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EFFECT OF SELECTED MACROECONOMICS VARIABLES ON THE AGRICULTURAL SECTOR PERFORMANCE IN NIGERIA

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ABSTRACT

This paper evaluates the influence of selected macroeconomics variables on the performance of the agricultural sector in Nigeria for the period 1986-2014. Data was sourced from CBN statistical bulletin and the econometric method of ADF unit root test, Johansen cointegration test and the ECM was used for the analysis. The Augmented Dickey-Fuller test revealed that government expenditure, agricultural sector output and foreign direct investment were first-difference stationary, while gross domestic product was second-difference stationary. There is also a long-run equilibrium relationship among these variables as depicted by the Johansen cointegration result. The ECM results indicated that government expenditure had a negative significant effect on agriculture sector output in the long run; foreign direct investment had a significant positive impact on agricultural sector output, while gross domestic product did not have any expanding influence on agricultural sector output The value of the coefficient of determination (R^2) of 0.647359 showed that the exogenous variables in the ECM equation, FDI, GDP and government expenditure explained over 65% of the systematic variations in agricultural sector output. The findings of the study suggest that the policy thrust should focus on attracting more foreign direct investment; effective monitoring and supervision of public funds to agriculture to ensure its judicious use and putting in place measures to translate economic growth propelled by other sectors to agricultural sector growth in the country.

KEY WORDS: Government Expenditure, FDI, GDP, ECM, Agriculture Output.

1.0 INTRODUCTION

Agriculture is the engine of growth and development of most nations and is usually believed to be a tool in the advancement of the economic as well as a way out from poverty for most developing countries (Jhingan, 2010). Findings for the economic disparity among nations have been traced to agricultural transformation as a key to economic liberation amongst worsening nations. The development and growth that emanates from the agricultural sector is a function of its relationship with other sectors of the economy. From the above premise, Eyo (2008); Omotor, Orubu and Inoni (2009), surmised that agriculture is the foremost determinant of achieving economic development and that the war against poverty can be lost or won, on the long run, because of it.

In Nigeria, the improvement in agriculture has been moderate despite different agricultural developmental approaches adopted. Different agricultural programs have been planned and executed by the governments to enhance the circumstance since independence in 1960. National Accelerated Food Production Program, River Basins Development Authority, Operation Feed the Nation, Green Revolution, Structural Adjustment Program and others have been introduced. These programs were designed to encourage mechanized large scale farming by the Federal and State government. While Structural Adjustment Programme was implemented to serve as an economic liberation for the country, Agricultural Credit Guarantee Scheme was meant to cater for the financial aspect of agricultural production (Omotor, Orubu and Inoni, 2009). Despite the fact that agriculture is characterized by long gestation periods, land fragmentation/ fractionalization, low yield and low level of inputs as a result of neglect by government due to over-dependence on a mono-sector economy, petroleum, it can still be viewed as an engine that adds to the growing of the overall economy of Nigeria.

Moreover, agricultural output in Nigeria is plagued with several macroeconomics crisis characterized by mass unemployment, persistent inflation rate, stunted growth, balance of payment deficit, chronic budget deficit and death of the cottage industries. The drastic fall in crude oil price to a 13- year low of 27 USD per barrel in 2016, also contributed to this worsening situation. Recently, the agricultural sector in developing nations has recorded profane decrease as

far as its involvement to export earnings and local consumption. This perception can be connected with policy inactivity amongst other variables. The Structural Adjustment Programme introduced in the 1980s was an approach aimed at boosting agricultural production. The adoption of SAP to remedy the situation by restructuring and diversifying the prolific base of the economy was its major aim. According to Gbosi (1996), establishing reasonable and sustainable exchange rate for the naira was part of the objectives to be accomplished through the key instruments of SAP which incorporate liberalization and tariff changes.

