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Boosting Staple Food Production through Fiscal and Monetary Policy Measures: The Nigerian Experience.

Bosco, E.I.[1] and Okowa, W.J.[2]

1. *Lecturer I, Department of Economics, University of Port Harcourt, Nigeria.*
2. *Professor, Department of Economics, University of Port Harcourt, Nigeria.*

Abstract
This paper examined the relative impact of monetary and fiscal policy instruments as options for boosting staple food production. Key monetary and fiscal policy instruments were selected for this study. Time series data, covering the period 1982-2020, were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin. Both trend and econometric method of data analysis were employed in this study. Pre-estimation econometric tests (unit root and cointegration) were conducted on the time series variables. From the unit root test, a mixed order of integration among the variables was found. Hence, the adopted Autoregressive Distributive Lag (ARDL) Bounds Cointegration test shows that a long run relationship exists between the variables in the model. The study found that while monetary policy variables are largely significant in driving staple food output in Nigeria in the long run if well managed; policy variables are largely significant in driving staple food production in the short run. The study therefore recommend that government should increase her budgetary allocation to the agricultural sector in a consistent manner, government should generally cut down on her recurrent expenditure on governance and particularly in the agricultural sector to free up scarce investible resources, and that apex monetary authority should specially direct the deposit money banks to see the agricultural sector as the buffer sector.

Keywords: *Staple Food, Monetary Policy, Fiscal Policy*

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I. Introduction

The agricultural sector, according to Obayelu (2011), is fundamental to the sustenance of life and the bedrock of economic development, especially in the provision of adequate and nutritious food so vital for human development, and industrial raw materials. Moro (1995) submitted that the agricultural sector constitutes one of the most important sectors of the Nigerian economy. Its importance stems from the abundance of agricultural resources and the high percentage of the active population engaged in agriculture. In addition to this, its contribution to the country's GDP as well as foreign earnings. To buttress this point, Ajie (2008) submitted that agriculture provides human beings with some of their most basic needs. Its outputs are food and raw materials. Without the food products, life can hardly be sustained; without the raw materials, the industrial sector of the economy cannot fully develop. no country can afford to neglect its agricultural sector as it constitutes the bedrock for industrial take-off. To speed-up the pace of economic growth and development of a country, it is pertinent to increase productivity per man, and per unit of land in the production of food stuffs and agricultural raw materials. Perhaps, it can be argued that the importance of agriculture lies in the fact that it provides food for the teeming population of an economy. Every human being needs food to stay alive. Interestingly, the realization that agriculture is the panacea to the achievement of an inclusive growth due to its backward and forward linkages led to the adoption of macroeconomic policy instruments by successive governments in Nigeria to increase agricultural productivity. In Nigeria, as observed by Wilson (2002), there has been declining food production and attendant rising foodstuff prices and food import bills, which in turn implies increasing external dependency. Apart from the problem of declining food production, the output of agricultural raw materials is also declining and therefore unable to provide the necessary agricultural raw materials to the industrial sector and as export. Supporting this, Coker (2010) argued that the overall agricultural situation in Nigeria has deteriorated creating a wide gap between the supply and demand for food. Revenue from agricultural export has also dwindled, government is faced with mounting food import bills and industries have increasingly resorted to imports of agricultural raw materials, thus putting lot of pressure on foreign exchange. Ojo and Akanji (1996) also noted that agricultural outputs were inadequate, not only in relation to the committed financial resources, but also with regard to the nation's minimum needs of agricultural products. Certainly, no country can truly be great if it cannot feed her populace and no meaningful progress can be made

in other sectors of life if there is scarcity of food for the people. Therefore, this paper examines effectiveness of fiscal and monetary policies in boosting staple food production in Nigeria. In specific terms, the paper examines the:

i. effect of government capital expenditure on agriculture on staple food production;
ii. impact of government recurrent expenditure on agriculture on staple food production;
iii. relationship between deposit money banks' loans and advances to agriculture and staple food production;
iv. impact of interest rate on staple food production; and
v. effect of exchange rate on staple food production.

The following hypotheses were also tested in this paper:

H_{01}: Government capital expenditure on agriculture has no significant effect on staple food production.
H_{02}: Government recurrent expenditure on agriculture has no significant impact on staple food production.
H_{03}: Deposit money banks' loans and advances to agriculture has no significant relationship with staple food production.
H_{04}: Interest rate has no significant impact on staple food production.
H_{05}: Exchange rate has no significant effect on staple food production.

The remaining part of this paper is organised into literature review, methodology, results & discussion, conclusion & recommendations.

II. Literature Review

2.1 Conceptual Clarification

(i) Monetary Policy: Monetary policy is a deliberate action of the government designed to affect the quantity and cost of money supply. This action is usually taken by the central bank which is the highest monetary authority of a country. Put differently, monetary policy involves measures designed to regulate and control the volume, cost, availability and direction of money and credit in an economy to achieve some specified macroeconomic policy objectives. That is, a deliberate effort by the monetary authorities to control the money supply and credit conditions for the purpose of achieving certain broad economic objectives among which is adequate agricultural output.

