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Macroeconomic Policy and Agricultural Development in Nigeria

KROKEYI, Wisdom Selekekeme
Department of Economics, Faculty of Social Sciences,
Niger Delta University, Wilberforce Island, P.M.B 071, Bayelsa State, Nigeria
Email Address: selekekeme2000@gmail.com: 2348036777252

AMAEGBERI, Michael
Department of Economics, Faculty of Social Sciences,Niger Delta University,
Wilberforce Island, P.M.B 071, Bayelsa State, Nigeria.
Email Address: selekekeme2000@gmail.com: 2348036777252

Abstract
The importance of economic diversification through agricultural development cannot be overstated, particularly the use of macroeconomic policy instruments. This paper interrogated the relationship between monetary policy and agricultural sector development, particularly the crops and livestock subsectors in Nigeria from 1970 – 2019. The Ordinary Least Square (OLS) technique was employed. Empirical results indicated a negative but significant effect of money supply (MS) on crops subsector agricultural output, while monetary policy rate (MPR) and average annual rain fall (AAR) had positive and insignificant effect on crops subsector agricultural output. Also, negative and insignificant effects of money supply and monetary policy rate on livestock subsector agricultural output was found. It was also found that money supply and government expenditure on education had positive and significant effects on aggregate agricultural sector output. Also, monetary policy rate and gross fixed capital formation had negative and statistically significant effect on aggregate agricultural sector output. Based on the findings, the study recommends that monetary authority, which is the Central Bank of Nigeria (CBN) should ease monetary policy in order to reduce negative effects of monetary policy on crops and livestock agricultural subsectors in Nigeria as indicated on the results.

Keywords: Average Annual Rainfall, CPI, Government Expenditure, Money Supply, MPR.

Introduction

Agricultural sector is very important to the survival of most African countries, and Nigeria in particular as it remains the largest sector in the economy that has contributed heavily to the economy. For example, the sector contributes an average of 24% to the GDP between 2013 -2019. The sector has the potential to reducing the huge unemployment rate which would reduce crime and other vices. Owing to its importance, there is the need to deepen the agricultural sector in Nigeria through monetary policy.Agricultural development and agricultural output growth is key due to its contributions to the growth process of the economy and poverty reduction. Agricultural sector has been the most dominant sector as majority of the country's poor depends largely on agriculture for their livelihood. It accounts in Nigeria about 70 percent of the sectors that generate employment; employing about 36% of the country's

labour force between the periods from 2013 – 2019, and one of the sectors that accelerates fast economic growth and development (Oyaniran, 2020). In Nigeria, the central bank is saddled with the responsibility to through various monetary policy instruments; provide liquidity through money supply and the monetary policy rate (MPR). When money supply is increased, it reduces interest rate, hence, encouraging borrowing for agricultural sector investment that would bring about the desired agricultural development. Changes in money supply stimulates old and new investment opportunities, including the agricultural sector investment (Olwenry & Chiluwe, 2012).Also, the monetary policy rate (MPR) plays pivotal role in deciding agricultural sector development. This is because, when the monetary policy rate (MPR) is low, banks' lending rates are grossly affected as lending rates would rise which shall affect the cost of borrowing and reduce the investment in agriculture. The important role of agriculture in bringing about growth and development had continued to attract the attention of not only the government but also economic analysts and the general public. The government has shown greater commitment to agricultural sector in many ways.In the light of the above, the study therefore, interrogated the relationship between monetary policy and agricultural sector development, particularly crops and livestock subsectors in Nigeria.

Literature Review

Theoretical Literature

Structural Change Theory

The structural change theory is associated with Nobel laureate, Arthur W. Lewis in the mid-1950s. The theory establishes how developing nations can change the structure of their domestic economies from high dependency on traditional subsistence agriculture to a modernized and advanced agricultural system. This according to the theory is achieved through proper financial support; which may again lead to an industrial breakthrough. However, the theory was later modified. The new version of the theory stated that the benefits of agricultural development (or increase in agricultural output) can only be realized through credit and financial support from the government. The theory pointed out that government expenditure in the form of incentives, credit and input provision enable farmers to expand output and therefore raise farm productivity. This theory directly pointed out the need for government expenditure on agriculture. The more the government expenditure in the form of credit and input provision, the more will be the agricultural output and productivity (Ubah, 2008).

