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DYNAMICS OF STABILIZATION POLICIES AND INVESTMENT EFFECTS ON AGRICULTURAL OUTPUT IN NIGERIA (1981-2019).

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Abstract

The dynamics of stabilization policies and the effects of investment on agricultural output in Nigeria were explored in this study. (1981-2019). The study specifically looked at the impact of investment, monetary policy, policy mix, and fiscal policy on agricultural output. World Development Indicators (WDI), Index mundi, and Macrotrends were used as sources for the annual time series data on the research variables for the period 1981–2019. The Autoregressive Distributed Lagged Model was used in the investigation. The unit root test revealed in the pre-diagnostic tests that the variables were 1(0) and I.(1). The ARDL Bound test for co-integration revealed that the variables related to fiscal, monetary, and policy mix had long-run co-integrating relationships while the variables related to investment had none. Additionally, empirical findings indicated that, in the short term, only government agricultural expenditure (P = 0.0007 < 0.05) as a fiscal policy variable affected agricultural output. Exchange rate (P = 0.0000 < 0.05) and inflation rate (P = 0.0000 < 0.05) as monetary policy variables significantly effected agricultural output. All policy mix variables significantly effected agricultural output in the short run. However, only private domestic investment (P = 0.0322< 0.05) as an investment variable significantly effected agricultural output.
Keywords: *Stabilization policy,Monetary policy, Fiscal policy, Agriculture, Investment, ARDL, Nigeria.*
JEL Codes: *C18, C15, E63, E52, E62, O13, O55, Q10, Q18*

1. Introduction

Economic concerns are regulated by stabilization policies in accordance with defined objectives. They are a set of policy frameworks designed to affect or manage macroeconomic variables like overall output, overall employment, overall economic growth, average wage levels, average price levels, and interest rates, among others (Tuaneh and Nmegbu, 2021). Stabilization tools include fiscal, monetary, and other macro-prices-controlling actions. Discretionary fiscal measures are used to address government spending as well as the balance between taxation and spending. Monetary tools are used to regulate the availability of money and credit. By affecting input and other prices, as well as the exchange rate, interest rate, and inflation rate changes, changes in monetary and fiscal policies have an effect on the performance of the agricultural economy. In order to achieve national development goals through agricultural growth, it is crucial to have effective stabilizing policies in place. (Fan et al., 2008).

Despite Nigeria's rich agricultural resources, literature indicates that the sector's economic output has been declining. Because successive Nigerian administrations have neglected for decades to create effective macroeconomic stabilization measures to lessen the impact of domestic and international macroeconomic shocks on farmers' incentives to produce, the agricultural sector has not performed as expected. (Udensi et al, 2012). As a result, for Nigeria to achieve its desired social and economic growth through agriculture, the agricultural sector's success is strongly dependent on its stabilizing policies.

Since investment and growth have historically been closely correlated, inadequate investment practices have been blamed for the subpar development performances of some developing nations (Osmond, 2015). Investment in the agricultural sector could be gotten from two sources viz; Foreign Direct Investment (FDI) and Foreign Domestic Investment (FDI). Compared to foreign portfolio investment, which may not involve positive transfer but only a change in ownership, foreign direct investment exhibits greater positive externalities because it disseminates advanced technology and managerial practices throughout the host country. This makes it the most effective form of foreign capital lending to developing countries. In addition, the information that is currently available indicates that foreign direct investment flows are typically more stable than foreign portfolio investment (Oni et al., 2014).

Researchers have worked on monetary and fiscal policies instruments for instance, Ighoroje and Orife (2021) evaluated the impact of specific macroeconomic variables on agricultural sector output in Nigeria from 1987 to 2019 whereas Adegboyo, Keji, and Oluwadamilola (2021) studied the impact of fiscal, monetary, and trade policies on Nigerian economic growth from 1985 to 2020. Bodunrin (2016) studied the effects of fiscal and monetary policy on Nigeria's economic growth from 1981 to 2015, and Okidim (2018) examined the dynamics of monetary and fiscal policy and their effects on farm credit and agricultural output in Nigeria between the years (1983-2014). The researcher wants to prove that, in spite of all these studies, little to no attention has been paid to monetary and fiscal policies, as well as investment, because these things have an impact on both agricultural and business. Other research did not include government agriculture spending as one of the fiscal policies, but this study does. The study's coverage also includes more recent times, namely from 1981 to 2019. The purpose of this study is to close this gap. The investigation offered responses to the subsequent research questions; What are the effects of fiscal policies on agricultural output? What are the effects of monetary policies on agricultural output? What are the effects of policy mix (Monetary and fiscal policy) on Agricultural output? and What are the effects of investment (Foreign Direct Investment and Private Domestic Investment) on agricultural output? The study sought to achieve the following specific objectives: determine the effects of fiscal policies on agricultural output in Nigeria;determine the effects of monetary policies on agricultural output in Nigeria;determine the effects of policy mix (fiscal and monetary) on agricultural output; determine the effects of investment on agricultural output.