(ii) Fiscal Policy: Fiscal policy entails government's management of the economy through the manipulation of its income and spending power to achieve certain desired macroeconomic objectives (goals) amongst which is economic growth. Put differently, fiscal policy is the part of a government's overall economic policy which aims to achieve the government's economic objectives through the use of the fiscal instruments of taxation, public spending and the budget deficit or surplus. Furthermore, fiscal policy is associated with Keynesian economic theory and policy. In addition, fiscal policy can be expansionary or contractionary in nature. An expansionary fiscal policy involves increase in government expenditure and/or decrease in taxes with the aim of stimulating aggregate demand and hence the economy.

(iii) Staple Food: Staple food is food that is routinely consumed and constitutes a significant proportion of the calorie requirements of a standard diet in a community (Syeda, Ilaiyaraja, & Farhath, 2017). A staple crop, by definition, dominates the major part of our diet and supplies a major proportion of our energy and nutrient needs. If staple crops are threatened by drought, pests or nutrient-poor soils, hunger and poverty can rise dramatically. Of more than 50,000 edible plant species in the world, only a few hundred contribute significantly to our food supplies. Almost all of the world's food energy intake is satisfied by just a few crop plants. Rice, maize and wheat make up two-thirds of this already small group of foods. These three grains are the staple foods for more than four billion people both as a source of nutrition and income (Kilian, 2012).

2.2 Theoretical Literature

The Monetarist Theory: Monetarist economists are seeking to restore neoclassical economics, the economics doctrine which Keynes overthrew and caused the capitalist world to abandon. They insist that neoclassical economics which relies on the market mechanism for the direction and regulation of economic activities in the society is in fact right, and that Keynesian economics which requires government direction and regulation of activities, is wrong. They argue that governments should stop trying to direct and regulate economic activities for they distort things and create more problems for the society when they do so, that their policies destabilize rather than stabilize the economy (Akpakpan, 1999). Moreover, the monetarists hold that money is the key determinant of macroeconomic activities. In particular, an increase in money supply leads directly to an increase in output and employment (if the economy is operating under capacity) and increases the general price level (if the economy is already operating at full capacity). Put differently, monetarists believe that money supply is the key determinant of economic activities. They infer that instability in money supply translates into observed

economic instability in economies. They believe that in a dynamic situation, it is impossible to stabilize the economy with a stop-go policy (involving monetary expansion and contraction). This is basically because of the limitation of human knowledge in precisely identifying the right solution. Additionally, there are lag problems: the recognition lag, execution lag, administration lag, etc. which lead to delays in monetary impacts or overreaction to monetary problems. For example, efforts to cure a 'recession' may inadvertently precipitate inflation, and efforts to cure inflation may bring about recession. Monetarists also believe that if the deficit is financed by borrowing directly from Central Bank, the effect will be expansionary. But they do not regard this as pure fiscal action. It is essentially a monetary action brought about by the creation of new, high-powered money (i.e., direct supply of money credit). Monetarists believe absolutely in the potency of monetary action.

The Keynesian Theory: The early economists are often referred to as the classicists. Among the leading ones were Adam Smith, J. B. Say, John Stuart Mill, David Ricardo, Alfred Marshall and A. G. Pigou. These economists, in general, took the position that the macro-economy was a stable system-always operating at full employment equilibrium. Any deviation from the position was automatically restored by flexible wages and prices (Umo, 2012). The theoretical underpinning of this self-adjusting capitalist system was given by what came to be known as Say's Law of the Market. Propounded by a French economist, Jean B. Say (1767-1832), the law simply states that 'Supply creates its own demand'. Thus, immediately something was produced, it was bought off the market. Under this situation, over-production was impossible. Any temporary deviation from full employment was quickly restored by flexible movement in wages and prices. In the classical view, full employment was the norm. There could be no long period of sustained recession or depression. This is because any fall in price would automatically lead to a decrease in wages and this will encourage businessmen to hire labour thereby enabling the economy to revert to full employment. The classical perspective as articulated above was the dominant macro-theory until the unprecedented breakdown of the capitalist system during the Great Depression of the 1930s. Contrary to the expectation of the classicists, this depression did not turn out to be a temporary, self-adjusting phenomenon. It was long-drawn lasting from 1929 to 1939 and by 1933, over a quarter of the labour force in the Western world had lost their jobs.