Cobb-Douglas Production Function

The study adopts the Cobb-Douglas production function. The Cobb-Douglas production function at time t, with constant returns to scale, is specified as follows:

$$Y(t) = \left[A(t),\ K(t)^{\alpha}\right)L(t)^{1-\alpha}, \quad 0 < a > \qquad (3.1)$$

Where;

α = a share of capital in total output and

1-α = a share of output paid to labour.

The exogenous growth of capital and technology are shown at rates n and g respectively. Where n is the population growth rate, g is a labour productivity growth rate. It is also assumed that s is constant fraction of output saved and invested. Thus, stock of capital per unit of labour is defined as:

$$K = \frac{K}{AL} \quad . \qquad (3.2)$$

While the output level per unit of labour is as follows:

$$y = \frac{Y}{AL} \quad . \qquad (3.3)$$

This shows that capital accumulation is the strength for economic growth. Therefore, change in capital brings about change in total income. Net investment is then the rate of increase of capital stock, $\frac{dK}{dt}$ or $\acute{K}$ and is determined by equation 3.4:

$$\underline{K} = sf(K) - \left(n + g + \delta\right)K = sK^{\alpha} - \left(n + g + \delta\right)K \qquad (3.4)$$

Empirical Literature

Using the Ordinary Least Square regression technique, Adongo, John, Zeph& Muyima (2020) analysed the impact of monetary policy on Agricultural sector gross domestic product in Kenya from 1981 to 2019. The findings showed that broad money supply had a positive influence on agricultural GDP while the exchange rate had a negative impact on the performance of the agricultural sector in Kenya. While this study is appreciated as it relates to what is being investigated, it was conducted in Kenya which is at variance with our focus of Nigeria. According to a study of Mashinini, Dlamini & Dlamini (2019) who examined the effect of monetary policy on agricultural gross domestic product in Eswatini from 1980 to 2016 showed that the long-run exchange rate, interest rate, inflation, broad money supply and agriculture credit had a negative effect on agriculture GDP. While, in the short run, the variation in agriculture GDP was largely caused by the lagged agricultural GDP, interest rate, exchange rate as well as inflation. Money supply and agriculture credit contributed about 0.46% and 0.55% respectively to the variation in agricultural GDP. This study was 1980 to 2016. However, our focus is from 1981 to 2019. Vector Error Correction Model (VEC) was used for analysis in the study. Their study was in Eswatini, while ours focuses on Nigeria.

Iyoboyi, Okereke & Pedro (2018) investigated the impact of macroeconomic policy on agricultural value chain in Nigeria. The study employed secondary data covering the periods from 1981– 2016. The autoregressive distributed lag (ARDL) model was employed. The result shows a long-run relationship among the variables. Government expenditure and broad money supply were found to have a significant positive impact on the agricultural value chain. Energy was found also to have a direct statistically significant impact on the agricultural value chain in Nigeria. This study meets our a priori expectation. However, the difference from our study is the time frame of 1980 to 2016, while ours is from 1981 to 2019.The impact of macroeconomic policy on employment, food inflation, and agricultural growth were investigates by Wagan, Chen, Seelro & Shah (2018). The data covered the periods from 1995 to 2016. A

factor-augmented vector autoregressive model (FARVAR) was employed in the study. According to them, monetary policy significantly reduced food inflation and agricultural production while increasing the rural unemployment rate. Short-term and 10-year interest rates were increased owing to the contractionary monetary policies pursued by Pakistan and India. While this study focused on Pakistan and India from 1995 to 2016, we focused on Nigeria from 1981 to 2019.Macroeconomic policy decisions on domestic food production and food inflation in Pakistan was examined by Akbar & Jabbar (2017). Annual data was used in the study disaggregated, covering the periods from 1963–1964, and 2013–2014. A generalized method of moments (GMM) technique was employed in the study. The findings revealed that the decrease in public expenditure had a significant negative impact on the availability and accessibility parameters of food security in Pakistan. This study focused on Pakistan, while ours is focused on Nigeria and with a period of 1981 to 2019. Zarai Taraqiati Bank Limited (2017) examined impact of monetary policy rate on agriculture credit disbursement on the agricultural output of Pakistan. The study was a time series covering the periods 1993 to 2017. The study utilized OLS regression technique to analyze the data. The result obtained showed that monetary policy rate, food exports, agricultural land, employment in agriculture had a positive and significant impact on AGDP, while subsidy on fertilizer and agriculture credit disbursement had a positive but insignificant impact on AGDP. This study focus was 1993 to 2017, while ours focuses on Nigeria and from 1981 to 2019.