2. Methodology

Instead of focusing on just one State or region, this study examined Nigeria as a whole. On the Gulf of Guinea, there lies a country called Nigeria in West Africa. It has a 4047 km total circumference, an 853 km coastline, and a population of about 167 million (NPC). (2006). The Federal Republic of Nigeria is positioned between "latitudes 40 and 140 N, and longitudes 20 and 150 E, with approximately 263 billion cubic meters of water and two of the largest rivers in Africa, namely the Rivers Niger and Benue" (Fertilizer Suppliers' Association of Nigeria, Federal Ministry of Agriculture & Rural Development, Nigeria, and Federal Fertilizer Department, 2014). There are 36 states in it, with Abuja serving as the Federal Capital Territory. Utilizing the ARDL model, mean, standard deviation, skewness, kurtosis, and trend analysis, relevant statistical and economic tools were used to analyze the data. In order to determine whether there is a long-term relationship between dependent and independent variables, the Augmented-Dickey Fuller test and the ARDL Bound cointegration test were both utilized.

The objectives were specifically examined in the manner listed below.

$$\Delta lnAO_t=\alpha_0+\sum\alpha_1\Delta lnAO_{t-i}+\sum\alpha_2\Delta lnAL_{t-i}+\sum\alpha_3\Delta lnGAE_{t-i}+\beta_1 lnAO_{t-1}+\beta_2 lnAL_{t-1}+\beta_3 lnGAE_{t-1}+U_t. \quad (1)$$

AO = Agricultural output, AL = Agricultural loan, GAE = Government Agricultural Expenditure, Ln = Natural logarithm, Δ = first difference operator, βs= vector long run multipliers, αs= vector of short term coefficients, U_t = error term

$$\Delta lnAO_t=\alpha_0+\sum\alpha_1\Delta InAO_{t-i}+\sum\alpha_2\Delta InINR_{t-i}+\sum\alpha_3\Delta InINF_{t-i}+\sum\alpha_4\Delta InEXR_{t-i}+\sum\beta_1 InINR_{t-1}+\sum\beta_2 InINF_{t-1}+\sum\beta_3 InEXR_{t-1}+U_t \quad (2)$$

Where:
AO = Agricultural output, INR = Interest rate, INF = Inflation rate, EXR = Exchange rate
Ln = Natural logarithm, Δ = first difference operator, βs= vector long run multipliers
αs= vector of short term coefficients and U_t = error term

$$\Delta lnAO_t=\alpha_0+\sum\alpha_1\Delta InAO_{t-i}+\sum\alpha_2\Delta InAL_{t-i}+\sum\alpha_3\Delta InGAE_{t-i}+\sum\alpha_4\Delta InINR_{t-i}+\sum\alpha_5\Delta InINF_{t-i}+\sum\alpha_6\Delta InEXR_{t-i}+\beta_1 InAO_{t-1}+\beta_2 InAL_{t-1}+\beta_3 InGAE_{t-1}+\beta_4 InINR_{t-1}+\beta_5 InINF_{t-1}+\beta_6 InEXR_{t-1}+U_t \quad (3)$$

Where:
AO = Agricultural output, AL = Agricultural loan, GAE = Government Agricultural Expenditure, INR = Interest rate, INF = Inflation rate, EXR = Exchange rate
Ln = Natural logarithm,Δ = first difference operator, βs= vector long run multipliers
αs= vector of short term coefficients, U_t = error term

$$\Delta lnAO_t=\alpha_0+\sum\alpha_1\Delta lnAO_{t-i}+\sum\alpha_2\Delta lnFDI_{t-i}+\sum\alpha_3\Delta lnPDI_{t-i}+\beta_1 InFDI_{t-1}+\beta_2 InPDI_{t-1}+U_t \quad (4)$$

Where: AO = Agricultural output, FDI = Foreign Direct Investment, PDI = Private Domestic Investment, Ln = Natural logarithm, Δ = first difference operator, βs= vector long run multipliers, αs= vector of short term coefficients, U_t = error term

ARDL Model

With lags of both the dependent and explanatory variables as regressors, the Autoregressive Distributed Lag (ARDL) models use least squares regression. (Greene, 2008). Although

ARDL models have been employed in econometrics for many years, they have only lately been well-known as a method for analyzing cointegrating correlations between variables, according to the work of Pesaran and Shin (1998) and Pesaran et al. (2001).With lags of both the dependent and explanatory variables as regressors, the Autoregressive Distributed Lag (ARDL) models use least squares regression. (Greene, 2008). Although ARDL models have been employed in econometrics for many years, they have only lately been well-known as a method for analyzing cointegrating correlations between variables, according to the work of Pesaran and Shin (1998) and Pesaran et al. (2001). Specifically, if $y_t$is the dependent variable and are k e x_1, x_2,x_k explanatory variables, a general *ARDL* (p, q_1, q_2,…… q_k) model is given by:

$$y_t=\alpha_0+ +\sum_{i=1}^{p}\alpha_i y_{t-1}+\sum_{i=0}^{q}\beta_i X_{t-1} +\varepsilon_t \quad (5)$$

where

Yt is a vector of endogenous variables, Yt-1 is its lag, Xt are exogenous variables, i goes from 1 to k, p and q are optimal lag lent of the endogenous and the exogenous variables, α_0 = intercept, while $\alpha_1$and β_i = coefficients, ε_t is the stochastic error term