In spite of all these measures, the slow growth of the agricultural sector have created issues like insufficient food for the populace, inadequate raw materials for the industrial sector and decrease in its exchange earnings. Its growth rate has failed to keep pace with the countries' population growth. This resulted in shortage of food, continuous soaring prices, and mass food importation. Based on this, it is obvious that the Nigerian economy cannot achieve desired sustainable growth rate with this present rate of agricultural output. More so, the serious decline of agricultural output over the years could have been the factor contributing to the high incident of poverty in the rural areas of the country.

The above specified problems of the study necessitated the following research questions; what are the impacts of real Gross Domestic Product, government expenditure and Foreign Direct Investment on agricultural output in Nigeria? It was the answers to the question that provoked this study.

2.0 LITERATURE REVIEW

Theoretical Framework: Neoclassical Growth Model

This shows that if there were no technological progress, then the effects of diminishing returns would eventually cause economic growth to cease (Aghion and Howitt, 1998).Turning to the issue of convergence/divergence, the model predicts convergence in growth rates on the basis that poor economies will grow faster compared to rich ones. The neoclassical model predicts that countries with low per-capita incomes grow faster than those with high output (y), so that over time per-capita incomes converge.

The neoclassical growth model assumes the Cobb-Douglas production function that, in its intensive form, is expressed as: $y = Ak^{\alpha}$

where; y and k are the output-labour ratio and the capital-labour ratio respectively, α is the capital elasticity of output, and A is the total factor productivity (TFP) representing technological capacity of the productive system. Under the model, 'A' grows either as a purely exogenous process or through exogenous technical innovations which are embodied in capital goods (Solow, 1956). Diminishing returns to capital, combined with assumptions of constant savings rate and constant growth of labour, generate a steady state growth rate depending only on the rate of exogenous technical progress.

Empirical Literature

Empirical works of scholars on selected macroeconomic variables on the agricultural sector performance abounds in both developed and developing countries. Such work include; Ewubare and Eyitope (2015) who in their study examined the effects of government spending on the agricultural sector in Nigeria. The OLS regressions, the Johansson co-integration techniques and the Error Correction Model were used for the analysis. Having established the stationarity and long run equilibrium relationship, the ECM results showed that the R^2 is 95% and the coefficient of the ECM appeared with negative sign and statistically significant. The explanatory variable, government spending is positive and statistically significant. Based on the findings, the study recommended for an increased funding of the agricultural sector in Nigeria.

In a similar study, Uger(2013) used a Simple regression with the view of analyzing the data which indicated the effect of agricultural expenditure on production and its output from 1991 to 2010. The R^2 was 1% indicating a weak relationship between the variables as a result of inadequate funding. However he proposed that government should reinforce its budgetary allocations to the agricultural sector, ensure proper release of funds, monitor agricultural inputs distribution to farmers and create commodity markets.

On FDI and the agricultural sector, Iddrisu, Immaurana and Halidu (2015) concentrated the effect of FDI on the improvement of the Agricultural sector in Nigeria utilizing time arrangement information covering the period 1981 and 2012 and utilizing the OLSestimation strategy. It was discovers that FDI affect farming. The OLS likewise discovers precariousness of the political condition to conversely influence the farming division.

An Empirical Analysis of the Relationship between Foreign Direct Investment and the agricultural sector of Nigeria was conducted by Adetunji (2013). This study sought to investigate the prevalent gap in empirical analysis of FDIAgricultural sector relationship in Nigeria by using VAR method from 1980-2007. The results showed that the current value of FDI would not significantly affect agricultural output but impact positively on labor.

Utilizing time series data, Lawal (2011) endeavored to confirm the measure of government spending on agriculture in the thirty-year time frame of 1979 – 2007. Huge factual proof gotten from the examination shows that administrationspending does not take after a standard example and that the agriculture altogether adds to the development of the GDP is in direct association with government funding to the sector.