Data and Methodology

Data

The study design is a correlational research design. The data used are time-series which are crops subsector agricultural output(CROPSOUT) a measure for crops subsector development, money supply(MS), monetary policy rate(MPR), consumer price index(CPI), average annual rainfall (AAR) and government expenditure on education(GXE) which is a proxy for human capital in this study from 1981 to 2019. The data were sourced from Central Bank of Nigeria (CBN).

Model Specification

The functional form of the model for objective one is specified as:

$$CROPSOUT = f(MS, MPR, AAR, \text{CPI}) \quad (3.1)$$

Where;

CROPSOUT = crops subsector agricultural output is a measure for crops subsector development

MS = Money Supply (M2)

MPR = Monetary Policy Rate

CPI = Consumer Price Index

AAR = Average Annual Rainfall

The model is specified in econometric form as:

$$CROPSOUT = b_0 + b_1 MS + b_2 MPR + b_3 AAR + b_4 CPI + u_{1t} \quad (3.2)$$

The functional form of model two for objective two is specified as:

$$LIFESOUT = f(MS, MPR, CPI, \text{GXE}) \quad (3.3)$$

Where;

LIFESOUT = livestock subsector agricultural output as a measure for livestock subsector agricultural sector development

MS = Money Supply (M2)

MPR = Monetary Policy Rate

MPR = Monetary Policy Rate
GFCF = Gross Fixed Capital Formation, proxy for domestic investment
GXE = government expenditure on education, a proxy for human capital
Presenting equation (3.3) in the econometric form will yield the following equation:

$$PASOUT = \pi_0 + \pi_1 MS + \pi_2 MPR + \pi_3 GFCF + \pi_3 GXE + u_{3t} \quad (3.6)$$

Justification of Variables

Money Supply (M2):. It is also a monetary policy variable. An increase in the supply of money lowers interest rates, and generates more investments and reinvestments.
Thus it is a good determinant of investment and economic growth as used in the model.

The Monetary Policy Rate (MPR): is the rate at which the CBN lend to banks and other financial institutions. Banks are a significant determinant of the amount of the level of liquidity in the economy. The monetary policy rate affects the rate of interest which the deposit money banks lend to the non-bank public. An increase in the monetary policy rates leads to an increase in the rate of interest, which leads to a reduction in the loan demand and therefore supplied. The reverse is the case for a reduction in the monetary policy rate

Consumer Price Index (CPI): looks at the prices of hundreds of agricultural products we commonly spend money on, such as food and other items and track how these prices changed over time. It determines the level of agricultural productivity. Agricultural products with higher prices attract more farmers to the cultivation and production of such products. Thus output on such products increases leading to an increase in total output. Thus, the use of CPI in our model as a determinant of agricultural output is relevant.

Annual Average Rain (AAR): Annual average rainfall determines the level of agricultural output. This depends on the level of rainfall. Too much rainfall could be detrimental to total agricultural output. It reduces agricultural productivity, whereas a shortage of rainfall could as well reduce output. The level of rainfall, therefore, affects agricultural productivity. Thus determine the agricultural output in a given period.

Government Expenditure on Education (GXE): is the government expenditure on primary, secondary and tertiary education. It is believed that countries with a high level of education will have more human capital and are anticipated to be in a better position in regards to their income level than countries that are backward in education. The role of human capital (including expenditure on education) is required in the growth process.

Gross Fixed Capital Formation (GFCF): It is a measure for production expenditure in the economy. Hence, gross capital formation is a measure for investment in this study.

Per Capita Agricultural Output (PASOUT): is a measure of agricultural productivity. It is the agricultural output per head. It is often used as an average output, a measure of the agricultural productivity of the total population. Higher per capita output means enough agricultural production for

the population. While lower per capita output is an indication of agricultural productivity below the agricultural production requirements of the population size.

Livestock Subsector Agricultural Output (CROPSOUT): livestock subsector agricultural output is the output of the livestock subsector. It is a measure of the development of the livestock subsector. When there is a growth and development of the livestock subsector, the output will also increase.