In scientific method, when the predictions of a theory are falsified by hard realities, then it is time to re-examine the theory and its assumptions with a view to proposing a new paradigm. This is what Keynes did in his book, The General Theory of Employment, Money and Interest. In doing this, Keynes provided both a theoretical foundation and practical policy perspective to the challenge of the Great Depression which was facing the world in the 1930s. For developing a new perspective on the working of the macro-economy, Keynes notes as follows: (a) supply does not create its own demand automatically as assumed by Say's Law of the Market. This is because savings are not automatically translated into investment so that full employment cannot be guaranteed at all times. (b) Wages and prices were inflexible not flexible as assumed by the classicists. (c) Aggregate supply of an economy represents its GDP which could be either flat or upward-sloping but not completely vertical as assumed by the classicists. (d) Aggregate demand which is defined as the sum of consumption, government expenditure, gross investment and net exports, is not necessarily stable: it can shift up or down. Following the above perspectives, Keynes reached the following fundamental conclusions: (a) a modern economy can be trapped in an underemployment equilibrium whereby AD=AS at any point less than full employment; and (b) the manipulation of aggregate demand by monetary and fiscal policies can push the economy to attain full employment. In addition, Keynes stated that all the income earned by households are not consume, (do not go for the purchase of national output) some are saved. Therefore, the economy cannot always be at full employment equilibrium. He further stated that the problem (including unemployment) that existed was as a result of insufficient spending (insufficient aggregate demand) in the system. Hence, he advocated for government intervention as the solution to the problem (i.e., he suggested a way out of the problem) which proved effective. Supporting the above, Umo (2012) submitted that, Keynesian revolution emerged to counterattack the classical tenets and to demonstrate that the capitalist system cannot run itself, and needed government as the manager.

2.3 Empirical Review

Ajudua, Davis and Osmond (2015) employed Ordinary Least Squares (OLS) regression method to investigate the impact of monetary policy variables on agricultural sector in Nigeria from 1986 to 2013. The outcome revealed that there exists a significant relationship between monetary policy and agricultural sector performance in Nigeria. Ojiegbe and Duruechi (2015) evaluated the impact of agricultural loans on food production in Nigeria. Findings revealed that agricultural loans have significant and positive impact on food production in Nigeria. Agunuwa, Inaya and Proso (2015) examined the impact of commercial banks' credits on agricultural productivity in Nigeria using Ordinary Least Squares (OLS) techniques. Commercial banks' credit and interest rate has positive and negative impact on agricultural productivity respectively. Shariff and Noor (2015) investigated the impact of macroeconomic variables toward agricultural productivity in Malaysia using annually data spanning the period 1980 to 2014. Specifically, the specific aims of the study were to examine the

short run and long run links between agricultural productivity and some key macroeconomic fundamentals in Malaysia. Through the Autoregressive-Distributed Lag (ARDL) approach, the researchers discovered that there is a long-run relationship between agricultural productivity and macroeconomic variables, namely net export, inflation rate, interest rate, nominal exchange rate, government expenditure and money supply. The notable result is only nominal exchange rate showed significant impact on agricultural productivity in the long run while the other variables do not have a significant impact upon agricultural productivity in the long run. In addition, net export, government expenditure, and inflation rate seem to influence agricultural productivity in the short run. Ogunbadejo and Oladipo (2016) examined the impact of monetary policy on fishery growth in Nigeria. The study adopted the error correction model (ECM) techniques to analyze the times series data. The result of the ECM confirmed the existence of long-run equilibrium between the dependent and independent variables. Nwokoro (2017) examined the relationship between Banks' Credit and Agricultural Sector Performance in Nigeria from 1980 to 2014. Based on the Error Correction Modeling (ECM) technique adopted, the study found out that apart from interest rate that has a negative but significant relationship, Banks' Credit to Agriculture (BCRA), Foreign Exchange Rate (FREX), Government Expenditure on Agriculture (GEXA) and Money Supply (MSPL) have a positive and significant relationship with Agricultural Gross Domestic Product (AGDP). Ekine and Nwaokedibe (2018) analyzed the effectiveness of monetary policy measures in driving agricultural output in Nigeria from 1981 to 2016. The parsimonious ECM result revealed that one period lag of money supply and deposit money bank credits to agriculture have significant positive impact on agricultural output. Wagan, Chen, Seelro and Shah (2018) investigated the impact of macroeconomic policy (i.e. monetary policy) on employment, food inflation, and agricultural growth by analysing to what extent monetary policy is effective in controlling food price inflation, the effect of contractionary monetary policy on the agricultural sector's employment and productivity, and the extent of monetary policy transmission to money market rates and 10-year interest rates. The researchers did the investigation by applying a factor-augmented vector autoregressive model proposed by Bernanke et al. (2005) to agricultural data from 1995 and 1996 to 2016 for India and Pakistan, respectively. The result revealed that tight monetary policy significantly reduced food inflation and agricultural production while increasing the rural unemployment rate. Short-term and 10-year interest rates increased owing to the contractionary monetary policies pursued by both countries. Mashinini, Dlamini and Dlamini (2019) applied Vector Error Correction model (VEC) to investigate the effects of monetary policy on the agriculture Gross Domestic Product (GDP) in Eswatini using annual data from 1980 to 2016. The empirical results indicated that in the long run, exchange rate, interest rate, inflation, broad money supply, and agriculture credit have a negative effect on agriculture GDP in Eswatini. In the short run, the study indicated that the variation in agriculture GDP is largely significant caused by the lagged agricultural GDP, interest rate, exchange rate as well as inflation. Enilolobo, Mustapha and Supo-Orija (2019) examined the effect of macroeconomics indicators' dynamics on agricultural output in Nigeria. The study modeled exchange rate, interest rate, money supply and inflation volatility, against agricultural output using quarterly time series data for the period 1981:1 to 2018:4. The data were analysed using descriptive and econometrics techniques. The volatility series of inflation was generated by employing the standard deviation while the level of volatility was established by employing the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) technique. The regression model was estimated with the fully modified ordinary least square (FMOLS) estimation method to capture the effect of the macroeconomic indicators on agricultural output. The trend analysis showed that both inflation rate and agricultural output were unstable during the period of study. The results revealed that inflation rate in Nigeria is volatile over the period of study and inflation volatility has a negative but significant impact on agricultural growth. Exchange rate and cost of fund also possessed varying impacts on agricultural output in Nigeria.

