1981) extension of the Hicks (1937) IS-LM hypothesis analyzed monthly data sourced from the central bank of Nigeria from January 1985 to December 2013. The result of the study showed that stock prices responded significantly to innovations in the interest rate and the real gross domestic product (RGDP),

Davis and Emerenini (2015) investigated the impact of interest rate on investment in Nigeria. Multiple regressions were used as the statistical method for the study which revealed that high interest rate negatively affects investment. The study recommended that appropriate monetary authority should advance policies that will encourage savings and also reduce prime lending rate to savvy investors, among others.

Diala, Kalu, and Igwe-Kalu (2016) examined the relationship between commercial property market and foreign exchange markets in Nigeria from 2000 to 2010 with the aim of determining the effects of Naira/US Dollar exchange rate volatility on commercial property returns in Nigeria. This study was motivated by the progressive Naira/Dollar exchange rate regime and its potential consequences on real estate investment decision making. The Exponential Generalized Auto-Regressive Conditional Heteroscedasticity (EGARCH) was used in establishing the relationship between exchange rate volatility and property investment returns volatility in Nigeria. It was found that there exists a positive insignificant relationship between commercial property returns and Naira/US Dollar exchange rate movement in Nigeria.

Chandio et al. (2016) analyzed the impact of formal credit on agricultural output in Pakistan by using secondary data from 1996 to 2015. The findings showed that formal credit has a positive and significant impact on agricultural output.

A study by Chris and Mbat (2016) with data collected from the central bank of Nigeria statistical bulletin, employing ex-post facto research design and using Ordinary Least Squares Regression technique examined the effect of commercial banks' credit on agricultural output in Nigeria. The estimated results showed a positive and significant relationship between agricultural credit guarantee scheme fund and agricultural production in Nigeria; a positive and significant relationship between commercial banks credit to the agricultural sector and agricultural production in Nigeria; a positive and significant relationship between government expenditure on agriculture and agricultural production in Nigeria; and a negative relationship between interest rate and agricultural output in Nigeria thereby confirming theoretical postulations. This result signified that an increase in commercial banks credit to agricultural sector led to an increase in agricultural production in Nigeria and that an increase in the rate of interest on borrowed funds is a deterrent to many farmers who may opt to reduce or fail to borrow thereby stalling the rate of investment on agriculture. This had negative consequences agricultural output.

However, most of these studies were done in an environment outside that of Nigeria. Again, these studies could not use the core variables that capture the effect of selected macroeconomic variables on agricultural sector and the results from these studies are conflicting. These shortcomings have somehow contributed to the knowledge gap in the literature, thus warranting a more systematic and comprehensive study on the effects of selected macroeconomic variables on the agricultural sector in Nigeria. This study seeks to improve on the past studies by making use of a broad data set spanning from 1987 to 2019

2. Empirical Analysis

2.1 Model Specification:

The model which is adopted for the study is the model of Muftandeen and Hussain (2014) which examined macroeconomic policy and agricultural output in Nigeria. This study has contributed to knowledge by expanding the sope from 1087 t0 2019 and incorporating exchange rate into the multivariate model,

The model is stated thus:

$$AOT = f(GDP, ITR, M2)$$

Where:

AOT = Agricultural Output.

GDP= Gross Domestic Product

ITR = Interest Rate.

M2 = Money Supply

The model will be modified as follows

$$AOT = f(GDP, ITR, M2, EXR)$$

$$AOT = \beta_0 + \beta_1GDP + \beta_2ITR + \beta_3 M2 + \beta_4EXR + \mu - \dots - 1$$

Where:

AOT = Agricultural Output

GDP= Gross Domestic Product

ITR = Interest Rate

M2 = Money Supply

EXR= Exchange Rate

B0 = The constant term

B1- B4 = the coefficients of the explanatory variables Ut = Error term

Table 1: The Descriptive Statistics

Mean	2.332788	205053.1	2234.52	4067.800	3146.800
Median	0.078000	72542.00	405.0000	2489.000	681.0000
Maximum	0.578000	406992.0	65374.00	42348.00	7616.000
Minimum	0.012000	2153.000	107.0000	143.0000	356.0000
Std. Dev.	0.135964	103868.6	23906.85	5837.354	2833.232
Skewness	2.467154	1.342420	1.820587	1.290438	0.606183
Kurtosis	9.953294	4.165351	4.828068	3.111696	1.613795
Jarque-Bera	75.72468	8.923340	17.29165	6.951451	3.532703
Probability	0.000000	0.011543	0.000176	0.030939	0.000956
Sum	3.319700	2701327.	328363.0	129695.0	68920.00
Sum Sq. Dev.	0.669046	2.59E+11	1.37E+10	8.18E+08	1.93E+08
Observations	32	32	32	32	32