Crops Subsector Agricultural Output (CROPSOUT): Crops subsector agricultural output is the output of the crops subsector. It is a measure of the development of the crops subsector. When there is a growth and development of the crops subsector, the output will also increase.

Results and Discussion

Analysis and Discussion of Results

The equations for the respective objectives specified in equations 3.2, 3.4 and 3.6 respectively were estimated using the Ordinary Least Square (OLS). The variables were tested for unit root and cointegration. See the estimation results and the findings discussed in table 4.1.

Descriptive Statistics of the Variables

The mean, standard deviation, skewness and others were determined as indicated in Table 4.1

Table 4.1:

Variables	Obs.	Mean	Standard Deviation	Minimum value	Maximum value	Probability (Skewness)	Probability (Kurtosis)
CROPSOUT	39	6995.863	4926.373	1759.115	16181.99	0.1205	0.0023
LIFESOUT	39	683.0417	285.0617	341.4115	1210.055	0.0624	0.0441
PASOUT	39	3025.136	2015.188	857.7497	7072.859	0.0899	0.0299
MS	39	475819.0	904453.4	5127.401	4027902	0.0000	0.0003
MPR	39	12.9887	3.9272	6.0000	26.0000	0.0457	0.0396
CPI	39	89.7876	80.9067	1.0279	276.6007	0.1263	0.4172
AAR	39	207.8051	140.5137	0.3000	494.8000	0.3908	0.0293
GXE	39	123.3091	162.7984	0.1622	593.3328	0.0020	0.3220
GFCF	39	35.7896	19.4997	14.1687	89.3861	0.0085	0.1954

Source: Authors' Computation

Monetary policy rate, consumer price index and gross fixed capital formation have mean values near the respective standard deviation. This means that these variables have values that are close to their respective mean values. The rest variables, on the other hand, have values that are not close to their respective mean values, as indicated by the large difference between the mean and the standard deviation values. The minimum values of the variables respectively are less than the respective mean values, while the maximum values are higher than the mean values respectively. This shows that the values of the variables respectively spread around the mean values. Concerning the Skewness, money supply, government education expenditure and gross fixed capital formation has significant Skewness

probability values. It implies that the variables were not normally distributed. However, the rest variables (crops subsector agricultural output, monetary policy rate, consumer price index, average annual rainfall, livestock subsector agricultural output, and per capita agricultural sector output) have insignificant Skewness probability values. But, variables have statistically significant Kurtosis values. Therefore, the null hypothesis is rejected at the 5 per cent level. Meaning, the variables: crops subsector agricultural output, monetary policy rate, average annual rainfall, livestock subsector agricultural output, and per capita agricultural sector output do not have tails of normal distribution.

Unit Root Test

Table 4.2: Augmented Dickey-Fuller and Philips–Perron unit root test results

Variable	Augmented Dickey-Fuller Result		Philips–Perron Result		Lag order	~I(d)
	Level	1st Difference	Level	1st Difference		
CROPSOUT	-1.660	-4.976*	-1.697	-5.758*	2	I(1)
LIFESOUT	-1.836	-4.812*	-1.123	-3.873*	2	I(1)
PASOUT	-1.308	-3.831*	-1.203	-6.153*	2	I(1)
MS	-1.899	-3.811*	-2.424	-7.212*	2	I(1)
MPR	-2.323	-3.930*	-3.094	-8.464*	2	I(1)
CPI	-2.255	-3.887*	-2.412	-6.801*	2	I(1)
AAR	-2.156	-4.147*	-2.049	-7.762*	2	I(1)
GXE	-0.207	-4.344*	-0.060	-4.710*	2	I(1)
GFCF	-2.634	-3.830*	-3.230	-5.312*	2	I(1)

Where * denotes significance at 5% and the rejection of the null hypothesis of the presence of unit root. The optimal lag lengths were chosen according to Akaike's Final Prediction Error (FPE), and Akaike's information criterions. The ADF 5% critical values at level and 1st difference are -3.556 and -3.560, while the Philips–Perron critical values at level and 1st difference are -3.548 and -3.552. Trend is included in both the Augmented Dickey-Fuller and Philips–Perron unit root test models estimated.