Gap in Literature: Most scholars have either examined the either impact of monetary or fiscal policy on agricultural output at some point or the other. These studies paid little or no attention on the relative impact of policy options on agricultural production. This paper considers this a gap. An investigation into the relative impact of monetary and fiscal policy instruments on agricultural output is covered in this paper. Moreover, most of the study focused on the impact of policy instruments on aggregate agricultural output. This study considers it a gap has not all categories of agricultural output has the level of nutritional benefit and as such this paper focused on staple food because they are eaten regularly and makes up the dominant part of a population's diet and supply a major proportion of a person's energy and nutritional needs.

III. Methodology

This investigation adopted a quasi-experimental research design, which is often applied as a substitute for true experimental research to test hypotheses about cause-and-effect relationships. In the study, predominantly secondary data was used in our analysis due to the nature of our study. This study relied extensively on the following data set:

i. Government Capital Expenditure on Agriculture (GCEA) 1982-2020
ii. Government Recurrent Expenditure on Agriculture (GREA) 1982-2020

iii. Deposit Money Banks' Loans and Advances to Agriculture (DCA) 1982-2020
iv. Interest Rate (INR) 1982-2020
v. Exchange Rate (EXR) 1982-2020
vi. Staple Food Output (SFP) 1982-2020

The model for the study is specified thus:

$SFP = F(GCEA, GREA, DCA, EXR, INR)$ 3.1

$SFP_t = a_0 + a_1GCEA_t + a_2GREA_t + a_3DCA + a_4EXR + a_5INR + u_t$ 3.2

Where; SFP =Growth Rate of Staple Food Output (Contribution of Staple Food Output to Gross Domestic Product at 1990 Constant Basic Prices)
GCEA = Growth Rate of Government Capital Expenditure on Agriculture
GREA = Growth Rate of Government Recurrent Expenditure on Agriculture
DCA = Growth Rate of Deposit Money Banks' Loans and Advances to Agriculture
INR = Interest Rate (i.e., monetary policy rate)
EXR= Exchange Rate,
u = Error Term
a_0 = The constant parameter
a_1, a_2, a_3, a_4 and a_5 = The slope parameters
Apriori expectation: On the apriori: $a_1 - a_4 > 0$, and $a_5 < 0$

Method of Data Analysis

Trend Analysis: These involve basic quantitative statistical tools which are usually employed to analyse relevant characters of the time series data included in the models (Cookey, 2001). The primary tools that were employed for the analyses of the variables adopted in this study include the Mean, Skewness, Kurtosis, Jarque-Bera, as well as graphs.

Econometric Technique: This study first of all employed the Augmented Dickey Fuller (ADF) unit root test to check the order of integration of the variables in the models. That is, ADF was used to test for the unit root property of the variables included in the models. The general form of ADF is estimated by the following regression

$$\Delta LS_t = \alpha_0 + \alpha_1 LS_{t-1} + \Sigma\alpha_1 \Delta LS_i + \delta_t + U_t \quad 3.3$$

Where: y is a time series, t is a linear time trend, Δ is the first difference operator, α_0 is a constant, n is the optimum number of lags in the independent variables and U is random error term. Furthermore, the variables for this study were integrated of order (0) and (1), then this study checked for cointegration via ARDL Bounds testing approach. The ARDL cointegration approach was developed by Pesaran and Shin (1999) and Pesaran et al. (2001). ARDL approach provides unbiased long-run estimates with valid t-statistics if some of the model repressors are endogenous and it provides a method of assessing the short run and long run effects of one variables on the other and as well separate both once an appropriate choice of the order of the ARDL model is made. For instance, for model three, the ARDL model was presented thus:

$$\Delta SFP_{t,j} = C_0 + C_1 SFP_{t-1,j} + C_2 GCEA_{t-1,j} + C_3 GREA_{t-1,j} + C_4 DCA_{t-1,j} + C_5 EXR_{t-1,j} + C_6 INR_{t-1,j} + \sum_{i=1}^{n1} a_{1i,j}\Delta LS_{t-1,j} + \sum_{i=0}^{n2} a_{2i,j}\Delta GCEA_{t-1,j} + \sum_{i=0}^{n3} a_{3i,j}\Delta GREA_{t-1,j} + \sum_{i=0}^{n4} a_{4i,j}\Delta DCA_{t-1,j} + \sum_{i=0}^{n4} a_{5i,j}\Delta EXR_{t-1,j} + \sum_{i=0}^{n4} a_{6i,j}\Delta INR_{t-1,j} + +\mu_t \quad 3.4$$