An *ARDL* (*p*, *q*) model has p lags of the dependent variable and q lags of the independent variable:

$$y_t=\beta_0+\beta_1 y_{t-1}......+ \beta_p y_{t-p}+ \alpha_0 X_t+\alpha_1 X_{t-1}+ \alpha_2 X_{t-2}+..........+\alpha_q X_{t-q}+U_t \quad (6)$$

where $U_t$is a random “disturbance” term.

The model is "autoregressive" in the sense that t y "explains" (in part) lagged values of itself. A "distributed lag" component is also a part of it; it comprises of the "x" explanatory variable's successive lags. On rare occasions, the distributed lag component of the model's structure does not include the current value of itself. (Soharwardiet.al., 2018).The model is "autoregressive" in the sense that t y "explains" (in part) lagged values of itself. A "distributed lag" component is also a part of it; it comprises of the "x" explanatory variable's successive lags. On rare occasions, the distributed lag component of the model's structure does not include the current value of itself. (Soharwardi et.al., 2018).

Augmented Dickey Fuller (ADF) Unit Root Test

This test is used to determine the level of cointegration among variables (Dickey and Fuller, 1979) this is given by the regression

$$\Delta y_t = \alpha_0 + \alpha_1 t + \gamma y_{t-1} + \sum_{j=1}^{p} \Delta y_{t-j}\delta_j + \varepsilon_t \quad (7)$$

From equation (3), α_0 is a constant, α_1 is the coefficient on a time trend series, the coefficient of y_{t-1} measures the unit root, p is the lag order of the autoregressive process, j is a measure of lag length, $\Delta y_t = y_t – y_{t-1}$ are first differences of y_t , y_{t-1} are lagged values of order one of y_t , y_{t-j} are changes in lagged values, and $\mathcal{E}_t$ is the white noise (Ssekuma, 2011). A t statistic larger in absolute value than the critical value results in a rejection of the null hypothesis of unit root in favour of the stationarity alternative.

Cointegration Test – ARDL Approach

In this work, the autoregressive distributed lag (ARDL) bound testing method was used to examine the cointegration (long run) relationship between agricultural output and stability variables. (interest rate, inflation rate, exchange rate, agricultural loan from commercial banks and government agricultural expenditure). The Autoregressive Distributed Lag (ARDL) model and an estimated error correction version of the Ordinary Least Square (OLS) estimator were used to calculate the bound test. (Pesaran et al., 2001).

The functional form of the model is as follows:

AO = f (AL, GAE) (4)

Re-writing equation (2.2) in a linear form, we have the equation as:

$$AO_t = \beta_0 + \beta_1 AL_t + \beta_2 GAE_t + U_t. \quad (8)$$

In order to minimize spurious results, the study therefore, converted the data of the parameters above into their natural log form. Therefore, the new equation is of the form:

$$LnAO_t = \beta_0 + \beta_1 LnAL_{t-1} + \beta_2 LnGAE_{t-1} + U_{t-1} \quad (9)$$

Following Pesaran *et al.* (2001), the ARDL model specification of the above equations is expressed as unrestricted error correction model (UECM) to test for cointegration between the variables under study:

$$\Delta lnAO_t = \alpha_0 + \sum\alpha_1 \Delta lnAO_{t-i} + \sum\alpha_2 \Delta lnAL_{t-i} + \sum\alpha_3 \Delta lnGAE_{t-i} + \beta_1 lnAO_{t-1} + \beta_2 lnAL_{t-1} + \beta_3 lnGAE_{t-1} + U_t. \quad (10)$$

Once cointegration is established, the long run relationship is estimated using the conditional ARDL model specified as:

$$InAO_t = \beta_0 + \beta_1 InAO_t + \beta_2 InAL_t + \beta_3 InGAE_t + U_t \quad (11)$$

The short run dynamic relationship was estimated using an error correction model specified as:

$$\Delta lnAO_t = \alpha_0 + \sum\alpha_1 \Delta InAO_{t-i} + \sum\alpha_2 \Delta InAL_{t-i} + \sum\alpha_3 \Delta InGAE_{t-i} + \delta ECT_{t-1} + U_t \quad (12)$$