Source: Authors' Computation

The results above supports the acceptance of null hypothesis, indicating the presence of unit root.. At the 1st difference, all the variables became significant (the test statistic is higher than the critical value). Therefore, the null hypothesis of presence of unit root is rejected. This means that the variables are integrated of order 1, I(1).

Effect of Monetary Policy on Crops Subsector Output

Objective one examines effect of monetary policy on crops subsector output. This section presents and discusses the results concerning objective one. However, before the presentation and discussion of the result for objective one, the cointegration result is presented and discussed.

Table 4.3: Result of Johansen test for cointegration

Maximum Rank	Eigenvalue	Trace Statistics	5% critical value
0	-	80.4296	59.46
1	0.6318	43.4637	39.89
2	0.4521	21.2045*	24.31
3	0.3340	6.1604	12.53
4	0.1271	1.1315	3.84
5	0.0301		

Source: Authors' computation

The trace statistics, when compared with the 5 per cent critical value, is greater up to maximum rank one. This means that there are two cointegrating equations. The presence of cointegrating equations brings about rejection of null hypothesis. Therefore, the variables in the equation for objective one are cointegrated. The equation for objective one was estimated using the OLS technique. See Table 4.4.

Table 4.4: Estimates of the effect of monetary policy on crops subsector output

CROPSOUT Value	Coefficients	Standard Errors	T-stat	P-
MS	-0.0008	0.0003	-2.34	0.025
MPR	6.5039	77.4449	0.08	0.934
AAR	0.6039	2.1934	0.28	0.785
CPI	57.9724	3.7825		15.33
0.000				
Constant	1965.866	1257.538	1.56	0.127

R-Squared	0.8791
Adj. R-Squared	0.8649
F(4, 34)	61.82 (0.0000)
Durbin-Watson d-statistic (5, 39) = 0.8099	
Breusch-Godfrey LM chi	1.402 (0.7701)

Source: Authors' computation

Money supply has negative effect on crops subsector agricultural output. Specifically, an increase in money supply leads to 0.001 per cent decreases in crops subsector agricultural output. The t-value is -2.34, which is greater than 2 in absolute terms. The 0.025 probability value is less than 0.05. Money supply has negative and statistically significant effect on crops subsector agricultural output. A rise in monetary policy rate brings about 6.50 per cent increase in crops subsector agricultural output. The t-value is 0.08. Since the t-value is statistically insignificant, the null hypothesis that the monetary policy rate has no statistically significant effect on crops subsector agricultural output is accepted. The p-value is 0.934, which is insignificant at the 5 percent level. Thus, the monetary policy rate has positive and statistically insignificant effect on crops subsector agricultural output.

The coefficient for average annual rain fall is 0.6039 while a t-value is 0.28. Since the t-value is less than 2 in absolute sense, the null hypothesis that average annual rain fall has no statistically significant effect on crops subsector agricultural output is accepted. The insignificant p-value (0.785 > 0.05) supports the acceptance of the null hypothesis. In specific terms, an increase in average annual rain fall leads to an insignificant increase in the crops subsector agricultural output.

Consumer price index has a positive coefficient of 57.9724 and a t-value of 15.33. Since the t-value is statistically significant, the null hypothesis that the consumer price index has no statistically significant effect on crops subsector agricultural output is rejected at the 5 per cent level. The significant p-value supports the rejection of the null hypothesis. An increase in the consumer price index results to 57.97 per cent significant increase in the crops' subsectors agricultural output.

The value of the R^2 is 0.8791. This means that the independent variables in the model could explain about 87.91 per cent change in the crops' subsector agricultural output. The F-statistics (4, 34) value of 61.82 (p = 0.0000) is significant, since the probability value is less than 0.05. We say that the independent variables in the model have joint significant effect on the crops subsector agricultural output. The Durbin-Watson test statistics is 0.8099. This value is nondeterministic. That is, the presence or absence of autocorrelation cannot be ascertained since the value is in the zone of indecision. However, the Breusch-Godfrey LM chi2 test shows a value of 1.402 (p = 0.7701). Since the p-value is statistically insignificant, we accept the null hypothesis of no serial correlation.

Effect of Monetary Policy on Livestock Subsector Output

Objective two is to examine the effect of monetary policy on livestock subsector output. This section presents and discusses the results concerning objective two. However, before the presentation and discussion of the result for objective two, the cointegration result is presented and discussed.