Some post-estimation diagnostic tests to confirm whether or not the statistical criteria of the estimated models are met, to validate whether parameters are reliable and to determine whether the models are generally fit for policy recommendations were conducted. Thus, the Wald test for coefficient of restriction, Breusch-Godfrey (B-G) Lagrange Multiplier (LM) test for serial correlation, Autoregressive Conditional Heteroskedasticity (Breusch-Pagan-Godfrey), and Jarque-Bera test for normality are the various post estimate tests conducted in this study.

IV. Results and Discussions

4.1 Trend Analysis

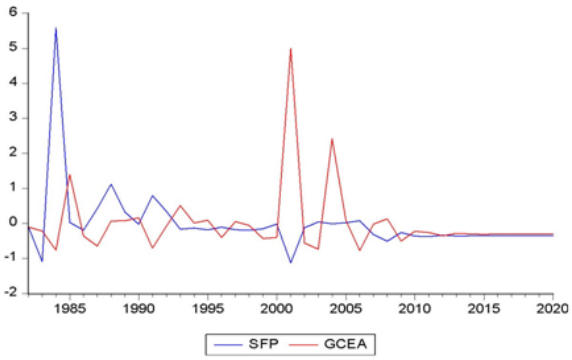

Figure 4.1: The Trend of Staple Food Output and Government Capital Expenditure on Agriculture in Nigeria, 1982-2020
Source: Computed by the researcher using E-Views 9 (2020)

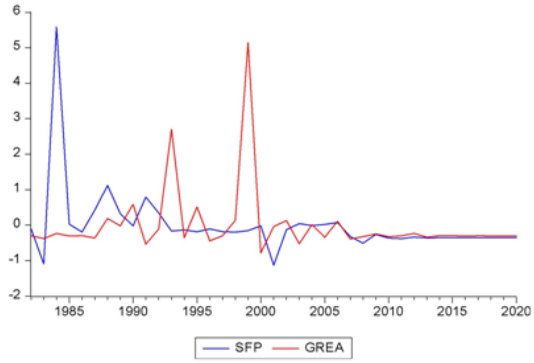

Figure 4.2: The Trend of Staple Food Output and Government Recurrent Expenditure on Agriculture in Nigeria, 1982-2020
Source: Computed by the researcher using E-Views 9 (2020).

Figure 4.3: The Trend of Staple Food Output and Deposit Money Banks' Loans and Advances to Agriculture in Nigeria, 1982-2020
Source: Computed by the researcher using E-Views 9 (2020).

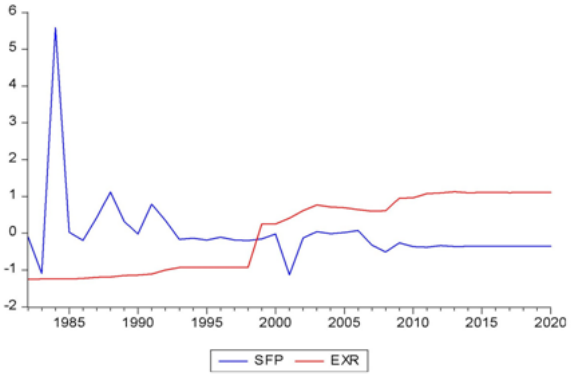

Figure 4.4: The Trend of Staple Food Output and Exchange Rate in Nigeria, 1982-2020
Source: Computed by the researcher using E-Views 9 (2020).

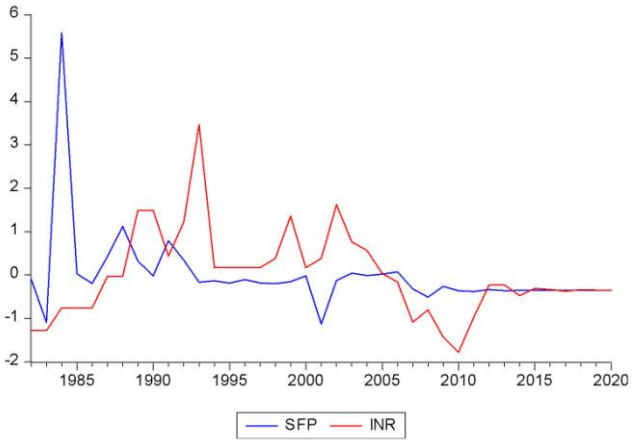

Figure 4.5: The Trend of Staple Food Output and Interest Rate in Nigeria, 1982-2020
Source: Computed by the researcher using E-Views 9 (2020).

increase in 1984. Afterwards, it recorded a spiral trend from 1985 to 2010 and recorded a somewhat steady or stable trend from 2011 to 2020. Thirdly, Figure 4.3 shows a spiral trend of deposit money banks' loans and advances to agriculture over the period of study. It also reveals that deposit money banks' loans and advances to agriculture has a single maximum increase in the year 1999. At the same time, the graph in Figure 4.3 also shows that staple food output recorded a sharp increase in 1984. Afterwards, it recorded a spiral trend from 1985 to 2010 and recorded a somewhat steady or stable trend from 2011 to 2020. Fourthly, Figure 4.4 shows that exchange rate was very low between 1980 and 1998. A spiral trend then occurred over the period of 1999 and 2020. Moreover, the graph in Figure 4.4 also shows that staple food output recorded a sharp increase in 1984.