3. Results and Discussion

3.1 Summary Statistics

Table 1: Descriptive Statistics, using the observation 1981 – 2019

	AO	**GAE**	**AL**	**EXR**	**INF**	**INR**	**FDI**	**PDI**
Mean	8.599	0.461	2.969	3.169	2.699	2.840	7.135	5.804
Median	8.387	0.892	3.381	3.089	2.574	2.877	7.508	5.809
Maximum	9.641	4.180	5.996	5.066	4.341	3.394	10.429	9.805
Minimum	7.742	-4.605	-0.511	-0.494	1.172	2.048	4.847	2.148
Std. Dev.	0.633	2.948	1.937	1.934	0.841	0.309	1.519	2.528
Skewness	0.336	-0.470	-0.265	-0.684	0.283	-0.758	0.086	0.123
Kurtosis	1.635	1.830	1.909	2.119	2.241	3.269	2.313	1.715
Jarque-Bera	3.277	3.189	2.085	3.755	1.270	3.357	0.710	2.425
Probability	0.194	0.203	0.353	0.153	0.529	0.186	0.701	0.297
Sum	292.384	15.678	100.947	107.758	91.789	96.570	242.604	197.339
Sum Sq. Dev.	13.216	286.811	123.816	123.479	23.360	3.158	76.173	210.985

Source: Author's Computation

Notes:AO=Agricultural Output; GAE= Government Agricultural Expenditure; AL= Agricultural Loan; EXR = Exchange Rate; INF= Inflation; INR= Interest rate; FDI= Foreign Direct Investment; PDI= Private Direct Investment

Table 1 took into account each variable's mean, median, maximum, minimum, standard deviation, skewness, kurtosis, and probability as well as descriptive statistics. According to the results, the mean value for agricultural output was approximately 8.599, as well as 2.969 for agricultural loans, 0.461 for government agricultural spending, 2.840 for interest rates, 2.699 for inflation, 3.169 for exchange rates, 7.135 for foreign direct investment in agriculture, and 5.804 for private domestic investment. Agriculture output had the highest average value (8.599), while government spending on agriculture had the lowest average value. (0.461). The variables' standard deviation served as a measure for the dispersion of the series. Agriculture-related government spending had the biggest standard deviation (2.948), while interest rates had the lowest (0.309). A greater variation between the mean and standard deviation is a sign that the data set is real, and this difference in the mean demonstrates the data set's dependability. The distribution of the interest rate was peaked because it exceeded the normal range of three, according to the greatest kurtosis value of 3.269, whereas the distributions of the other variables were flat in comparison to the normal range because they were less than three. The chosen stabilization policy variables' skewnesses varied widely. Agriculture loan, inflation, foreign direct investment, and domestic private investment were all positive skewness variables, whereas agricultural output, government spending on agriculture, interest rates, and currency rates were all negatively skewed. Positive skewness denotes a large right tail in the distribution, whereas negative skewness denotes a long left tail. Interest rate was leptokurtic, indicating that the distribution was peaked relative to the normal distribution, while agricultural output, agricultural loan, government expenditure on agriculture, inflation rate, exchange rate, domestic private investment, and foreign direct investment were platykurtic because they were less than three (3). The Jarque-Bera statistic showed that all of the variables were normally distributed at the 5% level. Indicating that these variables had modest growth over the study period, the standard deviations of agricultural output, agricultural loans, currency rates, inflation rates, interest rates, and foreign direct investment were all lower than their respective means. The fact that the standard deviation of government spending on agriculture was higher than the mean value indicated that this spending grew quickly throughout the time period under consideration.

3.2 Unit Root Test

A unit root test was run to determine whether or not the data were stationary. Data is stable in econometric analysis when its means and variance are constant across time and the value of the covariance between the two time periods solely depends on how far apart they are from one another, not when the covariance is computed. (Gujarati, 2004). There are a number of tests for stationarity, however this study used the Dickey-Fuller augmented unit root test because it is the most used in practical econometrics. The outcomes of the ADF test are summarized in Table 2.

The table indicates that LINTR and LINF were stationary at level, whilst LAO, LAL, LGAE, LEXR, LFDI, and LPDI were all stationary at first difference. The implications for these empirical results are that the study's variables are suitable tool of analyzing the error correction mechanism since the variables used in the model were stationary at level and first difference. As a result, the variables under investigation were not integrated in the same order, which justifies the adoption of the bounds approach to cointegration over other traditional methods that require the variables to be integrated in the same order.

Table 2. Results of Augmented Dickey Fuller Test at Level and First Difference

Variables	Augmented Dickey-Fuller		Critical Values at Level		Critical Values at First Difference		Remarks
	Level	1st difference	5%	10%	5%	10%	
LAO	-0.079861 (0.9445)	-5.907054 (0.0000)	-2.941145	-2.609066	-2.943427	-2.610263	1(1)
LRGDP	-0.096781 (0.9424)	-3.434088 (0.0160)	-2.943427	-2.610263	-2.943427	-2.610263	1(1)
LAL	-1.133557 (0.6924)	-6.951060 (0.0000)	-2.941145	-2.609066	-2.943427	-2.610263	1(1)
LGE	-2.333844 (0.1673)	-8.652991 (0.0000)	-2.945842	-2.611531	-2.943427	-2.610263	1(1)
LINR	-3.427542 (0.0160)		-2.941145	-2.609066			1(0)
LINF	-4.204364 (0.0021)		-2.941145	-2.609066			1(0)
LEXR	-2.116156 (0.2397)	-5.193298 (0.0001)	-2.941145	-2.609066	-2.943427	-2.610263	1(1)
LFDI	-0.874587 (0.7828)	-8.121503 (0.0000)	-2.960411	-2.619160	-2.960411	-2.619160	1(1)
LPDI	-0.369458 (0.9039)	-4.290004 (0.0018)	-2.945842	-2.611531	-2.948404	-2.612874	1(1)