2.2.2 Unit Root Test

Table 2: Summary of the Unit Root Result

Variables	T-statistics	Probability	Order of Integration
AOT	-6.088595	0.0000	1(0)
GDP	-3.867397	0.0063	1(0)
ITR	-4.619034	0.0010	1(0)
M2	-5.531824	0.0001	1(0)
EXR	-9.281478	0.0000	1(0)

The table above shows that agricultural output, gross domestic product, interest rate, money supply and exchange rate attained stationarity at level. Therefore, all the variables are stationary at 1(0)

2.2.3 OLS Results:

Table 3: Ordinary Least Square Regressions

Dependent Variable: AOT
Method: Least Squares
Date: 06/20/20 Time: 09:42
Sample: 1987 2019

β_0 and μ are the constant and error term respectively while β_1 , β_2 , β_3 , and β_4 are the coefficient of selected macroeconomic variable on agricultural sector output in Nigeria

2.2 Method of Analyses

The data will be analyzed with econometric techniques involving descriptive statistics, Augmented Dickey Fuller tests for Unit Root and the Ordinary Least Square (OLS) for test of hypotheses.

2.2.1 Data Analysis

The variables of the study shown on Table 1 below indicate that agricultural output (AOT) has mean of 2.33 with minimum value of 0.012 and maximum value of 0.578 respectively. However, the standard deviation is 0.135 indicating low variation in agricultural output (AOT). This means that the value of selected macroeconomic variables in Nigeria is relatively predictable and less risky. This is capable of encouraging investment in Nigeria.

Gross Domestic Product has a mean of 205 with a minimum value of 215 and maximum values of 408 respectively. Interest rate has a mean of 223 with minimum value of 107 and maximum values of 653 respectively. Money supply has a mean of 406 with minimum value of 143 and maximum values of 423 respectively. Exchange rate has a mean of 314 with a minimum value of 356 and maximum values of 761 respectively.

Included observations: 32				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.301739	0.146105	2.065220	0.0532
GDP	2.031447	0.021113	2.963169	0.0043
ITR	-0.313365	0.019159	-0.587643	0.3852
M2	3.251443	0.033448	2.626423	0.0023
EXR	-1.217301	0.012804	-1.236732	0.6324
R-squared	0.750802	Mean dependent var		0.433810
Adjusted R-squared	0.738503	S.D. dependent var		0.077941
S.E. of regression	0.058403	Akaike info criterion		-2.638627
Sum squared resid	0.054575	Schwarz criterion		-2.389931
Log likelihood	32.70559	Hannan-Quinn criter.		-2.584654
F-statistic	4.904765	Durbin-Watson stat		2.343716
Prob(F-statistic)	0.004661			

2.3.4 Discussion of the Results:

It can be observed that the regression line has a positive intercept as presented by the constant (c) = 0.301739 which is statistically significant at 0.05%.

Gross Domestic Product (GDP): The coefficient of gross domestic product is positive at 2.031447 with t-Statistic of 2.963169 and probability value of 0.0043 which means that gross domestic product has positive and significant effect on agricultural output (AOT), a unit increase in gross domestic product (GDP) will cause agricultural output (AOT) to increase by 2.031447 units.

Interest Rate (ITR): The coefficient of interest rate is negative at -0.313365 with a t-statistics value of -0.587643 and a probability value of 0.3852 which is highly insignificant. This shows that interest rate has a negative and insignificant effect on agricultural output. A unit increase in interest rate will cause agricultural output to decrease by -0.313365 units.

Money Supply (M2): The coefficient of money supply is positive at 3.251443 with t-statistics value of 2.626423 and a probability value of 0.0023 which means that money supply has positive and significant effect on agricultural output. A unit increase on money supply will cause agricultural output to increase by 3.251443 units.