Afterwards, it recorded a spiral trend from 1985 to 2010 and recorded a somewhat steady or stable trend from 2011 to 2020. Lastly, Figure 4.5 shows a spiral trend of interest rate over the period of study. It also reveals that interest rate has a single maximum increase in the year 1993. Moreover, the graph in Figure 4.5 also shows that staple food output recorded a sharp increase in 1984. Afterwards, it recorded a spiral trend from 1985 to 2010 and recorded a somewhat steady or stable trend from 2011 to 2020.

Table 4.1: Descriptive Statistics Result for Model I

	SFP	GCEA	GREA	DCA	INR	EXR
Mean	6.383077	51.67308	52.65436	22.46333	12.85615	85.03421
Median	3.110000	3.550000	0.470000	8.000000	12.25000	112.9400
Maximum	107.5300	904.5500	957.6700	336.0400	26.00000	161.5000
Minimum	-14.01000	-81.01000	-84.58000	-16.01000	6.130000	0.670000
Std. Dev.	18.11310	170.6582	176.1310	54.76304	3.787390	67.83822
Skewness	4.605558	3.707071	4.110796	4.982711	1.087273	-0.147456
Kurtosis	26.40659	17.92573	20.29442	29.07236	5.167843	1.195831
Jarque-Bera	1028.159	451.3387	595.8735	1266.001	15.32081	5.430749
Probability	0.000000	0.000000	0.000000	0.000000	0.000471	0.066180
Observations	39	39	39	39	39	39

Source: Computed by the researcher using E-Views 9 (2021).

The descriptive statistics reported in Table 4.1 indicates that staple food output (SFP), government capital expenditure on agriculture (GCEA), government recurrent expenditure on agriculture (GREA), deposit money banks' loans and advances to agriculture (DCA), interest rate (INR) and exchange rate (EXR) averaged, 6.383077, 51.67308, 52.65436, 22.46333, 12.85615 and 85.03421 respectively. The standard deviation showed that interest rate and exchange rate converged around their mean. While staple food output, government capital expenditure on agriculture, government recurrent expenditure on agriculture and deposit money banks' loans and advances to agriculture did not converge around their respective mean. The Skewness test result showed positive values for staple food output, government capital expenditure on agriculture, government recurrent expenditure on agriculture, deposit money banks' loans and advances to agriculture and interest rate, meaning that they have high tails. However, the Skewness test result showed negative value for exchange rate indicating that the variable does not have a high tail. Exchange rate is platykurtic relative to normal, since its value for kurtosis 1.195831 is less than 3. This suggests that the variable has short and thin tails, and it central peak is lower and broader. Moreover, staple food production, government capital expenditure on agriculture, government recurrent expenditure on agriculture, deposit money banks' loans and advances to agriculture, and interest rate have leptokurtic distributions relative to normal, since their values for kurtosis 26.40659, 17.92573, 20.29442, 29.07236, 5.167843 respectively are more than 3. This indicates a flatter than normal distribution and the variables have large tails. That is, they have longer and fatter tails, and their central peaks higher and sharper. The probability of Jarque-Bera statistics suggests that the alternative hypotheses of normal distribution for staple food production, government capital expenditure on agriculture, government recurrent expenditure on agriculture. Deposit money banks' loans and advances to agriculture and interest rate were accepted at 5% level while the alternative hypothesis of exchange rate was rejected at 5% level. Therefore, the study concludes from the revealed statistical properties of the time series that all the variables are not normally distributed, which may have resulted from the problem of unit root. This necessitated the unit root test for stationarity as shown in the following section.

4.2 Econometric Analysis

4.2.1 Unit Root Test

This test was conducted using the Augmented Dickey Fuller (ADF) test to establish the order of stationarity of the variables. The ADF test with constant and time trend; at level and first difference were considered for the study at conventional level (i.e., 5 percent critical values). The stationarity status of the data series is presented in Tables 4.2 below.