Source: Author's Computation

Table 3: ARDL Bounds Test for Cointegration

Model (1): (Dependent variable: AO) F(AL, GAE)		**F-Statistics** 5.237006
Critical Values K=2; n=36	**Lower Bound 1(0)**	**Upper Bound 1(1)**
10%	4.19	5.06
5%	4.87	5.85
Model (2): (Dependent variable: AO) F(EXR, INF, INR)		**F-Statistics** 19.50710
Critical Values K=2; n=36	**Lower Bound 1(0)**	**Upper Bound 1(1)**
10%	2.72	3.77
5%	3.23	4.35
Model (3): (Dependent variable: AO) F(AL, GAE, EXR, INF, INR)		**F-Statistics** 20.65014
Critical Values K=5; n=35	**Lower Bound 1(0)**	**Upper Bound 1(1)**
10%	2.26	3.35
5%	2.62	3.79
Model (4): (Dependent variable: AO) F(FDI, PDI)		**F-Statistics** 1.831791
Critical Values K=2; n=33	**Lower Bound 1(0)**	**Upper Bound 1(1)**
10%	3.17	4.14
5%	3.79	4.85

Source: Author's Computation

3.3. ARDL Bounds Test for Cointegration

Table 3 contained the findings of the ADRL bounds co-integration tests for equations (1) through (4). Table 3 displays the results of the calculated F-statistics and values for both the upper and lower bound for the Wald tests (F tests) for the joint null hypothesis that there is no co-integration between the variables and the coefficients of the lagged variables in the level form are zero. The estimated F-statistics for models 1, 2, and 3 (objectives 1, 2, and 3) were all higher than the upper critical limit for 5% and 10% critical values, as shown in Table 3. As a result, the study draws the conclusion that the variables in models 1, 2, and 3 have a long-term association based on the results of the ARDL bounds test. We acquire the variables' long-run and short-run dynamic parameters since the variables were co-integrated. Cointegration implies that the variables won't result in an erroneous regression.

These models can only be estimated using the ARDL model without long- or short-run effects because the computed F-statistics for model 4 (objective 4) were lower than the lower critical bound of 5% and 10%, respectively.

3.4 Effects of Fiscal Policies on agricultural output

Agricultural loan (AL) and Government Agricultural Expenditure (GAE) were two of the fiscal policies studied. Table 4 provide the long-run and short-run findings.

Table 4. Error Correction Model result of Fiscal Policies and Agricultural output

Regressor	Coefficient	Standard error	T-Statistic	Probability
Long-Run Result				
LAO(-1)*	-0.299162	0.104790	-2.854868	0.0083
LAL	-0.465976	0.052561	-8.865486	0.0000
LGAE	0.134714	0.013444	10.02051	0.0000*
Short-Run Result				
C	2.498827	0.579911	4.308981	0.0002
D(LAL)	-0.072713	0.038715	-1.878180	0.0716
D(LAL(-1))	0.073152	0.037954	1.927388	0.0649
D(LGAE)	-0.023341	0.014148	-1.649792	0.1110
D(LGAE(-1))	-0.063453	0.016609	-3.820419	0.0007
D(LGAE(-2))	-0.082684	0.014504	-5.700913	0.0000
ECM(-1)*	-0.299162	0.072730	-4.113339	0.0003

R-squared	0.593480	Mean dependent var	0.055801
Adjusted R-squared	0.491850	S.D. dependent var	0.074642
S.E. of regression	0.053208	Akaike info criterion	-2.836070
Sum squared resid	0.079272	Schwarz criterion	-2.484177
Log likelihood	59.04927	Hannan-Quinn criter.	-2.713250
F-statistic (2, 36)	5.839616	Durbin-Watson stat	1.961316
Prob(F-statistic)	0.000303		

Source: Author's Computation

According to Table 4, agricultural loans had a negative impact on agricultural output over the long term, with an estimated coefficient of -0.466. The consequence is that poorer agricultural output will come from increasing agricultural loans to the industry. This result may be attributed to a variety of factors specific to the Nigerian economy, including elevated levels of official corruption, ineffective policy implementation, a porous institutional structure, and rising levels of farmer poverty, to name just a few. In contrast to this adverse effect, Okafor's (2020) study discovered that agricultural loans had a favorable influence on Nigeria's agricultural economy. The agricultural loan had a negative coefficient (-0.073) with agricultural output in the current period but a positive coefficient (0.073) in the first lag, according to the short run model. However, it was demonstrated to be barely significant at a 10% level of significance, indicating that it has the potential to significantly alter agricultural output.