Exchange Rate (EXR): The coefficient of exchange rate is negative at 1.217301 with a t-statistics value of -1.236732 and a probability value of 0.6324. This indicates that exchange rate has a negative and insignificant effect on agricultural output. A unit increase in exchange rate will cause agricultural output to decrease by 1.217301 units

The Adjusted R-squared is 0.738503 which means that 74% of total variation in agricultural output can be explained by the variables, namely GDP, ITR, M2 and EXR while the remaining 26% is due to other stochastic variables. The Durbin-Watson statistics at (2.343716) which means the model is free from autocorrelation. The F-statistic is 0.004661 which means that all the explanatory variables in the study have significant effect on agricultural output within the period under study.

2.3.5 Summary of Results

Test of Hypotheses

The statistical significance of the individual parameters was used to test the hypotheses. These tests were conducted at 5% level of significance

Test of Hypothesis One

Stage One: Restatement of Hypothesis in Null and Alternate form:

Ho1: Gross Domestic Product has no significant effect on Agricultural Sector in Nigeria

Hi: Gross Domestic Product has significant effect on Agricultural Sector in Nigeria

Stage Two: Analysis of the Regression Results,

Table 4: OLS on Effect of Macroeconomic Variables on Agricultural Product

Variable	Coefficient	t-Statistic	Probability	Conclusion
Constant	0.301739	2.065220	0.0532	Statistically Positive and Significant
GDP	2.031447	2.963169	0.0043	Statistically Positive and Significant
ITR	-0.313365	-0.587643	0.3852	Statistically Negative and Insignificant
M2	3.251443	2.626423	0.0023	Statistically Positive and Significant
EXR	-1.217301	-1.236732	0.6324	Statistically Negative and Insignificant

Stage Three: Decision

From table 4, since the probability value is less than 5% (0.0043 < 0.05) with coefficient value of 2.031447 and t-Statistic of 2.963169, the study rejects the null hypothesis and accepts the

alternative hypothesis: This implies that gross domestic product has significant effect on agricultural sector in Nigeria

Hypothesis Two

Stage One:

Restatement of Hypothesis in Null and Alternate Form:

Ho2: Interest Rate has no significant effect on Agricultural Sector in Nigeria

Hi: Interest Rate has significant effect on Agricultural Sector in Nigeria

Stage Two:

Analysis of the Regression Results

Stage three: Decision

Table4, reveals that the probability value is more than 5% ($0.3852 > 0.05$) with coefficient value of -0.313365 and t-Statistic of -0.587643 , the study accepts the null hypothesis and rejects the alternative hypothesis and submit that interest rate has no significant effect on agricultural sector in Nigeria

Hypothesis Three

Stage One: Restatement of Hypothesis in Null and Alternate Form

Ho3. Money Supply has no significant effect on Agricultural Sector in Nigeria.

Hi. Money Supply has significant effect on Agricultural Sector in Nigeria

Stage Two: Analysis of the Regression Results

Stage Three: Decision

From table4, since the probability value is less than 5% ($0.0023 < 0.05$) with coefficient value of 3.251443 and t-Statistic of 2.626423 the study rejects the null hypothesis and accepts the alternative hypothesis: which means that money supply has significant effect on agricultural sector in Nigeria

Hypothesis Four

Stage One: Restatement of Hypothesis in Null and Alternate Form:

Ho4. Exchange rate has no significant effect on Agricultural Sector in Nigeria Hi. Exchange Rate has significant effect on Agricultural Sector in Nigeria

Stage Two: Analysis of the Regression Results,

Stage Three: Decision

From table 4, since the probability value is more than 5% ($0.6324 > 0.05$) with coefficient value of -1.217301 and t-Statistics of -1.236732 , the study accepts the null hypotheses and rejects the alternative hypotheses: which means that exchange rate has no significant effect on agricultural sector in Nigeria.

5. Discussion of Findings

The result of the ordinary least square (OLS) indicates that gross domestic product has positive and significant effect on agricultural sector output. The results of our findings are consistent

with the work of Yakubu and Shehu, (2013) which found that gross domestic product has positive effect on agricultural output.

Interest Rate: The result shows that interest rate has a negative and insignificant effect on agricultural output. This agrees with the work of Alex and Ebieri, (2014), in which interest rate was found to have negative relationship with agricultural output.

Money Supply: The result shows that money supply has positive and significant effect on agricultural output. The result confirms the findings of Anthony and Chukwudi (2015) which indicate that money supply has positive and significant relationship with agricultural output.