3.0 METHODOLOGY

This study employed principally secondary data obtained from the Central Bank of Nigeria statistical bulletin and the Federal Bureau of Statistics. In this study, data on government expenditure on the agricultural sector output and foreign direct investment in agriculture was obtained for the periods of 1986 to 2014 and used as indicators of the macroeconomic environment.

3.1 Model Specification

The model postulates that agricultural output(AGO) is a function of the macroeconomic variables, namely; real Gross Domestic Product(GDP), government expenditure (GTE) and Foreign Direct Investment in agriculture(FDI).

Consequently, **AGO= f (GDP, GTE, FDI) …… (3.1)**

The implicit form of the model was given as;

$AGO = b_0 + b_1GDP + b_2GTE + b_3 FDI + e$ …….. (3.2)

Where; AGO = Agricultural Sector Output in Million Naira, GTE = Government Expenditure in Million Naira, FDI = Foreign Direct Investment in Million Naira, GDP = Gross Domestic Product Million Naira, b_0 = intercept, $b_1 = b_3$ coefficients, e = Stochastic Disturbance Term

Apriori expectations; $b_1 > 0$, $b_2 > 0$, $b_3 > 0$

The natural log of equation (3.2) then gives;

3.2 Technique of Data Analysis

3.2.1 The Unit Root Tests

Using time series data in econometric analysis of this nature requires, first of all, that we test for the stationarity properties of the variables. We employed both the Augmented Dickey-Fuller (ADF) tests for unit root. The ADF approach to unit root takes the equation below:

$$\Delta Y_t = \beta_1 + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \varepsilon_t$$

Null hypothesis, H_0: $\delta = 0$ (implying that the series are not stationary)
Alternative hypothesis H_1: $\delta < 0$ (implying that the series are stationary).

3.2.2 Cointegration Test

The system approach developed by Johansen and Juselius (1990) to test for cointegration among the variables would be utilized. The tests for cointegration will permit the gauging the adequacy for specifying the long-run value of the dependent variables. Johansen and Juselius (1990) propose two tests with differing assumptions about the alternative hypothesis. They are the Trace statistic which tests the restriction r ≤q (q <n) against the completely unrestricted model r ≤ n and the maximum Eigen value statistic which makes the alternative more precise by specifying that only one additional cointegrating vector exists (r≤ q + 1)

The log- likelihood ratio test statistics are formed thus:

Trace = -T Σ ln (ι-ʎ ;)

ʎmax = -T ln (1-^ʎ q+ι)

The trace statistic and the Maximum Eigen value statistic will be used to determine whether the variables in our model are cointegrated.

3.2.3 Error Correction Model

As the variables are cointegrated, the Error Correction Model as stipulated below was run;

D (AGO) = b_0 + b_1*D (GDP) + b_2*D (GTE) + b_3*D (FDI) + b_4ECM+*U_{t-1} …….. (3.2.3.1)

Where;AGO, GDP, GTE, FDI are the first differenced variables, b_0 is the intercept.

b_1-b_4 are the short run coefficients, U_{t-1} is the one period lag residual of model 3.4.3.1 (error term) or equilibrium error term of one period lag. Thus, the sign of error correction term should be negative after estimation and significant. The coefficient of the ECM showed at what rate it corrects the previous period disequilibrium in the system.

4.0 RESULTS AND DISCUSSIONS

Table 4.1Result of Unit Root Test

Variable	ADF Statistic	Critical Value	Probability	Level of Significance	Order of Integration
AGO	-2.810462	-1.953858	0.0068	5	1(0)
FDI	-6.912019	-2.976263	0.0000	5	1(0)
GTE	-3.028355	-2.986255	0.0459	5	1(0)
GDP	2,225076	-1.959071	0.9887`	5	2(0)

NB: *AGO = Index of Agricultural Sector, GTE = Government Expenditure in Naira, FDI = Foreign Direct Investment in Naira and GDP = Gross Domestic Product*

Source: Authors' Computation from E-View 8

The test of stationarity via the Augmented Dickey Fuller shows that at various significant levels (1%, 5% and 10%) both the dependent and the independent variables were found to be stationary. Thus, FDI, Government Expenditure and agricultural output were found to be stationary at first difference. But GDP was found to be stationary at second difference.