Government agricultural spending has a long-term, considerable positive (0.135) impact on agricultural output. This suggests that a boost in government agricultural spending eventually results in a gain in agricultural output. This finding is consistent with that of Ogah, Kotur, and Essien (2021), who discovered that government spending had a favorable and significant impact on the long-term growth of agricultural output. However, in the short run, both the first and second lags as well as the present period's agricultural output were significantly negatively impacted by government agricultural spending. Government expenditure coefficient for the current period was -0.0233, first lag was (-0.063), and second lag was (-0.083). It was demonstrated to be significant in the first and second lags, though. This implies that a rise in government spending on agriculture causes a short-term decline in sector production. This unfavorable result is in line with the findings of Mathew and Mordecai (2016), who discovered that public agricultural spending has a considerable but unfavorable impact on agricultural output in the short-term.

According to Table 4, the R^2 was 0.593, meaning that factors related to fiscal policy explained 59.3 percent of the variation in agricultural output and that factors unaccounted for by the model accounted for the remaining 40.7 percent. The financial implication is that changes or variations in agricultural output may result from fiscal policies like agricultural expenditure. (Okidim and Eze, 2018). The error correction term (ECT) was properly signed, and the absence of a positive sign means that the previous error was fixed in the subsequent term. For agricultural output from the previous year to long-run equilibrium, the ECT was also significant (P = 0.0003 0.05), with a matching coefficient of -0.299, reflecting a speed of adjustment of 29.9%.

3.5 Effects of Monetary Policies on agricultural output

Exchange rate (EXR), inflation rate (INF), and interest rate were among the monetary policies studied. Table 5 present the long-run and short-run outcomes.

The findings of the long and short runs showed that the previous level of agricultural output in Nigeria had a negative (-0.121958) short-run coefficient and a negative (-0.232970) long-run coefficient, both of which had a substantial impact on the level of agricultural output at present. An rise in historical agricultural output values reduces current output in the short run by -0.121958 percent at a level of significance less than 10%, and in the long run by -0.232970 percent at a level of significance less than 5%. This showed a decline in Nigeria's agricultural output over the short and long runs.

Table 5 long-run and short-run data revealed that exchange rate had a positive (0.309) substantial impact on agricultural output in the long run, translating to a 0.31 percent increase in agricultural output for every 1% increase in the exchange rate. Since a fiscal expansion boosts output under flexible exchange rates, the relationship between exchange rates and agricultural output is positive. However, this could be attributed to agricultural export receipts, which lower imports, raise the prices of domestic agricultural production, and ultimately increase the income of the agricultural sector. This study confirms the findings of Ogah, Kotur, and Essien (2021), who discovered that a 31% increase in exchange rate increases rice productivity. The exchange rate, however, had a positive impact on agricultural output in the third lag (0.190863) compared to the first and second lags' negative and substantial effects (-0.095716, -0.07693, respectively).

Table 5. Error Correction Model result of Monetary Policies and Agricultural output

Regressor	Coefficient	Standard error	T statistic	Probability
Long-Run Result				
LAO(-1)*	-0.232970	0.032727	-7.118511	0.0000
LEXR	0.309151	0.020580	15.02159	0.0000
LINF	-0.490926	0.054831	-8.953368	0.0000
LINR	-0.861742	0.168831	-5.104160	0.0000
Short-Run Result				
C	2.732698	0.286084	9.552098	0.0000
D(LAO(-1))	-0.121958	0.061473	-1.983938	0.0605
D(LEXR)	-0.009689	0.015115	-0.641019	0.5284
D(LEXR(-1))	-0.095716	0.015816	-6.051912	0.0000
D(LEXR(-2))	-0.076939	0.017784	-4.326418	0.0003
D(LEXR(-3))	0.190863	0.014694	12.98919	0.0000
D(LINF)	-0.002463	0.006015	-0.409549	0.6863
D(LINF(-1))	0.073330	0.013245	5.536331	0.0000
D(LINF(-2))	0.043993	0.008411	5.230151	0.0000
D(LINF(-3))	0.013150	0.008391	1.567205	0.1320
ECM(-1)*	-0.232970	0.024670	-9.443269	0.0000

R-squared	0.924308	Mean dependent var	0.058675
Adjusted R-squared	0.892770	S.D. dependent var	0.073682
S.E. of regression	0.024128	Akaike info criterion	-4.359610
Sum squared resid	0.013972	Schwarz criterion	-3.870786
Log likelihood	87.29318	Hannan-Quinn criter.	-4.190868
F-statistic (3, 35)	29.30759	Durbin-Watson stat	1.967477
Prob(F-statistic)	0.000000		