Exchange Rate: our findings show that exchange rate has a negative and insignificant effect on agricultural output. This collaborates the findings of Uchenna and Garry (2015), on this issue The Adjusted R-squared is 0.738503 . This means that 74% of total variation in agricultural output can be explained by the variables, GDP, ITR, M2 and EXR while the remaining 26% is due to other stochastic variables. The Durbin-Watson statistics at (2.343716) shows that the model is free from autocorrelation. The F-statistics is 0.004661 indicating that all the explanatory variables in the study have significant effect on agricultural output within the period under study.

6. Conclusion

The study concludes that macroeconomic variables investigated have a mixed effect on agricultural output in Nigeria in the period covered by the study. While gross domestic product and money supply each has a positive effect on agricultural output, interest rate and exchange rate have a negative effect, however, only the effect of gross domestic product is Significant implying that increase in GDP enhances agricultural output.

Recommendations

The investigation made the following recommendations;

The positive effect of gross domestic product on agricultural output calls for more government spending on the agricultural sector as such spending will provide the needed fund for farmers to increase their agricultural production. The negative effect of interest rate on agricultural output calls for policy to lower interest rate charged by deposit money banks to farmers. The lowering of interest rate will enable the famers to borrow more funds for the purpose of agricultural investment and hence increase their productive capacity. The monetary authorities (Central Bank of Nigeria) should pay special attention on broad money supply by manipulating instruments like the liquidity ratio, reserve ratio, among others which directly affects the monetary aggregate to enhance the banking sector credit in Nigeria. Exchange rate policy should aim at enhancing the value of the naira to reduce the cost of importing agricultural inputs

Reference

- [1] Adetoun Abdullahi S.I. (2012). Threshold effect of inflation on economic growth in Nigeria. CBN Journal of Applied Statistics.3 (1) 12-35
- [2] Abdullahi, F.A. (2002). Spectrum memory guide, agricultural science for senior secondary certificate examination. Ibadan: Spectrum Books Limited.
- [3] Adeniran, J.O; Yusuf, S.A., & Adeyemi, O.A. (2014). The impact of exchange rate fluctuation on the Nigeria