Table 4.5: Result of Johansen test for cointegration

Maximum Rank	Eigenvalue	Trace Statistics	5% critical value
0	-	113.4289	59.46
1	0.8517	42.8182	39.89
2	0.4201	22.6543*	24.31
3	0.3545	6.4579	12.53
4	0.1515	0.3778	3.84
5	0.01016		

Source: Authors' computation

The trace statistics is greater than the 5 per cent critical value up to maximum rank one. This means there are two cointegrating equations. The presence of cointegrating equations means the rejection of the null hypothesis. Therefore, the variables in the equation for objective two are cointegrated. The equation for objective two was also estimated using the OLS technique. See Table 4.6.

Table 4.6: Estimates of the effect of monetary policy on livestock subsector output

LIFESOUT	Coefficients	Standard Errors	T-stat	P-Value
MS	-0.0001	0.0000	-0.73	0.471
MPR	-1.2349	3.268	-0.38	0.708
CPI	1.4349	0.3471	4.13	0.000
GXE	1.0399	2.1711	6.08	0.000
Constant	447.9418	47.4689	9.44	0.000
R-Squared		0.8367		
Adj. R-Squared		0.8293		
F (4, 34)		125.86 (0.0000)		
Durbin-Watson d-statistic (5, 39)		1.7455		
Breusch-Godfrey LM chi		1.226 (0.9702)		

Source: Authors' computation

Money supply has negative effect on livestock subsector agricultural output. Specifically, an increase in money supply leads to 0.001 per cent decreases in livestock subsector agricultural output. The t-value is -0.73, which is less than 2 in absolute terms. Thus, using the 2-t rule of thumb, we say that the effect of money supply on livestock subsector agricultural output is statistically insignificant. The probability value of 0.471 – greater than 0.05, means no significant error in accepting the null hypothesis. Money supply has negative and statistically insignificant effect on livestock subsector agricultural output. A rise in monetary policy rate leads to 1.23 per cent decrease in livestock subsector agricultural output. The t-value is -0.38. Since the t-value is statistically insignificant, the null hypothesis that the monetary policy rate has no statistically significant effect on livestock subsector agricultural output is accepted. The p-value is 0.708, which is insignificant at the 5 per cent level. Thus, the monetary policy rate has negative and statistically insignificant effect on livestock subsector agricultural output.

Consumer price index has a positive coefficient of 1.4349 and a t-value of 4.13. Since the t-value is statistically significant, the null hypothesis that the consumer price index has no statistically significant effect on livestock subsector agricultural output is rejected at the 5 per cent level. The significant p-value supports the rejection of the null hypothesis. An increase of consumer price index results to 1.43 per cent significant increase in the livestock subsectors agricultural output.

The coefficient for government expenditure on education is 1.0399 with a t-value of 6.08. Since the t-value is greater than 2 in absolute sense, the null hypothesis that government expenditure on education has no statistically significant effect on livestock subsector agricultural output is rejected. The significant p-value ($0.000 < 0.05$) corroborates this decision. In specific terms, an increase in government expenditure on education leads to a significant increase in the livestock subsector agricultural output.

The value of the R^2 is 0.8367. This means that the independent variables in the model could explain about 83.67 per cent change in the livestock subsector agricultural output. The F-statistics (4, 34) value of 125.86 (p = 0.0000) is significant, since the probability value is less than 0.05. We say that the independent variables in the model have joint significant effect on the livestock subsector agricultural output. The Durbin-Watson test statistics is 1.7455. This value is approximately 2. Therefore, we accept the null hypothesis of no autocorrelation. Also, the Breusch-Godfrey LM chi2 test shows a value of 1.226 (p = 0.9702). Since the p-value is statistically insignificant, we accept the null hypothesis of no serial correlation.

Monetary Policy on Aggregate Agricultural Sector Output

Objective three examines the effect of monetary policy on aggregate agricultural sector output. This section presents and discusses the results concerning objective three. Before the presentation and discussion of the main result for objective three, the cointegration result is presented and discussed.