Source: Author's Computation

The naira's depreciation versus the dollar would raise prices, which would have an impact on output levels, according to the exchange rate's negative indication. As a result, increasing agricultural output need a stable and advantageous exchange rate. This result is in line with Osuagwu's (2020) study, which discovered that the exchange rate negatively affects Nigeria's agricultural output. The coefficient of inflation was negative over the long run (-0.490926) but turned positive in the first and second lags (0.073330 and 0.043993). Therefore, while having a positive relationship in the short run, agricultural output had a negative long-run relationship with inflation. The long-run negative association suggests that price volatility has a negative effect on the output of the agricultural industry. Because the real return on investment is reduced by inflation, investment is discouraged, especially in the real sector. This research supports the findings of Obasaju and Baiyegunhi (2019), who found a statistically significant inverse relationship between agricultural output and inflation in Nigeria. A priori expectations are defied by the positive correlation between inflation and agricultural output, as a rise in price level should be accompanied by an increase in production costs, which should lower output level. On the other hand, this positive link can be attributable to the fact that inflation is strongly influenced by the Nigerian exchange rate because of the economy's substantial reliance on imports. This discovery confirms that of Osuagwu (2020), who found that inflation had a favorable connection with agricultural output in the first lag's short run. While interest rates had no association with agricultural output in the short run, they did have a significant negative relationship (-0.861742) over the long run. Economic theory and the symbol are consistent. This can be explained by arguing that variations in interest rates affect the sector's investment choices, which in turn affect changes in agricultural prices. Rising interest rates make it more expensive for farmers to borrow money and increase the expenses of operations and long-term capital investments, which lowers farmer income. This is in line with Abubakar's (2019) findings, which indicated a poor correlation between Nigeria's agricultural sector activity and lending interest rates.

The R^2 in Table 5 was 0.924, suggesting that factors related to monetary policy accounted for 92.4 percent of the variation in agricultural output, with other factors not taken into account in the model accounting for the remaining 7.6 percent. With a corresponding coefficient of -0.232970, the error correction term (ECT) was also statistically significant (P = 0.0000 0.05), indicating a slow rate of adjustment of monetary policy instruments towards equilibrium and projecting a short-run speed of adjustment of 23%. Since the number was close to 2.0, the Durbin-Watson value of 1.967 implies that there is no autocorrelation.

Table 6. Error Correction Model Result of Policy Mix and Agricultural output

Regressor	Coefficient	Standard error	T statistic	Probability
Long-Run Result				
LAL	0.113726	0.038493	2.954.428	0.0105
LGAE	-0.110688	0.037810	-2.927.432	0.0110
LEXR	0.304982	0.079156	3.852.913	0.0018
LINF	-0.570544	0.084896	-6.720.506	0.0000
LINR	-0.264655	0.200698	-1.318.673	0.2084
Short-Run Result				
C	3.235.572	0.248031	1.304.503	0.0000
D(LAO(-1))	-0.226924	0.050438	-4.499.114	0.0005
D(LAO(-2))	-0.078803	0.044800	-1.758.994	0.1004
D(LEXR)	0.013930	0.013220	1.053.688	0.3099
D(LEXR(-1))	-0.161289	0.016192	-9.961.184	0.0000
D(LEXR(-2))	-0.121065	0.017878	-6.771.635	0.0000
D(LEXR(-3))	0.152464	0.014908	1.022.670	0.0000
D(LINF)	-0.021956	0.005394	-4.070.090	0.0011
D(LINF(-1))	0.127036	0.013479	9.424.734	0.0000
D(LINF(-2))	0.070176	0.008685	8.080.191	0.0000
D(LINF(-3))	0.034506	0.008100	4.260.283	0.0008
D(LINR)	-0.162586	0.026927	-6.038.121	0.0000
D(LINR(-1))	-0.007020	0.027082	-0.259195	0.7993
D(LINR(-2))	-0.072927	0.024383	-2.990.919	0.0097
D(LINR(-3))	-0.111051	0.022372	-4.963.749	0.0002
ECM(-1)*	-0.323726	0.024965	-1.296.731	0.0000

R-squared	0.966033	Mean dependent var	0.058675
Adjusted R-squared	0.939217	S.D. dependent var	0.073682
S.E. of regression	0.018166	Akaike info criterion	-4.875174
Sum squared resid	0.006270	Schwarz criterion	-4.164158
Log likelihood	101.3155	Hannan-Quinn criter.	-4.629731
F-statistic (5, 33)	36.02442	Durbin-Watson stat	1.931407
Prob(F-statistic)	0.000000		

3.6 Effects of Policy Mix on Agricultural Output

Agricultural loan (AL), Government Agricultural Expenditure (GAE), Exchange rate (EXR), Inflation rate (INF), and Interest rate (INR) were among the policy mix variables evaluated. Table 6 provide the long-run and short-run findings.