Table 4.2 Augmented Dickey Fuller (ADF) Unit Root Test at Level and First Difference

Variables	**ADF Test@ Level**	**Critical Value**			**ADF Test@ 1ST Diff**	**Critical Value**			**Order of Integra-tion**
		1%	**5%**	**10%**		**1%**	**5%**	**10%**	
SFP	-6.479170	-3.615588	-2.941145	-2.609066					1(0)
GCEA	-7.071396	-3.615588	-2.941145	-2.609066					1(0)

GREA	-6.624953	-3.615588	-2.941145	-2.609066					1(0)
DCA	-5.761352	-3.615588	-2.941145	-2.609066					1(0)
INR	-3.091594	-3.615588	-2.941145	-2.609066					1(0)
EXR		-3.615588	-2.941145	-2.609066		-	-	-	1(1)
						3.6210	2.9434	2.610	
	-0.744841				-6.193544	23	27	263	

Source: Computed by the researcher using E-Views 9 (2021)**.**

The above results presented in Tables 4.2 reveals that in all the variables were not stationary at level, considering the 1 per cent, 5 per cent and 10 per cent critical values. Therefore, the null hypothesis of the presence of unit root was accepted. In line with Granger and Newbold (1974), the variables were differenced. Thus, they became stationary at first difference (i.e., integrated of order one). The results of the variables being stationary at various levels makes it inappropriate for the application of the Ordinary Least Square (OLS) method, therefore the tests to determine the long run relationship for the model can be achieved with the aid of ARDL bounds testing approach as popularized by Pesaran and Shin (1999). Specifically, given that the variables were integrated of order 1(0) and 1(1). The requirement to fit in an ARDL model to test for long run relationship is satisfied.

4.2.2 Cointegration Test

Table 4.3: ARDL Bounds Co-integration Test Result

Model		**F-Statistic** = 5.488254
SFP = F(GCEA, GREA, DCA, INR, EXR)		K = 5
Critical Values	Lower Bound	Upper Bound
10%	2.26	3.35
5%	2.62	3.79

Source: Computed by the researcher using E-Views 9 (2021).

Since the variables were integrated of order 1(0) and 1(1), and the sample size is small, Narayan (2004) critical values for small sample sizes ranging from 30 observations to 80 observations was adopted. From the ARDL bounds test result presented in Table 4.3, it is clear that there is a long run relationship amongst the variables (SFP, GCEA, GREA, DCA, INR and EXR). This is because the computed F-statistic of about 5.488254 is higher than the upper critical bounds at 5% and 10% critical values. Following the establishment of long-run co-integration among the variables, the long-run and short-run dynamic parameters for the variables were obtained.

4.2.3 Model Estimation

Table 4.4 Estimated ARDL Long Run Coefficients.
Dependent Variable: SFP ARDL (4, 4, 3, 4, 4, 4)

Regressors	**Coefficient**	**t-Statistic**	**P-Value**
GCEA	0.023057	1.224402	0.2667
GREA	-0.068181	-4.337149	0.0049
DCA	-0.015370	-0.349922	0.7384
INR	1.552731	4.460330	0.0043
EXR	-0.040278	-3.144446	0.0200

Source: Computed by the researcher using E-Views 9 (2021).

The result of the estimated ARDL Staple Food Production model is presented in Table 4.4 above. The estimated ARDL long run coefficients reveals that, on the one hand, government capital expenditure on agriculture and interest rate appeared with a positive sign; and this conforms to *a priori* expectation. On the other hand, government recurrent expenditure on agriculture, deposit money banks' loans and advances to agriculture, and exchange rate have negative relationship with staple food output in Nigeria. These negative signs do not conform to *a priori* expectations. Only the parameter estimates of government recurrent expenditure on agriculture, interest rate, and exchange rate are statistically significant at 5% level of significant error. Hence, a long run negative and significant relationship is expected between government recurrent expenditure on agriculture and staple food production, a long run negative and significant relationship is expected between exchange rate and staple food production, and a long run positive and significant relationship is expected between interest rate and staple food production.

The error correction representation for the selected ARDL Model as shown in Table 4.5 suggests evidence of error correction. The coefficient of the ECM has the hypothesized negative sign (-1.877215) and is statistically significant. This implies that deviations from the short-term in staple food production adjust quickly to long run equilibrium. That is, the long run equilibrium in staple food output can almost immediately be

restored should there be short run distortion in the staple food output. Moreover, the result revealed that disequilibria in the staple food production in the previous year were corrected for in the current year. It therefore, follows that the ECM could rightly correct any deviations from short run to long-run equilibrium relationship between staple food output and the explanatory variables (government capital expenditure on agriculture, government recurrent expenditure on agriculture, deposit money banks' loans and advances to agriculture, interest rate and exchange rate). Moreso, the parameter estimates of government capital expenditure on agriculture and exchange rate appeared with a positive sign in the short run but only exchange rate is significant at 5% level of error. Government recurrent expenditure on agriculture, deposit money banks' loans and advances to agriculture, and interest rate all appeared with a negative sign; but only government recurrent expenditure on agriculture and deposit money banks' loans and advances are statistically significant at 5% level of error. Furthermore, the R^2 value of 0.9847 shows that 98.47% of the variation in the dependent variable is accounted for by the explanatory variables in the error correction the model. Hence, the explanatory power of the model is high. Moreover, the f-statistic value of 13.78 with probability value of 0.00 which is less than 0.05 critical value shows that all the explanatory variables (government capital expenditure on agriculture, government recurrent expenditure on agriculture, deposit money banks' loans and advances to agriculture, interest rate and exchange rate) are significant in explaining the level of staple food output in Nigeria during the period of study.