Table 4.7: Result of Johansen test for cointegration

Table 4.7: Result of Johansen test for cointegration

Maximum Rank	Eigenvalue	Trace Statistics	5% critical value
0	-	69.5530	59.46
1	0.5279	41.7856	39.89
2	0.4956	16.4622*	24.31
3	0.2444	6.0937	12.53
4	0.1345	0.7491	3.84
5	0.0200		

Source: Authors' computation

The trace statistics of maximum ranks 0 and 1 are greater than the 5 per cent critical values respectively. The implication is the presence of cointegrating equations. The presence of cointegrating equations means the rejection of the null hypothesis. Therefore, the variables in the equation for objective three are cointegrated. The equation for objective three as well, was estimated using the OLS technique.

Table 4.8: Estimates of the effect of monetary policy on aggregate agricultural sector output

PASOUT	Coefficients	Standard Errors	t-stat	P-value
MS	0.0002	0.0000	2.07	0.046
MPR	-43.5667	19.1745	-2.27	0.030
GFCF	-30.4739	5.7366	-5.31	0.000
GXE	9.2142	0.6879	13.40	0.000
Constant	3458.368	425.6774	8.12	0.000
R-Squared	0.9566			
Adj. R-Squared	0.9515			
F (4, 34)	187.54 (0.0000)			
Durbin-Watson d-statistic (5, 39) =	1.9663			
Breusch-Godfrey LM chi	0.457 (0.0812)			

Source: Authors' computation

Money supply has a positive effect on aggregate agricultural sector output. Specifically, an increase in money supply leads to 0.002 per cent increases in aggregate agricultural sector output. The t-value is 2.07, which is greater than 2 in absolute terms. Thus, we say that the effect of money supply on aggregate agricultural sector output is statistically significant. The null hypothesis that money supply has no significant effect on aggregate agricultural sector output is rejected. Money supply has positive and statistically significant effect on aggregate agricultural sector output. A rise in monetary policy rate leads to 43.57 per cent decrease in aggregate agricultural sector output. The t-value is -2.27. Since the t-value is statistically significant at the 5 per cent level, the null hypothesis that the monetary policy rate has no statistically significant effect on aggregate agricultural sector output is rejected. The p-value is 0.030, which is significant at the 5 per cent level. Thus, the monetary policy rate has negative and statistically significant effect on aggregate agricultural sector output.

Gross fixed capital formation has a negative coefficient of -30.4739 and a t-value of -5.31. Since the t-value is statistically significant, the null hypothesis that the gross fixed capital formation has no statistically significant effect on aggregate agricultural sector output is rejected. Gross fixed capital formation results to 30.47 per cent significant increase in the aggregate agricultural sector output.The coefficient for government expenditure on education is 9.2142 with a t-value of 13.40. Since the t-value is greater than 2 in absolute sense, the null hypothesis that government expenditure on education has no statistically significant effect on aggregate agricultural sector output is rejected. The significant p-value ($0.000 < 0.05$) supports the rejection of the null hypothesis. In specific terms, an increase in government expenditure on education leads to a significant increase in the aggregate agricultural sector output. The value of the R^2 is 0.9566. This means that the independent variables in the model could explain about 5.66 per cent change in the aggregate agricultural sector output. The F-statistics (4, 34) value of 187.54 ($p = 0.0000$) is significant, since the probability value is less than 0.05. We say that the independent variables in the model have joint significant effect on the aggregate agricultural sector output. The Durbin-Watson test statistics is 1.9663. This value is approximately 2. Therefore, we accept the null hypothesis of no autocorrelation. Also, the Breusch-Godfrey LM chi2 test shows a value of 0.457 ($p = 0.0812$). Since the p-value is statistically insignificant, we accept the null hypothesis of no serial correlation.

Conclusion and Recommendation

Conclusion

The effects of monetary policy and agricultural sector development in Nigeria has been interrogated with findings. Based on the results, it is concluded that monetary policy has not made positive and significant contributions to the development of the crops subsector. Money supply and monetary policy rate instruments of monetary policy negatively and significantly affects the livestock agricultural subsector, but the consumer price level and human capital development affects the development of the livestock agricultural subsector.

Recommendation

Based on the findings, the study recommends that:Central Bank of Nigeria should ease monetary policy to reduce negative effect of monetary policy on crops and livestock agricultural subsectors. This recommendation is made because of the negative effect of monetary policy on crops and livestock agriculture as shown from the results. Also, early prediction on the level of rainfall should be made and sensitize the public before the planting season commences. This recommendation, when implemented, shall encourage farmers to plan ahead which shall bring about significant impact of agricultural output in Nigeria.

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