The R^2 was 0.966 implying that policy mix factors explained 96.6 percent of the variation in agricultural output, according to Table 6, while other variables that were not included in the model explained the remaining 3.4 percent. The error correction term (ECT) (-1) is clearly characterized because it gauges how quickly long-run equilibrium is restored following a short-run shock and is negatively significant (-0.323726).

3.7 Effects of Investment on agricultural output

Foreign Direct Investment (FDI) and Private Domestic Investment (PDI) were among the investments examined. The calculated F statistics (1.831791) fell below the critical values for the lower and upper bounds, as shown in table 3. Because cointegration was not discovered in the model, it means that the dependent and independent variables in the model have no long-run relationship. The model was then estimated using the ARDL method as shown in Table 7.

Agricultural output from the previous year was positively (0.748327) significant (0.0000) in the current year at a 1% level, according to the results of the autoregressive distributed lag (ARDL) model, which means that an increase in the previous value of agricultural output increases current agricultural output by 0.748327 percent.

Table 7 Results of the ARDL Estimation of Investment And Agricultural Output

Regressor	***Coefficient***	***Std. Error***	***T-statistic***
LAO(-1)	*0.748327*	*0.116728*	*6.410876*
LPDI	0.093075	0.041294	2.253957
LFDI	-0.017374	0.021503	-0.808001
LFDI(-1)	-0.033036	0.024459	-1.350665
C	2.022249	0.905006	2.234515
Adjusted R-squared	0.985002	S.D. dependent var	0.625091
S.E. of regression	0.076553	Akaike info criterion	-2.162953
Sum squared resid	0.164088	Schwarz criterion	-1.936209
Log likelihood	40.68872	Hannan-Quinn criter.	-2.086660
F-statistic (2, 36)	526.4066	Durbin-Watson stat	2.010925
Prob(F-statistic)	0.000000		

Source: Author's Computation

Private domestic investment in the present period was significant (P=0.0322) and positive (0.093075). In other words, higher levels of domestic private investment will lead to higher levels of agricultural output. This positive link is consistent with a priori predictions as well as Oyedokun and Ajose's (2018) finding that private investment and economic output in Nigeria have a significant and positive relationship.

The coefficient of Foreign Direct Investment (FDI) in the current period was negative (-0.017374) and insignificant (P=0.4259), indicating that FDI had a detrimental but not statistically significant impact on agricultural output. The results of Ukpe et al. (2017), who found that foreign direct investment had little effect on agricultural growth, are in line with this one.

The R^2 value of 0.986 implies that investment variables accounted for 98.6 percent of the variation in agricultural output, while 1.4 percent was explained by other variables not taken into account in the model. The model's estimate is not impacted by serial auto-correlation, as demonstrated by the Durbin-Watson Stat of 2.01.

4. Conclusion and Recommendations

Using annual time-series data, the current study was carried out to access the effect of stabilization policies on agricultural output in Nigeria for the period 1981-2019. The ADF test was employed to determine whether the series were stationary because at level, most time-series data are nonstationary. Result showed LINTR and LINF were stationary at level, whilst LAO, LAL, LGAE, LEXR, LFDI and LPDI were all stationary at first difference. The implications for these empirical results are that the study’s variables were suitable tool of analyzing the error correction mechanism since the variables used in the model were stationary at level and first difference. The ARDL bound testing approach to cointegration was employed to ascertain whether there was a long-run equilibrium relationship among stabilization policies variables and agricultural ourput when it was discovered that the variables were integrated at mix order (level and order 1).

Based on the results and findings of this study, it was concluded that both fiscal and monetary policies and investment policies were significant in driving agricultural growth. The selected fiscal policy variables; agricultural loan and government agricultural expenditure were significant policy variables that affect agricultural output in the logn-run while only government agricultural expenditure affected positively in the short-run. On the other hand, all monetary policy variables (exchange rate, inflation and interest rate) significantly affected agricultural output in the long-run whereas in the short-run, only exchange rate and inflation rate affected agricultural output.

The study established that there was a relative impact of policy mix (fiscal and monetary policies) on Nigeria’s agricultural output. However, the result comparatively shows that the coefficient of the parameter estimates of monetary policy variables were greater than that of fiscalpolicy variables, implying that monetary policy exerts greater impact on agricultural output inNigeria. The study ascertains that the use offiscal and monetary policies has been successful in stimulating agricultural growth in Nigeria,especially in the long-run. In the same vein, only private domestic investment affected agricultural output whereas foreign direct investment had no effect on agricultural output. The finding showed that agricultural loan negatively affected agricultural output, as such it was recommended that the government should ensure proper monitoring of loans disbursed for agricultural purposes in order to avoid diversion of loan for other activities other than agriculture.

Since monetary policy varaibles had sizable impact on agricultural output in Nigeria both in the short-run and long-run, as such government should allow the monetary authority (as regulated by the Central Bank of Nigeria) to operate with adequate autonomy so as to promote unbiased or effective policy framework. Also, government should judiciously fuel funds generated from Foreign Direct Investments into the agricultural sector so that its impact can be felt in the sector.

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