- economic growth: An empirical investigation: International Journal of Academic Research in business and Social Sciences, 3(4),8- 35
- [4] Afangideh, U. J (2006). Financial development and agricultural investment in Nigeria: Historical simulation approach: Journal of Economic and Monetary Integration, (1)9:75-97.
- [6] Ahmed, S. (2010). An empirical study on inflation and economic growth in Bangladesh. OIDA International Journal of Sustainable Development, Vol. 2, No. 3, pp. 41-48
- [7] Ahmed, S. (2010). An empirical study on inflation and economic growth in Bangladesh. OIDA International Journal of Sustainable Development, Vol. 2, No. 3, pp. 41-48.
- [8] Ahmed, Y. O. (1993). Bank of the north pamphlets on agricultural financing. Various circulars and policy guidelines on agricultural financing in bank of the north limited." A Paper delivered at Seminars at Bank of the North Human Resources and Development Centre by (Agric. Officer, Bank of the North Limited). Commented [U41
- [9] Aliyu, S. U. (2009) Real Exchange Rate Misalignment: An Application of Behavioral Equilibrium Exchange Rate (BEER) to Nigeria Available at SSRN: <https://ssrn.com/abstract=1333642> or <http://dx.doi.org/10.2139/ssrn.1333642>
- [10] Anthony I. I., Peter U & Richard S(2012).The impact of macroeconomic variables on non-oil exports performance in Nigeria, 1986-2010. Journal of Economics and Sustainable Development, 3(5).
- [11] Anthony I. I., Uzomba P. C. & Olatunji L. M. (2013).An analysis of interest and exchange rates effect on the Nigerian economy: 1975 – 2008: Asian Economic and Financial Review 2(6),6
- [12] Anthony O., Emmanuel O. O & Abiola O. A (2015). Impact of private sector credit on economic growth in Nigeria: CBN Journal of Applied Statistics (6),2,5
- [13] Aroriode, O. R & Ogunbadejo, H. K., (2014). Impact of macroeconomic policy on agricultural growth in Nigeria: IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS), (7),11,6
- [14] Babajide A. A., Lawal A. I., & Somoye R. O. (2016). Stock market response to economic growth and interest rate volatility: evidence from Nigeria. International Journal of Economics and Financial (6),3
- [15] Barakat, M. R., Elgazzar, S. H.,& Hanafy, K. M. (2016). Impact of Macroeconomic Variables on Stock Markets: Evidence from Emerging Markets, International Journal of Economics and Finance; 8(1): 195-207
- [16] Central Bank of Nigeria (2012). Statistical Bulletin application of reduced vector autoregressive (VAR) technique. European Journal of Accounting Auditing and Finance Research (2),9,7
- [17] Central Bank of Nigeria (CBN) (2015). Agricultural development issues of sustainability.
- [18] Chris O Udoka, Mbat, & Stephen B. Duke (2016). The effect of commercial banks' credit on agricultural production in Nigeria. Journal of Finance and Accounting, (4),5,7
- [19] Contemporary Economic Policy in Nigeria, Central Bank of Nigeria 2003, 185-213.
- [20] Dada, E.A & Oyeranti, O.A. (2012). Exchange rate and macroeconomic aggregates in Nigeria:
- [21] Davis O., & Emerenini F.M. (2015). Impact of interest rate on investment in Nigeria.
- [22] Developing Country Studies (3),5,7
- [23] Diala, A. O., Kalu, I. U. & Igwe-Kalu, A. (2016).Effects of exchange rate volatility on commercial property returns in Nigeria:African Journal of Accounting, Economics, Finance and Banking Research, (10),10,6
- [24] Econometric analysis: International Letters of Social and Humanistic Sciences Submitted, (3),5,7
- [25] Ekefere, E. D (2012). "Management and Use of Serials Collection at College of Education Library Illorin". ND Project, Library and Information Science, Federal Polytechnic Nasarawa. Pp. 40-43, 60-63
- [26] Eneji M. A., Dimis M., & Rose I. U., (2017). Impact of economic recession on macroeconomic stability and sustainable development in Nigeria: Science Journal of Economics Published (2),5,
- [27] Fabozzi, F. J., & Peterson, P. P. (2003). Financial management and analysis, Second Edition, John Wiley & Sons, Inc., New Jersey
- [28] Froyen, R. T. (2013). Macroeconomics Theories and Policies. Pearson Education Limited, University of North Carolina-Chapel Hill GlobalEconomy.com, (2019)
- [29] Idoko, I. A,Emmanue. E and kpeyol. K (2012). An assessment of the impact of interest rates deregulation on economic growth in Nigeria, IJE, 6(2):349-362
- [30] Jhingan, M.L. (2005) The Economics of Development and Planning. Vrinda Publications (P) Ltd. Delhi.
- [31] Memon, M. H, Baig W. S, & Ali M. (2008). Causal relationship between exports and agricultural GDP in Pakistan" MPRA Papers No.11845. Available at <http://mpra.ub.uni-muenchen.de/11845/>.
- [32] Mohamed A. A.L & Sri L. (2016). Impact of money supply on Sri lankan economy. Journal of Economics and Sustainable Development, (3),2,9
- [33] Muftaudeen O. O., & Hussainatu A., (2014).Macroeconomic policy and agricultural output in Nigeria: implications for food security:American Journal of Economics (2),5,7
- [34] Ojede A., Amin M., & Daigyo S. (2013). Macroeconomic policy reforms and productivity growth in African agriculture: Journal of Contemporary Policy (31),4,7
- [35] Olorunshogo (2010). Effect of monetary policy on agricultural output in Nigeria"http://www.academia.edu/1347756/The Effect of monetary policy on agricultural output_in_Nigeria
- [36] O'Neill, A. (2021). Nigeria: Distribution of gross domestic product (GDP) across economic sectors from 2009 to 2019. Statista
- [37] Onuorah, A. C. & Ozurumba, B. A. (2013). Bank credits: an aid to economic growth in Nigeria" Information and Knowledge Management, (3),3,9
- [38] Osiegbu, P.I. and Onuorah, A.C. (2011), "Fundamentals of finance". C.m. Global Co. Ltd. Cable-Point, Asaba, Delta State
- [39] Sunday, B.; Ini-mfon, V.; Glory, E. & Daniel, E. (2012). Agricultural productivity and macro-economic variable fluctuation in Nigeria: International Journal of Economics and Finance; (4),5,8

- [40] Yakubu Musa, & Aminu B. Z (2014). Relationship between Money Supply and Government
- [41] Yusuff, M.A., Afolayan, O.T. & Adamu, A.M. (2015). Analysis of Foreign Direct Investment on Agricultural

Sector and Its Contribution to GDP in Nigeria, Journal of Emerging Trends in Economics and Management Sciences, 6(2). 94-100