Table 4.5: Error Correction Representation for the Selected ARDL Model ARDL (4, 4, 3, 4, 4, 4)

Regressors	**Coefficients**	**t-Statistic**	**P-Value**
GCEA	0.026520	1.857076	0.1127
GREA	-0.065774	-2.575930	0.0420
DCA	-0.180138	-3.348632	0.0154
INR	-0.747686	-1.884579	0.1085
EXR	0.250437	1.472962	0.1912
ECM (-1)	-1.877215	-4.457978	0.0043
R-squared = 0.984689 | F-statistic = 13.78 | Prob(F-statistic) = 0.001731			

Source: Computed by the researcher using E-Views 9 (2021).

4.2.4 Post-Estimation Diagnostics

Table 4.6 Post-Estimation Diagnostics Result

Tests	Test Statistics [F-statistic]	Probability
Wald Test for Coefficient of Restrictions	89457.17	0.00
The Breusch-Godfrey Serial Correlation LM	0.10	0.91
Breusch-Pagan-Godfrey Heteroscedasticity Test	0.34	0.98

Source: Computed by the researcher using E-Views 9 (2021).

The result in Table 4.6 shows that the F-statistic is approximately 89457 and the probability value of 0.0000 is less than 0.05 at the conventional 5 per cent level. Therefore, all the explanatory variables (government capital expenditure on agriculture, government recurrent expenditure on agriculture, deposit money banks' loans and advances, interest rate and exchange rate) included in the estimated model (i.e., model one) are jointly significant in explaining the performance of staple food production in Nigeria over the data period. Secondly, the serial correlation test result as displayed in Table 4.6 reveals that the parsimonious error correction model is not suffering from serial autocorrelation problem. This is because the chi-square value of about 1.602078 and the corresponding probability value of 0.4489 of the chi-square statistic surpasses the 0.05. The Breusch-Pagan-Godfrey test result in Table 4.6 confirms that the parsimonious error correction model (i.e. for model one) is free from heteroskedasticity, which suggests that the variance of the residual in the parsimonious ECM model is homoscedastic over the period covered in this study.

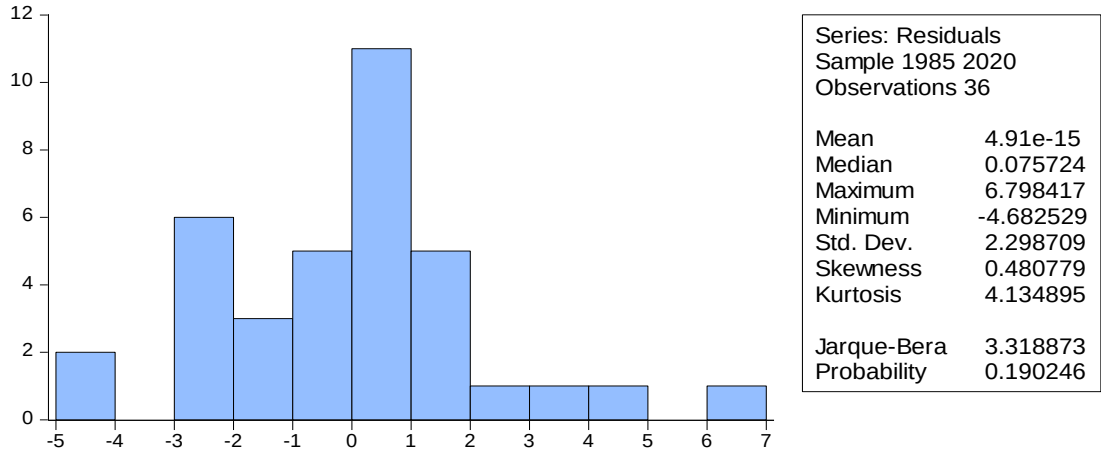

Figure 4.6: Normality Test Result
Source: Computed by the researcher using E-Views 9 (2021)

The result shown in Figure 4.6 depicts that the error term is normally distributed at the conventional level (i.e., 5%). This is because the probability value of the Jarque-Bera statistic of approximately 0.1902 is greater than the 0.05% conventional level. This implies that the Jarque-Bera statistic hypothesis of normally distributed residuals in the parsimonious ECM model (i.e., model one) is accepted.

V. Conclusion and Recommendations

This study on the impact of fiscal and monetary policy measures on staple food production is invaluable because it examined the extent to which fiscal and monetary policies have impacted on staple food output. Momentously, a cursory look at the analysis reveals that monetary policy variables are largely significant in driving staple food output in Nigeria in the long run if well managed. While in the short run fiscal policy variables are largely significant in driving staple food production. The study therefore recommend that government should increase her budgetary allocation to the agricultural sector in a consistent manner, government should generally cut down on her recurrent expenditure on governance and particularly in the agricultural sector to free up scarce investible resources, and that apex monetary authority should specially direct the deposit money banks to see the agricultural sector as the buffer sector.

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