Table 4.2:Results of Johansen co-integration Test

HYPOTHESIZED NO. OF CE(S)	EIGEN VALUE	TRACE STATISTIC	PROBABILITY
None	0.761598	76.69844	0.0000
At most 1	0.589614	37.98588	0.0046
At most 2	0.369405`	13.93813	0.0847
At most 3	0.053643	1.488650	0.2224

Author's Computation from E-View 8

Table 4.2 reports the results of the Johansen cointegration tests. The Trace test indicates 2 cointegrating equations at the 0.05 level. The tests reject the null hypothesis of no co-integration, that is, no long-run relationship between the dependent and the independent variables in favour of at least one, co-integrating vector. This implies that a long-run relationship exist among the

dependent and independent variables. This implies that the explanatory variables can adequately capture all the changes in the agricultural output over the time of study.

Table 4.3: Result of the Parsimonious ECM for Agricultural Output Model

Variable	Coefficient	Std. Error	t-statistic	Probability
C	362.4309	4963.218	0.073022	0.0094
D(GDP(-1,2)	0.485602	0.778099	0.624088	0.5426
D(GTE(-1),2)	-3.14378	15.74019	-0.644451	0.0397
D(FDI(-1),2)	1.64E-06	1.30E-05	0.126217	0.0414
ECM(-1)	-0.741978	0.26637	-2.785534	0.0052
R^2= 0.647359; Adjusted R^2= 0.541825; DW= 2.582: F-stat=8.3732:Prob(f-stat)= 0.0000				

NB: *AGO = Index of Agricultural Sector, GTE = Government Expenditure in Naira, FDI = Foreign Direct Investment in Naira and GDP = Gross Domestic Product*

Source: Authors' Computation from E-View 8

The results in the parsimonious model (Table 4.5) showed that GTE has a significant negative relationship with AGO contrary to our apriori expectation. A unit increase in GTE leads to 3.14378units decrease in AGO. This finding suggests that public funds have not been actually judiciously spent on the agricultural sector to bring about output growth in the sector.

FDI has a significant positive impact on AGO. A unit increase in FDI consequently leads to 1.62 units increase in AGO. The result of FDI conforms to our apriori expectation. However,GDP has a positive insignificant influence on AGO. It implied that GDP does not play any significant role in determining the level of agricultural output in Nigeria.

The value of the coefficient of determination (R^2) of 0.647359shows that the exogenous variables in the ECM equation, FDI, GDP and GTE explains over 65% of the systematic variations in AGO while the remaining 35% variations in AGO are caused by factors outside the model captured in the stochastic term (μ). Taking into consideration the degree of freedom, the Adjusted R^2dips down a little to 0.541825. This confirms the goodness of fit of the model. Furthermore, the f-statistical value (8.373218) was highly statistically significant at the 5% level going by its probability value of 0.000874.

5.0 CONCLUSION AND RECOMMENDATIONS

This study evaluated the influence of selected macroeconomic variables on the performance of the agricultural sector in Nigeria for the period 1986-2014. Based on the findings from the ECM analysis, it was concluded that government expenditure does not have an expanding role in the agricultural sector output contrary to apriori expectations. This could be as a result of allocated fund not used for the intended purpose. Also, gross domestic product did not have any significant effect on the output in the agricultural sector; which could be attributable to the absence of a backward linkage between agricultural and economic growth.However, the study concluded that there was a significant positive impact on agricultural sector output by foreign direct investment.

Based on these findings, it is recommend that government should create a more conducive environment in terms of policy formulation and infrastructural development to help attract to the agricultural sector more foreigndirect investment. Also, there should be effective monitoring and supervision of government funds allocated to the agricultural sector to ensure that such funds are judiciously utilized for the intended purpose.

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